Supplementary materials

Adverse maternal and neonatal outcomes associated with hemoglobin concentration in pregnancy: a Burden of Proof study

Table of Contents

SECTION 1. DATA SOURCE IDENTIFICATION AND ASSESSMENT....6

Section 1.1. Literature searches....6
Section 1.1.1. Data Sources....6
Section 1.1.2. Examples of search strings for exposure....6
Section 1.1.3. Examples of search strings for effect size....7
Supplemental Table 1. Search strings for outcomes developed for PubMed and Web of Science....8
Section 1.2. Inclusion and exclusion criteria....10
Section 1.2.1. General inclusion and exclusion criteria....10
Supplemental Table 2. General inclusion and exclusion criteria....10
Section 1.2.2. Outcome-specific inclusion and exclusion criteria....11
Supplemental Table 3. Outcome-specific inclusion and exclusion criteria....11
Section 1.3. Title and abstract screening using Distiller-SR....13
Supplemental Figure 1. Workflow for title and abstract screening using Distiller-SR....14
Section 1.4. PRISMA diagrams....15
Supplemental Figure 2. PRISMA diagram - Maternal mortality, obstructed labors, sepsis & other infections....15
Supplemental Figure 3. PRISMA diagram - Maternal hemorrhage (postpartum and antepartum)....16
Supplemental Figure 4. PRISMA diagram - Maternal hypertension....17
Supplemental Figure 5. PRISMA diagram - Peripartum depression....18
Supplemental Figure 6. PRISMA diagram – Neonatal outcomes (combined)....19
Section 1.5. Data extraction....20
Section 1.5.1. Extraction protocol....20
Section 1.5.2. Data extraction template....20
Section 1.5.3. References:....20
Supplemental Table 4. General data extraction template....21
Supplemental Table 5. Outcome-specific data extraction template....29
Section 1.6. References....38

SECTION 2. DATA INPUTS....38

Section 2.1. Summary of outcomes that were evaluated but not screened or screened but not modeled....38
Supplemental Table 6. Definitions of outcomes that were evaluated but not screened or screened but not modeled....38
Section 2.2. Study-level characteristics of extracted studies....41
Supplemental Table 7. Characteristics of extracted studies - Maternal mortality, obstructed labors, sepsis and other infections....41
Supplemental Table 8. Characteristics of extracted studies - Maternal hemorrhage (postpartum and antepartum)....44
Supplemental Table 9. Characteristics of extracted studies - Maternal hypertension....52
Supplemental Table 10. Characteristics of extracted studies - Peripartum depression....64
Supplemental Table 11. Characteristics of extracted studies - Neonatal outcomes (combined)....73
Section 2.2.1. References....139
Section 2.3. Data processing approaches and quality control....170
Section 2.3.1. Post-extraction data cleaning and errors identification....170
Section 2.3.2. Creating bias covariates....170
Section 2.3.3. Age bound imputation....170
Section 2.3.4. Hemoglobin bound imputation and elevation adjustment....170
Section 2.3.5. References....172
Section 2.4. Observation-level effect sizes for model inputs....173
Supplemental Table 12. Observation-level effect sizes - All-cause maternal mortality....173
Supplemental Table 13. Observation-level effect sizes - Postpartum hemorrhage....175
Supplemental Table 14. Observation-level effect sizes - Antepartum hemorrhage....187
Supplemental Table 15. Observation-level effect sizes - Preeclampsia (maternal hypertension)....188
Supplemental Table 16. Observation-level effect sizes - Maternal sepsis and other infections....191
Supplemental Table 17. Observation-level effect sizes - Peripartum depression....194
Supplemental Table 18. Observation-level effect sizes - All-cause neonatal mortality....197

Supplemental Table 19. Observation-level effect sizes - Stillbirth 206
Supplemental Table 20. Observation-level effect sizes - Preterm birth 209
Supplemental Table 21. Observation-level effect sizes- Low birthweight 244
Supplemental Table 22. Observation-level effect sizes - Small-for-gestational-age 278
Supplemental Table 23. Observation-level effect sizes- Large-for-gestational-age 293
Supplemental Table 24. Observation-level effect sizes - Neonatal sepis 295

SECTION 3. OTHER RESULTS AND SENSITIVITY ANALYSES **296**

SECTION 3.1. MAIN RESULTS WITH AND WITHOUT BETWEEN STUDY HETEROGENEITY 296
Supplemental Table 25. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes with and without between-study heterogeneity 296
SECTION 3.2. BY TIMING OF HEMOGLOBIN MEASUREMENT 298
Supplemental Table 26. Strength of the evidence for the relationship between first-trimester maternal hemoglobin and maternal and neonatal outcomes 298
Supplemental Table 27. Strength of the evidence for the relationship between first-trimester maternal hemoglobin and maternal and neonatal outcomes with and without between-study heterogeneity 300
Supplemental Figure 7. First-trimester maternal hemoglobin and maternal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis 301
Supplemental Figure 8. First-trimester maternal hemoglobin and neonatal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis 302
Supplemental Table 28. Strength of the evidence for the relationship between second-trimester maternal hemoglobin and maternal and neonatal outcomes 303
Supplemental Table 29. Strength of the evidence for the relationship between second-trimester maternal hemoglobin and maternal and neonatal outcomes with and without between-study heterogeneity 305
Supplemental Figure 9. Second-trimester maternal hemoglobin and maternal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis 306
Supplemental Figure 10. Second-trimester maternal hemoglobin and neonatal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis 307
Supplemental Table 30. Strength of the evidence for the relationship between third-trimester maternal hemoglobin and maternal and neonatal outcomes 308
Supplemental Table 31. Strength of the evidence for the relationship between third-trimester maternal hemoglobin and maternal and neonatal outcomes with and without between-study heterogeneity 310
Supplemental Figure 11. Third-trimester maternal hemoglobin and maternal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis 311
Supplemental Figure 12. Third-trimester maternal hemoglobin and neonatal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis 312
SECTION 3.3 . BY STUDY DESIGN AND OUTCOME DEFINITIONS 313
Supplemental Table 32. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes, including observations with socioeconomic factors adjustment, unclear temporality between exposure and otucome, undefined outcomes and low birtweight and preterm birth severities 313
Supplemental Table 33. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes, including observations with socioeconomic factors adjustment, unclear temporality between exposure

and otucome, undefined outcomes and low birtweight and preterm birth severities with and without between-study heterogeneity 316
Supplemental Figure 13. Maternal hemoglobin and low birthweight, subsetting to observations that adjusted for socioeconomic factors: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis. 318
Supplemental Figure 14. Maternal hemoglobin and antepartum hemorrhage and preeclampsia, including observations with unclear temporal relationship between exposure and outcome: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.. 319
Supplemental Figure 15. Maternal hemoglobin and neonatal outcomes, including observations with undefined outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis. 320
Supplemental Figure 16. Maternal hemoglobin and low birthweight and preterm birth severities: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis. 321
SECTION 3.4. USING A UNIFORM REFERENCE HEMOGLOBIN LEVEL OF 120 G/L 322
Supplemental Table 34. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes, relative to a uniform reference hemoglobin of 120 g/L 322
Supplemental Table 35. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes, relative to a uniform reference hemoglobin of 120 g/L with and without between-study heterogeneity. 325
SECTION 3.5. COMPARING MODEL DERIVED- VS. FUNCTIONAL REFERENCE HEMOGLOBIN CONCENTRATIONS 327
Supplemental Figure 17. Derivatives of the log relative risk (RR) function for the relationship between maternal hemoglobin and maternal outcomes: First derivative; Second derivative; Mean log RR function 327
Supplemental Figure 18. Derivatives of the log relative risk (RR) function for the relationship between maternal hemoglobin and neonatal outcomes: First derivative; Second derivative; Mean log RR function 328
Supplemental Figure 19. Derivatives of the log relative risk (RR) function for the relationship between first trimester maternal hemoglobin and maternal outcomes: First derivative; Second derivative; Mean log RR function 329
Supplemental Figure 20. Derivatives of the log relative risk (RR) function for the relationship between first trimester maternal hemoglobin and neonatal outcomes: First derivative; Second derivative; Mean log RR function 330
Supplemental Figure 21. Derivatives of the log relative risk (RR) function for the relationship between second trimester maternal hemoglobin and maternal outcomes: First derivative; Second derivative; Mean log RR function 331
Supplemental Figure 22. Derivatives of the log relative risk (RR) function for the relationship between second trimester maternal hemoglobin and neonatal outcomes: First derivative; Second derivative; Mean log RR function 332
Supplemental Figure 23. Derivatives of the log relative risk (RR) function for the relationship between third trimester maternal hemoglobin and maternal outcomes: First derivative; Second derivative; Mean log RR function 333
Supplemental Figure 24. Derivatives of the log relative risk (RR) function for the relationship between third trimester maternal hemoglobin and neonatal outcomes: First derivative; Second derivative; Mean log RR function 334

SECTION 4. PRISMA & GATHER CHECKLIST 335

Supplemental Table 36. PRISMA abstract cheklist 335
Supplemental Table 37. PRISMA manuscript checklist 337
Supplemental Table 38. GATHER checklist 341

SECTION 5. STUDY QUALITY AND BIAS ASSESSMENT 343

Supplemental Table 39. General bias covariates 343
Supplemental Table 40. Outcome-specific bias covariates 345
Supplemental Table 41. Distribution of study-level bias covariates - Maternal mortality 349
Supplemental Table 42. Distribution of study-level bias covariates - Postpartum hemorrhage 350
Supplemental Table 43. Distribution of study-level bias covariates - Antepartum hemorrhage 355
Supplemental Table 44. Distribution of study-level bias covariates - Preeclampsia 356
Supplemental Table 45. Distribution of study-level bias covariates - Maternal sepsis and other infections 358
Supplemental Table 46. Distribution of study-level bias covariates - Peripartum depresstion 360

Supplemental Table 47. Distribution of study-level bias covariates - All-cause neonatal mortality 362
Supplemental Table 48. Distribution of study-level bias covariates - Stillbirth 365
Supplemental Table 49. Distribution of study-level bias covariates - Preterm birth 366
Supplemental Table 50. Distribution of study-level bias covariates - Low birthweight 374
Supplemental Table 51. Distribution of study-level bias covariates - Small-for-gestational-age 385
Supplemental Table 52. Distribution of study-level bias covariates - Large-for-gestational-age 389
Supplemental Table 53. Distribution of study-level bias covariates - Neonatal sepsis 390

Section 1. Data source identification and assessment

Section 1.1. Literature searches

We developed and refined our research questions to create queries for seven different databases. Using these criteria, we developed outcome-specific search strings as well as search strings for exposure and measures of association. The search terms were expanded by interrogating the thesaurus for synonyms found in PubMed - MeSH (Medical Subject Headings), the NLM controlled vocabulary thesaurus used for indexing articles for PubMed. We tested the search strings in PubMed to maximize the number of returned articles while maintaining specificity. We also added variation in spellings and used truncations to maximize our returned citations list. In addition, we used NOT terms to exclude irrelevant results, such as animal studies, studies of glycated hemoglobin, or publications type, such as letters/editorials.

Search terms for each specific outcome were unique for each search while the risk and measures of association terms remained conserved across all searches. The search strings were developed in consultation with a research librarian specialized in systematic reviews from the University of Washington Libraries. All search strings were vetted by clinicians and senior epidemiologists on the project.

Section 1.1.1. Data Sources

We used seven databases to search across geographic regions and include as many unique sources as possible. As such, we did not include any language restrictions. The syntax of the search strings was modified as needed to meet the requirements of the various databases. We restricted the searches to literature published after 1980, to include human subjects only, and to primary data sources. The searches were conducted in July and August 2022.

The databases employed included:

- Cumulated Index to Nursing and Allied Health Literature (CINAHL)
- China National Knowledge Infrastructure (CNKI)
- Excerpta Medical Database (EMBASE)
- Global Index Medicus (GIM)
- Public/Publisher MEDLINE (PubMed)
- Scientific Electronic Library Online (SciELO)
- Web of Science

The results from each database search were combined into outcome-specific libraries in EndNote and then de-duplicated. We also sourced citations from other systematic reviews that were found during the searches.

Section 1.1.2. Examples of search strings for exposure

PubMed

(Anemia[MeSH] OR Anemia, Iron-Deficiency [MeSH] OR hemoglob*[Tiab] OR haemoglob*[Tiab] OR anemi*[Tiab] OR anaemi*[Tiab] OR "iron deficiency"[tiab] OR "iron deficient"[tiab] OR ferritin[tiab] OR "TSAT"[tiab] OR "transferrin saturation"[tiab])

Web of Science

(anemia OR anaemia OR hemoglobin OR haemoglobin OR “iron deficiency” OR "iron deficiency anemia" OR hemoglob* OR transferrin OR ferritin OR “iron deficient” OR “anemic” OR “anaemic” OR hemoglob* or “transferrin saturation” OR “TSAT”)

Section 1.1.3. Examples of search strings for effect size

PubMed

(Risk[MeSH] OR Odds Ratio[MeSH] OR risk[Tiab] OR morbidit*[Tiab] OR mortality[Tiab] OR inciden*[tiab] OR prevalen*[tiab] OR "risk factors"[Tiab] OR "relative risk"[Tiab] OR "odds ratio"[Tiab] OR "cross-product ratio"[Tiab] OR "hazards ratio"[Tiab] OR "hazard ratio"[Tiab] OR “dose-response"[Tiab] OR “dose response”[Tiab] OR death [Tiab] OR odds [Tiab] OR “likelihood"[Tiab])

Web of Science

(“risk factor*” OR risk OR morbidity OR mortality OR incidence OR prevalen* OR “relative risk“ OR “odds ratio” OR “cross-product ratio” OR “hazards ratio” OR “hazard ratio” OR “dose response” OR “dose-response” OR odds OR death OR likelihood)

Supplemental Table 1. Search strings for outcomes developed for PubMed and Web of Science

Table S1. Examples of maternal and neonatal outcome-specific search strings

Outcomes	Pub Med	Web of Science
Maternal outcomes		
Maternal mortality	(“maternal mortality” [MeSH] OR “maternal mortalit*” [Tiab] OR “mortalit*, maternal” [Tiab] OR “maternal death*” [Tiab] OR “death*, maternal” [Tiab] OR “pregnancy-related death” [Tiab] OR “death, pregnancy-related" [Tiab]**)**	("maternal mortalit*” OR “mortalit*, maternal” OR “maternal death*” OR “death*, maternal” OR “pregnancy-related death” OR “death, pregnancy-related")
Maternal hemorrhage	("postpartum hemorrhage" [MeSH] OR ("antepartum" [Tiab] OR "postpartum" [Tiab]) AND "hemorrhage*" [Tiab]) OR "placenta diseases" [MeSH] OR ("placenta*" [Tiab] AND ("disease*" [Tiab] OR "disorder*" [Tiab])) OR “severe vaginal bleeding”[Tiab] OR “PPH”[Tiab])	((("antepartum" OR "postpartum") AND "hemorrhage*") OR ("placenta*" AND ("disease*" OR "disorder*")) OR “severe vaginal bleeding” OR “PPH”)
Maternal hypertension	(“hypertension, pregnancy-induced" [MeSH] OR ((“pregnancy” [Tiab] OR “gestation*” [Tiab]) AND (“hypertension” [Tiab] OR “transient” [Tiab])))) OR (“pre-eclampsia” [MeSH] OR “pre eclampsia” [Tiab] OR ”preeclampsia” [Tiab] OR “EPH” [Tiab] OR “toxemia*” [Tiab] OR “gestos*s” [Tiab] OR ”proteinuria” [Tiab]) OR (“eclampsia” [MeSH] OR “eclampsia*” [Tiab]) OR (“HELLP syndrome” [MeSH] OR “HELLP” [Tiab] OR “Hemolysis, Elevated Liver Enzymes, Lowered Platelets” [Tiab] OR “Hemolysis, Elevated Liver Enzymes, Lowered Platelets Syndrome” [Tiab]) OR “hypertensive disease* of pregnancy” [Tiab])	(((“pregnancy” OR “gestation*”) AND (“hypertension” OR “transient”)) OR (“pre-eclampsia” OR “pre eclampsia” OR ”preeclampsia” OR “EPH” OR “toxemia*” OR “eclampsia*” OR “gestos*s”) OR (“HELLP syndrome” OR “HELLP” OR “Hemolysis, Elevated Liver Enzymes, Lowered Platelets” OR “Hemolysis, Elevated Liver Enzymes, Lowered Platelets Syndrome”) OR “hypertensive disease* of pregnancy”)
Maternal sepsis and infections	(“pregnancy complications, infectious” [MeSH] OR “infectious pregnancy complication” [Tiab] OR “complication, infectious pregnancy” [Tiab] OR “maternal sepsis” [Tiab] OR “sepsis, maternal” [Tiab] OR “sepsis in pregnancy” [Tiab] OR “sepsis during pregnancy” [Tiab] OR (“severe bacterial infection”[Tiab] AND (“pregnan*”[Tiab] OR “deliver*”[Tiab] OR “postpartum”[Tiab] OR “post-partum”[Tiab]))	(“pregnancy complications, infectious” OR “infectious pregnancy complication*” OR “complication, infectious pregnancy” OR “maternal seps*s” OR “seps*s, maternal” OR “seps*s in pregnancy” OR “seps*s during pregnanc*” OR (“severe bacterial infection” AND (“pregnan*” OR “deliver*” OR “postpartum” OR “post-partum”)))
Peripartum depression	(“depression, postpartum” [MeSH] OR “depression, postpartum ” [Tiab] OR “postpartum depression” [Tiab] OR “postnatal depression” [Tiab] OR “depression, postnatal” [Tiab] OR “post natal depression” [Tiab] OR “depression, post natal” [Tiab] OR ”prenatal depression” [Tiab] OR “depression, prenatal” [Tiab] OR “pre natal depression” [Tiab] OR “depression, pre natal” [Tiab] OR “antenatal depression” [Tiab] OR “perinatal depression” [Tiab])	("depression, postpartum” OR “postpartum depression” OR “postnatal depression” OR “depression, postnatal” OR “post natal depression” OR “depression, post natal” OR ”prenatal depression” OR “depression, prenatal” OR “pre natal depression” OR “depression, pre natal” OR “antenatal depression” OR “perinatal depression”)
Peripartum cardiomyopathy	("peripartum cardiomyopathy" [Tiab] OR "postpartum cardiomyopathy" [Tiab] OR "peripartum myocardiopathy" [Tiab] OR "postpartum	("peripartum cardiomyopathy" OR "postpartum cardiomyopathy" OR "peripartum myocardiopathy" OR "postpartum myocardiopathy" OR

	myocardiopathy" [Tiab] OR "PPCM"[Tiab] OR "pregnancy associated cardiomyopathy" [Tiab] OR "postpartum heart failure" [Tiab])	"PPCM" OR "pregnancy associated cardiomyopathy" OR " postpartum heart failure ")
Neonatal		
Neonatal mortality	("infant mortality" [MESH] OR "mortality, infant" [Tiab] OR "neonatal mortality" [Tiab] OR "mortality, neonatal" [Tiab] OR "postnatal mortality" [Tiab] OR "mortality, postnatal" [Tiab] OR "sudden infant death syndrome" [Tiab] OR "SIDS" [Tiab] OR "infant death*"[Tiab] OR "neonatal death*"[Tiab])	("infant mortality" OR "mortality, infant" OR "neonatal mortality" OR "mortality, neonatal" OR "postnatal mortality" OR "mortality, postnatal" OR "sudden infant death syndrome" OR "SIDS" OR "infant death" OR "neonatal death")
Low birthweight, preterm birth, and small-for-gestational-age	("premature birth" [MeSH] OR "infant, low birth weight" [MeSH] OR ((premature [Tiab] OR preterm [Tiab] OR "gestational age" [Tiab] OR "short gestation*" [Tiab] OR "low birth weight" [Tiab] OR "low birthweight" [Tiab] OR LBW [Tiab] OR VLBW [Tiab] OR "intrauterine growth" [Tiab] OR IUGR [Tiab] OR "fetal growth" [Tiab] OR FGR [Tiab] OR "small for gestational age" [Tiab] OR "small-for-gestational age" [Tiab] OR SGA [Tiab]) AND (infant* [Tiab] OR birth* [Tiab] OR neonate* [Tiab] OR newborn* [Tiab])))	((premature OR preterm OR "gestational age" OR "short gestation*" OR "low birth weight" OR "low birthweight" OR LBW OR VLBW OR "intrauterine growth" OR IUGR OR "fetal growth" OR FGR OR "small for gestational age" OR "small-for-gestational age" OR SGA) AND (infant* OR birth* OR neonate* OR newborn*))

Section 1.2. Inclusion and exclusion criteria

Section 1.2.1. General inclusion and exclusion criteria

Supplemental Table 2. General inclusion and exclusion criteria

General criteria	
Inclusion	**Exclusion**
• Cohort, case-control, and cross-sectional studies reporting a measure of association (or which can be derived based on the information provided) for exposures such as anemia, iron-deficiency, or iron deficiency anemia and one of the outcomes • Studies with a clear quantitative definition of the exposure which involves biomarker(s) including hemoglobin, hematocrit, or others, for both the exposed and unexposed groups	• No measurable exposure such as anemia without a reported cutoff • No reported or calculable measure of association • No outcome of interest • Non-representative population or study population defined by a comorbidity or traits that could interact with the exposure and affect outcome where these were not adjusted in the risk calculation

Section 1.2.2. Outcome-specific inclusion and exclusion criteria

Supplemental Table 3. Outcome-specific inclusion and exclusion criteria

Maternal outcomes		
Outcome	**Inclusion**	**Exclusion**
All-cause maternal mortality	Maternal mortality can be up to within one year after giving birth regardless of cause	• Hb/iron deficiency markers reported only after hemorrhagic event • Bleeding prior to 24 weeks gestation or miscarriage
Postpartum hemorrhage	Evidence of outcomes in the study population to include postpartum hemorrhage, PPH, antepartum hemorrhage, APH, placental disorders with blood loss, placenta abruption with blood loss, placenta previa with blood loss, postpartum transfusion because of hemorrhage, obstetric complications that include blood loss, transfusion because of blood loss	*No additional exclusion criteria*
Gestational hypertension, preeclampsia, and HDOP	• Study population is pregnant women up to six weeks post-natal • Evidence of outcomes in the study population to include gestational hypertension, PIH, transient hypertension, toxemia, edema, proteinuria, hypertension/EPH toxemia, proteinuria, preeclampsia, severe preeclampsia, eclampsia, HELLP syndrome	Chronic hypertension prior to pregnancy
Maternal sepsis, other infections, and obstructed labor	• Evidence of outcomes in the study population to include maternal sepsis, pregnancy-related infection, incident cases of sepsis can occur anytime from antepartum to 6 weeks after delivery; and only during labor and delivery for the obstructed labor outcome group • Obstructed labor to include labor dystocia, fetal-pelvic disproportion, obstetric/vesicovaginal fistula, prolonged labor/rupture of membranes/breech presentation	*No additional exclusion criteria*
Peripartum depression	Evidence of outcomes in the study population to include antenatal or postnatal or peripartum depression with onset tied to pregnancy	Population is not representative of the general population
Peripartum cardiomyopathy	• Evidence of outcomes in the study population includes peripartum cardiomyopathy, postpartum cardiomyopathy, postpartum heart failure. Other search terms include peripartum myocardiopathy, postpartum myocardiopathy, pregnancy-associated cardiomyopathy, pregnancy-associated myocardiopathy, and PPCM. Keywords in the search terms mortality can be within up to one year after giving birth for maternal mortality regardless of cause. • Cases can occur between the last month of pregnancy up to 1 year following delivery.	*No additional exclusion criteria*
Neonatal		
All-cause neonatal mortality and stillbirth	*No additional inclusion criteria*	Miscarriage that took place before 24 weeks gestation • The risk and/or outcome measurement took place beyond 28 days since birth, infant ages outside of neonate range (>28 days of age)

		• Study population involves twins, cancer, thalassemia, sickle cell disease, stage 4+ chronic kidney disease, end-stage renal disease, or renal transplantation, without a comparator
Low birthweight, preterm birth, small-for-gestational-age, and large-for-gestational-age	Population of interest is pregnant women and neonates participating in case-control, cohort, longitudinal and randomized controlled trials.	• The risk and/or outcome measurement took place beyond 28 days since birth, infant ages outside of neonate range (>28 days of age) • Study population involves twins, cancer, thalassemia, sickle cell disease, stage 4+ chronic kidney disease, end-stage renal disease, or renal transplantation, without a comparator
Neonatal sepsis	*No additional inclusion criteria*	• The risk and/or outcome measurement took place beyond 28 days since birth, infant ages outside of neonate range (>28 days of age) • Study population involves twins, cancer, thalassemia, sickle cell disease, stage 4+ chronic kidney disease, end-stage renal disease, or renal transplantation, without a comparator

Note: PPH: postpartum hemorrhage; APH: antepartum hemorrhage; PIH: pregnancy-induced hypertension; EPH: edema, proteinuria, hypertension; HELLP syndrome: Hemolysis, Elevated Liver Enzymes, Lowered Platelets syndrome; PPCM: peripartum cardiomyopathy.

Section 1.3. Title and abstract screening using Distiller-SR

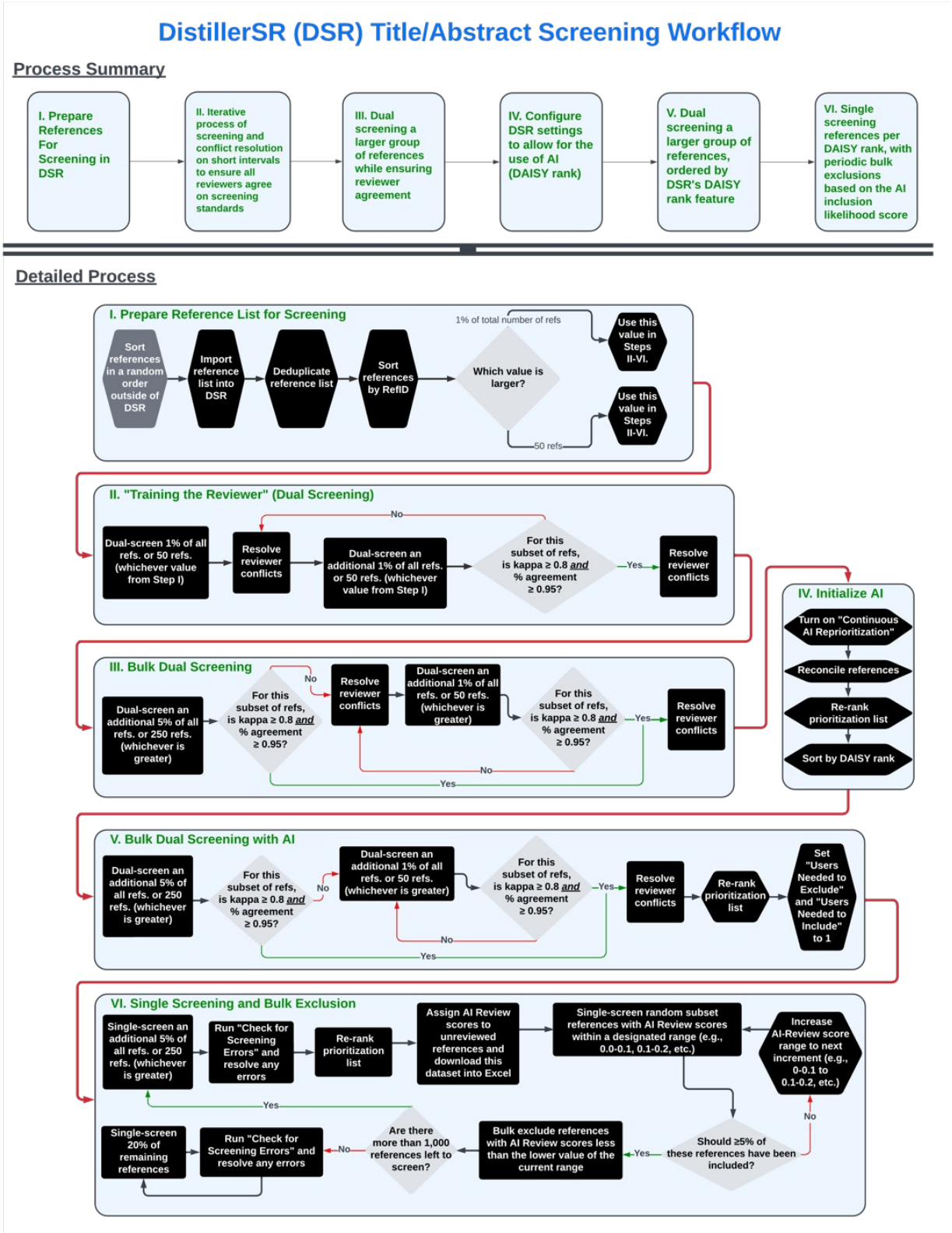
DistillerSR (DistillerSR. Version 2025.3.2 DistillerSR Inc.; 2025. Accessed May-June 2023. https://www.distillersr.com.) is a commercially available software that our team used to assist with title/abstract screening stage of these systematic reviews. Briefly, DSR uses natural language processing technology to assign an artificial intelligence (AI) review score to each reference after training the AI on a subset of references. Using this review score, DSR can order the references based on this score, so references most likely to be accepted for inclusion appear at the top of the list and are reviewed first. Because of the large number of references retrieved from these searches (over 20,000), we developed a screening protocol that systematically trained reviewers and the AI feature to complete dual screening and bulk exclusions, followed by single screening and bulk exclusions.

First, the reference list was prepared for screening by sorting references in a random order, importing into DSR, and deduplicating. Then, reviewers screened the first 1% of all references or 50 references, whichever value was larger, in duplicate until the kappa value was greater than or equal to 0.8 and percent agreement between reviewers was over 95% before resolving conflicts. Duplicate title-abstract screening continued at increments of 5% or 250 references, whichever was greater, checking agreement with kappa and percent agreement at standard intervals.

After this step, once reviewers were confident in their own training, reviewers initialized the AI feature, and references were sorted by their rank of inclusion likelihood. Dual screening and conflict resolution continued until another 5% or 250 references had been screened in agreement, after which point reviewers switched single screening (i.e., only one reviewer required to include or exclude). After single-screening another 5% or 250 references, the "check for screening errors" AI feature was run, errors were examined and resolved, and a new rank was assigned to the remaining references. To verify that the AI rank scores were aligned with human inclusion/exclusion criteria, we screened a random subset of references with AI review scores in designated lower ranges. If at least 5% of these references that AI labeled as likely for exclusion should have been included, reviewers repeat the single screening process. Otherwise, references with an AI review score less than the predefined cutoff are bulk excluded. If more than 1000 references remained at this point, the single screening process was repeated until there were fewer than 1000 references left. Finally, reviewers ran "check for screening errors" again, resolved those errors, and single screened a subset of the remaining references. Supplementary Figure 1 illustrates the workflow in detail.

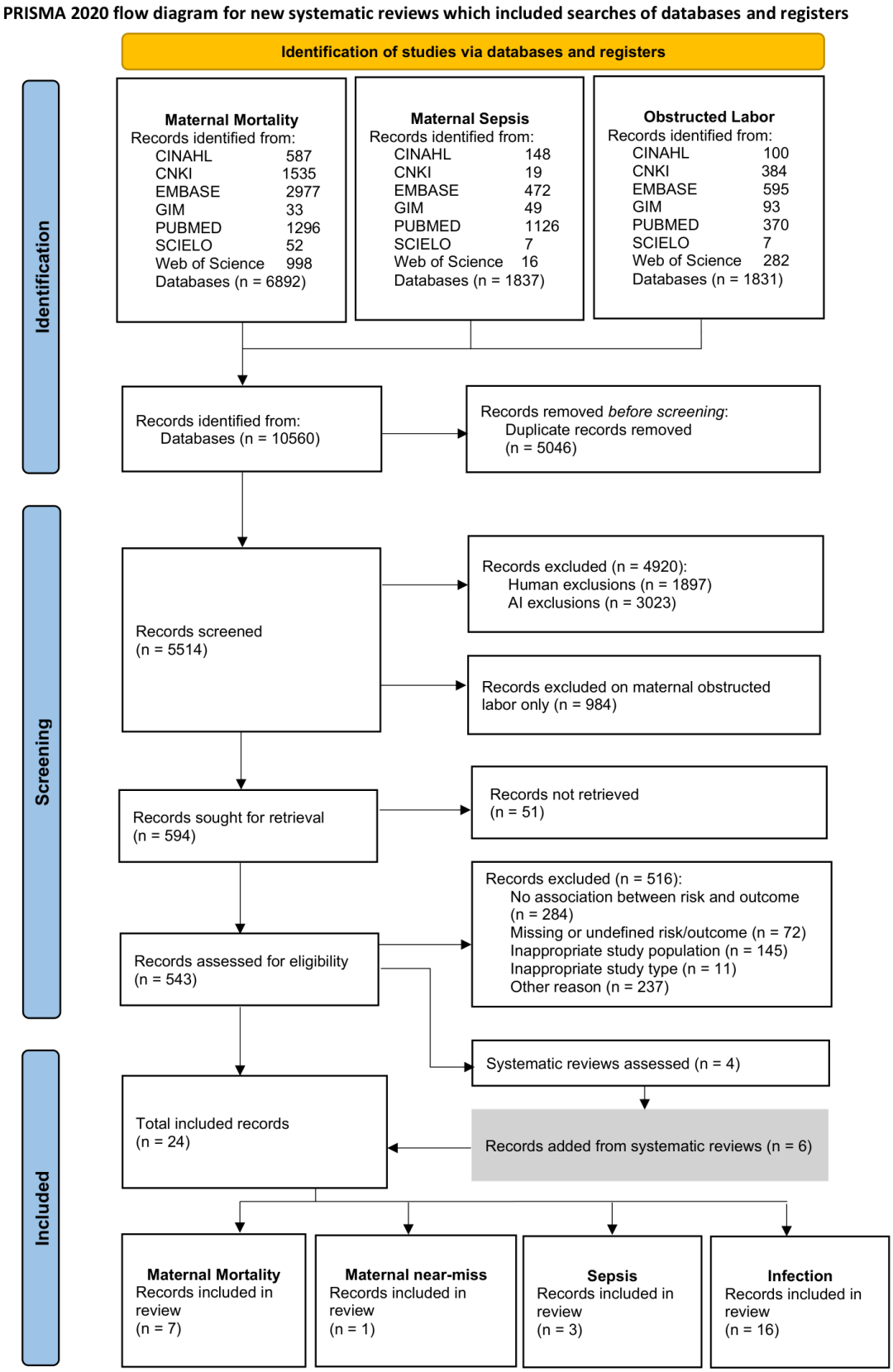
We followed the above protocol for all systematic reviews of all maternal outcomes. For neonatal outcomes, the first systematic review in the series, we followed a simpler title and abstract screening protocol. We screened 20% of our titles and abstracts in duplicates, during which screeners periodically met to resolve conflicts by consensus. After 5% duplicate screening, the AI training commenced. The remaining 15% of the duplicate screening was conducted by prioritizing references with higher AI scores which indicated a higher likelihood of inclusion. Guided by the AI scores, the remaining references were screened by single screeners until an AI-predicted 95% inclusion rate was achieved. A 10% random sample of references outside of the 95% inclusion rate was then screened and given that less than 5% of the randomly sampled references were includable, we concluded our title and abstract screening process.

Supplemental Figure 1. Workflow for title and abstract screening using Distiller-SR

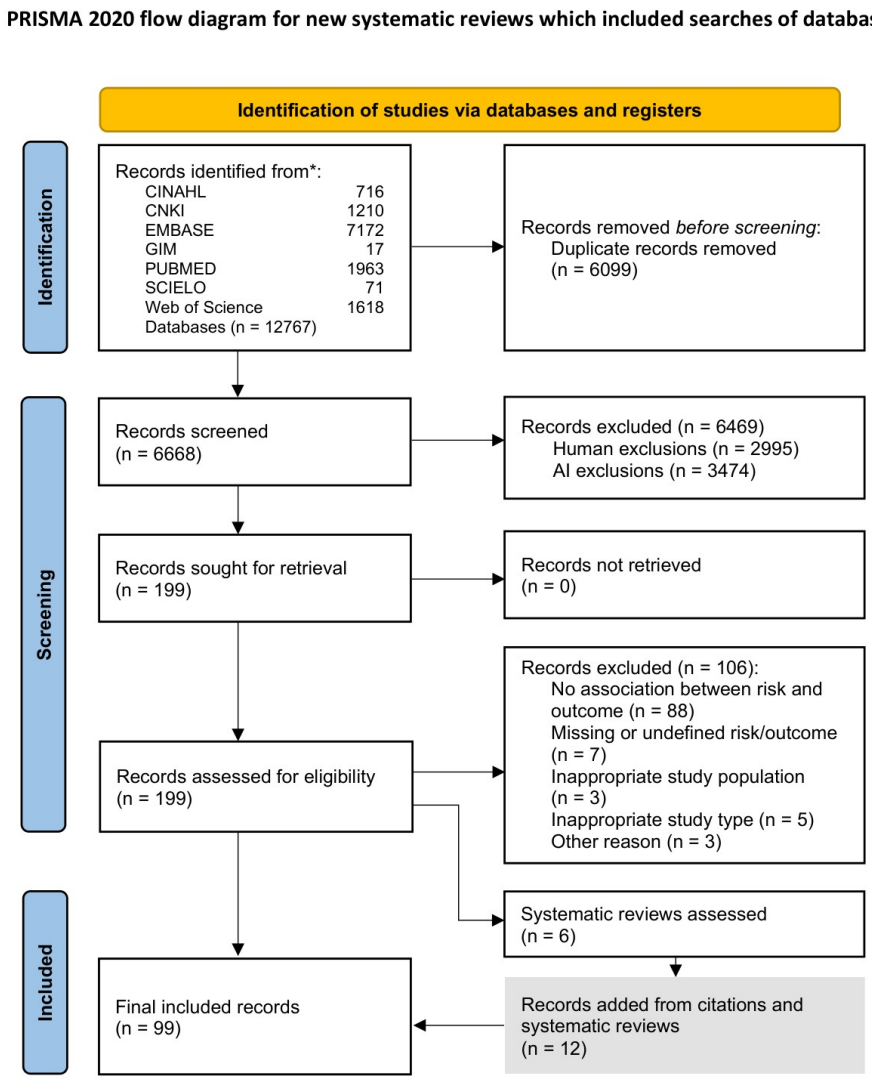


Section 1.4. PRISMA diagrams

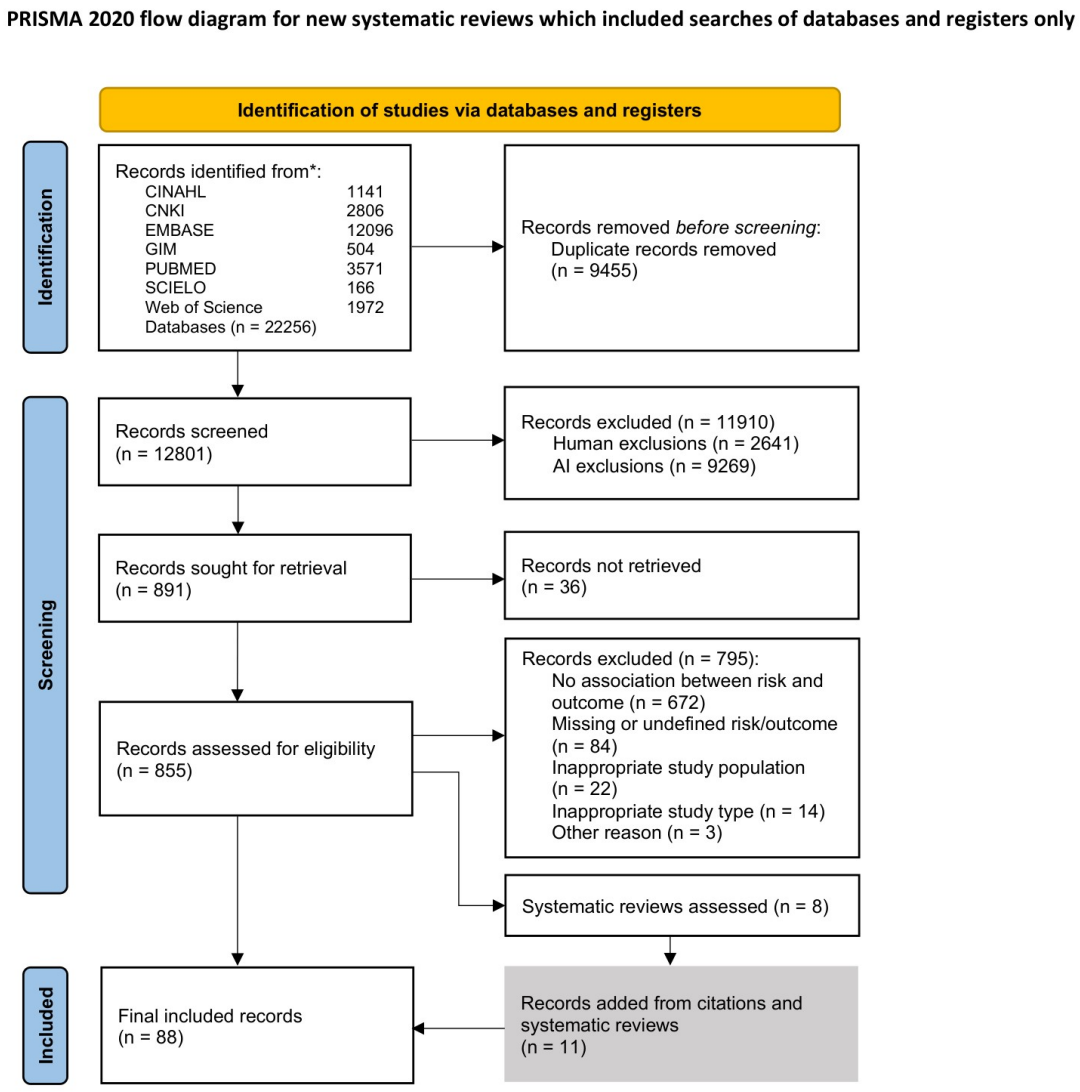
Supplemental Figure 2. PRISMA diagram - Maternal mortality, obstructed labors, sepsis & other infections



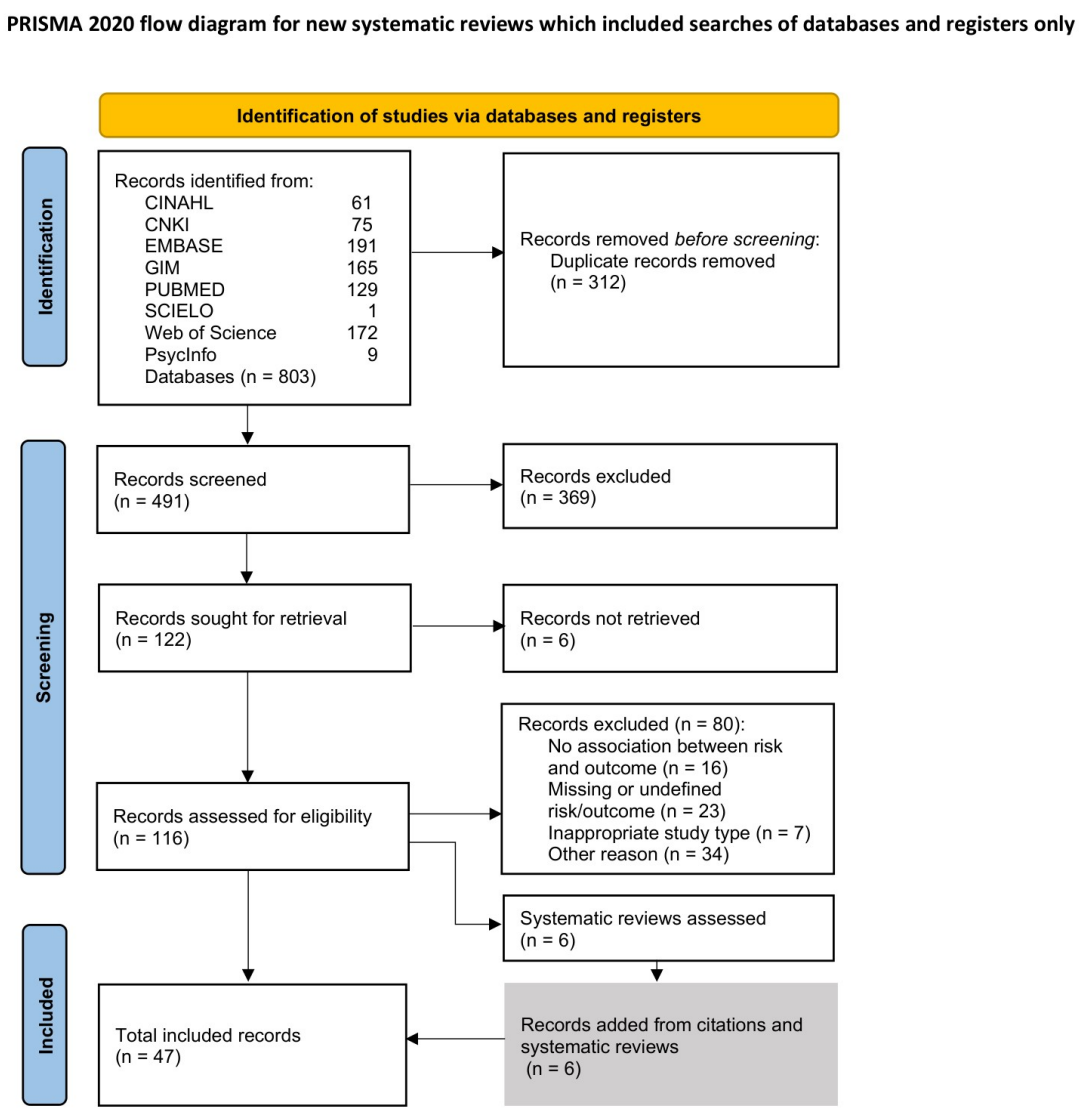
Supplemental Figure 3. PRISMA diagram - Maternal hemorrhage (postpartum and antepartum)



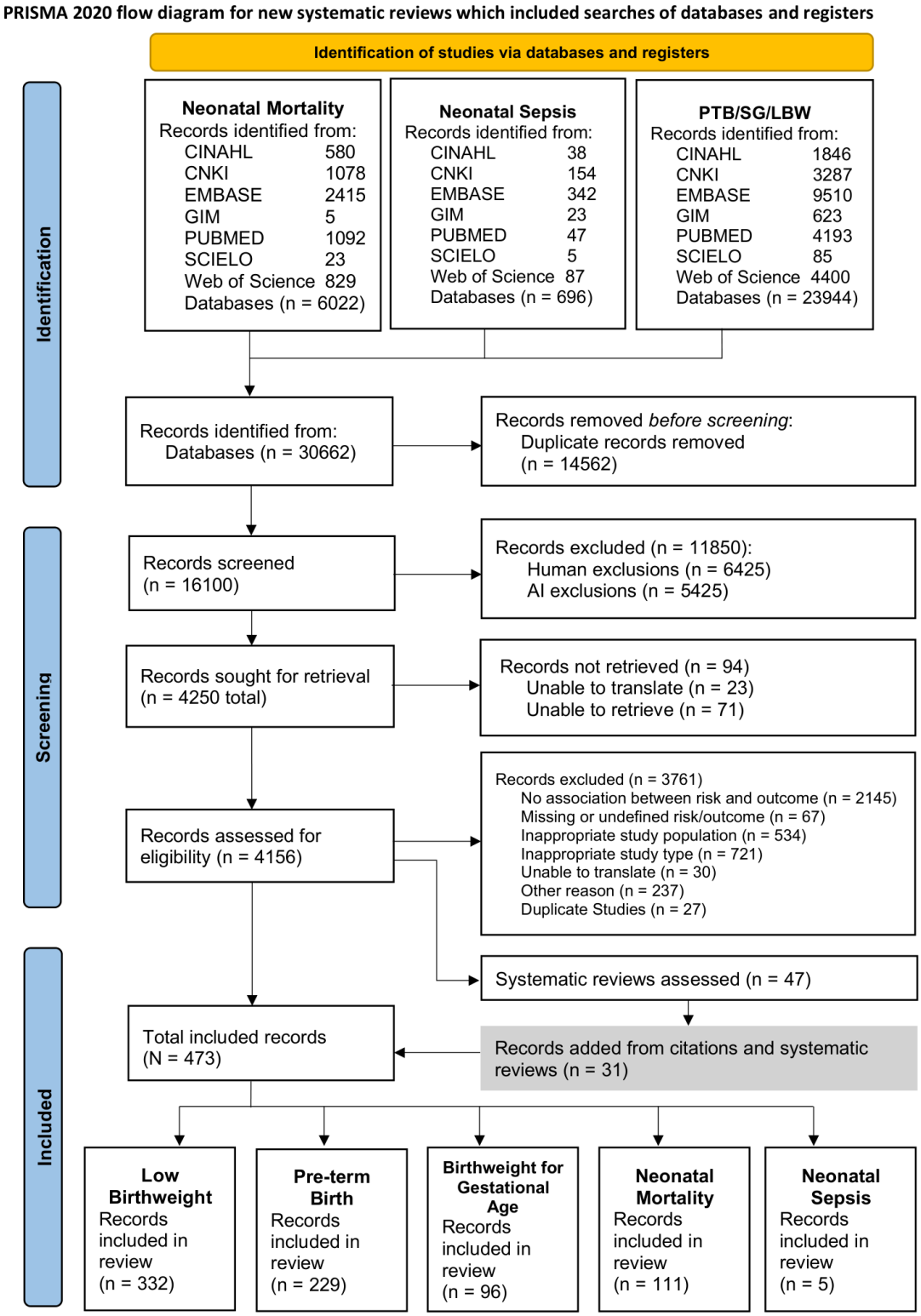
Supplemental Figure 4. PRISMA diagram - Maternal hypertension



Supplemental Figure 5. PRISMA diagram - Peripartum depression



Supplemental Figure 6. PRISMA diagram – Neonatal outcomes (combined)



Section 1.5. Data extraction

Section 1.5.1. Extraction protocol

Data extraction was performed by multiple extractors following the templates described in sections 1.5.2 and 1.5.3. All neonatal outcomes, maternal hemorrhage, and peripartum depression were extracted using validated excel spreadsheets to minimize errors and allow consistency across reviewers. After refining and optimizing the extraction process, all-cause maternal mortality, maternal sepsis and other infections, and hypertensive disorders of pregnancy (including gestational hypertension and preeclampsia) were extracted using REDCap electronic data capture tools hosted at the University of Washington[1,2], but with the same template applied to ensure continuity.

All extractions had to be completed post completion of full-text review. To ensure the reliability and validity of our data analysis, a rigorous two-tier review process occurred at the extraction stage. Initially, a subset (10%) of all the references from each exposure-outcome pairing accepted for extraction were extracted in duplicate. Extractors convened to discuss and resolve any discrepancies in these duplicate extractions, ensuring consistency and accuracy across all data extraction efforts. The remaining 90% were extracted by a single extractor per reference.

Subsequently, every extraction was independently reviewed by a second reviewer to verify accuracy and consistency, focusing on the essential variables needed for the analytical stages of extracted data. To prevent multiple observations from being counted in the analyses, the extraction spreadsheet was inspected, and only the most adjusted observation per study was retained. This selection was based on identical values across specific variables, including study identifiers and characteristics such as age range, type and timing of exposure biomarker, quantitative exposure bounds for both exposed and unexposed categories, outcome definitions, and effect size measures (i.e., *nid, age_start, age_end, rei, exp_timepoint, bio_type_1, alt_upper_1, alt_lower_1, ref_upper_1, ref_lower_1, out_type, out_lower, out_upper, and effect_size_measure*). Any missing data or values that fell outside predetermined validation limits (e.g., improbable hemoglobin values) triggered an additional review of the original study.

Section 1.5.2. Data extraction template

To ensure systematic and transparent documentation, we extracted a comprehensive set of metadata and study-level variables. Metadata included a unique source identifier, study type, extractor identity, and the storage location of source materials, enabling full traceability for audit purposes. We also captured key exposure and outcome details, including type, timing, and measurement instruments, along with open-text fields for study-defined terms. Given that we evaluated maternal hemoglobin as a continuous exposure, we also recorded the upper and lower bounds of hemoglobin concentrations for both the exposed (alternative risk) and unexposed (reference risk) categories. Reported effect size metrics (e.g., relative risks, odds ratios, mean differences) were recorded, as well as information on adjusted confounders and descriptive characteristics of study cohorts (e.g., number of individuals who are exposed and unexposed and who experienced outcomes). To support flexibility and context, extractors could also enter notes or flag issues in designated supplementary columns.

Section 1.5.3. References:

1. Harris, P. A. et al. Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. Journal of Biomedical Informatics 42, 377–381 (2009).
2. Harris, P. A. et al. The REDCap consortium: Building an international community of software platform partners. Journal of Biomedical Informatics 95, 103208 (2019).

Supplemental Table 4. General data extraction template

Category	Extraction Field Name	Field Type	Definition
Source	extractor	Free text	UW NetID of person completing extraction.
	nid	Numerical	Unique identifier for the data created for the GHDx.
	underlying_nid	Numerical	NID that identifies the underlying data source; File NIDs will cause errors, only NIDs in the GHDx database are accepted.
	field_citation_value	Free text	Citation of NID pulled from the GHDx.
	file_path	Free text	Full file path for the article where it is stored internally in the GHDx database.
	source_type	Categorical	The type of data collection used to evaluate the risk factor. • For cohort studies which conduct data collection of the risk multiple times during follow-up, select 'Survey-longitudinal'. • For cohort studies which conduct data collection of the risk at baseline only and case-cohort studies, select 'Survey - cohort'. • For the family of case-control study designs, select 'Survey - other/unknown'. • If a study was originally cross-sectional, but the study design changed through analysis (e.g., ran a case-control study based on the data from a cross-sectional survey or conducted outcome follow-up of cross-sectional survey participants), select 'Survey - cross-sectional'.
Location & representativeness	location_name	Categorical	The name of the country or subnational location where the study was conducted. If the effect size is reported for multiple subnational locations, extract the location higher up in the location hierarch that encompasses all the locations.
	location_id	Numerical	Unique identifier for location based on GBD identifiers; autopopulated from location_name in extraction template.
	rep_geography	Binary	Does the geographic coverage of the study match or nearly match that of the GBD geography? 1=yes, 0=no
	rep_population	Binary	Indicate whether the target population of the study is more broadly representative of the population at the study geography. 1=yes, 0=no
	site_memo	Free text	Copy and paste verbatim from the source all the information regarding the location of data collection. Please include facility names (hospitals, clinics, etc.) and street addresses, GPS coordinates, etc., if provided.
	rep_selection_criteria	Free text	Please specify the selection criteria of the study that is used in the analysis.
	rep_exclusion_criteria	Free text	Please specify the exclusion criteria of the study that is used for study participants.
	rep_prevalent_disease	Binary	Is the study aiming to evaluate the risk or mortality of people who have already developed the outcome? 1=yes, 0=no
Study population	year_start	Numerical	Year the study was started.
	year_end	Numerical	Yea the study was finished (including most recent follow up).
	year_issue	Binary	Flag for any issues with study year that are identified during extraction. 1=issue flagged for modeler, 0=no issue flagged
	age_start	Numerical	Low end of range of ages in study sample used for the effect size.
	age_end	Numerical	High end of range of ages in study sample used for the effect size.
	age_mean	Numerical	Mean of ages in study sample used for the effect size.
	age_sd	Numerical	Standard deviation of ages represented in study sample used for the effect size.

	age_issue	Binary	1=issue flagged for modeler, 0=no issue flagged
	sex	Categorical	Sex identifier: Male, Female, Both
	percent_male	Numerical	Percentage of the study sample that is male (decimal from 0-1).
	sex_issue	Binary	Issues with sex identified during extraction. 1=issue flagged for modeler, 0=no issue flagged
	study_total_sample_size		
Study design	study_design	Categorical	Specifies the design of the study
	study_name	Free text	The name of the study (e.g., Nurses' Health Study), if provided.
Risk	risk	Categorical	Risk factor selected from a dropdown menu. It should always be either 'Low hemoglobin' or 'Iron deficiency'.
	rei	Categorical	The human and machine-readable name associated with the risk factor in the GBD.
	risk_def	Free text	Provide a brief description of the risk as reported in the study.
Exposure	exp_assess_level	Categorical	Level at which the exposure was assessed.
	exp_instrument	Free text	Specifies the name of the exposure instrument. Unless a specifically named instrument is reported, leave blank.
	exp_assess_period	Categorical	Frequency of exposure assessment.
	exp_assess_num	Numerical	If multiple exposure assessments, specify the number of times that exposure was assessed (including baseline).
	exp_method_1	Categorical	Specifies the method of exposure assessment.
	exp_method_2	Categorical	Specifies the secondary method of exposure assessment if there are 2 or more.
	exp_method_3	Categorical	Specifies the tertiary method of exposure assessment if there are more than 2.
	exp_maternal	Binary	1=maternal exposure, 0=non-maternal exposure
	exp_neonatal	Binary	1=neonatal exposure, 0=non-neonatal exposure
	exp_timepoint_description	Free text	Please describe the times when exposure assessment was conducted (e.g., prenatal - 1st trimester, at delivery, postnatal 7 days).
	exp_timepoint	Categorical	Exposure timepoint selected from a dropdown menu that most closely fits the description in exp_timepoint_description.
	exp_wks_mos_trimester	Numerical	Number of week(s), month(s), or trimester(s) at which exposure assessment was conducted.
	exp_timepoint_units	Categorical	Units of exposure timepoint in exp_wks_mos_trimester selected from a dropdown menu.
Exposure level definitions	bio_number_assessed	Numerical	If more than one biomarker is used in the risk definition in the study, provide the number of biomarkers evaluated.
	bio_type_1	Categorical	Type of analyte measured selected from a dropdown menu. If 'other' is selected, please describe the analyte and unit in a note in the note_sr field.
	bio_unit_1	Categorical	Units of the analyte selected from a dropdown menu.
	bio_blood_sample_1	Categorical	Blood sample source selected from a dropdown menu.
	bio_form_1	Categorical	Select the data type from a dropdown menu.
	ref_lower_1	Numerical	Lowest numeric level of reference group risk definition.
	ref_upper_1	Numerical	Upper numeric level of reference group risk definition.
	ref_mean_1	Numerical	Mean biomarker level of the reference group.
	ref_sd_1	Numerical	Standard deviation of the mean biomarker level of the reference group.

ref_se_1	Numerical	Standard error of the mean biomarker level of the reference group.
ref_iqr_1	Numerical	Interquartile range (midrange) the difference between the 75 and 25th percentile of the reference group biomarker levels.
alt_lower_1	Numerical	Lowest numeric level of alternative group risk definition.
alt_upper_1	Numerical	Upper numeric level of alternative group risk definition.
alt_mean_1	Numerical	Mean biomarker level of the alternative group.
alt_sd_1	Numerical	Standard deviation of the mean biomarker level of the alternative group.
alt_se_1	Numerical	Standard error of the mean biomarker level of the alternative group.
alt_iqr_1	Numerical	Interquartile range (midrange) the difference between the 75 and 25th percentile of the alternative group biomarker levels.
bio_type_2	Categorical	If more than one biomarker is used in the risk definition in the study, provide the number of biomarkers evaluated.
bio_unit_2	Categorical	Type of analyte measured selected from a dropdown menu. If ‘other’ is selected, please describe the analyte and unit in a note in the note_sr field.
bio_blood_sample_2	Categorical	Units of the analyte selected from a dropdown menu.
bio_form_2	Categorical	Blood sample source selected from a dropdown menu.
ref_lower_2	Numerical	Select the data type from a dropdown menu.
ref_upper_2	Numerical	Lowest numeric level of reference group risk definition.
ref_mean_1	Numerical	Upper numeric level of reference group risk definition.
ref_sd_2	Numerical	Mean biomarker level of the reference group.
ref_se_2	Numerical	Standard deviation of the mean biomarker level of the reference group.
ref_iqr_2	Numerical	Standard error of the mean biomarker level of the reference group.
alt_lower_2	Numerical	Interquartile range (midrange) the difference between the 75 and 25th percentile of the reference group biomarker levels.
alt_upper_2	Numerical	Lowest numeric level of alternative group risk definition.
alt_mean_2	Numerical	Upper numeric level of alternative group risk definition.
alt_sd_2	Numerical	Mean biomarker level of the alternative group.
alt_se_2	Numerical	Standard deviation of the mean biomarker level of the alternative group.
alt_iqr_2	Numerical	Standard error of the mean biomarker level of the alternative group.
bio_type_3	Categorical	If more than one biomarker is used in the risk definition in the study, provide the number of biomarkers evaluated.
bio_unit_3	Categorical	Type of analyte measured selected from a dropdown menu. If ‘other’ is selected, please describe the analyte and unit in a note in the note_sr field.
bio_blood_sample_3	Categorical	Units of the analyte selected from a dropdown menu.
bio_form_3	Categorical	Blood sample source selected from a dropdown menu.
ref_lower_3	Numerical	Select the data type from a dropdown menu.
ref_upper_3	Numerical	Lowest numeric level of reference group risk definition.

	ref_mean_1	Numerical	Upper numeric level of reference group risk definition.
	ref_sd_3	Numerical	Mean biomarker level of the reference group.
	ref_se_3	Numerical	Standard deviation of the mean biomarker level of the reference group.
	ref_iqr_3	Numerical	Standard error of the mean biomarker level of the reference group.
	alt_lower_3	Numerical	Interquartile range (midrange) the difference between the 75 and 25th percentile of the reference group biomarker levels.
	alt_upper_3	Numerical	Lowest numeric level of alternative group risk definition.
	alt_mean_3	Numerical	Upper numeric level of alternative group risk definition.
	alt_sd_3	Numerical	Mean biomarker level of the alternative group.
	alt_se_3	Numerical	Standard deviation of the mean biomarker level of the alternative group.
	alt_iqr_3	Numerical	Standard error of the mean biomarker level of the alternative group.
Outcome	out_def	Categorical	Provide a brief description of the outcome as reported in the study.
	out_measure	Categorical	Please specify if the outcome definition includes incidence, prevalence, or mortality from a disease endpoint.
	out_type	Categorical	Select an outcome type: Gestational Age, Birthweight, Birthweight for Gestational Age, Neonatal Sepsis, Neonatal Mortality, Stillbirth, Perinatal Mortality.
	out_form	Categorical	Specify data type: continuous or categorical.
	unit_of_measure	Categorical	Units for particular outcome: days, week, SD, grams, kilograms, percentile, per 1000 live births, per 1000 births, per 1000 pregnancies, or %.
	out_lower	Numerical	Lower cutoff of outcome definition.
	out_upper	Numerical	Upper cutoff of outcome definition.
	out_mean	Numerical	Mean of outcome measurement.
	out_sd	Numerical	Standard deviation of outcome measurement.
	out_se	Numerical	Standard error of outcome measurement.
	out_median	Numerical	Median value of outcome measurement.
	out_iqr	Numerical	Interquartile range of outcome measurement.
	out_timepoint	Free text	Describe when outcome occurred or was measured (prenatal, postnatal, delivery, 7d postdelivery).
	out_assess_1	Categorical	Specify the method of assessment of the study outcome. If more than 1 are appropriate, enter additional methods in the next column labeled "outcome_assess_2"
	out_assess_2	Categorical	Specify the method of assessment of the study outcome. If more than 2 are appropriate, enter additional methods in the next column labeled "outcome_assess_3"
	out_assess_3	Categorical	Specify the method of assessment of the study outcome.
Follow up	duration_fup_measure	Categorical	Type of follow up measure (i.e., mean, median, max, min).
	duration_fup_units	Categorical	Units of follow up duration.
	duration_fup_value	Numerical	The length of participant follow up.
Effect size location	page_num	Numerical	Page number where the effect size is found within the literature or survey question. Use page number(s) of the article, not the page number of the PDF, if journal pagination is present.

	table_num	Free text	Table/figure number from literature or survey question where the effect size is from. For figures, put F before the figure number. Text may be entered (e.g., name of a table).
	in_supplement	Binary	Is the effect size found in the supplementary material of the article? 1=yes, 0=no
Effect size & uncertainty	effect_size_measure	Categorical	The type of effect size being extracted selected from a dropdown menu.
	effect_size_unit	Categorical	Mathematical space of the effect size. Rows with 'linear' effect_size_unit values must have positive values for mean. If lower and upper are provided, they must also be positive.
	lower	Numerical	Provide the effect size estimate.
	upper	Numerical	Provide the lower limit of the CI. Enter on a 'per 1' basis. (If the CI is reported as a percent, you must convert to a decimal.) These 3 fields must all be filled in if any of them are filled in: lower, upper, uncertainty_type_value.
	uncertainty_type_value	Numerical	Provide the upper limit of the CI. Enter on a 'per 1' basis. (If the CI is reported as a percent, you must convert to a decimal.) These 3 fields must all be filled in if any of them are filled in: lower, upper, uncertainty_type_value.
	standard_error	Numerical	This field is required if lower and upper are entered. This column reports the confidence level of the CI(e.g., 95, 90, 99). These 3 fields must all be filled in if any of them are filled in: lower, upper, uncertainty_type_value.
	uncertainty_issue	Binary	Required if upper and lower uncertainty bounds are not extracted. 1=issue flagged for modeler, 0=no issue
	effect_size_derived	Binary	Is a measure of uncertainty not reported? 1=yes, 0=no
	effect_size_from_image	Binary	Was the effect size calculated (eg, adjusted to linear space, calculated using an online tool)? 1=yes, no=0
Effect size analysis details	subgroup_analysis	Binary	Is the effect size from the main analysis (all participants)? (Examples of a sub-analysis include only males, among a specific age group, etc.) 1=yes, 0=no
	subgroup_analysis_free_text	Free text	If the effect size is a sub-analysis, describe the sub-analysis (e.g., age, sex, etc.).
	effect_size_multi_location	Binary	Is the effect size from a multi-country study and only one effect size is reported for all locations? 1=yes, 0=no
	effect_size_multi_location_specify	Categorical	The geography level that represents the effect size selected from a dropdown menu.
	pooled_cohort	Binary	Is the effect size from a pooled analysis and only a pooled effect size is reported? 1=yes, 0=no
	dose_response	Binary	Does the study support a dose-response relationship between the exposure and the outcome? 1=yes, 0=no
	dose_response_detail	Free text	If '1' was specified in the dose_response field, please specify in this field the type of evidence supporting the dose-response relationship. For example, 'statistically significant p-value for linear trend'.
Confounders controlled for	conf_maternal_age	Binary	1=the study controls for age in the RR estimation analysis, 0=age is not controlled for
	conf_maternal_education	Binary	1=the study controls for maternal education in the RR estimation analysis, 0=maternal education is not controlled for
	conf_income	Binary	1=the study controls for income in the RR estimation analysis, 0=income is not controlled for
	conf_social_support	Binary	1=the study controls for social support in the RR estimation analysis, 0=social support is not controlled for
	conf_antenatal_care	Binary	1=the study controls for antenatal care in the RR estimation analysis, 0=antenatal care is not controlled for
	conf_antenatal_supplements	Binary	1=the study controls for antenatal supplements in the RR estimation analysis, 0=antenatal supplements is not controlled for
	conf_dietary_components	Binary	1=the study controls for dietary components in the RR estimation analysis, 0=dietary components is not controlled for
	conf_smoking_exposure	Binary	1=the study controls for smoking exposure in the RR estimation analysis, 0=smoking exposure is not controlled for
	conf_maternal_alcohol_use	Binary	1=the study controls for maternal alcohol use in the RR estimation analysis, 0=maternal alcohol use is not controlled for
	conf_maternal_bmi	Binary	1=the study controls for maternal BMI in the RR estimation analysis, 0=maternal BMI is not controlled for

	conf_physical_activity	Binary	1=the study controls for physical activity in the RR estimation analysis, 0=physical activity is not controlled for
	conf_maternal_hemorrhage	Binary	1=the study controls for maternal hemorrhage in the RR estimation analysis, 0=maternal hemorrhage is not controlled for
	conf_parity_gravidity	Binary	1=the study controls for parity/gravidity in the RR estimation analysis, 0= parity/gravidity is not controlled for
	conf_birth_spacing	Binary	1=the study controls for birth spacing in the RR estimation analysis, 0=birth spacing is not controlled for
	conf_maternal_hypertension	Binary	1=the study controls for hypertension in the RR estimation analysis, 0= hypertension is not controlled for
	conf_maternal_diabetes	Binary	1=the study controls for diabetes in the RR estimation analysis, 0= diabetes is not controlled for
	conf_maternal_hyperchol	Binary	1=the study controls for hypercholesterolemia in the RR estimation analysis, 0= hypercholesterolemia is not controlled for
	conf_infection	Binary	1=the study controls for infection in the RR estimation analysis, 0=infection is not controlled for
	conf_other	Binary	1=additional confounders besides those with specified columns are controlled for in the RR estimation analysis, 0=no additional confounders are controlled for
	Conf_all	Free text	Specify all confounders controlled for in the RR estimation analysis.
Cohort sample details	cohort_person_years_exp	Numerical	The number of person-years of follow-up in the exposed cohort group, if provided.
	cohort_person_years_unexp	Numerical	The number of person-years of follow-up in the unexposed cohort group, if provided.
	cohort_person_years_total	Numerical	Enter the total person-years of follow up if person-years of follow up in exposed and unexposed not reported.
	cohort_number_events_exp	Numerical	The number of events in the exposed cohort group.
	cohort_number_events_unexp	Numerical	The number of events in the unexposed cohort group.
	cohort_number_events_total	Numerical	Enter the total number of events/cases if number of events in exposed and exposed.
	cohort_sample_size_exp	Numerical	Please specify the number of people in the exposed group if person-years of follow up in unexposed is not reported.
	cohort_sample_size_unexp	Numerical	Please specify the number of people in the unexposed group if person-years of follow up in unexposed is not reported.
	cohort_sample_size_total	Numerical	Please specify the number of people included in the analysis if total person-years of follow up is not reported.
	cohort_dropout_rate	Numerical	Specify the dropout rate (%) at the end of the study. Entered on a per 1 basis. For example, 23% is entered as 0.23.
	cohort_dropout_assess	Free text	Specify how dropout rate was defined in the study.
	cohort_exposed_def	Free text	Provide a brief description of the exposed group as used in estimation of the RR.
	cohort_exp_unit_rr	Free text	Exposure unit (for continuous risks). Specify the unit of exposure (e.g., grams/day) for the exposed group.
	cohort_exp_level_rr	Numerical	Exposure level in the exposed group (for continuous risks). Specify the mean/median level of exposure in the exposed group
	cohort_unexp_def	Free text	Provide a brief description of the unexposed group as used in estimation of the RR (e.g., non-anemic).
	cohort_unexp_unit_rr	Free text	Exposure unit (for continuous risks). Specify the unit of exposure (e.g., grams/day) for the unexposed group.
	cohort_unexp_level_rr	Free text	Exposure level in the unexposed group (for continuous risks). Specify the mean/median level of exposure in the unexposed group.
	cohort_exp_level_dr	Free text	Exposure level for dose-response RRs (for continuous risks). If the study reports dose-response RR, please specify the level of exposure for the reported RR.
Case-control sample Details	cc_community	Binary	Were the controls selected from the community? 1=yes, 0=no
	cc_cases	Numerical	Number of cases across all exposure levels used in the estimate of the effect size.

	cc_control	Numerical	Number of controls across all exposure levels used in the estimate of the effect size.
	cc_dropout_rate	Numerical	Specify the dropout rate (%) at the end of the study. Entered on a per 1 basis. For example, 23% is entered as 0.23
	cc_dropout_assess	Numerical	Specify how dropout rate was defined in the study.
	cc_exposed_def	Free text	Exposure unit (for continuous risks). Specify the unit of exposure (e.g., grams/day) for the exposed group.
	cc_exp_unit_rr	Free text	Exposure level in the exposed group (for continuous risks). Specify the mean/median level of exposure in the exposed group
	cc_exp_level_rr	Numerical	Provide a brief description of the unexposed group as used in estimation of the RR (e.g., non-anemic).
	cc_unexposed_def	Free text	Exposure unit (for continuous risks). Specify the unit of exposure (e.g., grams/day) for the unexposed group.
	cc_unexp_unit_rr	Free text	Exposure level in the unexposed group (for continuous risks). Specify the mean/median level of exposure in the unexposed group.
	cc_unexp_level_rr	Numerical	Exposure level for dose-response RRs (for continuous risks). If the study reports dose-response RR, please specify the level of exposure for the reported RR.
	cc_exp_level_dr	Free text	Exposure unit (for continuous risks). Specify the unit of exposure (e.g., grams/day) for the exposed group.
Intervention sample details	int_intervention_description	Free text	Provide a brief description of the intervention as reported in the study.
	int_control_description	Free text	Provide a brief description of the control as reported in the study.
	int_intervention_multi_rf	Binary	Does this intervention simultaneously target more than one risk? 1=yes, 0=no
	int_intervention_multi_rf_specify	Free text	Specify the risks that are targeted by the intervention.
	int_intervention_level	Free text	Specify the level of intervention.
	int_adhere_assess	Free text	Specify how adherence was defined in the study.
	int_adhere_rate_intervention	Numerical	Adherence rate in the intervention group; Enter on a "per 1" basis. For example: 23% is entered as .23.
	int_adhere_rate_control	Numerical	Adherence rate in the control group; Enter on a "per 1" basis. For example: 23% is entered as .23.
	int_dropout_rate_intervention	Numerical	Specify the dropout rate (%) at the end of the study. Enter on a "per 1" basis. For example: 23% is entered as .23.
	int_dropout_rate_control	Numerical	Specify the dropout rate (%) in the control group at the end of the study. Enter on a "per 1" basis. For example: 23% is entered as .23.
	int_dropout_assess	Free text	Specify how dropout rate was defined in the study.
	int_blinding		For trials, specify blinding.
	int_exp_unit		For trials, specify the unit of exposure (e.g., mmol/l).
	int_baseline_exp_int	Numerical	For trials, specify the exposure level in the intervention group at baseline.
	int_baseline_exp_comp	Numerical	For trials, specify the exposure level in the comparison group at baseline.
	int_fup_exp_int	Numerical	For trials, specify the exposure level in the intervention group at the end of the follow-up time.
	int_fup_exp_comp	Numerical	For trials, specify the exposure level in the comparison group at the end of follow up time.
	int_fup_exp_int_difference	Numerical	For trials, please specify the difference of exposure level between baseline and follow up time for the intervention group.
	int_fup_exp_comp_difference	Numerical	For trials, please specify the difference of exposure level between baseline and follow up time for the comparison group.
	int_person_years_int	Numerical	Please specify the number of person years of follow up for the intervention group.

	int_person_years_comp	Numerical	Please specify the number of person years of follow up in the comparison group.
	int_number_events_int	Numerical	For trials, specify the number of cases in the intervention group at the end of follow up.
	int_number_events_comp	Numerical	For trials, specify the number of cases in the control group at the end of follow up.
	int_sample_size_int_group_baseline	Numerical	For trials, specify the sample size in the intervention group at baseline.
	int_sample_size_comparison_group_baseline	Numerical	For trials, specify the sample size in the comparison group at baseline.
	int_sample_size_int_group_follow_up	Numerical	For trials, specify the sample size in the intervention group at the end of the follow-up time.
	int_sample_size_comparison_group_follow_up	Numerical	For trials, specify the sample size in the comparison group at the end of follow up time.
Misc	note_modeler	Free text	Any notes added by the modeler when reviewing the source.
	note_sr	Free text	Any notes related to the extraction, including assumptions, data adjustments, problems with the source, any other notes that may be relevant, etc.

Note: GHDx: Global Health Data Exchange; GBD: Global Burden of Disease; GPS: global positioning system; SD: standard deviation; CI: confidence interval; BMI: body mass index; RR: relative risk.

Supplemental Table 5. Outcome-specific data extraction template

Outcome	Category	Extraction Field Name	Field Type	Definition	Choices
Maternal mortality, obstructed labors & other infections	Source	redcap_id	Numerical	Unique identifier for an extraction record within a given REDCap project.	
		dsr_refid	Numerical	Unique identifier for a record within a given DistillerSR project.	
		custom_author	Free text	List of authors of source that is being extracted	
		custom_decision	Categorical	Should this study be included for extraction	• Yes, include. • No, exclude.
		incl_reason	Categorical	If 'Yes, include." was selected for custom_decision, select a reason for inclusion.	• Evidence of assessment between an outcome and anemia/low Hb/iron deficiency markers during pregnancy or delivery prior to an outcome event in a primary study. • SR/MA that assesses the relationship for the R-O pair of interest.
		excl_reason	Categorical	If 'No, exclude." was selected for custom_decision, select a reason for exclusion.	• No relevant risk definition. • No evidence of assessment between an outcome and anemia/low Hb/iron deficiency markers during pregnancy or delivery prior to an outcome event, whether primary study or SR/MA. • Conference abstracts, case study, modeling study, animal study, guidelines, narrative reviews, comments, letters, or non-SR/MA. • Twin/multiple gestation studies. • Studies that only report on an outcome without a comparator (e.g., all diseased or has an outcome of interest).
		custom_inghdx	Binary	Is this citation already in the GHDx? 1=Yes, 0=No	
		ext_notes	Free text	Indicate any additional notes you would like to leave for extraction tracking.	
		extraction_tracking_complete	Categorical	Is the extraction tracking section complete?	• Incomplete

				• Unverified • Complete
Location & representativeness	study_loc	Categorical	Choose the option that best describes the location where the study was conducted.	• Study location exactly corresponds to a GBD location • Study location corresponds to a more granular location within another exact GBD location (e.g., Seattle is more granular than Washington) • No location is listed • One effect size is reported for multiple subnational locations • One effect size is reported for multiple countries
	study_information_complete	Categorical	Is the study information complete?	• Incomplete • Unverified • Complete
Study population	age_median	Numerical	If provided, please record the median age of the study population.	
outcome	outsub_sepsis	Categorical	What suboutcome are you extracting for maternal sepsis, if any?	• Sepsis (parent outcome, unspecified) • Sepsis (puerperal) • Sepsis (other) • Antepartum/intrapartum chorioamnionitis • Cervicovaginitis • Endometritis • Fever (postpartum, etc.) • Nosocomial infection • Unspecified infection/Other infection • Intrapartum/postpartum wound infection • Septic shock • Surgical site infection from C-section • Urinary tract infection • Wound infection
	outsub_obslabor_2	Categorical	What suboutcome are you extracting for obstructed labor, if any?	• Obstructed/prolonged labor (parent outcome) • Emergency C-section due to obstructed labor • Abnormal process of labor • Uterine rupture • Fistula • Dystocia

		out_mapping	Categorical	Select the scope of the study definition of the outcome in relation to the GBD definition of the outcome for a particular effect size.	• Exact • Aggregate • Component • Unspecified
	Confounders controlled for	conf_race	Binary	1=the study controls for race in the relative risk estimation analysis, 0=race is not controlled for	
		conf_inflammation	Binary	1=the study controls for inflammation in the relative risk estimation analysis, 0=inflammation is not controlled for	
Maternal hemorrhage	outcome	out_mode_of_delivery	Categorical	Outcome mode of delivery: did the article examine vaginal birth, C-section, abortion, or a combination of more than one	• Vaginal birth • C-section • Abortion • A combination of more than one
		out_hemorrhage_assessment	Categorical	How was hemorrhage quantified for blood loss?	• Measured blood volume (ml or L) • Weighted blood (grams) • Estimation of blood volume by gauze pad absorption • % drop in Hb/Hct • Need for tranfusion • Hemodynamic deterioration hypotension/shock • Not described
		out_assess_ga	Categorical	For gestational age or preterm delivery, please specify the method used to estimate gestational age.	
	Confounders controlled for	conf_previous_maternal_hemorrhage	Binary	1=the study controls for previous maternal hemorrhage in the relative risk estimation analysis, 0=maternal hemorrhage is not controlled for	
		conf_history_of_abortion	Binary	1=the study controls for history of abortion in the relative risk estimation analysis, 0=history of abortion is not controlled for	

conf_mode_of_delivery	Binary	1=the study controls for mode of delivery in the relative risk estimation analysis, 0=mode of delivery is not controlled for
conf_trauma	Binary	1=the study controls for trauma in the relative risk estimation analysis, 0=trauma is not controlled for
conf_coagulation_disorders	Binary	1=the study controls for coagulation disorders in the relative risk estimation analysis, 0=coagulation disorders is not controlled for
conf_placental_abnormalities	Binary	1=the study controls for placental abnormalities in the relative risk estimation analysis, 0=placental abnormalities is not controlled for
conf_uterine_scar_atony	Binary	1=the study controls for uterine scar atony in the relative risk estimation analysis, 0=unterine scar atony is not controlled for
conf_prolonged_labor	Binary	1=the study controls for prolonged labor in the relative risk estimation analysis, 0=prolonged labor is not controlled for
conf_proximity_to_hospital	Binary	1=the study controls for proximity to hospital in the relative risk estimation analysis, 0=proximity to hospital is not controlled for
conf_gestational_age	Binary	1=the study controls for gestational age in the relative risk estimation analysis, 0=gestational age is not controlled for
conf_newborn_sex	Binary	1=the study controls for newborn sex in the relative risk estimation analysis, 0=newborn sex is not controlled for
conf_inflammation	Binary	1=the study controls for inflammation in the relative risk estimation analysis, 0=inflammation is not controlled for

		cov_altitude_adjusted	Binary	1=the study controls for altitude in the relative risk estimation analysis, 0=altitude is not controlled for	
Hypertensive disorders of pregnancy	Source	redcap_id	Numerical	Unique identifier for an extraction record within a given REDCap project.	
		dsr_refid	Numerical	Unique identifier for a record within a given DistillerSR project.	
		custom_author	Free text	List of authors of source that is being extracted	
		custom_decision	Categorical	Should this study be included for extraction	• Yes, include. • No, exclude.
		incl_reason	Categorical	If 'Yes, include." was selected for custom_decision, select a reason for inclusion.	• Evidence of assessment between an outcome and anemia/low Hb/iron deficiency markers during pregnancy or delivery prior to an outcome event in a primary study. • SR/MA that assesses the relationship for the R-O pair of interest.
		excl_reason	Categorical	If 'No, exclude." was selected for custom_decision, select a reason for exclusion.	• No relevant risk definition. • No evidence of assessment between an outcome and anemia/low Hb/iron deficiency markers during pregnancy or delivery prior to an outcome event, whether primary study or SR/MA. • Conference abstracts, case study, modeling study, animal study, guidelines, narrative reviews, comments, letters, or non-SR/MA. • Twin/multiple gestation studies. • Studies that only report on an outcome without a comparator (e.g., all diseased or has an outcome of interest).
		custom_inghdx	Binary	Is this citation already in the GHDx? 1=Yes, 0=No	

	ext_notes	Free text	Indicate any additional notes you would like to leave for extraction tracking.	
	extraction_tracking_complete	Categorical	Is the extraction tracking section complete?	• Incomplete • Unverified • Complete
Location & representativeness	study_loc	Categorical	Choose the option that best describes the location where the study was conducted.	
	study_information_complete	Categorical	Is the study information complete?	• Incomplete • Unverified • Complete
Study population	age_median	Numerical	If provided, please record the median age of the study population.	
Outcome	outsub_htn	Categorical	What suboutcome are you extracting for hypertensive disorders of pregnancy, if any?	• Gestational hypertension or pregnancy-induced hypertension • Pre-eclampsia
	outsub_sevpecl	Categorical	What suboutcome are you extracting for severe preeclampsia, if any?	• Severe pre-eclampsia • HELLP syndrome
	outsub_ecl	Categorical	What suboutcome are you extracting for eclampsia, if any?	• Eclampsia • Hypertension and seizures • Eclampsia & HELLP syndrome
	out_sys_ref	Numerical	Threshold for systolic blood pressure in the reference group used in the study.	
	out_dia_ref	Numerical	Threshold for diastolic blood pressure in the reference group used in the study.	
	out_prot_ref	Numerical	Threshold for proteinuria in the reference group used in the study.	
	out_seiz_ref	Binary	Were seizures described as part of diagnosis in the reference group?	
	out_orgflr_ref	Numerical	Was organ failure described as part of the diagnosis in the reference group?	

out_gest_ref	Numerical	If provided, please describe the minimum weeks of gestation at which the even would have occurred in the reference group.	
out_sys_alt	Numerical	Threshold for systolic blood pressure in the alternative group used in the study.	
out_dia_alt	Numerical	Threshold for diastolic blood pressure in the alternative group used in the study.	
out_prot_alt	Numerical	Threshold for proteinuria in the alternative group used in the study.	
out_seiz_alt	Numerical	Were seizures described as part of diagnosis in the alternative group?	
out_orgflr_alt	Numerical	Was organ failure described as part of the diagnosis in the alternative group?	
out_gest_alt	Numerical	If provided, please describe the minimum weeks of gestation at which the even would have occurred in the alternative group.	
out_unit	Categorical	Units for the selected outcome.	• Per 100 births • Per 100 pregnancies • Per 1000 births • Per 1000 pregnancies
out_case_method	Categorical	Case ascertainment method selected from a dropdown menu.	• Study personnel make the diagnosis based on pre-defined criteria for vital signs, symptoms, exam signs, and lab results • Diagnose by study clinicians or study personnel based on routine local practice or criteria that are not described • Identify from chart review • Identify using ICD codes in administrative records • Ascertainment of diagnosis not described

	out_diag	Categorical	Diagnostic criteria definitions.	• Blood pressure cutoffs defined • Blood pressure cutoffs not defined • Proteinuria cutoffs defined\ • Proteinuria cutoffs not defined
	out_sev	Categorical	How was pre-eclampsia evaluated in the study?	• All cases of pre-eclampsia considered • together (severity not defined) • Severe pre-eclampsia • Pre-eclampsia
	out_chr_htn	Categorical	Was chronic hypertension included in the study?	• Excluded from study • Could not determine if included/excluded • Included
	out_mapping	Categorical	Select the scope of the study definition of the outcome in relation to the GBD definition of the outcome for a particular effect size.	• Exact • Aggregate • Component • Unspecified
Confounders controlled for	conf_race	Binary	1=the study controls for race in the relative risk estimation analysis, 0=race is not controlled for	
	conf_prev_pecl	Binary	1=the study controls for previous pre-eclampsia in the relative risk estimation analysis, 0=previous pre-eclampsia is not controlled for	
	conf_chr_htn	Binary	1=the study controls for chronic hypertension in the relative risk estimation analysis, 0=chronic hypertension is not controlled for	
	conf_vasc_ds	Binary	1=the study controls for vascular disease in the relative risk estimation analysis, 0=vascular disease is not controlled for	
	conf_mal	Binary	1=the study controls for malaria in the relative risk estimation analysis, 0=malaria is not controlled for	
	conf_hiv	Binary	1=the study controls for HIV in the relative risk estimation analysis, 0=HIV is	

				not controlled for	
		raut	Binary	1=the study controls for inflammation in the relative risk estimation analysis, 0=inflammation is not controlled for	
Peripartum depression	Confounders controlled for	covariate_maternal_morbidity	Binary	1=the study controls for maternal morbidity in the relative risk estimation analysis, 0=maternal morbidity is not controlled for	
		covariate_altitude_adjusted	Binary	1=the study controls for altitude in the relative risk estimation analysis, 0=altitude is not controlled for	
Neonatal outcomes	Outcome	out_assess_ga	Categorical	For gestational age or preterm delivery, please specify the method used to estimate gestational age.	• Obstetric estimate (e.g., ultrasound) • Dubowitz/Ballard Examination • First day of LMP • Other methods • Unspecified
	Confounders controlled For	conf_maternal_morbidity	Binary	1=the study controls for maternal morbidity in the relative risk estimation analysis, 0=maternal morbidity is not controlled for	
		conf_gestational_age	Binary	1=the study controls for gestational age in the relative risk estimation analysis, 0=gestational age is not controlled for	
		conf_newborn_sex	Binary	1=the study controls for newborn sex in the relative risk estimation analysis, 0=newborn sex is not controlled for	
		conf_altitude_adjusted	Binary	1=the study controls for altitude in the relative risk estimation analysis, 0=altitude is not controlled for	

Note: SR/MA: systematic review/meta-analysis; R-O pair: risk-outcome pair; GHDx: Global Health Data Exchange; GBD: Global Burden of Disease; Hb: hemoglobin; C-section: Cesarean section; Hct: hematocrit; HELLP syndrome: 'Hemolysis, Elevated Liver Enzymes, Lowered Platelets' syndrome; ICD: International Classification of Diseases; HIV: human immunodeficiency virus; LMP: last menstrual period.

Section 1.6. References

Section 2. Data inputs

Section 2.1. Summary of outcomes that were evaluated but not screened or screened but not modeled

Other maternal and neonatal outcomes that were evaluated but not analyzed due to inadequate data or lack of biological plausibility are outlined below.

Supplemental Table 6. Definitions of outcomes that were evaluated but not screened or screened but not modeled

Outcome	Reference definition	Alternate case definition	Exclusion	Justification for non-modeled outcomes
Maternal outcomes				
Antepartum hemorrhage	Vaginal bleeding from any cause at or beyond 20 weeks of gestation and prior to onset of labor	• Placental disease or disorders with blood loss • Placental abruption with blood loss • Placental previa or accreta with blood loss	N/A	Inadequate data
Obstructed labor	Acute events of arrest in the first or second stage of active labor despite strong uterine contractions as well as prolonged latent phase, defined as >20 hours in nulliparous individuals and >14 hours in multiparous individuals	Obstructed labor due to malpresentation, malposition, cephalopelvic disproportion, labor dystocia, fetal-pelvic disproportion, obstetric or vesicovaginal fistula, prolonged labor, rupture of membranes, or breech presentation	Malpresentation, malposition, or cephalopelvic disproportion by itself without trial of labor	Lack of a plausible direct causal link to low hemoglobin
HELLP syndrome	Hemolysis, elevated liver enzymes and low platelets syndrome of hypertension	N/A	Chronic hypertension present prior to 20 weeks of gestation unless where superimposed preeclampsia develops	Lack of a plausible direct causal link to low hemoglobin (likely mediated by gestational hypertension and/or preeclampsia)
Severe preeclampsia	Preeclampsia with severe hypertension (>160/100 mmHg) or other signs of end organ damage (including injury to the liver [e.g., low platelets, elevated liver enzymes, coagulation issues], kidney [e.g., elevated creatinine], and central nervous system [e.g., headaches or visual disturbances])	N/A	Chronic hypertension present prior to 20 weeks of gestation unless where superimposed preeclampsia develops	Lack of a plausible direct causal link to low hemoglobin (likely mediated by gestational hypertension and/or preeclampsia)
Eclampsia	Hypertension (>140/90 mmHg on ≥1 occasion) and seizures, with or without proteinuria	N/A	Chronic hypertension present prior to 20 weeks of gestation unless where superimposed preeclampsia develops	Lack of a plausible direct causal link to low hemoglobin (likely mediated by gestational hypertension and/or preeclampsia)
Peripartum cardiomyopathy	Heart failure with LVEF <45% developing in the last month of pregnancy or within five months of delivery without any other cause for heart failure	• Diagnoses based on other pre-defined criteria for LVEF • Any heart failure/cardiomyopathy in pregnancy and postpartum • Cut-offs for timing of presentation	N/A	Inadequate data

Outcome	Reference definition	Alternate case definition	Exclusion	Justification for non-modeled outcomes
		of cardiomyopathy earlier or later than the standard case definition • Presentation of cardiomyopathy among people without recognizable/diagnosed cardiovascular diseases prior to the last month of pregnancy • Other causes of heart failure in pregnancy and postpartum		
Ectopic pregnancy	Pregnancy that implants outside of the uterine cavity as determined by: visualization at surgery with histologic confirmation following resection of ectopic pregnancy tissue, visualization of an extrauterine gestational sac with a yolk sac or embryo (with or without a heartbeat) on TVUS or a combination of >2000 IU/mL serum hCG and no evidence of an intrauterine pregnancy on TVUS	• No evidence of intrauterine pregnancy with positive and qualitative hCG values on transabdominal or transvaginal ultrasound at a date when the last menstrual period predicts visualization • Confirmed pregnancy using different criteria of hCG (e.g., positive qualitative serum hCG, >2000 IU/mL serum hCG, > 6000 IU/mL serum hCG) • Cases where only specific sites of implantation is counted (e.g., tubal, abdominal, and ovary)	N/A	Lack of a plausible direct causal link to low hemoglobin
Gestational diabetes	Condition in which carbohydrate intolerance develops during pregnancy	• Any diabetes in which abnormal glucose tolerance was first recognized at any time during pregnancy • Diabetes diagnosed in the second or third trimester that was not clearly present prior to conception • Any type of diabetes during pregnancy	N/A	Lack of a plausible direct causal link to low hemoglobin
Abortion and miscarriage	Elective or medically-indicated termination of pregnancy at any gestational age, regardless of symptoms or complications (abortion) or spontaneous loss of pregnancy before 24 weeks of gestation (miscarriage) with complications requiring medical care	• Abortion and miscarriage measured in aggregate prior to 24 weeks of gestation irrespective of medical intervention • Self-reported abortion or miscarriage	N/A	Lack of a plausible direct causal link to low hemoglobin
Neonatal outcomes				
Neonatal encephalopathy/ birth asphyxia	Clinical diagnosis of disturbed neurological function within 7 days of life, manifested by reduced level of	N/A	N/A	Lack of a plausible direct causal link to low hemoglobin

Outcome	Reference definition	Alternate case definition	Exclusion	Justification for non-modeled outcomes
	consciousness or seizures, often accompanied by difficulty initiating and maintaining respiration, and by depression of tone and reflexes			
Hemolytic disease of the newborn	Clinical diagnosis of pathological neonatal jaundice or hyperbilirubinemia (total serum bilirubin >20-25 mg/dL) for postnatal age and prematurity	N/A	N/A	Lack of a plausible direct causal link to low hemoglobin

Note: LVEF: left ventricular ejection fraction; HELLP syndrome: 'Hemolysis, Elevated Liver Enzymes, Lowered Platelets' syndrome; TVUS: transvaginal ultrasound; hCG: human chorionic gonadotropin.

Section 2.2. Study-level characteristics of extracted studies

Because studies often report on multiple neonatal outcomes, a single systematic review was conducted to capture all relevant associations between maternal hemoglobin and neonatal outcomes. Similarly, unified reviews were conducted for maternal mortality and infections, and for antepartum and postpartum hemorrhage, respectively.

Supplemental Table 7. Characteristics of extracted studies - Maternal mortality, obstructed labors, sepsis and other infections

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Ali, 2020[1]	India, Pakistan	Prospective cohort	130888	Community based	Hb 11 - 12.9 g/dL	Hb < 7 g/dL, Hb 7 - 7.9 g/dL, Hb 8 - 8.9 g/dL, Hb 9 - 9.9 g/dL, Hb 10 - 10.9 g/dL, Hb > 13 g/dL	Prenatal	Unspecified	Maternal mortality	RR	N/A
Ambedkar, 2021[2]	India	Case-control	476	Community based	Hb > 11 g%	Hb 10 - 10.9 g%, Hb 7 - 9.9 g%, Hb 4 - 6.9 g%, Hb < 4 g%	Prenatal	Unspecified	Unspecified infection/Other infection	OR	N/A
Bizuayew, 2021[3]	Ethiopia	Retrospective cohort	622	Tertiary care	Hct >= 30	Hct < 30	Third trimester	Unspecified	Surgical site infection from C-section	OR	Adjusted but unspecified
Dacho, 2018[4]	Ethiopia	Cross-sectional	325	Tertiary care	Hct >= 30	Hct < 30	At delivery	N/A	Surgical site infection from C-section	OR	N/A
Daru, 2018[5]	Global	Cross-sectional	312281	Community based	Hb 70 - 120 g/L	Hb < 70 g/L	Prenatal	N/A	Maternal mortality, Sepsis (parent outcome, unspecified)	OR	N/A
Edelson, 2023[6]	Uganda	Retrospective cohort	352	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	At delivery	Unspecified instrument, venous blood sample	Maternal mortality, Postpartum fever	RR	N/A
Flores-Venegas, 2019[7]	Mexico	Prospective cohort	1051	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	UTI	RR	N/A
Gelaw, 2017[8]	Ethiopia	Cross-sectional	384	Tertiary care	Hct > 30	Hct < 29.9	At delivery	N/A	Surgical site infection from C-section	OR	N/A
Gonzales, 2012[9]	Peru	Retrospective cohort	446398	Community based	Hb 11 - 14.5 g/dL	Hb < 7 g/dL, Hb 7 - 8.99 g/dL, Hb 9 - 10.99 g/dL, Hb >	Prenatal	Unspecified	Maternal mortality	OR	Age, maternal education, marital status, BMI, prenatal

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
						14.501 g/dL					care, parity, gestational diabetes mellitus, cardiopathy (in current pregnancy) gestational age, migration
Huang, 2018[10]	China	Prospective cohort	3000	Tertiary care	Hb > 105.01 g/L	Hb < 105 g/L	Unspecified	Unspecified	Postpartum infection	RR	N/A
Kajeguka, 2020[11]	United Republic of Tanzania	Cross-sectional	183	Tertiary care	Hb >= 12 g/dL	Hb 11 - 11.9 g/dL, Hb < 11 g/dL	At delivery	N/A	Sepsis (puerperal)	OR	N/A
Ma, 2020[12]	China	Retrospective cohort	612264	Community based	Hb >= 110 g/L	Hb < 39.9 g/L, Hb 40 - 69 g/L, Hb 70 - 99 g/L, Hb 100 - 109.9 g/L	Unspecified	Unspecified instrument, unspecified blood sample, non-invasive	Maternal near miss	OR	Age, delivery hospital, delivery method, prenatal examination, maternal complication, anemia
Malhotra, 2002[13]	India	Prospective cohort	447	Tertiary care	Hb > 11.01 g/dL, Hb > 11 g/dL	Hb 9 - 10.09 g/dL, Hb 7 - 8.9 g/dL, Hb < 7 g/dL	Prenatal	Cyanmethaemoglobin method, unspecified blood sample	Unspecified infection/Other infection	RR	N/A
Mamo, 2017[14]	Ethiopia	Retrospective cohort	384	Tertiary care	Hct >= 33.01	Hct < 21	Third trimester	Unspecified	Surgical site infection from C-section	OR	N/A
Ojiyi, 2013[15]	Nigeria	Case-control	509	Tertiary care	Packed cell volume >= 30	Packed cell volume < 30	At delivery	Unspecified	Surgical site infection from C-section	OR	N/A
Parks, 2019[16]	South Asia	Prospective cohort	92247	Registry based	Hb >= 11 g/dL	Hb < 7 g/dL, Hb 7 - 9.9 g/dL, Hb 10 - 10.9 g/dL	Prenatal	N/A	Maternal mortality	RR	N/A
Parveen, 2025[17]	India	Retrospective cohort	74	Tertiary care	Hb >= 10 g/dL	Hb < 109 g/dL	Prenatal	N/A	Positive blood culture	OR	N/A
Rose, 2018[18]	Ethiopia	Retrospective cohort	247	Tertiary care	Hb < 10 g/dL	Hb >= 10 g/dL	Third trimester	Unspecified	Surgical site infection from C-section	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Rukuni, 2016[19]	United Kingdom	Retrospective cohort	80422	Community based	Hb >= 10 g/dL	Hb <= 10 g/dL	Prenatal	Unspecified	Maternal mortality, Postpartum infection	OR	Age, parity, smoking status, ethnicity, socio-economic status, BMI, chronic kidney disease
Sehgal, 2016[20]	India	Prospective cohort	328	Community based	Hb > 11 g%	Hb 8 - 10.9 g%	Second trimester	Unspecified	Intrapartum/ postpartum wound infection, UTI, Fever (postpartum, etc.)	RR	N/A
Shanbhag, 2021[21]	India	Prospective cohort	548	Tertiary care	Hb > 11.01 g/dL, Hb > 11 g/dL	Hb 10 - 11 g/dL, Hb 7 - 10 g/dL, Hb < 7 g/dL	At delivery	Unspecified	Surgical site infection from C-section	OR	Adjusted but unspecified
Shen, 2024[22]	China	Prospective cohort	600	Tertiary care	Hb >= 100 g/L	Hb < 1009 g/L	Prenatal	N/A	UTI	OR	N/A
Shrivastava, 2024[23]	India	Prospective cohort	102	Tertiary care	Hb 4 - 6.999 g/dL	Hb < 49 g/dL	At delivery	N/A	Maternal mortality, Sepsis (parent outcome, unspecified)	OR	N/A
Singal, 2018[24]	India	Prospective cohort	400	Tertiary care	Hb >= 10 g/dL	Hb < 9.9 g/dL	Prenatal	Unspecified	UTI	OR	N/A
Tandu-Umba, 2015[25]	Democratic Republic of the Congo	Cross-sectional	412	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	N/A	UTI	OR	N/A
Viplava, 2022[26]	India	Case-control	160	Tertiary care	Hb > 11 g%	Hb < 7 g%	At delivery	Unspecified	Maternal mortality	OR	N/A
Wodajo, 2017[27]	Ethiopia	Cross-sectional	592	Tertiary care	Hb >= 11 mg/dL	Hb < 11 mg/dL	Postnatal	N/A	Surgical site infection from C-section	OR	N/A
Yuya, 2025[28]	Ethiopia	Retrospective cohort	280	Tertiary care	Hb >= 7 g/dL	Hb < 79 g/dL	Unspecified	N/A	Maternal mortality	OR	N/A

Supplemental Table 8. Characteristics of extracted studies - Maternal hemorrhage (postpartum and antepartum)

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Abumohsen, 2021[121]	Palestine	Cross-sectional	2565	Tertiary care	Hb >= 11 g/dL, Hb 11 - 12.5 g/dL	Hb < 11 g/dL, Hb > 12.6 g/dL	First trimester	Unspecified	GH	OR	N/A
Adam, 2013[122]	Sudan	Case-control	3290	Tertiary care	Hb >= 11 mg/dL	Hb < 11 mg/dL	Prenatal	Unspecified	Preeclampsia	OR	Age groups, parity, educational level, prenatal care, and placenta previa
Aghamohammadi, 2011[123]	Iran (Islamic Republic of)	Case-control	1008	Tertiary care	Hb 11 - 13.19 g/dL	Hb > 13.2 g/dL	First trimester	Unspecified	HDOP	OR	N/A
Ajori, 2024[124]	Iran (Islamic Republic of)	Case-control	288	Primary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	Preeclampsia	OR	N/A
Ali, 2011[125]	Sudan	Case-control	130888	Community based	Hb >= 11 g/dL	Hb 7 - 10.9 g/dL, Hb < 6.9 g/dL	Prenatal	N/A	Preeclampsia, Eclampsia	OR	N/A
Ali, 2020[1]	South Asia	Retrospective cohort	130888	Registry based	Hb 11 - 12.9 g/dL	Hb < 6.9 g/dL, Hb 7 - 7.9 g/dL, Hb 8 - 8.9 g/dL, Hb 9 - 9.9 g/dL, Hb 10 - 10.9 g/dL, Hb > 13.1 g/dL	Second and third trimesters	N/A	HDOP	RR	N/A
Ameliai, 2022[126]	Indonesia	Case-control	35327595	Tertiary care	Hb > 11 g%	Hb < 10.9 g%	Prenatal	N/A	Preeclampsia	OR	N/A
Asres, 2023[127]	Ethiopia	Case-control	471	Tertiary care	Hb < 11 mg/dL	Hb >= 11 mg/dL	Prenatal	Automated hematology analyzer machine, venous blood	GH	OR	Number of abortion, chemotherapy during pregnancy, kocho or bulla during pregnancy, eaten fish during pregnancy, animal products during pregnancy, cereal during pregnancy, sweet foods/drinks

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											during pregnancy
Aweke, 2024[128]	Ethiopia	Case-control	35327595	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Preeclampsia	OR	N/A
Bilano, 2014[129]	Global	Cross-sectional	276388	Community based	Hb >= 11 g/dL	Hb < 7 g/dL	Prenatal	N/A	Preeclampsia	OR	N/A
Biradar, 2023[42]	India	Retrospective cohort	302	Primary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Preeclampsia	RR	N/A
Bone, 2022[45]	India	Prospective cohort	11085	Community based	Hb >= 11 g/dL	Hb 10 - 10.99 g/dL, Hb 7 - 9.99 g/dL, Hb < 7 g/dL	First trimester	N/A	GH, Preeclampsia	RR	N/A
Bukhari, 2022[47]	Saudi Arabia	Cross-sectional	400	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	GH, Preeclampsia	OR	N/A
Çakmak, 2018[120]	Türkiye	Retrospective cohort	1306	Tertiary care	Hb 11 - 13 g/dL	Hb < 119 g/dL, Hb > 13 g/dL	First trimester	N/A	GH	RR	N/A
Cevher, 2022[130]	Türkiye	Retrospective cohort	365	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	First trimester	Unspecified	Preeclampsia	RR	N/A
Chen, 2018[131]	Global	Retrospective cohort	82169, 86692, 120808, 124867	Community based	Hb >= 11 g/dL	Hb < 7 g/dL	Prenatal	N/A	GH, Severe preeclampsia	OR	N/A
Detlefs, 2022[52]	United States of America	Prospective cohort	20690	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	Preeclampsia, GH	OR	Age, nulliparity, education status, race and ethnicity, composite medical condition, and tobacco use
Endeshaw, 2015[132]	Ethiopia	Case-control	453	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	Preeclampsia	OR	Age, residence, MUAC, fruit and vegetable intake, coffee intake, folate intake, and anemia
Endeshaw, 2016[133]	Ethiopia	Case-control	453	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Preeclampsia	OR	N/A
Fatima, 2013[134]	Bangladesh	Case-control	100	Tertiary care	Serum ferritin	Serum ferritin <	Unspecified	Unspecified	Preeclampsia	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
					>= 120	120					
Gaillard, 2014[135]	Netherlands	Prospective cohort	7317	Community based	Hb 11.1 - 13.19 g/dL, Hct 33.1 - 38.99 , Hb > 11 g/dL	Hb < 11 g/dL, Hct < 33 , Hb > 13.2 g/dL, Hct > 39 , Hb <= 11 g/dL	First and second trimesters	N/A	GH, Preeclampsia	RR	N/A
Gonzales, 2012[136]	Peru	Retrospective cohort	379816	Community based	Hb 11 - 14.5 g/dL	Hb 4 - 6.99 g/dL, Hb 7 - 8.99 g/dL, Hb 9 - 10.99 g/dL, Hb > 14.51 g/dL	Third trimester	N/A	Preeclampsia	OR	N/A
Gonzales, 2012[9]	Peru	Retrospective cohort	5385	Community based	Hb >= 11 g/dL, Hb 11 - 14.5 g/dL	Hb 9 - 10.9 g/dL, Hb < 9 g/dL, Hb > 14.6 g/dL	Second trimester, Third trimester, Prenatal	Unspecified	Preeclampsia	OR	Gestational age at first Hb, age, altitude, maternal education, marital status, BMI, ANC, parity, GDM and cardiopathy, infection of urinary tract (current pregnancy), and history of preeclampsia.
Gonzales, 2014[137]	Peru	Retrospective cohort	161909	Community based	Hb >= 11 g/dL	Hb 9 - 10.9 g/dL, Hb 7 - 8.99 g/dL, Hb < 7 g/dL	Prenatal	Unspecified	Preeclampsia	RR	N/A
Guignard, 2020[65]	France	Nested case-control	4903	Community based	Hb >= 11 g/dL	Hb < 11 g/dL, Hb 10 - 10.99 g/dL	Prenatal	N/A	GH	OR	N/A
Hämäläinen, 2003[140]	Finland	Case-control	22799	Primary care	Hb >= 100 g/L	Hb < 100 g/L	First trimester, Second trimester, Third trimester	Unspecified	Preeclampsia	OR	N/A
Harding, 1997[138]	Australia	Prospective cohort	1276	Community based	Hb 10 - 90 Z-score	Hb < 9.99 Z-score, Hb > 89.99 Z-score	First and second trimesters	N/A	GH	OR	N/A
Harrison,	United States of	Retrospective	166566	Primary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Eclampsia, GH	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
2021[139]	America	cohort									
Jain, 2025[141]	India	Retrospective cohort	35327595	Community based	Hb >= 110 g/L	Hb < 110 g/L	First and second trimesters	N/A	GH	OR	N/A
Kaul, 2017[69]	India	Prospective cohort	767	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	Preeclampsia, Eclampsia	RR	N/A
Knottnerus, 1990[142]	Netherlands	Prospective cohort	696, 587, 658, 569, 312, 529, 362	Community based	Hb 7 - 7.9 mmol/L, Hct 33 - 37 , MCV 85 - 89	Hb < 6.9 mmol/L, Hb > 8 mmol/L, Hct < 32 , Hct > 38 , MCV < 84 , MCV 90 - 94 , MCV > 95	Third trimester	N/A	GH	RR	N/A
Kumsa, 2024[143]	Ethiopia	Retrospective cohort	35327595	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Preeclampsia	RR	N/A
Larsen, 2016[144]	Norway	Retrospective cohort	60826	Tertiary care	Hb 9 - 13.5 g/dL	Hb < 9 g/dL, Hb > 13.51 g/dL	First and second trimesters	Unspecified instrument, unspecified blood sample	Preeclampsia	OR	N/A
Lin, 2018[145]	China	Retrospective cohort	43403	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Unspecified	HDOP	RR	N/A
Lokeshwari, 2018[77]	India	Prospective cohort	200	Community based	Hb 5.1 - 8 g/dL	Hb < 4.9 g/dL	Prenatal	Unspecified	Preeclampsia, Eclampsia	RR	N/A
Luik, 2021[78]	Estonia	Prospective cohort	2334	Tertiary care	Hb > 105 g/L	Hb < 104.9 g/L	Prenatal	N/A	Preeclampsia	OR	N/A
Mahmood, 2019[81]	Pakistan	Retrospective cohort	622	Tertiary care	Hb >= 11 mg/dL	Hb < 11 mg/dL	Prenatal	Unspecified	GH, Preeclampsia, Eclampsia	OR	N/A
Malhotra, 2002[13]	India	Prospective cohort	447	Tertiary care	Hb >= 11 g/dL	Hb 9 - 10.9 g/dL, Hb 7 - 8.9 g/dL, Hb < 7 g/dL	Prenatal	Cyanmethaemoglobin method	Preeclampsia	RR	N/A
Mardani, 2017[146]	Iran (Islamic Republic of)	Prospective cohort	2821, 2824	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	GH, Eclampsia	RR	N/A
Mehrabian, 2013[147]	Iran (Islamic Republic of)	Prospective cohort	973	Tertiary care	Hb < 12.49 g/dL	Hb > 12.5 g/dL	Prenatal	Unspecified	Preeclampsia	RR	N/A
Mogaddam,	Iran (Islamic	Prospective	700	Primary care	Hb 11 - 12.4	Hb < 11 g/dL,	Second trimester	Unspecified	Preeclampsia	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
2019[148]	Republic of)	cohort			g/dL	Hb > 12.51 g/dL		instrument, unspecified blood sample			
Moges, 2025[83]	Ethiopia	Prospective cohort	35327595	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	At delivery	N/A	GH	RR	N/A
Murphy, 1986[149]	United Kingdom	Retrospective cohort	44316	Community based	Hb 10.4 - 13.2 g/dL	Hb < 10.39 g/dL, Hb > 13.3 g/dL	First trimester, Second trimester, Second and third trimesters	Unspecified	GH	RR	N/A
Nanda, 2022[150]	Indonesia	Case-control	35327595	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Preeclampsia	OR	N/A
Nordenvall, 1990[151]	Sweden	Prospective cohort	330	Primary care	Hb 110 - 130 g/L	Hb < 110 g/L, Hb > 130 g/L	Second trimester	Unspecified instrument, capillary blood, administrative medical records	Preeclampsia, GH	RR	N/A
Özgen, 2020[167]	Türkiye	Retrospective cohort	8916	Tertiary care	Hb 11 - 12.5 g/dL	Hb 10 - 10.99 g/dL	First trimester	Complete blood count analysis was performed using the coulter lh780 analyzer (beckman coulter inc., ca, usa)., venous blood	GH	OR	N/A
Phaloprakarn, 2008[152]	Thailand	Retrospective cohort	874	Community based	Hb 110 - 124 g/L	Hb > 125 g/L	First and second trimesters	N/A	Preeclampsia	RR	N/A
Prakash, 2018[153]	India	Cross-sectional	100	Tertiary care	Hb > 11 g%	Hb 10 - 10.9 g%, Hb 7 - 9.9 g%, Hb < 6.9 g%	At delivery	N/A	GH, Preeclampsia, Eclampsia	OR	N/A
Prasetya, 2020[154]	Indonesia	Case-control	35327595	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	First trimester	N/A	Preeclampsia	OR	N/A
Ratna, 2018[155]	Bangladesh	Case-control	80	Primary care	Serum ferritin <= 210	Serum ferritin > 210	Prenatal	N/A	Preeclampsia	RR	N/A
Ridho, 2021[156]	Indonesia	Case-control	35327595	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Preeclampsia	OR	N/A
Rukuni, 2016[19]	United Kingdom	Retrospective cohort	72947	Community based	Hb >= 10 g/dL	Hb <= 10 g/dL	Prenatal	Abstracted from medical records	Preeclampsia, Eclampsia, GH	OR	Age, parity, smoking status, ethnicity, socio-

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											economic status, BMI, and chronic kidney disease
Safarzadeh, 2023[99]	Iran (Islamic Republic of)	Retrospective cohort	8888	Tertiary care	Hb > 10.5 mg/dL	Hb < 10.49 mg/dL	Prenatal	Unspecified	Preeclampsia	RR	N/A
Sarin, 1995[157]	India	Prospective cohort	144129	Tertiary care	Hb >= 11 g/dL	Hb 7 - 10.9 g/dL, Hb < 6.9 g/dL	Prenatal	Tallqvist technique, capillary blood	HDOP	RR	N/A
Savajols, 2014[158]	France	Prospective cohort	339	Primary care	Hb 10.8 - 12.4 g/dL, Hb > 10.7 g/dL	Hb > 10.7 g/dL, Hb < 12.5 g/dL	At delivery	Unspecified	GH	RR	N/A
Savige, 1985[159]	Papua New Guinea	Retrospective cohort	1722	Tertiary care	Hb >= 10 g/dL, Hb >= 8 g/dL	Hb < 10 g/dL, Hb < 8 g/dL	Third trimester	Unspecified	GH	OR	N/A
Shi, 2022[103]	China	Cross-sectional	18948443	Community based	Hb >= 110 g/L	Hb 100 - 109 g/L, Hb 70 - 99 g/L, Hb < 70 g/L	Pre-conception, Prenatal	Unspecified	HDOP	OR	N/A
Smith, 2019[106]	Canada	Retrospective cohort	515270	Community based	Hb >= 11 g/dL	Hb 9 - 10.9 g/dL, Hb 7 - 8.9 g/dL, Hb < 7 g/dL, Categorical, quintile	Third trimester	Unspecified	Preeclampsia	OR	Age, parity, pre-pregnancy weight, smoking, previous cesarean delivery, alcohol use, preexisting hypertension, chronic diseases, IVF
Suryanarayana, 2017[109]	India	Prospective cohort	446	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Preeclampsia	RR	N/A
Sutan, 2022[160]	Malaysia	Cross-sectional	40212	Primary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	Preeclampsia	OR	Age <35 years, nulliparity, multiple pregnancy, history of preeclampsia, gestational hypertension and chronic hypertension

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Taeubert, 2022[161]	Netherlands	Prospective cohort	5983	Community based	Serum ferritin 42 - 63	Serum ferritin 2 - 26 , Serum ferritin 26 - 41.99 , Serum ferritin 62.99 - 96 , Serum ferritin 96 - 390	Prenatal	Cobas e411 analyzer (roche), venous blood	GH, Preeclampsia	OR	Age, ethnicity, educational level, parity, pre-pregnancy BMI, folic acid supplementation , smoking, gestational age at time of blood sampling, and C-reactive protein levels
Tandu-Umba, 2015[25]	Democratic Republic of the Congo	Prospective cohort	412	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	N/A	GH	OR	N/A
Tian, 2024[110]	China	Retrospective cohort	362023	Community based	Hb >= 110 g/L	Hb < 109.9 g/L	Prenatal	N/A	Preeclampsia	OR	N/A
Tunkyi, 2018[162]	South Africa	Prospective cohort	1433	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Complete/full blood count	GH	RR	N/A
Ulfah, 2015[163]	Indonesia	Case-control	40	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Second and third trimesters	N/A	Preeclampsia	OR	N/A
Wang, 2018[164]	China	Retrospective cohort	21577	Tertiary care	Hb 110 - 129 g/L	Hb < 110 g/L, Hb 130 - 149 g/L, Hb > 150 g/L	First trimester	Unspecified	Preeclampsia	OR	Age, pre-pregnancy BMI, gravidity, parity, education level, and gestational age at the time of Hb measurement
Wu, 2024[165]	China	Prospective cohort	35327595	Tertiary care	Hb 110 - 119 g/L	Hb < 100 g/L, Hb 100 - 109 g/L, Hb 120 - 129 g/L, Hb 130 - 139 g/L, Hb > 140 g/L	First trimester	N/A	GH	RR	N/A
Zhang, 2009[166]	China	Prospective cohort	164667	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	First and second trimesters	Unspecified	GH, Preeclampsia	RR	Age, education, occupation, parity, folic acid use, BMI, registration, first prenatal visit

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Zhao, 2022[119]	China	Retrospective cohort	1206	Tertiary care	Serum ferritin > 20 , Serum ferritin >= 20	Serum ferritin < 20	Prenatal	Unspecified	GH	OR	N/A

Supplemental Table 9. Characteristics of extracted studies - Maternal hypertension

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Akinlusi, 2018[29]	Nigeria	Retrospective cohort	2134	Community based	Hct >= 30 %	Hct < 30 %	Third trimester	N/A	Blood Transfusion	OR	N/A
Al-Zirqi, 2008[30]	Norway	Prospective cohort	307415	Community based	Hb >= 9 g/dl	Hb < 9 g/dl	Prenatal	N/A	Primary PPH	OR	N/A
Ambedkar, 2021[2]	India	Case-control	476	Community based	Hb >= 11 g%	Hb < 11 g%	Prenatal	Unspecified	APH	RR	N/A
Ambedkar, 2021[31]	India	Case-control	476	Community based	Hb >= 11 g%	Hb < 11 g%	Prenatal	Unspecified	Secondary PPH	RR	N/A
Ashwini, 2018[32]	India	Case-control	400	Community based	Hb > 11 g%	Hb < 7 g%	during labor	N/A	PPH	OR	N/A
Attali, 2024[33]	Israel	Retrospective cohort	87424	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	at_admission for delivery	Unspecified	Blood Transfusion	RR	Age, antenatal thrombocytopenia, preterm delivery, retained placenta, mode of delivery, spontaneous labor, intrauterine or intrapartum fetal death, previous repeated pregnancy, macrosomia, multiparity
Atukunda, 2014[34]	Uganda	Prospective cohort	4314	Other	Hb >= 120 g/L	Hb < 119 g/L	at_admission for delivery	Unspecified	Primary PPH	RR	N/A
Awan, 2022[35]	Pakistan	Case-control	224	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	at_admission for delivery	Unspecified	PPH	OR	N/A
Aziz, 1994[36]	Pakistan	Retrospective cohort	254	Community based	Hb >= 10 g/dl	Hb < 10 g/dl	Third trimester	Unspecified	Placental Abruption w/ blood loss	RR	N/A
Bachou, 2006[37]	India	Prospective cohort	447	Community based	Hb > 11 g/dl, Hb >= 11 g/dl	Hb 9 - 10.99 g/dl, Hb 7 - 8.99 g/dl, Hb < 7 g/dl	Prenatal	N/A	PPH	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Banavathu, 2025[38]	India	Prospective cohort	200	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	N/A	PPH	RR	N/A
Barut, 2023[39]	Somalia	Prospective cohort	1186	Community based	Hb >= 11 g/dL	Hb < 11 g/dL, Hb 10 - 10.9 g/dL, Hb 7 - 9.9 g/dL, Hb < 6.9 g/dL	Prenatal	Unspecified	PPH, Blood Transfusion	OR	Adjusted but unspecified
Bazirete, 2022[40]	Rwanda	Case-control	430	Community based	Hb >= 11 g/dl	Hb < 11 g/dl	during labor	N/A	Primary PPH	OR	N/A
Bestman, 2024[41]	China	Retrospective cohort	144845	Community based	Hb >= 110 g/L	Hb < 110 g/L	Prenatal	Unspecified	PPH	OR	Age, marital status, educational status, gravidity, maternal sociodemographics
Biradar, 2023[42]	India	Retrospective cohort	302	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	APH, Placental Abruption w/ blood loss, PPH	RR	N/A
Bloch, 2015[43]	South Africa	Retrospective cohort	15725	Tertiary care	Hb 10.6 - 11 g/dL	Hb < 9.2 g/dL, Hb 9.3 - 10 g/dL, Hb 10.1 - 10.5 g/dL, Hb 11.1 - 11.4 g/dL, Hb 11.5 - 11.8 g/dL, Hb 11.9 - 12.2 g/dL, Hb 12.3 - 12.6 g/dL, Hb 12.7 - 13.3 g/dL, Hb > 13.4 g/dL	Prenatal	Unspecified	Peripartum Hemorrhage	OR	Hospital of data collection, age in years, prenatal care, birthweight in grams, gestational age in weeks, gravidity
Bloch, 2018[44]	South Africa	Case-control	2634	Community based	Hb > 10 g/dl	Hb 9 - 9.99 g/dl, Hb 8 - 8.99 g/dl, Hb 7 - 7.99 g/dl, Hb 0 - 6.99 g/dl	Prenatal	N/A	Blood Transfusion	OR	N/A
Bone, 2022[45]	India	Case-control	11085	Community based	Hb > 11 g/dl, Hb >= 11 g/dl	Hb 10 - 10.99 g/dl, Hb 7 - 9.99 g/dl, Hb < 7 g/dl	First trimester	N/A	PPH, APH	RR	N/A
Borovac-Pinheiro, 2021[46]	Brazil	Prospective cohort	270	Community based	Hb >= 11 g/dl	Hb < 11 g/dl	Third trimester	N/A	Primary PPH	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Bukhari, 2022[47]	Saudi Arabia	Retrospective cohort	400	Community based	Hb > 11 g/dl	Hb 10 - 10.99 g/dl, Hb 7 - 9.99 g/dl, Hb 7 - 10.99 g/dl	Third trimester	N/A	Primary PPH	RR, OR	N/A
Butwick, 2017[48]	United States of America	Retrospective cohort	819, 850	Tertiary care	Hb >= 11 g/dL	Hb 10 - 10.9 g/dL, Hb < 9.9 g/dL	Third trimester	N/A	C-Section with blood loss	OR	N/A
Buzaglo, 2015[49]	Israel	Retrospective cohort	56394	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	Unspecified	Primary PPH	RR	N/A
Çakmak, 2018[120]	Türkiye	Retrospective cohort	1306	Community based	Hb 11 - 12.9 g/dL	Hb < 11 g/dL, Hb > 13 g/dL	First trimester	N/A	Primary PPH	RR	N/A
Cheng, 2025[50]	India	Prospective cohort	9292	Community based	Hb >= 10 g/dL	Hb 7 - 9.99 g/dL, Hb < 7 g/dL	Third trimester	N/A	Primary PPH	RR	N/A
Chu, 2020[51]	Taiwan (Province of China)	Retrospective cohort	13026	Community based	Hb > 10.8 g/dL, Hb > 9.9 g/dL	Hb < 10.79 g/dL, Hb < 9.89 g/dL	at_admission for delivery	N/A	PPH	OR	N/A
Detlefs, 2022[52]	United States of America	Prospective cohort	20690	Community based	Hb > 11 g/dl	Hb < 10.9 g/dl	Prenatal	N/A	Primary PPH	OR	N/A
Dewi, 2018[53]	Indonesia	Case-control	200	Community based	Hb >= 11 g/dl	Hb < 11 g/dl	Prenatal	N/A	Primary PPH	OR	N/A
Drukker, 2015[54]	Israel	Retrospective cohort	75660	Community based	Hb >= 11 g/dL	Hb < 11 g/dL, Hb 10 - 10.9 g/dL, Hb < 9.9 g/dL	at_admission for delivery	N/A	Primary PPH	OR	N/A
Dutta, 2018[55]	India	Prospective cohort	80	Community based	Hb >= 11 g/dL	Hb 10 - 10.9 g/dL, Hb 7 - 9.9 g/dL	during labor	N/A	PPH	RR	N/A
Ehrenthal, 2012[56]	United States of America	Retrospective cohort	59282	Community based	Hb > 10.5 g/dl	Hb 9.5 - 10.49 g/dl, Hb < 9.49 g/dl	Prenatal	N/A	Blood Transfusion	OR	N/A
Ernawati, 2018[57]	Indonesia	Case-control	276	Community based	Hb > 10 g/dL	Hb <= 10 g/dL	Prenatal	N/A	PPH	OR	N/A
Fareh, 2005[58]	United Arab Emirates	Retrospective cohort	200	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Primary PPH	RR	N/A
Feng, 2023[59]	China	Retrospective	532	Community	Hb > 111 g/L	Hb 91 - 110 g/L,	Prenatal	N/A	Primary PPH	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort		based		Hb < 90 g/L					
Flores, 2020[60]	Australia	Retrospective cohort	11269	Tertiary care	Hb > 110.01 g/L	Hb < 110 g/L	Prenatal	Unspecified	PPH	RR	N/A
Gabbai, 2023[61]	Israel	Case-control	87424	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	Unspecified	Blood Transfusion	OR	Age, antenatal thrombocytopenia, PTB, retained placenta, mode of delivery, spontaneous labor, intrauterine or intrapartum fetal death, previous repeated pregnancy, macrosomia, multiparity
Geelhoed, 2006[62]	Ghana	Prospective cohort	327	Tertiary care	Hb >= 10.9 g/dL	Hb < 8 g/dL	Prenatal	Unspecified	PPH	RR	N/A
Gimono, 2024[63]	Oman	Retrospective cohort	723	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	PPH	RR	N/A
Gonzales, 2012[9]	Peru	Retrospective cohort	379816	Community based	Hb 11 - 14.5 g/dL	Hb < 6.9 g/dL, Hb 7 - 8.9 g/dL, Hb 9 - 10.9 g/dL, Hb > 14.5 g/dL	Third trimester	N/A	Primary PPH	OR	N/A
Goundan, 2011[64]	India	Retrospective cohort	1769	Community based	Hb >= 10 g/dL	Hb < 9.9 g/dL	at_admission for delivery	Unspecified	Blood Transfusion	OR	Adjusted but unspecified
Guignard, 2020[65]	France	Nested case-control	4903	Community based	Hb >= 11 g/dl, Hb > 11 g/dl	Hb < 11 g/dl, Hb 10 - 10.99 g/dl, Hb < 10 g/dl	Prenatal	Unspecified	PPH	OR	Age, BMI, maternal place of birth, single mother, pre-existing medical condition, parity, interpregnancy time interval<2 years, multiple pregnancy, non-severe pregnancy-related

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											hypertensive disorders, menorrhagia, macrosomia, timing of hemoglobin level measurement
Hasegawa, 2014[66]	Japan	Case-control	738	Community based	Hb >= 11 g/dl	Hb < 11 g/dl	First and second trimesters	N/A	Placental Abruption w/ blood loss	OR	N/A
Hews-Girard, 2023[67]	Canada	Retrospective cohort	601773, 336233, 264351	Community based	Hb >= 110 g/L	Hb < 110 g/L	at_admission for delivery	N/A	PPH	RR	N/A
Jaleel, 2010[68]	Pakistan	Case-control	2386	Community based	Hb >= 11 g/dl	Hb < 9 g/dl	Prenatal	N/A	PPH	OR	N/A
Kaul, 2017[69]	India	Prospective cohort	767	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	PPH	RR	N/A
Kavle, 2008[70]	United Republic of Tanzania	Prospective cohort	256	Tertiary care	Hb > 110.01 g/L, Hb >= 110.01 g/L	Hb 90 - 110 g/L, Hb < 90 g/L	Prenatal	Unspecified	Vaginal blood loss	MD	Presence of household latrine, ownership of motorcycle
Keren, 2019[71]	China	Prospective cohort	305	Other	Hb 7 - 9 g/dL	Hb 1 - 3 g/dL, Hb 4 - 6 g/dL	Second and third trimesters	N/A	PPH	RR	N/A
Labib, 2021[72]	Egypt	Prospective cohort	100	Community based	Hb >= 11 g/dL	Hb 7 - 9.99 g/dL	Prenatal	Unspecified	PPH	RR	N/A
Lao, 1996[74]	China	Retrospective cohort	10942	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	Unspecified	Primary PPH, Secondary PPH	RR	N/A
Lao, 2022[73]	China	Retrospective cohort	1176	Community based	SFe > 15 ug/L	SFe < 14.9 ug/L	Prenatal	Unspecified	APH	OR	Parity, previous abortion history, overweight, obesity, short stature, other antenatal complications as a composite factor, PTB, previous cesarean delivery, infant

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											gender
Lao, 2022[75]	China	Retrospective cohort	120129	Community based	SFe > 15 ug/L	SFe < 14.9 ug/L	Prenatal	Unspecified	Primary PPH	RR	Age, BMI, height, parity, abortion history, labor induction, augmentation, instrumental delivery, infant macrosomia
Liu, 2021[76]	China	Case-control	33334	Tertiary care	Hb >= 9 g/dL	Hb < 9 g/dL	at_admission for delivery	Unspecified	Primary PPH	OR	Age, parity, history of PPH, IVF, irregular prenatal examination, GDM, stillbirth, induction of labor, prolonged labor, mode of delivery, placenta previa, placental abruption, placenta accreta spectrum
Lokeshwari, 2018[77]	India	Prospective cohort	200	Tertiary care	Hb 5 - 7.99 g/dL	Hb < 5 g/dL	Prenatal	Unspecified	APH	RR	N/A
Luik, 2021[78]	Estonia	Prospective cohort	2262, 2015, 2112	Community based	Hb >= 11 g/dl, Hb > 10.5 g/dl	Hb < 11 g/dl, Hb < 10.49 g/dl	First trimester, Second trimester, Third trimester	N/A	Primary PPH	OR	N/A
Luis, 2016[79]	United Kingdom	Case-control	212	Community based	Hb >= 11 g/dL	Hb < 8 g/dL	Prenatal	N/A	Primary PPH	RR	N/A
Lumbanraja, 2019[80]	India	Retrospective cohort	200	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	PPH	RR	N/A
Mahmood, 2019[81]	Pakistan	Retrospective cohort	622	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	N/A	Primary PPH	RR	N/A
Mehrnoush, 2023[82]	Iran (Islamic Republic of)	Case-control	8888	Tertiary care	Hb > 10.01 g/dL, Hb >= 10.01 g/dL	Hb 7 - 10 g/dL, Hb < 7 g/dL	Prenatal	Unspecified	PPH	OR	N/A
Moges, 2025[83]	Ethiopia	Prospective	490	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	at_admission for	N/A	PPH	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort					delivery				
Movva, 2023[84]	United States of America	Retrospective cohort	11579	Community based	Hct >= 30 %	Hct < 30 %	Prenatal	Unspecified	PPH	RR	N/A
Nair, 2016[86]	India	Retrospective cohort	1007	Tertiary care	Hb >= 10 g/dL	Hb 7 - 9.9 g/dL, Hb < 7 g/dL	Prenatal	Unspecified	Primary PPH	OR	Caste, religion, residence, below poverty line status, women's employment status, tea garden worker, parity, BMI, age, previous cesarean section, previous pregnancy problems, pre-existing medical problems, multiple pregnancies, number of antenatal visits, whether folic acid tablets were received, mode of delivery
Nair, 2021[85]	India	Prospective cohort	1342	Community based	Hb >= 100 g/L	Hb 70 - 99.99 g/L, Hb < 70 g/L	Third trimester	N/A	Primary PPH	OR	N/A
Negesa, 2024[87]	Ethiopia	Case-control	333	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PPH	OR	Adjusted but unspecified
Nur, 2021[88]	Indonesia	Case-control	10719	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PPH	OR	N/A
Nyfløt, 2017[89]	Norway	Case-control	3123	Other	Hb > 9.01 g/dL	Hb < 9 g/dL	First trimester	Unspecified	PPH	OR	Septate uterus, uni- or bicornuate uterus, uterus didelphys, myomectomy, septal removals, previous cesarean section, previous severe

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											PPH (≥1500 mL), uterine fibromas, age, ethnicity, pre-pregnancy BMI, IVF, intra-cytoplasmic sperm injection, multiple pregnancy, gestational diabetes (insulin treated or diet regulated), use of anticoagulant medications such as low molecular weight heparin in pregnancy, polyhydramnios, severe preeclampsia or HELLP syndrome, PROM, intrapartum, maternal fever (>38°C) during delivery, mode of delivery, induction of labor, oxytocin, infant birthweight
Okunade, 2024[90]	Nigeria	Prospective cohort	1222	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	Primary PPH	OR	Adjusted but unspecified
Okunade, 2024[91]	Nigeria	Prospective cohort	1222	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	Primary PPH	OR	Duration of follow-up since enrollment
Orlandini, 2017[92]	Italy	Retrospective cohort	1131	Community based	Hb >= 11 g/dL	Hb 9 - 10.9 g/dL	Third trimester	N/A	Primary PPH	RR	N/A
Owiredu, 2016[93]	Ghana	Retrospective cohort	271	Community based	Hb >= 11 g/dl	Hb < 10 g/dl	Third trimester	N/A	Primary PPH	OR	N/A
Parks, 2019[16]	South Asia	Prospective	92247	Community	Hb >= 11 g/dl,	Hb < 7 g/dl, Hb	Prenatal	N/A	PPH	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort		based	Hb > 11 g/dl	7 - 9.99 g/dl, Hb 10 - 10.99 g/dl					
Prata, 2011[94]	Egypt	Retrospective cohort	2510	Community based	Hb > 11.01 g/dL	Hb < 11 g/dL	Prenatal	N/A	Primary PPH	OR	N/A
Randall, 2019[95]	Australia	Retrospective cohort	31571	Community based	Hb 110 - 130 g/L	Hb 82 - 110 g/L, Hb > 130.01 g/L	Prenatal	Unspecified	PPH	RR	N/A
Randall, 2019[96]	Australia	Retrospective cohort	31906	Community based	Hb 110 - 139 g/L	Hb < 109 g/L, Hb > 140 g/L	First and second trimesters	Unspecified	APH, PPH	RR	N/A
Ray, 2020[97]	Canada	Retrospective cohort	737393	Community based	Hb 125 - 129 g/L	Hb < 89.9 g/L, Hb 90 - 94 g/L, Hb 95 - 99 g/L, Hb 100 - 104 g/L, Hb 105 - 109 g/L, Hb 110 - 114 g/L, Hb 115 - 119 g/L, Hb 120 - 124 g/L, Hb 130 - 134 g/L, Hb 135 - 139 g/L, Hb 140 - 144 g/L, Hb 145 - 149 g/L, Hb > 150 g/L	First trimester	N/A	Blood Transfusion	OR	N/A
Rukuni, 2016[19]	United Kingdom	Retrospective cohort	80422	Community based	Hb > 10 g/dl	Hb < 9.9 g/dl	Prenatal	N/A	Primary PPH	OR	N/A
Saadah, 2016[98]	Indonesia	Retrospective cohort	90	Community based	Hb > 11 g/L	Hb < 10.9 g/L	Unspecified	N/A	PPH	OR	N/A
Safarzadeh, 2023[99]	Iran (Islamic Republic of)	Retrospective cohort	8631	Community based	Hb > 10.5 mg/dl	Hb < 10.49 mg/dl	at_admission for delivery	Unspecified	PPH, Blood Transfusion	OR	Age, education, residency place, access to prenatal care, smoking, parity, labor induction, fetal presentation, method of delivery
Salomon, 2021[100]	France	Prospective cohort	4034	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	at_admission for delivery	Unspecified	PPH	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Salunkhe, 2021[101]	India	Prospective cohort	1876	Community based	Hb > 11 g%	Hb < 10.9 g%	Unspecified	N/A	APH	RR	N/A
Satriyandari, 2017[102]	Indonesia	Case-control	80	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	during labor	N/A	Secondary PPH	OR	N/A
Shi, 2022[103]	China	Retrospective cohort	18948443	Community based	Hb >= 110 g/L	Hb 100 - 109.99 g/L, Hb 70 - 99.99 g/L, Hb < 70 g/L	Prenatal	Unspecified	PPH	OR	Age, social support, previous maternal hemorrhage, mode of delivery, trauma, coagulation disorders, placental abnormalities, uterine scar atony, prolonged labor, parity, maternal hypertension/pre-eclampsia, diabetes, hypercholesterolemia
Shrivastava, 2024[23]	India	Prospective cohort	102	Tertiary care	Hb 4 - 6.99 g/dL	Hb < 4 g/dL	at_admission for delivery	N/A	PPH	RR	N/A
Singal, 2018[24]	India	Case-control	400	Community based	Hb > 11 g/dl	Hb < 9.9 g/dl	Prenatal	N/A	Primary PPH	OR	N/A
Singh, 1998[104]	Singapore	Retrospective cohort	3728	Community based	Hb >= 11 g/dl	Hb < 11 g/dl	Third trimester	Unspecified	Primary PPH	RR	N/A
Skjeldestad, 2012[105]	Norway	Prospective cohort	32716, 47942	Community based	Hb > 9 g/dL	Hb < 8.9 g/dL	Prenatal	N/A	Primary PPH	OR	N/A
Smith, 2019[106]	Canada	Retrospective cohort	515270	Community based	Hb > 11 g/dl, Hb >= 11 g/dl	Hb 9 - 10.99 g/dl, Hb 7 - 8.99 g/dl, Hb < 7 g/dl	Third trimester	N/A	Blood Transfusion	OR	N/A
Soltan, 2007[107]	Egypt	Prospective cohort	1200 (300 controls)	Other	Hb >= 10.5 g/dL	Hb < 10.5 g/dL	Prenatal	N/A	Primary PPH	RR	N/A
Soltan, 2012[108]	Egypt	non-randomized trial	200	Tertiary care	Hb > 11.01 g/dL, Hb > 11	Hb 9 - 11 g/dL, Hb 7 - 9 g/dL,	at_admission for delivery	Unspecified	Primary PPH	RR, MD	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
					g/dL	Hb < 7 g/dL					
Suryanarayana, 2017[109]	India	Prospective cohort	446	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	PPH	RR	N/A
Tian, 2024[110]	China	Prospective cohort	362023	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Unspecified	PPH	RR	N/A
Tsu, 1993[111]	Zimbabwe	Case-control	450	Community based	Hb >= 12 g/dl	Hb < 12 g/dl	Prenatal	N/A	Primary PPH	OR	N/A
Tzur, 2012[112]	Israel	Retrospective cohort	33888	Community based	Hb >= 10 g/dL	Hb < 9.9 g/dL	First trimester	N/A	PPH	OR	N/A
Ummah, 2018[113]	Indonesia	Case-control	102	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	PPH	OR	N/A
Viplava, 2022[26]	India	Retrospective cohort	160	Community based	Hb > 11 g%	Hb < 6.9 g%	at_admission for delivery	N/A	PPH	OR	N/A
Wang, 2021[114]	China	Case-control	330	Community based	Hb >= 10 g/dl	Hb < 10 g/dl	Prenatal	Unspecified	Primary PPH	OR	Placenta previa, emergency surgery, general anesthesia
Wetta, 2013[115]	United States of America	Prospective cohort	1798	Other	Hb >= 9 g/dl	Hb < 9 g/dl	Prenatal	Unspecified	PPH	OR	Obesity, labor induction, twins, hydramnios, anemia, protracted second stage of labor, race/ethnicity, preeclampsia, chorioamnionitis
Xing, 2019[116]	China	Retrospective cohort	13328	Community based	Hb >= 100 g/L	Hb < 99.9 g/L	Prenatal	Unspecified	Blood Transfusion	OR	Adjusted but unspecified
Yang, 2016[117]	China	Prospective cohort	623	Tertiary care	Hb >= 110 g/L	Hb < 110 g/L	First trimester, Second trimester, Third trimester	Unspecified	PPH	OR	Age, parity/gravidity, macrosomia, preeclampsia, PROM placenta previa, prolonged labor, platelet reduction

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Yuliati, 2018[118]	Indonesia	Case-control	110	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	Primary PPH	OR	N/A
Zhao, 2022[119]	China	Retrospective cohort	1206	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Primary PPH	RR	N/A

Supplemental Table 10. Characteristics of extracted studies - Peripartum depression

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Adler, 2021[168]	Israel	Cross-sectional	26,520	Community based	Hb>10.51 g/dl, Continuous	Hb<10.5 g/dl, Continuous	Pre and postpartum	Abstracted from medical records	Peripartum Depression (EPDS>10)	OR	N/A
Aishwarya, 2025[169]	India	Prospective cohort	184	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	28 weeks of gestation	Blood Sample, Biomarker (Human)	Elevated Depressive Symptoms (EPDS > 13)	OR	N/A
Akbari, 2008[195]	Iran (Islamic Republic of)	Prospective cohort	159	Community based	Hb>11 g/dl	Hb<10.9 g/dl	Third trimester	Unspecified instrument, non-invasive blood sample	Peripartum Depression (EPDS>10)	RR	N/A
Al Khames, 2020[170]	Jordan	Prospective cohort	680	Community based	Continuous	Continuous	First and second trimesters	Unspecified	Peripartum Depression (Unspecified)	N/A	N/A
Albacar, 2011[171]	Spain	Cross-sectional	729	Community based	Ferritin ≥ 7.26 ug/L	Ferritin<7.26 ug/L	Postpartum	Immunoassay, unspecified blood sample	Depressive Disorders (EPDS>9)	Chi-square test	C-reactive protein, employment status
Alfayumi-Zeadna, 2023[172]	Israel	Ecological/cross sectional longitudinal	305	Community based	Hb >= 12 mg/dl	Hb < 12 mg/dl	2-4 months postpartum	Unspecified	Peripartum Depression (EPDS > 10 or greater)	correlation coefficient	N/A
Alharbi, 2014[173]	Saudi Arabia	Case-control	352	Tertiary care center	Hb ≥ 11 g/dL	Hb <11 g/dL	Postpartum, prenatal	Abstracted from medical records	Peripartum Depression (EPDS>10)	OR	Age, education, parity, delivery type
Anjum, 2019[174]	Pakistan	Cross-sectional	400	Community based	Continuous	Continuous	Unspecified	Unspecified	Peripartum Depression (EPDS; not depressive 0-9, minor depressive symptoms 10-12, major depressive 13+')	Chi square test	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Armony-Sivan, 2012[175]	China	Prospective cohort	704	Community based	Hb>110 g/l, Continuous, soluble transferrin receptor>14 mg/kg	Hb<109.9 g/l, Continuous, Categorical	Second trimester, Third trimester, postpartum	Abstracted from medical records	Postpartum Depression (EPDS>10)	MD	Education, birth weight, age, gestational age, and annual income
Aubuchon-Endsley, 2012[176]	United States of America	Prospective cohort	105	Community based	Hb > 14 g/dl	Hb < 13.9 g/dl	Prenatal or Postpartum (when infants were exclusively breastfed)	Venous Blood Sample, Venous Blood, Biomarker (Human)	Peripartum Depression (Symptom checklist 90 revised (SCL-90-R))	correlation coefficient	N/A
Babah, 2025[177]	Nigeria	Prospective cohort	438	Community based	Hb 10 - 10.9 g/dL, Hb >= 11 g/dL	Hb 7 - 9.9 g/dL, Hb < 7 g/dL, Hb 10 - 10.9 g/dL	At enrollment, Four weeks post enrolment	Blood Sample, Biomarker (Human)	Depression at Two Weeks Postpartum (EPDS > 10)	OR	N/A
Babandi, 2023[178]	Nigeria	Comparative cross-sectional (urban vs rural)	295	Community based	Hb≥11 g/dL	Hb<11 g/dL	Unspecified	Unspecified	Mild Depression (doctor's diagnosis)	Chi Square Test, OR	N/A
Babu, 2018[179]	India	Prospective cohort	823	Community based	Hb ≥ 11 g/dL	Hb <11g/dL	Prenatal	Unspecified	Mental distress (Kessler Psychological Distress Scale (K-10 Scale))	OR	Age, gestational age, parity
Bae, 2010[180]	Republic of Korea	Case-control	114	Tertiary care center	Hb>11 g/dl, hematocrit>33%	Hb & Hematocrit (continuous)	Prenatal	Abstracted from medical records	Peripartum Depression (Beck Depression Inventory (BDI))	T-test for mean difference	N/A
Bansil, 2010[181]	United States of America	Case-control	2,472,308	Secondary analysis	Continuous	ICD codes (ICD-9-CM: 648.2, 280-285)	Prenatal	Hospital discharge data, unspecified blood sample	Peripartum Depression (ICD-9 CM diagnosis)	OR	Age, insurance status, location, region
Basutkar, 2021[182]	India	Prospective cohort	120	Secondary care center	Hb ≥ 11 g/dL	All participants had Hb between 7 to <11 g/dL	Second and third trimesters	Unspecified	Peripartum Depression (EPDS >=12)	MD	Age, education, household income, occupation, diet, sun exposure, season of vitamin D measurement,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											and parity
Basutkar, 2022[183]	India	Cross-sectional	210	Secondary care center	Hb ≥ 11 g/dL	Hb 9-10.9 g/dL; Hb 7-8.9 g/dL; Hb<7 g/dL	Second and third trimesters	Unspecified instrument, venous blood sample	Depression (Validated Tamil version of the Edinburg Depression Scale)	Pearson correlation	Education level, occupation, income, marital status, gravida, abortion, diet, social habits of husband, current use of iron supplements
Beard, 2005[184]	South Africa	Randomized controlled trial	95	Community based	Hb>115 g/l	Hb concentration (continuous)	Postpartum	HemoCue, venous blood sample	Postpartum Depression (Unspecified)	Pearson correlation	N/A
Chandrasekaran, 2018[185]	Canada	Prospective cohort of women with c-section	103	Community based	Continuous	Continuous	Third trimester, postpartum	Unspecified instrument, venous blood sample	Peripartum Depression (EPDS>10)	OR	Age, parity, prenatal vitamins, breastfeeding at week 6
Cheng, 2023[186]	Malawi	Cross-sectional	565	Community based	Hb>110.1 g/L	Hb<110 g/L	Pre and postpartum	HemoCue HB201 point-of-care hemoglobin analyzer, capillary blood sample	Peripartum Depression (Patient Health Questionnaire-9)	OR	Age, education, parity, employment status, more than one wife, na
Corwin, 2003[187]	United States of America	Prospective cohort	37	Community based	Hb ≥ 12 g/dL	Postpartum Hb <12 g/dL	Postpartum	Finger-prick blood, portable hemoglobin analyzer, non-invasive blood sample, physical measurement (human)	Depressive Disorders (The Center for Epidemiological Studies Depressive Symptomology Scale)	Pearson correlations, chi-square test	Parity, marital status, feeding methods, ethnicity
Dama, 2018[188]	Canada	Cross-sectional study using retrospective chart review	142	Community based	Ferritin>12 ug/l	Ferritin<11.9 ug/l	Second and third trimesters	Chemiluminescent microparticle immunoassay, venous blood sample, abstracted from medical records	Peripartum Depresstion (EPDS >=12)	OR	Past history of depression, a history of anxiety, overweight or obesity, multiparity, and current use of iron supplements

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Eckerdal, 2016[189]	Sweden	Nested case-control	449	Community based	Hb ≥ 11 g/dL	Hb <11 g/dL	Postpartum	Capillary blood sample, abstracted from medical records	Peripartum Depression (EPDS >=12)	OR	Previous psychological contact, mood during pregnancy, and lack of exclusive breastfeeding at 6 weeks postpartum
Evanchuk, 2024[190]	Canada	Prospective cohort		Community based	Continuous, SFe>15 ug/L, SFe≥15 ug/L	Continuous, SFe>15 ug/L, SFe<15 ug/L	Second and third trimesters, Pre and postpartum	Enzyme-linked immunosorbent assays (R&D systems), venous blood sample, i2000SR architect plus blood analyzer machine (Abbott)	Peripartum Depression (Unspecified	Beta coefficient	Age, third trimester maternal iron supplementation (mg/d), ethnicity, income, education, Canada's Food Guide scores, GDM, pre-eclampsia, iron and vitamin d supplementation (pregnancy) and season
Goshtasebi, 2013[191]	Iran (Islamic Republic of)	Prospective cohort	254	Community based	Hb ≥ 11 g/dL	Hb <11 g/dL	Third trimester	Cyanmethemoglobin, venous blood sample	Peripartum Depression (EPDS>=13)	OR	Age, education level, type of delivery, newborn's sex, and gestational age at delivery
Hameed, 2022[192]	Palestine	Case-control	300	Community based	Continuous	Continuous	Postpartum	Complete blood count, venous blood sample	Peripartum Depression (EPDS>10)	MD, OR	N/A
Hasdemir, 2022[193]	Türkiye	Cross-sectional	408	Tertiary care center	Hb ≥ 11 g/dL	'IDA': Hb <11 g/dL in first and third trimesters, <10.5 g/dL in second trimester	Prenatal, First trimester, Second trimester, Third trimester	Coulter LH780 hematology analyzer, venous blood sample	Peripartum Depression (EPDS>12)	T-test for mean difference, and Chi-squared, OR	Age, education level, marital status, number of pregnancies
Hochman, 2023[194]	Israel	Retrospective cohort	104,715	Tertiary care center	Continuous	Hct (categorical (change in Hct: minimal, intermediate, maximal) and	First and second trimesters	Unspecified	Peripartum Depression (Unspecified)	Multivariate logistic regression of association between change	Age, marital status, country of birth, socioeconomic status, pre-

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
						continuous)				in Hct (categorical) and PPD; sensitivity of association between change in Hct (continuous) and PPD	pregnancy BMI, past psychiatric disorders, number of previous live births, gestational complications
Kemppinen, 2022[197]	Finland	Prospective cohort	4383	Community based	Hb≥11 g/dL	Hb<11 g/dL	Second and third trimesters	Unspecified instrument, venous blood sample	Peripartum Depression (EPDS >=10)	OR	Age, parity and smoking during pregnancy, maternal education, gestational age
Kemppinen, 2025[196]	Finland	Prospective cohort	1273	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Blood Sample, Capillary Blood, Biomarker (Human)	Postpartum Depression (EPDS > 12)	OR	N/A
Kim, 2012[198]	Republic of Korea	Prospective cohort	197	Secondary analysis, Tertiary care center	Continuous	Hb (continuous)	Postpartum	Blood test, unspecified blood sample	Peripartum Depression (Beck Depression Inventory (BDI) in Korean)	T-test for mean difference in Hb concentration among participants within categories of depression	Age, monthly income education, BMI
Kwak, 2022[199]	Republic of Korea	Prospective cohort	4067	Tertiary care center	Hb ≥ 11 g/dL	Hb <11 g/dL	First trimester	Unspecified	Depression (EPDS>10)	OR	Age, parity, maternal BMI, marital status, household income, gestational weight gain, low birth weight, small for gestational age, or hypertensive disorders of pregnancy
Kwak, 2025[200]	Republic of Korea	Retrospective cohort	3310	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Blood Sample, Unspecified Blood Sample, Biomarker (Human)	Postpartum Depression (EPDS > 10)	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
La Verde, 2024[201]	Israel	Prospective cohort	211	Community based	Hb>11 g/dl	Hb<10.9 g/dl	Third trimester	Unspecified instrument, venous blood sample	Peripartum Depression (EPDS>10)	OR	Age, level of education, marital and employment status, spontaneous previous abortions, mode of delivery, eclampsia, gestational diabetes, the Apgar index at the 1st and 5 min, relationship with the partner, family conflicts, socio-economic situation
Lukose, 2014[202]	India	Cross-sectional study	365	Community based	Hb>11 g/dl	Hb<10.9 g/dl	First trimester	Venous blood - coulter counter (ABX Pentra C+, Horiba medicals, CA, US), venous blood sample	Peripartum Depression (Kessler Psychological Distress Scale)	Prevalence ratio	N/A
Maeda, 2020[203]	Japan	Prospective cohort	977	Tertiary care center	Hb ≥ 11 g/dL	Hb tertiles &Hb <10.5 g/dL, Hb <11 g/dLPostpartum: Hb <10 g/dL	Second trimester, Third trimester, postpartum	Unspecified	Peripartum Depression (EPDS≥9)	OR	Age, parity, maternal education, household income, gestational week at delivery, and mode of delivery
Ohsuga, 2022[204]	Japan	Retrospective cohort	31	Tertiary care center	Hb ≥ 11 g/dL	Hb <11 g/dL	First and second trimesters	Unspecified	Perinatal Depressive Symptoms (EPDS>9)	T-test and Wilcoxin signed rank test for the mean differences in EPDS scores with and without non-anemic iron deficiency	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Parhizkar, 2013[205]	Iran (Islamic Republic of)	Cross-sectional	400	Community based	Hb>12 g/dl	Hb<11.9 g/dl	Postpartum	Unspecified	Postpartum Depression (EPDS>10)	OR	N/A
Paterson, 1994[206]	United Kingdom	Prospective cohort	1,010	Tertiary care center	Hb ≥ 10.5 g/dL	Hb <10.5 g/dL	Pre and postpartum	Unspecified	Peripartum Depression (EPDS>14)	Chi-square test for difference in proportion of participants with depression among anemic vs non-anemic	Age, marital status, social class, infant feeding method
Raisanen, 2014[207]	Finland	Cross-sectional	511,938	Community based	Hb>100 g/l	Hb<99.9 g/l	Prenatal	Finnish health system, unspecified blood sample	Peripartum Depression (ICD-10 codes)	OR	history of depression prior to pregnancy, age, parity, smoking status, marital status, socioeconomic status,prior miscarriages, prior terminations, IVF, anaemia, gestational diabetes, pre-existing diabetes, fear of childbirth and fetal sex.
Sparling, 2020[208]	Bangladesh	Cross-sectional analysis	961	Community based	Hb>11 g/dl	Hb<10.9 g/dl	Pre and postpartum	HemoCue, capillary blood sample	Peripartum Depression (EPDS≥12)	OR	Age, age at first marriage, time since first marriage, religion, wealth, household size, live births, stillbirth in last year, woman's education, literacy, breastfeeding status, duration of breastfeeding, whether the woman had never had a child before, woman's agency

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											in four domains (mobility, support, decision-making and inter-personal communication), interviewer, food insecurity, household food consumption score, minimum woman's dietary diversity, BMI
Tian, 2022[209]	China	Retrospective cohort	519	Community based	Hb ≥ 11 g/dL	Hb 10 g/dL to <11 g/dL, Hb 7 g/dL to <10 g/dL; Hb <7 g/dL	Third trimester	Automated hematology analyzer, unspecified blood sample	Peripartum Depression (EPDS>9)	OR	Age, BMI, education level, occupational status, marital status, planed/unplanned pregnancy, gravidity, parity, history of c-section
Titi, 2024[210]	Israel	Retrospective cohort	435	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	six weeks after childbirth	Self-Report	Depression (EPDS > 11)	OR	N/A
Tran, 2013[211]	Viet Nam	Prospective cohort	497	Community based	Hb ≥ 11 g/dL	Iron deficiency, Hb <11 g/dL	Second and third trimesters	HemoCue AB, non-invasive	Mental Disorders (EPDS>4)	B-coefficients from structural equation modelling to test whether persistent antenatal depression contributed to iron-deficiency anemia	Variable depending on the pathway
Vindhya, 2019[212]	India	Cross-sectional	280	Tertiary care center	Hb ≥ 11 g/dL	Hb <11 g/dL	First and second trimesters	Medical records, unspecified blood sample	Prenatal Depression (Unspecified)	OR	Unclear
Woldetensay, 2018[213]	Ethiopia	Prospective cohort	506	Community based	Hb ≥ 11 g/dL	Hb <11 g/dL after adjusting for altitude as described by Cohen and Hass	Prenatal	HemoCue HbB01 system for mobile screening, non-invasive,	Peripartum Depression (Patient health questionnaire-9)	OR	Age, religion, marital status, education, family size, wealth index,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
								physical measurement (human)			location, household food insecurity, fasting, mid-upper arm circumference, chewing tobacco, nutrition related knowledge, maternal social support, intimate partner violence
Yilmaz, 2017[214]	Türkiye	Cross-sectional	450	Community based	Hb>11 g/dl	Hb<10.9 g/dl	Third trimester	Hb analyzer (Hemocue); Eurotrol, BV Netherlands), venous blood sample	Depressive Disorders (EPDS>13)	Correlation coefficient	N/A

Supplemental Table 11. Characteristics of extracted studies - Neonatal outcomes (combined)

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Aballo, 2025[215]	Ghana	Retrospective cohort	389	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	First trimester, Second trimester, Third trimester	N/A	PTB, LBW	OR	N/A
Abdelmoneim, 2004[216]	Saudi Arabia	Case-control	7812	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Abstracted from medical records	LBW	OR	Age, weight of the mother, work of the mother, parity, systolic BP, baby weight, newborn sex
Abdullah, 2012[217]	Indonesia	Case-control	160	Community based	Hb >= 11 g%	Hb < 119 g%	Prenatal	Unspecified	Neonatal mortality	OR	N/A
Abera, 2019[218]	Ethiopia	Cross-sectional	380	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified instrument, venous blood sample	LBW	OR	Residence, maternal education, wealth index, height of mothers, additional meal at pregnancy, deworming at pregnancy, maternal MUAC, parity, frequency of ANC follow-up, hyperemesis gravidurium, frequency of taking dairy products, frequency of eating eggs
Abeysena, 2010[219]	Sri Lanka	Prospective cohort	817	Community based	Hb 10.4 - 13.9 g/dL	Hb < 10.39 g/dL, Hb > 14 g/dL	First and second trimesters	Direct cyanmethemoglobin method, venous blood sample	LBW, PTB, SGA	OR	Age <15 years, pre-existing diabetes, hypertension, multiple pregnancy
Abioye, 2023[220]	United Republic of Tanzania	Prospective cohort	724	Other	Hb >= 110 g/L	Hb < 110 g/L	Prenatal	Unspecified	Stillbirth, Perinatal mortality,	RR, MD	Age, diet, BMI, parity/gravidity/

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
									Neonatal mortality, LBW, SGA, BW (continuous), Birthweight for age (unspecified), PTB, PTB (<32 wk)		gestational age
Adam, 2019[221]	Ghana	Case-control	360	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	First trimester	Abstracted from medical records	LBW	OR	Gestational age at delivery, educational level of mother, supplementary iron intake, who mother lived with during pregnancy, hospital admission during pregnancy
Adane, 2018[222]	Ethiopia	Retrospective cohort	662	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	LBW	OR	N/A
Adjei-Gyamfi, 2023[223]	Ghana	Cross-sectional	356	Primary care	Hb 11 - 13.1 g/dL	Hb < 11 g/dL, Hb > 13.2 g/dL	First trimester, Third trimester	N/A	LBW, BW (> 4000 g)	OR	N/A
Adjei-Gyamfi, 2024[224]	Ghana	Retrospective cohort	422	Tertiary care	Hb 110 - 131.99 g/L	Hb < 110 g/L, Hb > 132 g/L	First trimester, Second trimester, Third trimester	N/A	SGA, LGA	OR	N/A
Agrawal, 2017[225]	India	Retrospective cohort	2050	Tertiary care	Hb > 9.1 g/dL	Hb < 8 g/dL, Hb 8.1 - 9 g/dL	Third trimester	Unspecified	Perinatal mortality	RR	N/A
Ahankari, 2017[226]	India	Retrospective cohort	655	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Sahli Method, capillary blood sample	PTB, LBW	OR	N/A
Ahankari, 2017[227]	India	Prospective cohort	303	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	First and second trimesters	Sysmex XP-100 automated analyser (Sysmex Corporation, Japan), venous blood sample	LBW	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Ahmad, 1997[230]	Malaysia	Retrospective cohort	9860	Community based	Hb > 11 g/dL, Hb > 11.01 g/dL	Hb < 9 g/dL, Hb 9 - 10.9 g/dL	Third trimester	Photocalorimetric methods, unspecified blood sample	LBW, BW (> 4 kg)	RR	N/A
Ahmad, 2017[228]	Pakistan	Prospective cohort	200	Community based	Hb >= 10 g/dL	Hb < 8 g/dL, Hb 8 - 8.9 g/dL, Hb 9 - 9.9 g/dL, Hb < 10 g/dL	Prenatal	Abstracted from medical records	LBW, BW (continuous)	RR, MD	N/A
Ahmad, 2022[229]	Pakistan	Prospective cohort	160	Tertiary care	Hb >= 12 g/dL	Hb < 12 g/dL, Hb 10 - 11.88 g/dL, Hb 8 - 9.9 g/dL, Hb < 8 g/dL	Prenatal	Unspecified	PTB, LBW	OR	N/A
Ahmed, 2018[231]	Ethiopia	Case-control	279	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	Adjusted but unspecified
Ahn, 2021[232]	Republic of Korea	Retrospective cohort	1072	Community based	SFe 0 - 9.1 ug/L, SFe < 25 ug/L	SFe 9.2 - 13.8 ug/L, SFe 13.9 - 20.3 ug/L, SFe 20.4 - 482.4 ug/L, SFe >= 75 ug/L	Third trimester	CLIA (Chemiluminoscense Immuno Assay) from ADVIA Centaur® Ferritin assay, Siemens Healthcare Diagnostics Ltd., Surrey, UK, venous blood sample, abstracted from medical records	PTB (<33.99 wk), PTB, LBW	RR	Age, parity, BMI, white blood sample cell count, hemoglobin, gestational weeks measured for ferritin, previous PTB history, GDM, preeclampsia, placental problems
Aimakhu, 2003[233]	Nigeria	Retrospective cohort	735	Community based	PCV > 30 %	PCV 27 - 29 %, PCV 19 - 26 %	Third trimester	Unspecified	Stillbirth, Neonatal mortality, BW (continuous)	RR, MD	N/A
Al-Sibai, 1987[234]	Saudi Arabia	Retrospective cohort	208	Community based	Hb > 10.61 g/dL	Hb < 10.6 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Alemu, 2016[236]	Ethiopia	Retrospective cohort	11872	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	BW (unspecified BW)	OR	Age, educational status, literacy level, region, urban/rural residence,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											wealth status by quintiles, absence of key household goods like electricity, radio, refrigerator, telephone, television, household, access to improved toilet facilities, access to safe water supply, child age, sex, birth weight, level of anemia, birth interval, whether the child is alive or not during the interview, singleton versus twin pregnancy, maternal reproductive, level of maternal anemia, number of births last year/last five years, knowledge about the reproductive system indicated by awareness of the ovulary cycle, cigarette, addictive substances during pregnancy
Alemu, 2020[235]	Ethiopia	Prospective cohort	341	Community based	Hb >= 10 g/dL	Hb < 9.9 g/dL	First trimester, Second trimester	Mindray BS-200E, chemistry analyzer, venous blood sample	LBW	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Ali, 2011[125]	Sudan	Retrospective cohort	9578	Community based	Hb >= 11 g/dL	Hb 7 - 10.9 g/dL, Hb < 7 g/dL	Prenatal	HemoCue, unspecified blood sample	PTB, LBW, Stillbirth	OR	Age, parity, education, residence, ANC
Ali, 2020[1]	South Asia	Prospective cohort	130888	Community based	Hb 11 - 12.9 g/dL	Hb < 7 g/dL, Hb 7 - 7.99 g/dL, Hb 8 - 8.99 g/dL, Hb 9 - 9.99 g/dL, Hb 10 - 10.99 g/dL, Hb > 13 g/dL	Prenatal	Unspecified	Stillbirth, Neonatal mortality, LBW	OR	Age, education, parity, BMI, gestational age
Alizadeh, 2014[237]	Iran (Islamic Republic of)	Prospective cohort	108	Community based	Hb 11 - 13.2 g/dL, Hb 10.5 - 13.2 g/dL	Hb > 13.201 g/dL, Hb < 10.499 g/dL, Hb < 11 g/dL	Prenatal, Second trimester, Third trimester	Coulter Counter, venous blood sample	BW (continuous)	MD	N/A
Alizadeh, 2014[238]	Iran (Islamic Republic of)	Cross-sectional	276	Tertiary care	Hb 10.5 - 12.5 g/dL	Hb < 10.49 g/dL, Hb > 12.51 g/dL	Third trimester	Unspecified	BW (continuous)	MD	N/A
Alvarez, 2019[239]	Cuba	Case-control	90	Tertiary care	Hb >= 110 g/L	Hb < 110 g/L	Prenatal	Abstracted from medical records	LBW	OR	N/A
Alwan, 2015[240]	United Kingdom	Prospective cohort	362	Community based	Hb >= 105 g/L, SFe >= 15 ug/L, Hb >= 110 g/L	Hb < 105 g/L, SFe < 15 ug/L, Hb < 110 g/L	First trimester	ELISA (Demeditec Diagnostics GmbH), venous blood sample	SGA, PTB (unspecified GA), PTB	OR, MD	Age pre-pregnancy BMI, ethnicity, parity, smoking, gestational diabetes, preeclampsia, area deprivation score (index of multiple deprivation)
Anchang-Kimbi, 2020[241]	Cameroon	Retrospective cohort	465	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	LBW	OR	N/A
Appiah, 2020[242]	Ghana	Cross-sectional	1029	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	Stillbirth	OR	Adjusted but unspecified
Arafa, 1998[243]	Egypt	Prospective cohort	832	Community based	Hb >= 11 g/dL	Hb 10 - 10.9 g/dL, Hb 9 - 9.9 g/dL, Hb < 8.9 g/dL	First trimester, Third trimester	Cyanmethemoglobin, venous blood sample	PTB	OR	Family history, weight, no antenatal care, early vaginal bleeding
Aranda, 2013[244]	Spain	Retrospective	300	Tertiary care	Hb < 130 g/L	Hb > 130.01 g/L	Third trimester	Unspecified	PTB	MD, OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort							(unspecified GA), BW (continuous), BW (unspecified BW)		
Arbedili, 2024[245]	Iran (Islamic Republic of)	Prospective cohort	600	Tertiary care	Hb 11 - 12.4 g/dL	Hb < 11 g/dL, Hb > 12.5 g/dL	Second trimester, Third trimester	N/A	PTB, LBW (< 2490 g)	RR	N/A
Ardic, 2019[246]	Türkiye	Retrospective cohort	483	Community based	Hb >= 11 g/dL	Hb 10 - 10.9 g/dL, Hb < 9.9 g/dL	First and second trimesters	Unspecified	PTB	OR	N/A
Ashley, 1994[247]	Jamaica	Cross-sectional	11766	Community based	Hb 11 - 12.9 g/dL	Hb < 8 g/dL, Hb 8 - 9.9 g/dL, Hb 10 - 10.9 g/dL, Hb > 13 g/dL, Categorical, ordinal	Prenatal	Unspecified	Perinatal mortality, Stillbirth	OR	Age, syphilis, vaginal discharge, bleeding < 28 weeks, bleeding 28 weeks +, highest diastolic, first diastolic, highest proteinuria, antenatal eclampsia, diabetes
Ashwini, 2018[32]	India	Retrospective cohort	400	Community based	Hb > 11 g%, Hb >= 11 g%	Hb 4 - 7 g%, Hb < 4 g%	Third trimester	Unspecified	PTB, SGA, Stillbirth, Neonatal mortality	RR	N/A
Awor, 2022[248]	Uganda	Prospective cohort	1004	Community based	Hb < 9.49 g/dL	Hb 9.5 - 12.1 g/dL, Hb > 12.11 g/dL	Prenatal	Unspecified	Stillbirth	OR	Personal history of preeclampsia, history of abortion, unilateral and bilateral uterine artery Dopler indices
Aynie, 2020[249]	Ethiopia	Retrospective cohort	292	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Aziz, 2021[250]	Pakistan	Retrospective cohort	90	Tertiary care	Hb < 10.5 g/dL	Hb < 10.49 g/dL	Third trimester	Unspecified	PTB	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Badi, 2021[251]	Sudan	Retrospective cohort	246	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	Unspecified	PTB, LBW, Stillbirth, Neonatal mortality	RR	N/A
Bakacak, 2015[252]	Türkiye	Prospective cohort, Retrospective cohort	329	Tertiary care	Hb >= 11 g/dL	Hb < 9 g/dL, Hb 9 - 11 g/dL	First trimester, Second trimester, Third trimester	Unspecified	LBW, BW (> 3500 g)	RR	N/A
Bakari, 2019[253]	Ghana	Prospective cohort	441	Community based	Hct >= 30.01 %, Hb >= 10 g/dL	Hct < 30 %, Hb < 10 g/dL	postpartum	Unspecified	Neonatal mortality	OR	Gestational age, neurologic and respiratory disfunction, chest compressions
Bakhtiar, 2007[254]	Pakistan	Prospective cohort	860	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB (unspecified GA), BW (unspecified BW)	RR	N/A
Bakhtiar, 2011[255]	Pakistan	Prospective cohort	1578	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified instrument, venous blood sample	PTB, BW (unspecified BW), Perinatal mortality	RR	N/A
Banavathu, 2025[38]	India	Retrospective cohort	200	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	N/A	PTB (unspecified GA), BW (unspecified BW), Stillbirth, Neonatal mortality	RR	N/A
Bánhidy, 2011[272]	Hungary	Retrospective cohort	60994	Community based	Hb >= 10.5 g/dL	Hb < 10.5 g/dL	First trimester	Unspecified	PTB (unspecified GA), PTB, BW (continuous), LBW	MD, RR	Age, birth order, maternal socio-economic status, age, birth order, maternal socio-economic status, gestational age
Barut, 2023[39]	Somalia	Prospective cohort	1186	Community based	Hb >= 11 g/dL	Hb < 11 g/dL, Hb 10 - 10.9 g/dL, Hb 7 - 9.9 g/dL, Hb < 6.9 g/dL	Prenatal	Unspecified	LBW, Stillbirth, PTB (unspecified GA)	OR	Adjusted but unspecified

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Bassiouny, 2005[256]	Yemen	Cross-sectional	276	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Unspecified	Capillary blood sample	PTB	RR	N/A
Becerra, 1998[257]	Peru	Prospective cohort	1015	Community based	Hb >= 11 g/dL	Hb < 7 g/dL, Hb 7 - 9 g/dL, Hb 9.01 - 10.99 g/dL, Hb < 11 g/dL	Third trimester	Abstracted from medical records	BW (continuous), LBW	MD, RR	N/A
Bener, 2013[258]	Qatar	Prospective cohort	1432	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Abstracted from medical records	PTB, LBW, BW (> 4000 g), Neonatal sepsis	RR	N/A
Bernhardt, 2021[259]	India	Retrospective cohort	60	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	PTB (unspecified GA), BW (continuous)	MD	N/A
Beta, 2013[260]	Poland	Retrospective cohort	1865	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Unspecified	Abstracted from medical records	PTB (<33.99 wk)	OR	N/A
Bhalerao, 2011[261]	India	Prospective cohort	1898	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB, LBW, SGA, Perinatal mortality, Stillbirth	RR	N/A
Bian, 2013[262]	China	Retrospective cohort	55633	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	First trimester	Abstracted from medical records	LBW	OR	N/A
Bique, 1995[263]	Mozambique	Case-control	102	Other	Hb >= 100 g/L	Hb < 100 g/L	Prenatal	Unspecified	LBW (< 2000 g)	OR	N/A
Biradar, 2023[42]	India	Retrospective cohort	302	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	Stillbirth, LBW, PTB, PTB (<38.86 wk)	RR	N/A
Bondevik, 2001[264]	Nepal	Case-control	1400	Community based	Hct 34 - 36 %	Hct < 24 %, Hct 25 - 27 %, Hct 28 - 30 %, Hct 31 - 33 %, Hct 37 - 39 %, Hct > 40 %	Prenatal	Micro-capillary reader, capillary blood sample	LBW, PTB	OR	Age, BMI, ethnic group, gestational age at first visit, calendar month of delivery
Boo, 2024[265]	India	Retrospective cohort	9823	Community based	Hb >= 11 g/dL	Hb 10 - 10.9 g/dL, Hb 7 - 9.9 g/dL, Hb < 6.9 g/dL	Third trimester	Unspecified	Stillbirth	RR	Women's education level, biochemical pregnancy loss status, number of ANC, duration of iron

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											and folic acid supplementation, age, parity or stillbirth/miscarriage history, severity of anemia, HDOP, gestational age at birth or birth weight for gestational age
Bora, 2014[266]	India	Retrospective cohort	470	Tertiary care	Hb >= 110 g/L	Hb < 110 g/L, Hb 100 - 109.99 g/L, Hb 71 - 99.99 g/L, Hb < 70 g/L	Third trimester	Unspecified	Neonatal sepsis, PTB (unspecified GA), BW (continuous), SGA (<3 percentile)	RR, MD, OR	N/A
Brabin, 1990[268]	Papua New Guinea	Prospective cohort, Retrospective cohort	592	Community based	Hb >= 8 g/dL	Hb < 8 g/dL	Prenatal, Third trimester	Unspecified	LBW	OR	N/A
Brabin, 1997[267]	Papua New Guinea	Retrospective cohort	7106, 4548	Community based	Hb 11 - 12.9 g/dL	Hb < 7 g/dL, Hb 7 - 8.99 g/dL, Hb 9 - 10.9 g/dL, Hb > 13 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Briand, 2016[269]	Lao People's Democratic Republic	Retrospective cohort	331	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Broekhuis, 2024[270]	Netherlands	Prospective cohort	2044	Community based	SFe < 190 ug/L, SFe < 129 ug/L	SFe > 190.01 ug/L, SFe > 129.01 ug/L	First trimester	Unspecified	PTB	OR	Age, previous PTB
Brummaier, 2020[271]	Thailand	Prospective cohort	381	Community based	Hct > 30 %	Hct < 29.9 %	Prenatal	Unspecified	PTB (<32 wk), PTB (<31 wk), SGA, LGA	RR	N/A
Bukhari, 2022[47]	Saudi Arabia	Cross-sectional	400	Primary care	Hb >= 11 g/dL	Hb 10 - 10.99 g/dL, Hb 7 - 9.99 g/dL	Prenatal	Unspecified	LBW, LBW (< 5.5 kg), BW (> 6 kg)	RR	N/A
Çakmak, 2018[120]	Türkiye	Prospective cohort	1306	Tertiary care	Hb 11 - 13 g/dL, Hb 11 - 12.9	Hb < 11 g/dL, Hb > 13 g/dL,	First trimester	N/A	Stillbirth, BW (continuous),	RR, MD	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
					g/dL	Hb < 9 g/dL, Hb 9 - 10.9 g/dL, Hb 9.01 - 10.9 g/dL			PTB (unspecified GA)		
Carboo, 2024[273]	South Africa	Prospective cohort	427	Tertiary care	Hb >= 11 g/dL, SFe >= 15 ug/L	Hb < 11 g/dL, SFe < 15 ug/L	Prenatal	N/A	PTB, LBW	OR	N/A
Carpenter, 2021[274]	Bangladesh	Prospective cohort	1665	Community based	Hb 10 - 11 g/dL	Hb < 6.9 g/dL, Hb 7 - 9.9 g/dL, Hb 11.1 - 13 g/dL, Hb > 13.1 g/dL	Prenatal	Unspecified	LBW	OR	Adjusted but unspecified
Casanueva, 2006[275]	Mexico	Prospective cohort	116	Other	Hb < 145 g/L	Hb > 145.01 g/L	Third trimester	Automatic cell counter (Coulter T890, version 3D, <2% coefficient of variation, Beckman, Gouda, The Netherlands), venous blood sample	LBW, PTB (<36 wk)	RR	N/A
Chang, 2003[276]	United States of America	Retrospective cohort	1214	Community based	Hb 106 - 120 g/L, Hb 96 - 105 g/L	Hb < 105 g/L, Hb > 120.01 g/L, Hb < 95 g/L, Hb > 105.01 g/L	Second trimester, Third trimester	Unspecified	LBW, PTB	RR	Adequacy of ANC, preeclampsia complications, timing of Hb measurement (weeks of gestation)
Chanie, 2017[277]	Ethiopia	Cross-sectional	243	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	Gestational age, iron supplement, ANC, number of days of iron taken, weight increase during pregnancy, newborn sex
Charan, 2023[278]	India	Prospective cohort	410	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	BW (unspecified BW), PTB (unspecified GA)	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Chasekwa, 2021[279]	Zimbabwe	Retrospective cohort	40444	Other	Hb >= 12 g/dL	Hb < 12 g/dL	Prenatal	HemoCue, unspecified blood sample	PTB, SGA, LBW, Neonatal mortality	RR	Age, married, education, height, MUAC, HIV, hypertension, low perceived social support, household factors (feces in yard), booked ANC, twin/triplet, hungry season delivery, female infant, study arm
Chaudhary, 2021[280]	Nepal	Cross-sectional	4000	Other	Hb >= 11 g/dL	Hb < 11 g/dL	Unspecified	Unspecified	SGA	OR	Age group, newborn sex, maternal sleep, education, high carbohydrate snacks, solid fuel use, smoking, environmental tobacco smoking, PIH, gestational diabetes, cardiovascular diseases, oligohydramnios, polyhydramnios, hypothyroid
Chen, 2024[281]	China	Prospective cohort	34087	Community based	Hb >= 110 g/L	Hb 100 - 109 g/L, Hb 70 - 99 g/L, Hb < 69 g/L	First trimester	Unspecified	PTB, LBW, SGA	OR	Age, maternal BMI, residence, education level, ethnicity, parity, folate use, per caput monthly family income, all maternal complications during pregnancy including gestational

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											diabetes mellitus, gestational hypertension, hyperlipidemia, hyperthyroidism, placenta previa
Chen, 2024[282]	China	Prospective cohort	34087	Tertiary care	Hb >= 110 g/L	Hb 100 - 109.99 g/L, Hb 70 - 99.99 g/L, Hb < 70 g/L	First trimester	N/A	PTB, LBW, SGA	RR	N/A
Chhabra, 2016[283]	India	Retrospective cohort	3000	Community based	Hb >= 11 g/dL	Hb 9 - 10.9 g/dL, Hb 7 - 8.9 g/dL, Hb < 6.9 g/dL	Third trimester	Unspecified	SGA	OR	N/A
Chu, 2020[51]	Taiwan (Province of China)	Retrospective cohort	16670	Community based	Hb > 10.8 g/dL, Hb > 9.9 g/dL	Hb < 10.799 g/dL, Hb < 9.899 g/dL	Third trimester	Unspecified	PTB (<33.99 wk), PTB, LBW (< 1499.99 g), LBW, BW (> 4000 g), SGA, LGA, Neonatal mortality	OR	Gestational weight gain, mean corpuscular volume, platelet count before delivery, history of cesarean delivery, history of preterm birth, history of fetal death, history of spontaneous, induced abortion, history of uterine fibroids, history of genetic amniocentesis, history of conception assisted by reproductive technology
Chumak, 2010[284]	Russian Federation	Retrospective cohort	24712	Community based	Hb >= 110 g/L	Hb < 110 g/L	Prenatal	Unspecified	Stillbirth, PTB, BW (continuous)	OR, MD	Gestational age
Col, 2019[285]	Türkiye	Retrospective cohort	4800	Tertiary care	Hb >= 11 g/dL	Hb < 7 g/dL, Hb 7 - 9.99 g/dL, Hb 10 - 10.9	Third trimester	Unspecified	SGA	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
						g/dL					
Correa-mesa, 2023[286]	Colombia	Retrospective cohort	370	Primary care	Hb >= 11 mg/dl	Hb < 11 mg/dl	Prenatal	N/A	BW (unspecified BW), Birthweight for age (unspecified), PTB (unspecified GA)	OR	N/A
Cozzi, 2023[287]	United States of America	Retrospective cohort	18357	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	Neonatal mortality	OR	Age, BMI, race/ethnicity, insurance status, marital status, parity, chronic hypertension, systemic lupus erythematosus, chronic renal disease, tobacco use, singleton gestation, GDM, preeclampsia, gestational age at delivery, admission platelet count, mode of delivery, labor, mode of analgesia, duration of membrane rupture, chorioamnionitis, estimated blood sample loss at delivery, placental abruption
Cross, 2020[288]	Gambia	Prospective cohort	450, 430	Tertiary care	Continous	Continous	Third trimester	Unspecified	Birthweight for age (unspecified), PTB, LBW	MD	N/A
Cung, 2014[289]	Palestine	Retrospective cohort	5644	Community based	Hb 110 - 144 g/L	Hb 70 - 89 g/L, Hb 90 - 109 g/L,	Third trimester	Unspecified	Stillbirth	OR	Time of delivery, age,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
						Hb > 145 g/L					parity, number of previous abortions, gestational age, mode
Damanhuri, 2024[290]	Malaysia	Retrospective cohort	49416	Registry based, Community based	Hb >= 11 g/dL	Hb 9 - 10.99 g/dL, Hb 7 - 8.99 g/dL, Hb < 7 g/dL	Prenatal	N/A	PTB (<26 wk), PTB	OR	N/A
Dane, 2013[291]	Türkiye	Retrospective cohort	307	Community based	Hb > 11.1 g/dL	Hb 10.1 - 11 g/dL, Hb 9.1 - 10 g/dL, Hb < 9 g/dL	Third trimester	Unspecified	LBW	RR	N/A
de Sa, 2015[632]	Brazil	Retrospective cohort	54	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	BW (continuous), LGA, SGA (<90 percentile), SGA	MD, RR	N/A
De, 2022[292]	India	Retrospective cohort	595	Community based	Hb >= 10 g%	Hb < 10 g%	Prenatal	Unspecified	LBW	OR	Covid status, age, parity, early antenatal registration ≤12 weeks, complete antenatal visits, adequate weight gain in pregnancy, adequate IFA given in pregnancy, newborn gender, religion, first visit, period of gestation
Delpisheh, 2008[293]	United Kingdom	Case-control	270	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	SGA	OR	Gestational age (as a continuous variable), underweight, primiparity

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Demmouche, 2011[294]	Algeria	Cross-sectional	207	Community based	Hb 11 - 14 g/dL	Hb 5 - 10.9 g/dL, Hb 10 - 10.9 g/dL, Hb 7 - 9.99 g/dL, Hb 5 - 6.99 g/dL	Third trimester	Unspecified instrument, venous blood sample	PTB (unspecified GA), BW (continuous)	MD	N/A
Deriba, 2021[295]	Ethiopia	Case-control	555	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Abstracted from medical records or disease registries	LBW	OR	N/A
Dessu, 2020[296]	Ethiopia, NA	Cross-sectional	1820	Community based	Hb >= 12 g/dL, Hb >= 12.01 g/dL, Hb > 12.01 g/dL	Hb < 10 g/dL, Hb 10 - 11.9 g/dL	Prenatal	Abstracted from medical records	Perinatal mortality	OR	Place of residence, parity, number of ANC visits, labor onset, mode of delivery, gestational age in weeks, birth weight, onset of PIH
Deswal, 1999[297]	India	Case-control	982	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Unspecified	Abstracted from medical records	LBW	OR	Socioeconomic status, maternal weight, undernutrition, birth spacing < 2 yrs, ANC not availed, ANC visits <4 times, twins/multiple gestation, tobacco smoking and chewing, poor obstetric history, toxemia
Detlefs, 2022[52]	United States of America	Prospective cohort	20690	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Hospital laboratory, venous blood sample	PTB, SGA, LGA, Neonatal sepsis, Stillbirth, Neonatal mortality	OR	N/A
Devaguru, 2023[298]	India	Cross-sectional	900	Community based	Hb >= 10 g/dL	Hb 7 - 9.9 g/dL, Hb < 6.9 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Dhar, 2003[299]	Bangladesh	Cross-sectional	316	Community based	Hb >= 12 g/dL	Hb < 9 g/dL, Hb 9 - 9.9 g/dL, Hb	Prenatal	Cyanmethemoglobin method,	LBW, BW (>	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
						10 - 10.9 g/dL, Hb 11 - 11.9 g/dL		venous blood sample	3000 g)		
Díaz-Granda, 2019[304]	Ecuador	Retrospective cohort	428	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	PTB (unspecified GA), PTB, BW (continuous), LBW	MD, RR	N/A
Dolan, 1993[300]	Thailand	Retrospective cohort	341	Community based	Hct > 25 %	Hct < 24.9 %	Third trimester	Unspecified	Neonatal mortality	RR	N/A
Domple, 2016[301]	India	Case-control	320	Community based	Hb >= 11 g/dL	Hb 8 - 10.99 g/dL, Hb < 8 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Dos Santos, 2022[302]	Brazil	Prospective cohort	781	Community based	Hb >= 11 g/dL, Hb >= 10.5 g/dL	Hb < 11 g/dL, Hb < 10.5 g/dL	Second trimester	Automatic method (Pentra DS 120), venous blood sample	Perinatal mortality, PTB, LBW (< 1499 g), LBW, LBW (< 2999 g), SGA	RR	N/A
Drukker, 2015[54]	Israel	Retrospective cohort	75660	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified instrument, venous blood sample	PTB, LBW, SGA, LGA	OR	Age at delivery, maternal education as a proxy for socioeconomic status, income, nullipara, multipara (2-5) or grand multipara (>5), previous spontaneous abortions, previous cesarean, assisted reproductive techniques, neonatal gestational age, induction of labor, epidural analgesia
Dubey, 2016[303]	India	Retrospective cohort	19251	Community based	Hb > 10.9 g/dL	Hb < 10.89 g/dL	Unspecified	Unspecified	LBW	OR	Place of residence, age, wealth index,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											education, religion, caste, anemia level, BMI, antenatal care, birth order
Dündar, 2010[305]	Türkiye	Retrospective cohort	1116	Community based	Hb >= 9 g/dL	Hb < 9 g/dL	Second trimester	Unspecified	PTB	RR	N/A
Dutta, 2018[55]	India	Retrospective cohort	80	Tertiary care	Hb >= 11 g/dL, Hb > 11 g/dL	Hb 10 - 10.9 g/dL, Hb 7 - 9.9 g/dL, Hb < 11 g/dL	Third trimester	Unspecified	LBW, LBW (< 1.99 kg), Neonatal mortality	OR	N/A
Edelson, 2023[6]	Uganda	Retrospective cohort	352	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	Unspecified	BW (continuous), Neonatal mortality	MD, RR	N/A
Ekubagewargies, 2019[306]	Ethiopia	Retrospective cohort	240	Tertiary care	Hb >= 12 g/dL	Hb < 12 g/dL	Prenatal	N/A	LBW	OR	N/A
El-Moselhy, 2012[307]	Egypt	Retrospective cohort	480	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Elhassan, 2010[308]	Sudan	Case-control, Retrospective cohort	194	Community based, Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal, Third trimester	Unspecified	LBW	OR	N/A
Elmugabil, 2022[310]	Sudan	Cross-sectional	1716	Community based	Hb 10 - 10.99 g/dL	Hb < 8 g/dL, Hb 8 - 8.99 g/dL, Hb 9 - 9.99 g/dL, Hb 11 - 11.99 g/dL, Hb 12 - 13 g/dL, Hb > 13.01 g/dL	Prenatal	Unspecified	PTB	OR	Adjusted but unspecified
Elmugabil, 2023[309]	Sudan	Cross-sectional	253	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	Age, parity, education, history of miscarriage, ANC level, BMI
Eng, 2016[311]	Australia	Case-control	164	Community based	Hb > 14.5 g/dL	Hb < 14.499 g/dL	Prenatal	Abstracted from medical records	Stillbirth	OR	Higher BMI, smoking in pregnancy, previous stillbirth, previous

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											caesarean section, primiparity, married, reduced fetal movement in last 2 weeks
Engidaw, 2022[312]	Ethiopia	Cross-sectional	211	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	Adjusted but unspecified
Essen, 2000[313]	Sweden	Retrospective cohort	15639	Community based	Hb >= 100 g/L	Hb < 99.9 g/L	Prenatal	Abstracted from medical records	Perinatal mortality	OR	Age, height, parity, smoking, cohabiting status, diabetes, preeclampsia, SGA, placental abruption
Essome, 2024[314]	Cameroon	Retrospective cohort	305	Other	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	N/A	LBW	RR	N/A
Eweis, 2021[315]	Egypt	Cross-sectional	383	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	Birthweight for age (unspecified)	RR	N/A
Fajriana, 2018[316]	Indonesia	Case-control	1616	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	N/A
Feleke, 2020[317]	Ethiopia	Prospective cohort	1709	Tertiary care	Hb > 11.6 g/dL	Hb < 11.59 g/dL	Prenatal	Unspecified	LBW (< 0.17 SD), PTB (<-0.09 SD)	MD	N/A
Figueiredo, 2019[318]	Brazil	Prospective cohort	622	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW (< 2999 g)	RR	N/A
Finkelstein, 2020[319]	India	Prospective cohort	366	Other	Hb >= 11 g/dL, SFe >= 15 ug/L	Hb < 11 g/dL, SFe < 15 ug/L	First trimester	Automated Coulter counter (ABX Pentra C+; Horiba Medicals) for Hb and Electrochemilu minescence (Elecsys 2010, Roche Diagnostics Mannheim, USA) for SFe,	BW (continuous), LBW, PTB (unspecified GA), PTB, SGA	MD, RR	Gestational age of sample, vitamin B12 intervention, gestational age of sample, vitamin B-12 intervention, maternal BMI, standard of living index >28, educational level, ln(CRP)

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
								venous blood sample			
Fite, 2022[320]	Ethiopia	Prospective cohort	412	Community based	SFe >= 15 ug/L	SFe < 15 ug/L	Second and third trimesters	Unspecified	LBW	RR	Age, MUAC, maternal height, newborn sex, CRP
Flores-Venegas, 2019[7]	Mexico	Retrospective cohort	1051	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	PTB (unspecified GA)	OR	N/A
Frøen, 2002[321]	Norway	Retrospective cohort	71171	Other	Hb >= 13 g/dL	Hb < 13 g/dL	Prenatal	Disease Registry	Stillbirth, PTB (unspecified GA)	OR, MD	Pregnancy duration, other adjustments unspecified
Fukushima, 1991[322]	Japan	Prospective cohort	460	Other, Community based	Hb 11 - 13.4 g/dL	Hb < 11 g/dL, Hb > 13.5 g/dL	Prenatal	Abstracted from medical records	PTB, BW (continuous)	RR, MD	N/A
Gaillard, 2014[135]	Netherlands	Prospective cohort	7317	Community based	Hb 11.01 - 13.199 g/dL	Hb < 11 g/dL, Hb > 13.2 g/dL	Prenatal	EDTA plasma samples in venous blood samples (STAR-MDC, Rotterdam, the Netherlands), venous blood samples	PTB, LBW, SGA (<4.99 percentile)	RR	Gestational age at enrolment and at blood sample sampling, age, BMI, parity, ethnicity, education, alcohol consumption during pregnancy, smoking during pregnancy, folic acid supplement use, multivitamin use
Gamini, 2021[323]	India	Prospective cohort	400	Tertiary care	Hb >= 10 g%	Hb < 10 g%	Prenatal	Unspecified	PTB	OR	N/A
Ganesh, 2010[324]	India	Case-control	450	Community based	Hb > 11 g%	Hb < 10.9 g%	Prenatal	Unspecified	LBW	OR	Age, weight/height
Gann, 1989[325]	United States of America	Retrospective cohort	562	Community based	Hb >= 100 g/L	Hb < 100 g/L	Prenatal	Abstracted from medical records	PTB, LBW	OR	N/A
Gazali, 1987[326]	Indonesia	Prospective cohort	1067	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	Cyanmethemoglobin method,	LBW	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
								venous blood sample			
Gebrehawerya, 2018[327]	Ethiopia	Case-control	287	Tertiary care	Hb >= 11 mg/dl	Hb < 11 mg/dl	Prenatal	Unspecified	LBW	OR	Family income, parity, pregnancy intended, ANC status, IFA supplementation, disease condition during pregnancy, number of meals per day
Geda, 2021[328]	Ethiopia	Case-control	450	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	Perinatal mortality	OR	Adjusted but unspecified
Geelhoed, 2006[62]	Ghana	Prospective cohort	175	Tertiary care	Hb >= 10.9 g/dL, Hb < 10.89 g/dL, Hb > 10.9 g/dL	Hb < 8 g/dL, Hb < 7 g/dL, Hb < 6 g/dL, Hb < 5 g/dL, Hb > 10.9 g/dL, Hb 8 - 10.8 g/dL	Prenatal	Unspecified	Perinatal mortality, LBW	OR	Age
Gerety, 2024[329]	Bangladesh	Prospective cohort	376	Registry based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB	OR	Newborn sex, maternal BMI (kg/m2), age, maternal years of education, preeclampsia
Getiye, 2017[330]	Ethiopia	Case-control	1113	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	Perinatal mortality	OR	N/A
Gimono, 2024[63]	Oman	Retrospective cohort	723	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	PTB, BW (unspecified BW)	OR	N/A
Gnanasekaran, 2019[331]	India	Retrospective cohort	486	Community based	Hb > 10.01 g%, Hb >= 10.01 g%	Hb 8 - 10 g%, Hb 7 - 7.99 g%, Hb < 7 g%	Prenatal	Unspecified	LBW, LBW (< 4000 g), LBW (< 4499 g)	RR	N/A
Go, 2022[332]	Japan	Prospective cohort	74392	Community based	Hb 11 - 12.9 g/dL	Hb < 8.9 g/dL, Hb 9 - 10.9 g/dL, Hb 13 - 13.9 g/dL, Hb > 14 g/dL	First trimester, Second trimester	Unspecified	PTB, Birthweight for age (unspecified), LBW	OR	Parity, age, maternal height, BMI, HDOP, smoking, drinking during pregnancy,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											passive smoking, sex, married, iron medicine, educational levels, annual household income
Goldenberg, 1996[333]	United States of America	Retrospective cohort	580	Community based	Categorical, quartile	Categorical, quartile	Prenatal	Unspecified instrument, venous blood sample	PTB, PTB (<32 wk), LBW, LBW (< 1500 g)	OR	Maternal zinc group, BMI, age
Gonzales, 2009[334]	Peru	Retrospective cohort	35449	Community based	Hb 11 - 12.9 g/dL	Hb < 9 g/dL, Hb 9 - 10.99 g/dL, Hb > 13 g/dL	Prenatal	Unspecified	Stillbirth, PTB, SGA	OR	Timing of Hb sampling, altitude
Gonzales, 2012[335]	Peru	Retrospective cohort	295651	Community based	Hb 11 - 14.4 g/dL	Hb < 6.9 g/dL, Hb 7 - 7.9 g/dL, Hb 8 - 8.9 g/dL, Hb 9 - 9.9 g/dL, Hb 10 - 10.9 g/dL, Hb > 14.5 g/dL	Prenatal	Unspecified	Stillbirth, PTB, SGA	OR	Age, parity, maternal education, marital status, cigarette smoking, pre-pregnancy BMI, history of LBW, previous perinatal death, history of preeclampsia, history of PTB, gestational diabetes, cardiopathy, gestational age at first attendance for ANC, number of ANC visits
Gonzales, 2014[137]	Peru	Retrospective cohort	161909	Other	Hb >= 11 g/dL	Hb 9 - 10.9 g/dL, Hb 7 - 8.9 g/dL, Hb < 6.9 g/dL	Prenatal	Unspecified	PTB, Stillbirth	OR	N/A
Govil, 2018[336]	India	Retrospective cohort	172	Community based	Hb >= 10 g/dL	Hb 7 - 9.9 g/dL, Hb < 6.9 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Guevara, 2009[337]	Cuba	Case-control	474	Tertiary care	Hb >= 110 g/L	Hb < 109.9 g/L	Prenatal	Unspecified	LBW	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Gyimah, 2021[338]	Ghana	Prospective cohort	416	Community based	Hb >= 11 g/dL, SFe > 15 ug/L	Hb < 11 g/dL, SFe < 14.9 ug/L	First trimester	Sysmex Hematology system and sandwich enzyme-linked immunosorbent assay (ELISA) technique (from R&D system Inc), venous blood sample	LBW, PTB	OR	Community type
Habe, 2024[339]	Japan	Prospective cohort	574	Community based	Hb >= 11 g/dL, SFe >= 12 ng/ml	Hb < 11 g/dL, SFe < 12 ng/ml	Prenatal, Third trimester	Unspecified	PTB, LBW, BW (continuous), SGA	RR, MD	N/A
Habib, 2017[340]	Pakistan	Case-control	950	Community based	Hb >= 110 g/L	Hb < 110 g/L	Prenatal	Unspecified	LBW	OR	Literacy, primary education, parity, history of miscarriage/ abortion, history of stillbirth, number of ANC visit, time when ANC was sought, IFA supplementation , history of hypertension during pregnancy, gestational diabetes, maternal weight
Haggaz, 2010[341]	Sudan	Retrospective cohort	430	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Hämäläinen, 2003[140]	Finland	Retrospective cohort	22799	Community based	Hb >= 100 g/L	Hb < 100 g/L	First trimester, Second trimester, Third trimester	Abstracted from medical records	Stillbirth, PTB, LBW, SGA	OR	N/A
Hameed, 2011[342]	Iraq	Case-control	200	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Abstracted from medical records	SGA	OR	N/A
Hansen, 2022[343]	Denmark	Prospective cohort	5763	Primary care	SFe >= 30 ng/ml	SFe < 30 ng/ml	First trimester	Unspecified	PTB, LBW, Birthweight for age	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
									(unspecified)		
Harding, 1997[138]	United Kingdom	Prospective cohort	1227	Tertiary care	Hb 10.9 - 13.4 g/dL	Hb < 10.8 g/dL, Hb > 13.5 g/dL	First and second trimesters	Coulter Counter (JT1 and JT2 Coulter Electronics, Luton, UK), unspecified blood sample	SGA, PTB	OR	Parity, smoking practices, poor obstetric history (defined as any pregnancy loss after 2 weeks' gestation, previous preterm delivery, previous baby of birthweight < 10th percentile, previous preeclampsia, age, maternal and paternal education, employment, family income per person supported
Harrison, 2018[344]	United States of America	Case-control	1911	Community based	SFe 25 - 41 ng/ml	SFe 2 - 13 ng/ml, SFe 14 - 24 ng/ml, SFe 42 - 662 ng/ml	Prenatal	Unspecified	PTB	OR	N/A
Hasin, 1996[345]	Bangladesh	Prospective cohort	151	Tertiary care	Continous	Continous	Prenatal	Unspecified instrument, venous blood sample	BW (continuous)	correlation coefficient	N/A
Hassen, 2020[346]	Ethiopia	Prospective cohort	379	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Hemo-Cue (Hb-201), capillary blood sample	LBW	correlation coefficient	Maternal height, previous ANC, comorbidity (i.e., history of asthma or chronic obstructive pulmonary disease, history of heart failure or ischemic heart disease, renal diseases
Heilmann,	Germany	Prospective	707	Tertiary care	Hb < 13 g/dL	Hb >= 13 g/dL	Prenatal	Unspecified	LBW, PTB	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
1993[347]		cohort									
Heydarpour, 2019[348]	Iran (Islamic Republic of)	Retrospective cohort	3649	Community based	Hb > 11 g/dL	Hb < 11 g/dL	First trimester, Third trimester	Unspecified	Neonatal mortality, LBW, BW (> 4001 g), PTB	OR	Adjusted but unspecified
Hirve, 1994[349]	India	Prospective cohort	1922	Community based	Hb >= 11 g/dL, Hb > 9 g/dL	Hb 7 - 8.99 g/dL	Prenatal	Photo-calorimetric method, unspecified blood sample	LBW	RR	N/A
Hong, 2022[350]	Malaysia	Cross-sectional	1000	Community based	Hb >= 11 g/dL	Hb 8 - 10.99 g/dL	Prenatal	Unspecified	LGA	OR	Adjusted but unspecified
Hosain, 2006[351]	Bangladesh	Prospective cohort	350	Community based	Hb >= 8 g/dL	Hb < 8 g/dL	First and second trimesters, Prenatal	Unspecified	LBW	OR	Adjusted but unspecified
Hou, 2000[352]	United States of America	Prospective cohort	480	Tertiary care	SFe >= 26 ug/L, SFe > 26 ug/L, SFe >= 20 ug/L, SFe > 20 ug/L	SFe < 5 ug/L, SFe 5 - 13 ug/L, SFe 14 - 25 ug/L, SFe < 3 ug/L, SFe 3 - 7 ug/L, SFe > 20 ug/L	Third trimester	Unspecified instrument, venous blood sample	SGA (<15 percentile)	RR	N/A
Howard, 2015[353]	Afghanistan	Retrospective cohort	517	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Unspecified	LBW	OR	N/A
Hsu, 2013[354]	Taiwan (Province of China)	Nested case-control	385	Tertiary care	Hb > 11.801 g/dL, Hct > 35.601 %, SFe < 20 ng/ml	Hb < 11.8 g/dL, Hct < 35.6 %, SFe 20 - 38 ng/ml, SFe 38 - 60 ng/ml, SFe >= 60.01 ng/ml	First trimester, Prenatal	Chemiluminometric immunoassay, unspecified blood sample	PTB	OR	N/A
Huang, 2015[355]	China	Prospective cohort	500	Tertiary care	Hb >= 110 g/L	Hb < 110 g/L	First trimester, Second trimester, Third trimester	Unspecified instrument, venous blood sample	LBW, PTB	OR	N/A
Huang, 2020[356]	China	Nested case-control	618	Community based	SFe < 84.06 ng/ml, SFe < 39.35 ng/ml, SFe < 10.34 ng/ml, Serum_CRP <	SFe 84.07 - 138.85 ng/ml, SFe > 138.86 ng/ml, SFe 39.36 - 82.76 ng/ml, SFe >	First trimester, Second trimester, Third trimester	Automatic electrochemical luminescence immunoassay on COBAS 6000 system	PTB	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
					11.39 mg/L, Serum_CRP < 14.97 mg/L, Serum_CRP < 11.4 mg/L	82.77 ng/ml, SFe 10.34 - 18.81 ng/ml, SFe > 18.82 ng/ml, Serum_CRP 11.4 - 16.6 mg/L, Serum_CRP > 16.61 mg/L, Serum_CRP 14.97 - 20.84 mg/L, Serum_CRP > 20.85 mg/L, Serum_CRP 17.77 - 24.08 mg/L, Serum_CRP > 24.09 mg/L		E601(Elecsys module) analyzer, venous blood sample			
Hwang, 2010[357]	Republic of Korea	Retrospective cohort	3560	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	Abstracted from medical records	SGA, Perinatal mortality, PTB, BW (continuous)	OR, MD	Adjusted but unspecified
Ibsen, 2025[358]	Denmark	Prospective cohort	449	Tertiary care	SFe >= 15 ug/L	SFe < 15 ug/L	Second trimester	N/A	SGA	OR	N/A
Ilunga, 2016[359]	Democratic Republic of the Congo	Case-control	526	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	Age, employment, education, celibacy, semi-urban residence, BMI<185, prenatal consultation, genetic infection, malaria in pregnancy, gestational hypertension
Iqbal, 2020[360]	Pakistan	Case-control	280	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	Unspecified instrument, venous blood sample	PTB	OR	N/A
Jackson, 1993[361]	Liberia	Prospective	80	Community	Hb 11 - 11.99	Hb 10 - 10.99	Third trimester	Cyanmethemogl	LBW (< 8.4	MD	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort		based	g/dL	g/dL, Hb 7 - 9.99 g/dL		obin, capillary blood sample	pounds), LBW (< 9.44 pounds)		
Jahedbozorgan, 2020[362]	Iran (Islamic Republic of)	Case-control	300	Tertiary care	Hb >= 10 g/dL	Hb 9.5 - 9.9 g/dL	Prenatal	Unspecified	PTB	OR	N/A
Jamshed, 2020[363]	Pakistan	Cross-sectional	195	Tertiary care	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jasim, 2020[364]	Iraq	Prospective cohort	4473	Tertiary care	Hb >= 11 g/dL	Hb 10 - 10.99 g/dL, Hb 7.1 - 9.99 g/dL, Hb < 7 g/dL	Prenatal	Unspecified	LBW, PTB, SGA (<2.99 percentile)	MD	N/A
Javadi, 2023[365]	Iran (Islamic Republic of)	Case-control	901	Registry based	Hb 11 - 13 g/dL	Hb < 11 g/dL, Hb > 13.01 g/dL	First trimester	Unspecified	LBW	OR	Maternal initial weight, age, gestational age, mother's education
Jehan, 2007[366]	Pakistan	Prospective cohort	1237	Community based	Hb 8 - 11 g/dL, Hb > 11 g/dL	Hb < 8 g/dL	Second trimester	Unspecified	Stillbirth	RR	N/A
Jember, 2020[367]	Ethiopia	Retrospective cohort	358	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	LBW	OR	N/A
Jessani, 2021[368]	India, Pakistan, Guatemala	Retrospective cohort	N/A	Community based	Hb 110 - 129 g/L	Hb 70 - 89.9 g/L, Hb 90 - 109.9 g/L, Hb > 130 g/L, Hb < 69 g/L	First trimester, Third trimester	N/A	PTB, Stillbirth, Neonatal mortality, SGA, LBW	RR	N/A
Jusoh, 2015[369]	Malaysia	Retrospective cohort	196	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	BW (unspecified BW), Birthweight for age (unspecified), PTB (unspecified GA)	RR	N/A
Kant, 2018[370]	India	Retrospective cohort	8748	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	PTB (unspecified GA), Stillbirth, LBW, LBW (< 1800 g)	RR	N/A
Kargbo, 2021[371]	Sierra Leone	Case-control	438	Community	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Abstracted from	LBW	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
				based				medical records or disease registries			
Kashyap, 2019[372]	India	Retrospective cohort	390	Community based	Hb >= 11 g%, Hb > 11 g%	Hb < 7 g%, Hb 7 - 9.9 g%, Hb 10 - 10.9 g%, Hb < 10.9 g%	Third trimester	Abstracted from medical records	LBW	RR	N/A
Kasuga, 2021[373]	Japan	Retrospective cohort	4224	Community based	Hb >= 10 mg/dL	Hb < 10 mg/dL	Prenatal	Abstracted from medical records	LBW	OR	Pre-pregnancy BMI, gestational weight gain, birth at 37 gestational week, cesarean section birth, HDOP neonatal sex, neonatal congenital anomaly
Kattula, 2014[374]	India	Prospective cohort	381	Community based	Hb >= 10 g/dL	Hb < 9.9 g/dL	Prenatal	Unspecified	LBW	OR	N/A
Kaul, 2017[69]	India	Prospective cohort	767	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Hospital laboratory, unspecified blood sample	PTB (unspecified GA), LBW, Neonatal mortality	RR	Multiple pregnancies, other associated medical complications, antepartum hemorrhage, anemia due to acute blood sample loss
Kaur, 2015[375]	India	Cross-sectional	100	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Second and third trimesters	Unspecified	PTB (unspecified GA), PTB, BW (continuous), LBW	MD, RR	N/A
Kelkay, 2019[376]	Ethiopia	Retrospective cohort	325	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB	OR	Adjusted but unspecified
Kemppinen, 2020[377]	Finland	Retrospective cohort	11760	Tertiary care	Hb >= 100 g/L	Hb < 100 g/L	Prenatal	Unspecified	LBW (< -2 SD), PTB, PTB (<34 wk), PTB (<31.99 wk), Stillbirth	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Khambalia, 2015[379]	Australia	Retrospective cohort	2254	Community based	SFe < 43 ug/L, SFe < 68 ug/L	SFe >= 43 ug/L, SFe >= 68 ug/L	First trimester	Solid-phase direct sandwich ELISA method (Calbiotech, Inc.), unspecified blood sample	PTB	OR	N/A
Khambalia, 2016[378]	Australia	Retrospective cohort	4420	Registry based	SFe >= 12 ug/L, Serum_transferrin_Receptor < 21 ug/L, Total body iron > 0.01 mg/kg	SFe < 12 ug/L, Serum_transferrin_Receptor < 21 ug/L, Total body iron < 0 mg/kg	First trimester	Solid-phase direct sandwich enzyme-linked immunosorbent assay (ELISA), (Calbiotech, Inc., Spring Valley, CA, USA) venous blood sample/ sTfR concentrations were measured using an ELISA (Quantikine IVD, Human sTfR Immunoassay, R & D Systems, Minneapolis, MN, USA)	Stillbirth, PTB, SGA, LGA	RR, OR	Age, gestational age at blood sample test, body weight, parity, smoking during pregnancy, private versus public health care, low socioeconomic status, log CRP levels
Khan, 2016[381]	Pakistan	Case-control	160	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	Unspecified	LBW	OR	Multiparous women, those suffering from a known chronic systemic disease known to affect LBW, HDOP, gestational diabetes, genitourinary infections, history of antepartum hemorrhage, mothers with stillborn birth, having periodontal therapy, educational

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											level, socioeconomic status, maternal nutrition
Khan, 2023[380]	Malaysia	Retrospective cohort	327	Registry based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW, PTB, Neonatal mortality, Stillbirth, BW (> 4001 g)	OR, RR	Adjusted but unspecified
Khatana, 2020[382]	India	Prospective cohort	1000	Community based	Hb > 11 g%	Hb 7 - 8.9 g%, Hb < 6.9 g%	Prenatal	Unspecified	Perinatal mortality	RR	N/A
Kheir, 2016[383]	Sudan	Retrospective cohort	380	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW, PTB	OR	N/A
Khezri, 2023[385]	Iran (Islamic Republic of)	Case-control	801	Community based	Hb >= 11 mg/dl	Hb < 11 mg/dl	First and second trimesters	Unspecified	PTB	OR	Age, education level, occupation, history of abortion, history of PTB, pre-pregnancy BMI, parity, preeclampsia/eclampsia, GDM
Khezri, 2025[384]	Iran (Islamic Republic of)	Case-control	414	Tertiary care	Hb >= 11 g/dL, Hb > 10.5 g/dL	Hb < 11 g/dL, Hb < 10.499 g/dL	First trimester, Second trimester	N/A	PTB	OR	N/A
Kibret, 2024[386]	Ethiopia	Cross-sectional	316	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB	OR	Adjusted but unspecified
Kidanto, 2009[388]	United Republic of Tanzania	Cross-sectional	1721	Community based	Hb >= 11 g/dL	Hb 9 - 10.99 g/dL, Hb 7 - 8.99 g/dL, Hb < 7 g/dL	First and second trimesters	Coultor counter, venous blood sample	PTB, LBW, Neonatal mortality, Stillbirth	OR	N/A
Kidanto, 2015[387]	United Republic of Tanzania	Cross-sectional	15305	Community based	Hb >= 70 g/L	Hb < 70 g/L	Prenatal	Unspecified	Stillbirth	OR	N/A
Kim, 1992[389]	United States of America	Cross-sectional	N/A	Community based	Hb > 11.2 g/dL, Hb > 10.6 g/dL, Hb > 11.1 g/dL	Hb < 11.19 g/dL, Hb < 10.59 g/dL, Hb < 11.09 g/dL	Prenatal	N/A	LBW	N/A	N/A
Kim, 1998[390]	Republic of	Retrospective	2586	Community	Hb 11.5 - 12.4	Hb < 8.5 g/dL,	Second and	Unspecified	BW	MD, RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
	Korea	cohort		based	g/dL	Hb 8.5 - 9.4 g/dL, Hb 9.5 - 10.4 g/dL, Hb 10.5 - 11.4 g/dL, Hb 12.5 - 13.4 g/dL, Hb 13.5 - 14.4 g/dL, Hb > 14.5 g/dL	third trimesters		(continuous), LBW, PTB		
Klebanoff, 1989[391]	United States of America	Retrospective cohort	35423	Tertiary care	Hct > 35 %	Hct < 34 %	Third trimester	Unspecified	PTB	OR	Age, education, study center
Knottnerus, 1990[142]	Netherlands	Prospective cohort	796	Community based	Hb 7 - 7.9 mmol/L	Hb < 6.9 mmol/L, Hb > 8 mmol/L	Third trimester	Sysmex Microcell Counter, venous blood sample	LBW, PTB	RR	N/A
Koh, 1997[392]	Republic of Korea	Retrospective cohort	1010	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	Unspecified	PTB (unspecified GA), SGA, LGA, LBW, BW (> 4001 g)	MD, OR	N/A
Komicha, 2021[393]	Ethiopia	Prospective cohort	403	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	HemoCue, capillary blood sample	LBW	OR	Rural/urban residency, hyperemesis during current pregnancy, planned/unplanned pregnancy, ANC follow-up, prenatal nutrition education, MUAC, IFA supplementation
Koura, 2012[394]	Benin	Prospective cohort	580	Other	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	HemoCue, capillary blood sample	LBW, PTB	OR	Maternity hospital, multiple births, stillbirths, neonatal deaths
Koyuncu, 2017[395]	Türkiye	Cross-sectional	433	Community based	Hb >= 11 g/dL	Hb < 8.5 g/dL, Hb 8.51 - 10.99 g/dL	Third trimester	Unspecified	BW (continuous)	MD	N/A
Kulmala, 2000[396]	Malawi	Prospective cohort	795	Community based	PCV >= 34 %	PCV < 34 %	Prenatal	Unspecified	Neonatal mortality	OR	Adjusted but unspecified

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Kumar, 2010[397]	India	Prospective cohort	2027	Community based	Hb > 10 g/dL	Hb <= 10 g/dL	First trimester	Unspecified	LBW	OR	N/A
Kumar, 2013[398]	India	Prospective cohort	1000	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	First trimester, Second trimester, Third trimester, Prenatal	Cyanmethemoglobin method, venous blood sample	BW (continuous), PTB (unspecified GA)	MD	N/A
Kumar, 2017[399]	India	Prospective cohort	800	Community based	Hb >= 11 g/dL	Hb 7 - 10.9 g/dL, Hb < 6.9 g/dL	Third trimester	Unspecified	LBW	RR	N/A
Kumar, 2020[400]	India	Prospective cohort	3085	Community based	Hb >= 11 g/dL	Hb 10 - 10.9 g/dL, Hb 7 - 9.9 g/dL, Hb < 6.9 g/dL	Third trimester	Unspecified	PTB, Stillbirth, Neonatal mortality	RR	N/A
Kumari, 2019[401]	India	Cross-sectional	515	Community based	Hb >= 12 g/dL	Hb 10 - 11.9 g/dL, Hb 8 - 9.9 g/dL, Hb < 7.9 g/dL	Prenatal	HemoCue, capillary blood sample	PTB, LBW	OR	Age at delivery, BMI, parity, education level
Lake, 2019[402]	Ethiopia	Retrospective cohort	304	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Lao, 1996[403]	China	Retrospective cohort	10942	Tertiary care	Hb >= 10 g/dL	Hb < 9.9 g/dL	First and third trimesters	Unspecified	PTB, PTB (<32.9 wk), PTB (<27.9 wk), LBW, LBW (< 1500 g), LBW (< 1000 g), Stillbirth, Neonatal mortality	OR	N/A
Lao, 2022[73]	China	Case-control	5880	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	Unspecified	PTB	OR	N/A
Larsen, 2016[144]	Norway	Retrospective cohort	57062	Tertiary care	Hb 9 - 13.5 g/dL	Hb < 9 g/dL, Hb > 13.501 g/dL	Third trimester	Disease Registry (human)	BW (continuous)	MD	N/A
Lee, 2006[404]	Republic of Korea	Prospective cohort	248	Community based	Hb >= 12 g/dL	Hb < 10.7 g/dL, Hb 10.8 - 11.9 g/dL	Second and third trimesters	HemoCue AB, capillary blood sample	PTB (unspecified GA), BW (continuous), PTB, LBW	MD, RR	N/A
Lemlem, 2021[405]	Ethiopia	Retrospective	627	Tertiary care	Hb >= 12 g/dL	Hb < 12 g/dL	Prenatal	N/A	LBW	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort									
Levy, 2005[406]	Israel	Retrospective cohort	153396	Tertiary care	Hb >= 10 g/dL	Hb 8 - 9.99 g/dL, Hb < 8 g/dL	First trimester	Unspecified	PTB, LBW, Perinatal mortality	OR	Ethnicity, age, placental problems, C-section, non-vertex presentation
Li, 2021[407]	China	Prospective cohort	266	Community based	Hb >= 145 g/L	Hb < 145 g/L	postpartum	Unspecified	BW (continuous)	MD	N/A
Li, 2023[408]	China	Retrospective cohort	781	Community based	Categorical, quartile	Categorical, quartile	First trimester	Unspecified	PTB (unspecified GA), BW (unspecified BW)	RR	N/A
Lieberman, 1988[409]	United States of America	Retrospective cohort	12718	Community based	Hct 31 - 34 %	Hct < 30 %, Hct 35 - 40 %, Hct 41 - 44 %, Hct 45 - 49 %	Prenatal	Unspecified	PTB	RR	N/A
Lin, 2018[145]	China	Retrospective cohort	43403	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Unspecified	PTB, LBW	RR	N/A
Little, 2005[410]	United Kingdom	Prospective cohort	144209	Community based	Hb 11.5 - 12.49 g/dL	Hb < 9.49 g/dL, Hb 9.5 - 10.49 g/dL, Hb 10.5 - 11.49 g/dL, Hb 12.5 - 13.49 g/dL, Hb 13.5 - 14.49 g/dL, Hb > 14.5 g/dL	Second trimester	Unspecified	Neonatal mortality, Stillbirth	RR	N/A
Liu, 2022[411]	China	Retrospective cohort	3748	Community based	Hb 110 - 129 g/L	Hb 70 - 99 g/L, Hb 100 - 109 g/L, Hb > 130 g/L, Hb < 69 g/L	First trimester, Second trimester, Third trimester	Automatic hematology analyzer, venous blood sample	LBW, SGA	RR	Age, education, occupation, per capita annual household income, parity, BMI at enrolment, gestational age at enrolment, number of ANC visits, micronutrient supplementation, newborn sex, gestational age

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											at delivery
Liu, 2022[412]	China	Prospective cohort	124725	Community based	Hb 120 - 129 g/L	Hb < 79 g/L, Hb 80 - 109 g/L, Hb 110 - 119 g/L, Hb 130 - 139 g/L, Hb > 140 g/L	Pre-conception	Unspecified	LBW, SGA	RR	Age, BMI, education, occupation, ethnicity, folic acid use
Locks, 2021[413]	India	Prospective cohort	35387	Registry based	Hb >= 11 g/dL	Hb 10 - 10.99 g/dL, Hb < 10 g/dL	First trimester	Unspecified	BW (continuous)	MD	Age, education, parity, height
Lokeshwari, 2018[77]	India	Case-control	200	Community based	Hb 5 - 8 g/dL	Hb < 5 g/dL	Prenatal	Clinical analyzer (Complete blood sample count), unspecified blood sample	PTB (unspecified GA), LBW, LBW (< 1.5 kg), Neonatal mortality, Neonatal sepsis	OR	N/A
Lolaso, 2021[414]	N/A	Cross-sectional	1980	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Stillbirth	OR	N/A
Lone, 2004[415]	Pakistan	Prospective cohort	629	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Second and third trimesters	Unspecified	PTB, LBW, SGA, Perinatal mortality	RR	Age, BMI, respondent, education, monthly income in rupees
Lu, 1991[416]	United States of America	Retrospective cohort	17149	Tertiary care	Hct 37 - 39 %	Hct < 30 %, Hct 30 - 32 %, Hct 33 - 36 %, Hct 40 - 42 %, Hct > 43 %	First and second trimesters, Third trimester	Unspecified	SGA	OR	Race, parity, age, pre-pregnancy weight, maternal height, maternal smoking, hypertension
Luik, 2021[78]	Estonia	Prospective cohort	2262	Tertiary care	Hb >= 105 g/L, Hb >= 110 g/L	Hb < 105 g/L, Hb < 110 g/L	Second trimester, Third trimester	Unspecified	PTB (unspecified GA), LBW	RR	Age, BMI, smoking, duration of pregnancy at delivery
Lumbanraja, 2019[80]	Indonesia, India	Prospective cohort	200	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Second and third trimesters	Capillary blood sample	Stillbirth, PTB, LBW	RR	N/A
Ma, 2009[417]	China	Cross-sectional	6413	Community based	Hb >= 110 g/L	Hb 70 - 90 g/L, Hb 90.01 -	Third trimester	Cyanomethemoglobin method,	BW (unspecified	MD	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
						109.99 g/L		venous blood sample	BW)		
Magahed, 1986[418]	United Arab Emirates	Case-control	400	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	N/A
Maghsoudlou, 2016[419]	Iran (Islamic Republic of)	Case-control	3383	Community based	Hb 110 - 120 g/L	Hb < 110 g/L, Hb 121 - 139 g/L, Hb > 140 g/L	Pre-conception, First trimester, Second trimester	Unspecified	Stillbirth	OR	Age, maternal height, maternal BMI, parity, smoking status, husband's profession, region, gestational age at Hb measurement
Mahajan, 2004[420]	India	Retrospective cohort	300	Tertiary care	Hb > 11 g/dL	Hb <= 11 g/dL	Third trimester	Unspecified	BW (continuous)	MD	N/A
Mahamuda, 2011[421]	Bangladesh	Prospective cohort	60	Community based	Hb >= 10 g/dL	Hb < 10 g/dL, Hb < 8 g/dL	Third trimester	Abstracted from medical records	BW (continuous)	MD	N/A
Mahmood, 2019[81]	Pakistan	Retrospective cohort	622	Community based	Hb >= 10.01 mg/dL	Hb < 10 mg/dL	Third trimester	Abstracted from medical records	LBW, LBW (< 1499.99 g), SGA, PTB, Stillbirth, Neonatal mortality	RR	N/A
Malhotra, 2002[13]	India	Prospective cohort	447	Tertiary care	Hb 9.6 - 10.5 g%	Hb < 7.5 g%, Hb 7.6 - 8.5 g%, Hb 8.6 - 9.5 g%, Hb 10.6 - 11.5 g%, Hb > 11.6 g%	Prenatal	Unspecified	LBW	OR	Age, parity
Mamidi, 2022[422]	India	Prospective cohort	762	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	First trimester	Unspecified	LBW, SGA	RR	N/A
Mamun, 2006[423]	Bangladesh	Retrospective cohort	1584	Other	Hb 9 - 9.99 g/dL	Hb 10 - 10.99 g/dL, Hb 11 - 11.99 g/dL, Hb > 12 g/dL	Second trimester	Unspecified	Perinatal mortality	OR	Hypertension, antepartum hemorrhage, Hb, infection, age, iron folate supplementation
Marahatta, 2007[424]	Nepal	Prospective cohort	863	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB (unspecified	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
									GA)		
Marchant, 2004[425]	United Republic of Tanzania	Prospective cohort	301	Community based	Hb >= 8 g/dL	Hb < 8 g/dL	Prenatal	HemoCue AB, capillary blood sample	Neonatal mortality	HR	N/A
Mardones, 2008[426]	Chile	Retrospective cohort	2171	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified instrument, venous blood sample	BW (continuous), PTB (<33.9 wk), PTB (<37.9 wk)	MD, NA	Age, parity,maternal height, pre-delivery maternal weight, maternal weight at the last check-up, Hbvalue, presence of morbidity, smoking habit
Martí, 2001[427]	Venezuela (Bolivarian Republic of)	Case-control	543	Community based	Hb 12 - 12.99 g/dL, Hb >= 11 g/dL	Hb 5 - 8 g/dL, Hb 9 - 9.99 g/dL, Hb 10 - 10.99 g/dL, Hb 11 - 11.99 g/dL, Hb 13 - 13.99 g/dL, Hb > 14 g/dL, Hb < 11 g/dL	Third trimester	Unspecified	PTB (<36 wk)	OR	Placenta previa, placental abruption, PROM, previous PTB, number of ANC visits
Masukume, 2015[428]	High-income	Prospective cohort	5609	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	SGA, PTB, LBW	OR	N/A
Mau, 1977[429]	Germany	Retrospective cohort	4690	Community based	Hb 12.9 - 15.2 g%, Hb 12.9 - 14.4 g%	Hb < 11.19 g%, Hb 11.3 - 12.89 g%, Hb > 15.21 g%, Hb < 10.4 g%, Hb 10.5 - 12.89 g%, Hb > 14.41 g%	First trimester, Third trimester	Unspecified	LBW (< 10 %), PTB (<260 days)	OR	N/A
Mayorga, 2012[430]	Honduras	Case-control	87	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB	OR	N/A
McFarlane, 1996[431]	United States of America	Prospective cohort	1203	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Meda, 1999[432]	Burkina Faso	Prospective cohort	248	Tertiary care	Hb >= 11 g/dL	Hb 10 - 10.99 g/dL, Hb 7 - 9.99 g/dL, Hb < 7 g/dL	Third trimester	HemoCue, capillary blood sample	PTB, BW (unspecified BW), Perinatal mortality	OR	Age, parity, prenatal consultations, diet, maternal

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											hemorrhage, medical evacuation status, BMI, occupation, education, labor complications
Meis, 1995[433]	United Kingdom	Retrospective cohort	25844	Other	Hb 11.8 - 13.2 g/dL	Hb < 10.39 g/dL, Hb 10.4 - 11.7 g/dL, Hb > 13.3 g/dL	Prenatal	Unspecified	PTB (<256 days)	OR	Age, height, weight, parity, history of previous abortion, history of previous stillbirth, maternal smoking, social class, mother's employment, hemoglobin, bacteriuria, hypertension-proteinuria, early pregnancy bleeding, late pregnancy bleeding
Mekie, 2019[434]	Ethiopia	Cross-sectional	282	Community based	Hb >= 11 mg/dL	Hb < 11 mg/dL	Prenatal	Abstracted from medical records	LBW	OR	Urban/rural residence, planned/unplanned pregnancy, number of ANC visits, iron supplementation, newborn sex, Rh status
Mekonen, 2019[435]	Ethiopia	Cross-sectional	575	Community based	Hct >= 33 %	Hct < 33 %	Prenatal	Unspecified	PTB	OR	Number of ANC visits less than 4 times, MUAC less than 24 cm, having PROM, being anemic, the complication in current pregnancy, HIV status
Mekuriyaw,	Ethiopia	Case-control	432	Community	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB	OR	PROM, PIH,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
2020[436]				based							education, abortion, multiple pregnancies
Meng, 1984[437]	Republic of Korea	Case-control	264	Tertiary care	Hb > 9.01 g/dL	Hb < 9 g/dL	Prenatal	Unspecified	BW (continuous), LBW	MD, OR	N/A
Mengesha, 2020[438]	Ethiopia	Cross-sectional	370	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	Stillbirth	OR	N/A
Menon, 2016[439]	India	Prospective cohort	178	Tertiary care	Hb > 105 g/L, Hb >= 110 g/L	Hb < 104.9 g/L, Hb < 109.9 g/L	Second trimester, Third trimester	Unspecified instrument, venous blood sample	PTB	OR	N/A
Meuris, 1993[440]	Democratic Republic of the Congo	Retrospective cohort	657	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	Unspecified	BW (continuous)	MD	N/A
Mezen, 2022[441]	Ethiopia	Case-control	451	Primary care	Hb > 12 mg/dl	Hb < 11.9 mg/dl	Prenatal	Unspecified	LBW	OR	Adjusted but unspecified
Mingude, 2020[442]	Ethiopia	Case-control	300	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	Marital status, monthly income, parity, history of preterm birth, maternal Rh factor, ANC visit, time of first ANC visit, number of ANC visits, gestational age, types of gestation, birth interval, nutritional counseling, iron and folic acid supplementation, MUAC, history of chronic illness, maternal smoking status, chat chewing, alcohol

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											drinking, husband smoking status
Mir, 2016[443]	Pakistan	Case-control	200	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Misra, 2015[444]	India	Prospective cohort	124	Community based	Hb > 11.01 g%	Hb < 10.899 g%	First trimester	Abstracted from medical records	LBW	OR	N/A
Mitsuda, 2020[445]	Japan	Prospective cohort	83354	Tertiary care	Hb 11 - 13.5 g/dL	Hb < 10 g/dL, Hb 10 - 10.99 g/dL, Hb > 13.51 g/dL	Second and third trimesters	Unspecified	PTB (unspecified GA), BW (continuous)	MD	N/A
Moakhar, 2019[446]	Iran (Islamic Republic of)	Cross-sectional	383	Community based	Hct 33 - 40 %, Hb 10.5 - 13 g/dL	Hct < 33 %, Hct > 40.01 %, Hb < 10.499 g/dL, Hb > 13.01 g/dL	First trimester, Second trimester, Third trimester	Technicon H-1 blood sample counter, venous blood sample	LBW, BW (> 4000 g), PTB, Gestational age	RR	N/A
Moges, 2025[83]	Ethiopia	Prospective cohort	490	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	PTB, Neonatal mortality, LBW	RR	N/A
Mohamed, 2012[447]	United States of America	Retrospective cohort	17338	Community based	Hb 11 - 11.9 g/dL	Hb < 9 g/dL, Hb 9 - 9.9 g/dL, Hb 10 - 10.9 g/dL, Hb 12 - 12.9 g/dL, Hb 13 - 13.9 g/dL, Hb > 14 g/dL	Third trimester	Unspecified	PTB, LBW	OR	Age, BMI measured during pregnancy, at time of delivery, gravidity, multiple gestation, previous cesarean delivery, thyroid disorder, diabetes mellitus (chronic or gestational), hypertension, street drug use, smoking, alcohol, newborn sex
Mohamed, 2012[448]	Egypt	Prospective cohort	1059	Community based	Hb > 11 g%	Hb < 10.9 g%	Prenatal	Unspecified	LBW	RR	N/A
Mohammed, 2019[449]	Ghana	Retrospective cohort	1756	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	Gestational age, parity, number of ANC visits, number of IPTp-

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											SP doses
Mola, 1999[450]	Papua New Guinea	Retrospective cohort	22405	Community based	Hb >= 8 g/dL	Hb < 8 g/dL	Second trimester	Unspecified	Stillbirth	OR	Syphilis, multiple pregnancy, grand multiparity, region of origin
Morgan-Ortiz, 2010[451]	Mexico	Case-control	1503	Community based	Hb >= 11 g%	Hb < 11 g%	Prenatal	N/A	PTB	OR	N/A
Morisaki, 2014[452]	Global	Retrospective cohort	302376	Community based	Hb >= 7 mg/dL	Hb < 7 mg/dL	Prenatal	Unspecified	PTB (<36 wk)	OR	N/A
Moyambe, 2013[453]	Democratic Republic of the Congo	Case-control	387	Other	Hb >= 11 g/dL	Hb 8 - 10.9 g/dL, Hb < 8 g/dL	Prenatal	Unspecified	BW (unspecified BW)	OR	Age, socioeconomic status, months of birth spacing, hypertension, malaria, arm circumference
Murphy, 1986[149]	United Kingdom	Prospective cohort	44316	Community based	Hb 10.4 - 13.2 g/dL	Hb < 10.39 g/dL, Hb > 13.3 g/dL	First trimester, First and second trimesters, Second trimester	Unspecified	Perinatal mortality, LBW, PTB	RR	N/A
Musrifa, 2014[454]	Indonesia	Case-control	87	Community based	Hb > 11.01 g%	Hb < 11 g%	Unspecified	Unspecified	Neonatal mortality	OR	N/A
Mwanyumba, 2001[455]	Kenya	Retrospective cohort	8563	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	Unspecified	LBW	RR	N/A
Nair, 2016[86]	India	Retrospective cohort	1000	Community based	Hb >= 10 g/dL	Hb 7 - 9.9 g/dL, Hb < 6.9 g/dL	Second and third trimesters	Unspecified	LBW, SGA, Perinatal mortality	OR	N/A
Nair, 2017[456]	United Kingdom	Retrospective cohort	14001	Community based	Hb > 110.1 g/L	Hb 101 - 108 g/L, Hb < 99 g/L	Prenatal, Third trimester	Unspecified	Stillbirth, Perinatal mortality	OR	Age, BMI, parity, smoking status, gestational diabetes, antepartum hemorrhage, PIH during index pregnancy, pre-existing diabetes

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											mellitus, hemoglobinopathies, other medical comorbidities, ethnicity
Narang, 1997[457]	India	Retrospective cohort	2915	Other	Hb >= 8 g%	Hb < 8 g%	Prenatal	Unspecified	Birthweight for age (unspecified)	RR	N/A
Nasiri-Amiri, 2007[458]	Iran (Islamic Republic of)	Prospective cohort	609	Tertiary care	Hct 34 - 40 %	Hct 25 - 33.9 %, Hct > 40.01 %	First trimester	Micro-capillary reader, capillary blood sample	LBW, PTB	OR	Age, parity, pregnancy interval, weight gain during pregnancy, other adjustments unspecified
Nasiri-Amiri, 2007[459]	Iran (Islamic Republic of)	Prospective cohort	609	Tertiary care	Hct 34 - 40 %	Hct 25 - 33.9 %, Hct > 40.01 %	First trimester	Micro-capillary reader, capillary blood sample	LBW, PTB	OR	Age, parity, pregnancy interval, weight gain during pregnancy, other adjustments unspecified
Navali, 2012[460]	Iran (Islamic Republic of)	Case-control	200	Tertiary care	Continous	Continous	Prenatal	Unspecified	PTB	MD	N/A
Nguyen, 2023[461]	Viet Nam	Retrospective cohort	340	Primary care	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Unspecified	BW (unspecified BW)	OR	Age, education level of the mother, history of preterm birth, height of mother, weight gain during pregnancy, serum albumin during pregnancy
Nordenvall, 1990[151]	Sweden	Prospective cohort	300	Community based	Hb >= 110 g/L	Hb < 110 g/L, Hb > 130 g/L	Second trimester	Hemocaps photometer, capillary blood sample	BW (continuous), PTB (unspecified GA)	MD	N/A
Novikova,	Indonesia	Case-control	200	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
2018[462]											
Nsereko, 2020[463]	Rwanda	Retrospective cohort, Prospective cohort	367	Tertiary care	Hb >= 11 g/dL, SFe > 12 ug/L, Continous	Hb < 11 g/dL, SFe < 11.9 ug/L, Continous	Third trimester, First trimester	Unspecified	PTB	OR	N/A
Nwabueze, 2023[464]	Nigeria	Retrospective cohort	140	Community based	SFe >= 35 ug/L	SFe < 35 ug/L	Third trimester	Unspecified	PTB	RR	N/A
O'Brien, 2000[465]	Canada	Retrospective cohort	205	Registry based	Hct > 33 %	Hct < 32.9 %	First trimester	Unspecified instrument, venous blood sample	BW (continuous), Birthweight for age (unspecified)	correlation coefficient	GDM, thyroid disease, renal or cardiovascular disease
Oaks, 2019[466]	Malawi, Ghana	Retrospective cohort	1391, 1320	Community based	Serum_transferrin_Receptor < 6 mg/L	Serum_transferrin_Receptor > 6.01 mg/L	First and second trimesters, Third trimester	Unspecified	PTB, LBW, SGA	RR	N/A
Oh, 2003[467]	Republic of Korea	Retrospective cohort	80	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	PTB	RR	N/A
Ohuma, 2023[468]	Global	Prospective cohort	2069	Community based	Hb 110 - 110.99 g/L	Hb 60 - 60.99 g/L, Hb 65 - 65.99 g/L, Hb 70 - 70.99 g/L, Hb 75 - 75.99 g/L, Hb 80 - 80.99 g/L, Hb 85 - 85.99 g/L, Hb 90 - 90.99 g/L, Hb 95 - 95.99 g/L, Hb 100 - 100.99 g/L, Hb 105 - 105.99 g/L, Hb 115 - 115.99 g/L, Hb 120 - 120.99 g/L, Hb 125 - 125.99 g/L, Hb 130 - 130.99 g/L, Hb 135 - 135.99 g/L, Hb 140 - 140.99 g/L, Hb 145 - 145.99 g/L, Hb 150 - 150.99 g/L, Hb 155 - 155.99	Second trimester, Third trimester, Prenatal	Unspecified	SGA, PTB	RR	Age, maternal BMI, nulliparity, previous caesarean section, malaria, HIV, history of hypertension, history of diabetes, history of miscarriages, termination of pregnancy

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
						g/L, Hb 160 - 160.99 g/L, Hb 165 - 165.99 g/L, Hb 170 - 170.99 g/L, Hb 175 - 175.99 g/L, Hb 180 - 180.99 g/L					
Oladeinde, 2015[469]	Nigeria	Cross-sectional	780	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Autoanalyser-Sysmex KX-21 (Sysmex Corporation, Kobe, Japan), venous blood sample	LBW	OR	N/A
Olga, 2024[470]	United Kingdom	Prospective cohort	3285	Tertiary care	Hb >= 105 g/L	Hb < 105 g/L	Third trimester	N/A	SGA, PTB (unspecified GA)	OR	N/A
Omar, 2022[471]	Somalia	Case-control	499	Primary care	Hb >= 11 g/dL	Hb 9 - 10.9 g/dL, Hb 7 - 8.9 g/dL, Hb < 6.9 g/dL	Third trimester	Unspecified	PTB	OR	N/A
Onadeko, 1996[472]	Nigeria	Retrospective cohort	4649	Community based	Hb 12 - 12.9 g/dL	Hb < 10 g/dL, Hb 10 - 10.9 g/dL, Hb 11 - 11.9 g/dL, Hb 13 - 13.9 g/dL, Hb 14 - 14.9 g/dL	Third trimester	Unspecified	Stillbirth, LBW	RR	N/A
Orlandini, 2017[92]	Italy	Retrospective cohort	1131	Community based	Hb > 11 g/dL	Hb <= 11 g/dL	Prenatal	Unspecified	BW (continuous)	MD	N/A
Ota, 2017[473]	Global	Prospective cohort	295829	Community based	Hb >= 7 mg/dL	Hb < 7 mg/dL	Prenatal	Abstracted from medical records	SGA, PTB (<36 wk)	OR	Facility capacity, human development index
Özgen, 2020[167]	Türkiye	Retrospective cohort	8916	Community based	Hb 11 - 12.4 g/dL	Hb < 11 g/dL, Hb > 12.5 g/dL	Prenatal	Unspecified	PTB, LBW	RR	N/A
Padda, 2011[474]	India	Cross-sectional	1341	Tertiary care	Hb > 11.01 g/dL	Hb < 6.49 g/dL, Hb 6.5 - 8 g/dL, Hb 8 - 11 g/dL	Unspecified	Unspecified	LBW	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Pal, 2020[475]	India	Retrospective cohort	2611	Community based	Hb >= 12 g/dL	Hb < 12 g/dL	First trimester	Hemoglobinometer, capillary blood sample	LBW	OR	Residence, religion, cast, level of education, occupation, economic condition, socioeconomic status of household, mother age, mother weight, height, BMI, hemoglobin level, blood sample pressure, gestational period, birth interval, number of children, chronic illness of the mother, dietary counseling during pregnancy, addition habit, ANC, follow-up, iron folic acid tablet consumption, availability of latrine, type of family, number of individuals in the house
Pardilawati, 2017[476]	Indonesia	Case-control	168	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Parks, 2019[16]	South Asia	Prospective cohort	92247	Community based	Hb >= 11 g/dL	Hb < 6.9 g/dL, Hb 7 - 9.9 g/dL, Hb 10 - 10.9 g/dL	Prenatal	Unspecified	PTB, Stillbirth, Neonatal mortality, BW (continuous), LBW, LBW (< 1499 g)	RR, MD	Age, education, parity, parity controlling for within-cluster correlation
Patel, 2018[477]	India	Prospective cohort	72750	Community based	Hb >= 11 g/dL	Hb 10 - 10.99 g/dL, Hb < 10 g/dL	First trimester, Second and third trimesters,	Sahli Method, unspecified	Stillbirth, Neonatal	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
							Prenatal	blood sample	mortality, LBW		
Patel, 2021[478]	India	Cross-sectional	1216	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	N/A
Pattanapisalsak, 2011[479]	Thailand	Retrospective cohort	2922	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	N/A
Perveen, 2016[480]	Pakistan	Prospective cohort	234	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	PTB, LBW, Perinatal mortality, Stillbirth	RR	N/A
Peters, 2001[481]	Papua New Guinea	Case-control	199	Community based	Hb >= 10 g/dL, Hb >= 8 g/dL	Hb < 10 g/dL, Hb < 8 g/dL	Prenatal	Unspecified	LBW	OR	N/A
Phaloprakarn, 2008[152]	Thailand	Retrospective cohort	870	Tertiary care	Hb 110 - 124 g/L	Hb > 125 g/L	First trimester	Automatic counter model LH 750 (Beckman Coulter), unspecified blood sample	PTB, LBW, SGA	RR	Age, parity, weight at first visit, BMI, GA at Hb screening, GA at delivery, route of delivery, birth weight
Pinho-Pompeu, 2017[482]	Brazil	Retrospective cohort	458	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	LBW, Birthweight for age (unspecified), PTB, Stillbirth	RR	N/A
Poespoprodjo, 2008[483]	Indonesia	Prospective cohort	2518	Tertiary care	Hb >= 7 g/dL	Hb < 7 g/dL	Prenatal	Unspecified	BW (unspecified BW)	OR	Malaria, Papuan ethnicity, primigravid, prematurity
Prakash, 2018[153]	India	Prospective cohort	1000	Community based	Hb >= 11 g/dL	Hb < 11 g/dL, Hb 10 - 10.9 g/dL, Hb 7 - 9.9 g/dL, Hb < 7 g/dL	Prenatal	Unspecified	NA, Neonatal mortality	RR	N/A
Prema, 1981[484]	India	Retrospective cohort	3461	Community based	Hb >= 11 g/dL	Hb < 5 g/dL, Hb 5 - 7.9 g/dL, Hb 8 - 10.9 g/dL	Third trimester	Unspecified	PTB (unspecified GA), LBW, Perinatal mortality	RR	N/A
Prioreschi,	South Africa	Prospective	789	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	First and second	N/A	PTB, LBW, BW	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
2025[485]		cohort					trimesters		(> 4000 g), SGA, LGA		
Puerto, 2021[486]	Colombia	Prospective cohort	1218	Community based	Hb >= 11 g/dL, SFe > 12 ug/L	Hb < 11 g/dL, SFe < 11.9 ug/L	Third trimester	Coultor counter, Immunoenzymometric sequential assay (AccuBind Elisa Microwells; Monobind Inc.), venous blood sample	LBW, SGA, PTB	OR	N/A
Radoń-Pokracka, 2016[487]	Poland	Retrospective cohort	450	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	LBW, PTB	OR	N/A
Raharjo, 2018[597]	Indonesia	Retrospective cohort	3607	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Unspecified	Unspecified	LBW (< 1499 g), LBW (< 1999 g)	RR	N/A
Rahbar, 2014[488]	Iran (Islamic Republic of)	Prospective cohort	541	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	First trimester	Unspecified	PTB, LBW, Stillbirth, Neonatal sepsis	RR	N/A
Rahfiludin, 2018[489]	Indonesia	Cross-sectional	114	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	First and second trimesters	Cyanmethemoglobin method, unspecified blood sample	LBW	RR	N/A
Rahman, 2021[490]	Bangladesh	Prospective cohort	573	Community based	SFe > 25.1 ug/L, SFe > 12.1 ug/L, Hb > 11.1 g/L	SFe 25.1 - 44.9 ug/L, SFe > 45.1 ug/L, SFe 12.1 - 20.9 ug/L, SFe > 21.1 ug/L, Hb < 10.9 g/L	Second trimester, Third trimester	HemoCue photometer (HemoCue AB, Angelholm, Sweden), venous blood sample	LBW, PTB	OR	N/A
Räisänen, 2013[514]	Finland	Case-control	1390742	Community based	Hb >= 100 g/L	Hb < 100 g/L	Prenatal	N/A	PTB (<27.99 wk), PTB (<31.99 wk), PTB	OR	N/A
Räisänen, 2014[513]	Finland	Retrospective cohort	1390742	Community based	Hb >= 100 g/L	Hb < 99 g/L	First trimester	Unspecified	PTB, SGA (<2 SD), Stillbirth, Neonatal mortality	OR	N/A
Ramadani,	Indonesia	Prospective	128	Community	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	HemoCue,	BW	MD	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
2019[491]		cohort		based				capillary blood sample	(continuous)		
Ramazanali, 2006[492]	Iran (Islamic Republic of)	Prospective cohort	1419	Tertiary care	Hct 36.001 - 39 %	Hct < 33 %, Hct 33.001 - 36 %, Hct 39.001 - 42 %, Hct > 42.001 %	Third trimester	Unspecified	LBW	OR	Age, maternal height, maternal weight, gestational age at delivery, parity, maternal race/nationality, newborn sex
Ramya, 2019[493]	India	Prospective cohort	1501	Community based	Hb >= 11 g/dL	Hb < 7 g/dL, Hb 7 - 10 g/dL, Hb 10 - 11 g/dL	Prenatal	Unspecified	LBW (< 1000 g), LBW (< 1500 g), LBW, BW (> 3500 g), PTB	RR	N/A
Ranaei, 2013[494]	Iran (Islamic Republic of)	Prospective cohort	271	Community based	Hb >= 11 mg/dL	Hb < 11 mg/dL	Prenatal	Unspecified	LBW, Perinatal mortality, Stillbirth	RR	N/A
Randall, 2019[95]	Australia	Retrospective cohort	31906	Community based	Hb 110 - 139 g/L	Hb < 109 g/L, Hb > 140 g/L	First and second trimesters	Unspecified	PTB, Stillbirth, SGA, LBW (< 1499 g)	RR	N/A
Rao, 2018[495]	India	Prospective cohort	1060	Community based	Hb >= 110 g/L, Hb >= 10 g/dL	Hb < 110 g/L, Hb < 10 g/dL	Second and third trimesters	Cyanmethemoglobin method, unspecified blood sample	PTB	RR	N/A
Rashid, 2020[496]	Pakistan	Case-control	450	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	N/A
Rasmussen, 1993[497]	Norway	Retrospective cohort	3074	Community based	Hb 11 - 14 g/dL, Hb 10 - 13 g/dL	Hb < 11 g/dL, Hb > 14.1 g/dL, Hb < 10 g/dL, Hb > 13.1 g/dL	First trimester, Second trimester	Unspecified	BW (continuous), SGA (<2.5 percentile), LGA, PTB (<259 days)	MD, RR	N/A
Rawat, 2025[498]	India	Retrospective cohort	300	Tertiary care	Hb >= 11 g/dL	Hb 9 - 10.99 g/dL, Hb 7 - 8.99 g/dL, Hb < 7 g/dL	Third trimester	N/A	PTB, LBW, Neonatal mortality	RR	N/A
Razmy, 2016[499]	Sri Lanka	Retrospective cohort	3498	Community based	Hb 105 - 125 g/L	Hb < 79.9 g/L, Hb 80 - 104.9 g/L, Hb > 125.1	Prenatal	Unspecified	LBW, PTB	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
						g/L					
Ren, 2007[500]	China	Prospective cohort	88149	Community based	Hb >= 110 g/L, Hb 110 - 119 g/L	Hb < 110 g/L, Hb 80 - 109 g/L, Hb < 80 g/L, Hb 80 - 99 g/L, Hb 120 - 139 g/L, Hb 140 - 159 g/L, Hb > 160 g/L	First trimester	Abstracted from medical records	LBW, PTB, SGA	OR	Age, education, gravidity, BMI
Restu, 2014[501]	Indonesia	Case-control	174	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Unspecified	Unspecified	LBW	OR	Supplementation, gestational age, parity, education, BMI
Riaz, 2018[502]	Pakistan	Retrospective cohort	301	Tertiary care	SFe >= 11 ng/ml	SFe < 11 ng/ml	Third trimester	Unspecified	LBW	OR	N/A
Ribot, 2012[503]	Spain	Prospective cohort	205	Community based	SFe >= 12 ug/L	SFe < 12 ug/L	First trimester	Coultor counter, venous blood sample	BW (continuous)	MD	SFe <12 mg/l at the start of pregnancy, TS<16% at the start of pregnancy, initial Hb
Ribot, 2014[504]	Spain	Prospective cohort	282	Community based	Hb >= 110 g/L, Hb >= 105 g/L	Hb < 110 g/L, Hb < 105 g/L	First trimester, Second trimester, Third trimester	Coultor counter, capillary blood sample	PTB	OR	Non-smoker, quitting tobacco during the first trimester, smokers, passive smokers, age, parity, newborn sex, BMI at the first visit, socioeconomic level, iron supplementation per day
Riu, 2020[505]	Indonesia	Retrospective cohort	6876	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Rocha, 2005[506]	Brazil	Retrospective cohort	168	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	HemoCue blood sample hemoglobin testing system,	LBW	MD	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
								capillary blood sample			
Rogerson, 2000[507]	Malawi	Retrospective cohort	1044	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Unspecified	LBW	OR	N/A
Rondó, 1995[509]	Brazil	Retrospective cohort	712	Community based	Hct 41 - 46 %, Hb 14.1 - 16 g/dL, Hct > 39 %, Hb > 11 g/dL	Hct < 40 %, Hct 47 - 50 %, Hct 51 - 56 %, Hct > 57 %, Hb < 14 g/dL, Hb 16.1 - 17 g/dL, Hb 17.1 - 18 g/dL, Hb > 18.1 g/dL, Hct < 31 %, Hct 32 - 38 %, Hb <= 11 g/dL	Third trimester	Unspecified	SGA	OR	N/A
Rondó, 1997[508]	Brazil	Case-control	712	Other	Hct > 39 %, Hb > 11 g/dL, SFe 21 - 50 ug/L	Hct < 31 %, Hct 32 - 38 %, Hb <= 11 g/dL, SFe < 10 ug/L, SFe 11 - 20 ug/L, SFe > 51 ug/L	Prenatal	Cyanmethemoglobin, immunoenzymatic assay	SGA	OR	Maternal body weight, per capita income, cigarette smoking, weight gain, prior LBW, maternal ferritin, beer intake, coffee intake
Rondó, 1999[510]	Brazil	Retrospective cohort	712	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	SGA	OR	N/A
Ronnenberg, 2004[511]	China	Prospective cohort	405	Community based	Hb >= 120 g/L, SFe 12 - 59.99 ug/L	Hb < 95 g/L, Hb 95 - 119.99 g/L, SFe < 12 ug/L, SFe > 60 ug/L	Prenatal	Unspecified instrument, venous blood sample	PTB, LBW, Birthweight for age (unspecified)	OR	Height, height-squared, exposure to dust, noise, work stress, gestational age, deficiency of folate, vitamin B-12, vitamin B-6
Roopnarine, 2017[512]	Trinidad and Tobago	Case-control	627	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Rukuni, 2016[19]	United Kingdom	Retrospective cohort	80422	Registry based	Hb >= 10 g/dL	Hb <= 10 g/dL	First trimester	Unspecified	PTB, LBW, LBW (< 1499 g), Stillbirth, Neonatal	RR	Age, parity, smoking status, ethnicity, socio-economic status,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
									mortality		BMI, chronic kidney disease
Sachdeva, 2013[515]	India	Retrospective cohort	1577, 2812	Community based	Hb >= 11 g/dL	Hb < 7 g/dL, Hb 7 - 9.99 g/dL, Hb 10 - 10.99 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Saeed, 2014[516]	Sudan	Retrospective cohort	381	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Safarzadeh, 2023[99]	Iran (Islamic Republic of)	Retrospective cohort	8631	Community based	Hb > 10.5 mg/dl	Hb < 10.49 mg/dl	Prenatal	Unspecified	PTB (unspecified GA), BW (unspecified BW), Stillbirth	OR	Age, education, residency place, access to prenatal care, smoking, parity, labor induction, fetal presentation, method of delivery
Sagen, 1984[517]	Norway	Prospective cohort	877	Community based	Hb 12 - 12.9 g/dL, Hb 13 - 15 g/dL	Hb 9 - 11.9 g/dL, Hb 13 - 15 g/dL	Third trimester	Unspecified instrument, venous blood sample	PTB (unspecified GA), BW (continuous)	MD	N/A
Sah, 2022[518]	Nepal	Cross-sectional	2418	Primary care	Hb 11 - 13 mg/dl	Hb < 11 mg/dl, Hb > 13.01 mg/dl	Prenatal	Unspecified	LBW, PTB (unspecified GA)	OR, MD	BMI, birth space, dietary habit, parity, age group, education level, ethnicity
Saleh, 2019[519]	Indonesia	Prospective cohort	109	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW	RR	N/A
Salman, 2020[520]	Iraq	Prospective cohort	500	Community based	Hb >= 11 g/dL	Hb 9 - 10.9 g/dL, Hb 7 - 8.9 g/dL, Hb < 6.9 g/dL	Second and third trimesters	Coultor counter, venous blood sample	PTB, SGA, Neonatal mortality	RR	N/A
Salunkhe, 2019[521]	India	Prospective cohort	714	Community based	Hb >= 11 g%	Hb < 11 g%	First trimester	Unspecified	LBW	RR	N/A
Salunkhe, 2021[101]	India	Prospective cohort	1876	Community based	Hb >= 11 g%	Hb < 7 g%	Prenatal	Unspecified	BW (continuous), LBW, PTB (unspecified GA), PTB	MD, RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Santure, 1999[522]	Canada	Retrospective cohort	202	Tertiary care	Hb <= 12 g/dL	Hb > 12 g/dL	Second trimester, Third trimester	Coulter counter, unspecified blood sample	BW (continuous), LBW (< 3199.99 g)	MD, RR	N/A
Saragih, 2020[523]	Indonesia	Case-control	68	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Abstracted from medical records or disease registries	LBW	OR	N/A
Saraswati, 1998[524]	Indonesia	Prospective cohort	432	Other	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	RR	Adjusted but unspecified
Savaliya, 2021[525]	India	Prospective cohort	93	Tertiary care	Hb 7.1 - 9 g%	Hb < 7 g%	Prenatal	Unspecified	PTB (unspecified GA), BW (unspecified BW)	RR	N/A
Scanlon, 2000[526]	United States of America	Retrospective cohort	173031	Community based	Hb 0 - 0 Z-score	Hb < -3.01 Z-score, Hb -3 - -2.1 Z-score, Hb -2 - -1.1 Z-score, Hb 1.1 - 2 Z-score, Hb 2.1 - 3 Z-score, Hb > 3.01 Z-score	First trimester, Second trimester, Third trimester	Unspecified	PTB, SGA	OR	Maternal race, marital status, weight gain
Scaria, 2022[527]	India	Retrospective cohort	147762	Community based	Hb >= 11 g/dL	Hb 10 - 10.9 g/dL, Hb < 9.9 g/dL	Prenatal	Unspecified	LBW (< 1499 g), LBW	OR	Gender, birth order, mother's age, education, social group, wealth index, geographic region, anemia, tobacco use, alcohol use, ANC, pregnancy type, height
Schmiegelow, 2012[528]	United Republic of Tanzania	Prospective cohort	872	Tertiary care	Hb >= 8 g/dL	Hb < 8 g/dL	Third trimester	Unspecified	Mortality	OR	Age, gravidity, education, short maternal stature (<156cm), weight, gestational age >21 weeks, ANC, intermittent

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											preventive treatment in pregnancy, bed-net, PIH, preeclampsia, preterm delivery, SGA, hemorrhage, placental weight, place of delivery
Scholl, 1992[531]	United States of America	Prospective cohort	826	Other	Hb >= 110 g/L	Hb < 110 g/L	First and second trimesters	Radioimmunoassay, venous blood sample	LBW, PTB, SGA	OR	Age, parity, ethnicity, prior LBW or preterm delivery, bleeding at entry, gestation at initial blood sample draw, number of cigarettes smoked per day, pre-pregnancy BMI
Scholl, 1994[529]	United States of America	Retrospective cohort	755	Tertiary care	SFe > 12 ug/L	SFe < 11.9 ug/L	Third trimester	Unspecified instrument, venous blood sample	PTB (unspecified GA), BW (unspecified BW)	OR	Age, parity, black ethnicity, cigarettes smoked/d, pre-pregnancy BMI, prior history of preterm delivery (or low birth weight), dietary energy intake, protein intake
Scholl, 1998[530]	United States of America	Prospective cohort	1162	Community based	SFe 0 - 15 ug/L, SFe 0 - 39.1 ug/L	SFe > 41.5 ug/L, SFe 25.8 - 41.4 ug/L, SFe 15.1 - 25.7 ug/L, SFe > 155.7 ug/L, SFe 71.1 - 155.6 ug/L, SFe 39.2 - 71 ug/L	Third trimester	Unspecified	PTB (<32.99 wk), PTB, LBW	OR	Age, parity, and, in certain models, pre-gravid BMI, inadequate gestational weight gain
Sebastian, 2015[532]	India	Retrospective cohort	36674	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	SGA	OR	Newborn sex, age, husband occupation,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											husband education, mother occupation, mother education, hypertension, multiple pregnancy, cardiac disease, oligohydramnios, BMI, mother overweight
Seedidhi, 2017[533]	India	Prospective cohort	500	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Sahli's method, unspecified blood sample	LBW	RR	N/A
Seid, 2022[534]	Ethiopia	Case-control	252	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	Adjusted but unspecified
Seifi, 2015[535]	Iran (Islamic Republic of)	Case-control	324	Other	Hb >= 11 g/dL, Hb >= 10.5 g/dL	Hb < 11 g/dL, Hb < 10.5 g/dL	First trimester, Second and third trimesters	Unspecified	PTB	OR	Age, education level, BMI, weight gain during pregnancy, relationship with husband, blood sample group, number of pregnancies, history of abortion, interval between pregnancies, history of PTB
Seijas-Chávez, 2021[536]	Brazil	Retrospective cohort	2807	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	N/A	Stillbirth	OR	N/A
Sekhavat, 2013[537]	Iran (Islamic Republic of)	Retrospective cohort	1842	Community based	Hb 10 - 13 g/dL	Hb < 10 g/dL, Hb > 13.01 g/dL	Third trimester	Unspecified	BW (continuous), LBW, BW (> 2500 g)	MD, OR	N/A
Senn, 2009[538]	Papua New Guinea	Retrospective cohort	310	Community based	Hb > 8 g/dL	Hb < 7.9 g/dL	Third trimester	Unspecified	BW (continuous)	MD	N/A
Serour, 1981[539]	Egypt	Retrospective	6990	Tertiary care	Hb >= 11.01 g,	Hb < 6 g, Hb 7 -	Prenatal	Unspecified	Perinatal	standardized	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort			Hb > 11.01 g	10 g			mortality	mortality ratio (smr)	
Shah, 2020[541]	India	Retrospective cohort	400	Community based	Hb >= 11 g/dL	Hb 10 - 10.9 g/dL, Hb 7 - 9.9 g/dL, Hb < 7 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Shah, 2022[540]	Pakistan	Cross-sectional	400	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	CBC haematology analyzer Celltac Alpha MEK-6500 (Nihon Kohden Germany), unspecified blood sample	LBW, PTB, SGA	RR	N/A
Shams, 2012[542]	Pakistan	Retrospective cohort	832	Community based	Hb >= 10 g%	Hb < 10 g%	Prenatal	Unspecified	LBW	OR	N/A
Shankar, 2019[543]	India	Prospective cohort, Retrospective cohort	N/A	Tertiary care	Hb > 10.5 g/dL, Hb >= 11 g/dL	Hb < 10.499 g/dL, Hb < 11 g/dL	Second trimester, Third trimester	N/A	LBW	OR	N/A
Sharma, 2008[544]	India	Prospective cohort	3698	Community based	Hb >= 11 g/dL	Hb 5 - 7.9 g/dL, Hb 8 - 10.9 g/dL	Prenatal	Cyanmethaemoglobin method, unspecified blood sample	BW (continuous)	MD	N/A
Sharma, 2015[545]	Nepal	Case-control	465	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	Adjusted but unspecified
Shi, 2022[103]	China	Retrospective cohort	18948443	Community based	Hb >= 110 g/L	Hb 100 - 109 g/L, Hb 70 - 99 g/L, Hb < 69 g/L, Hb < 110 g/L	Prenatal	Unspecified	PTB, Birthweight for age (unspecified), Stillbirth	OR	N/A
Shin, 2014[546]	Republic of Korea	Retrospective cohort	353	Community based	Hb > 11.72 g/dL, Hct > 35.19 %, Iron > 88.53 ug/dL, TIBC < 409.299 ug/dL, SFe > 21 ug/dL, Transferrin_Saturation > 19.61	Hb < 11.7199 g/dL, Hct < 35.1899 %, Iron < 88.5299 ug/dL, TIBC > 490.3 ug/dL, SFe <= 20.9899 ug/dL, Transferrin_Sat	Third trimester	Abstracted from medical records	BW (continuous)	MD	Age, height, BMI, gestational age at birth

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
					%, Hb >= 10 g/dL, Hb >= 11 g/dL, Hb >= 12 g/dL, Hb >= 13 g/dL, iron >= 30 ug/dL, TIBC >= 360 ug/dL, SFe >= 15 ng/mL, Transferrin_Saturation >= 10 %	uration < 19.6099 %, Hb < 10 g/dL, Hb < 11 g/dL, Hb < 12 g/dL, Hb < 13 g/dL, iron < 30 ug/dL, TIBC < 360 ug/dL, SFe < 15 ng/mL, Transferrin_Saturation < 10 %					
Shobeiri, 2006[547]	India	Prospective cohort	500	Tertiary care	Hb >= 11 g/dL, Hb >= 10.5 g/dL	Hb < 11 g/dL, Hb < 10.5 g/dL	First trimester, Second trimester, Third trimester	Cyanmethemoglobin method, non-invasive sample	BW (continuous)	RR	N/A
Shrivastava, 2024[23]	India	Prospective cohort	102	Tertiary care	Hb >= 4 g/dL	Hb < 4 g/dL	Prenatal	N/A	PTB, LBW, SGA, Stillbirth	RR	N/A
Siega-Riz, 1998[548]	United States of America	Prospective cohort	7120	Other	Hct 33 - 40 %	Hct < 33 %, Hct > 40 %	First and second trimesters, Third trimester	Unspecified	PTB	RR, OR	Adjusted but unspecified
Singal, 2019[549]	India	Retrospective cohort	400	Community based	Hb >= 11 g/dL	Hb < 9.9 g/dL, Hb 7 - 9.9 g/dL, Hb < 6.9 g/dL	Prenatal	Unspecified	NA, Birthweight for age (unspecified), Stillbirth, LBW (< 0.99 kg), LBW (< 1.49 kg), LBW, BW (> 4 kg)	RR	N/A
Singh, 1997[553]	India	Retrospective cohort	459	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Singh, 1998[552]	Singapore	Cross-sectional	3728	Community based	Hb >= 11 g/dL	Hb < 7 g/dL, Hb 7 - 8.99 g/dL, Hb 9 - 10.99 g/dL	Unspecified	HemoCue, abstracted from medical records	BW (continuous)	MD	N/A
Singh, 2009[551]	India	Retrospective cohort	340	Community based	Hb >= 11 g%	Hb < 11 g%	Unspecified	Abstracted from medical records	LBW	OR	N/A
Singh, 2014[550]	India	Case-control	400	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	First and second trimesters	Unspecified	LBW	OR	Adjusted but unspecified
Singla, 1997[554]	India	Prospective	76	Community	Hb >= 11 g/dL	Hb < 6 g/dL, Hb	Third trimester	Unspecified	BW	MD	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort, Retrospective cohort		based		6.1 - 8.5 g/dL, Hb 8.6 - 10.9 g/dL			(continuous)		
Skhvitaridze, 2025[555]	Georgia	Retrospective cohort	105811	Community based	Hb >= 110 g/L	Hb 100 - 109.99 g/L, Hb < 100 g/L	Third trimester	N/A	PTB	OR	N/A
Smith, 2019[106]	Canada	Retrospective cohort	515270	Registry based	Hb >= 11 g/dL	Hb 9 - 10.9 g/dL, Hb 7 - 8.9 g/dL, Hb < 7 g/dL, Hb < 11 g/dL	Third trimester	Unspecified	PTB, PTB (<31.99 wk), SGA, SGA (<2.99 percentile), Stillbirth, Neonatal mortality, Perinatal mortality	OR	Age, parity, pre-pregnancy weight, smoking, previous cesarean delivery, alcohol use, pre-existing hypertension, chronic diseases, in vitro fertilization, multiple birth, twin, triplet gestations (except as indicated)
Smithers, 2014[556]	Australia	Retrospective cohort	124061	Community based	Hb >= 11 g/L	Hb < 11 g/L	Prenatal	Unspecified	LBW, PTB, Birthweight for age (unspecified)	standardized incidence ratio (sir)	Singleton/twin, age, smoking in pregnancy, number of ANC visits, parity, inter-pregnancy interval, maternal occupation, paternal occupation, maternal aboriginal or Torres strait islander status, the index of relative socio-economic disadvantage, remote/not remote living area
Soubasi, 2010[557]	Greece	Retrospective	63	Tertiary care	SFe 11 - 60	SFe < 10 ug/L,	Third trimester	Unspecified	BW	MD, OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort			ug/L	SFe > 60 ug/L			(continuous), SGA (<-2 SD)		
Spinillo, 1994[558]	Italy	Case-control	613	Tertiary care	Hb > 8.1 g/dL	Hb < 8 g/dL	Prenatal	Unspecified	SGA	OR	Maternal smoking, age, nulliparity, pre-pregnancy weight, poor weight gain, previous low birthweight, previous abortions, female newborn sex, preeclampsia, chronic hypertension, maternal education,
Srikrishna, 2003[559]	India	Cross-sectional	959	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	OR	N/A
Steer, 1995[560]	United Kingdom	Retrospective cohort	153602	Community based	Hb 96 - 105 g/L	Hb < 85 g/L, Hb 86 - 95 g/L, Hb 106 - 115 g/L, Hb 116 - 125 g/L, Hb 126 - 135 g/L, Hb 136 - 145 g/L, Hb > 145 g/L	Prenatal	Unspecified	LBW, PTB	OR	Ethnicity
Stephansson, 2000[561]	Sweden	Case-control	1404	Community based	Hb 126 - 135 g/L	Hb < 115 g/L, Hb 116 - 125 g/L, Hb 136 - 145 g/L, Hb > 146 g/L	First trimester	Unspecified	Stillbirth	OR	N/A
Stephen, 2018[562]	United Republic of Tanzania	Prospective cohort	529	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	PTB, LBW, Stillbirth, Neonatal mortality	RR	N/A
Suleman, 2018[563]	Pakistan	Cross-sectional	200	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	BW (continuous)	MD	N/A
Sun, 2021[564]	China	Nested case-control	3172	Community based	Hb >= 110 g/L	Hb < 110 g/L	Prenatal	Unspecified	PTB	OR	Region, gestational weight gain,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											rural registration, PROM, occupational status
Sureshbabu, 2021[565]	India	Case-control	391	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB	OR	PIH, amniotic fluid volume, PROM, other systemic diseases, history of PTB, UTI, GDM, history of abortion, hypothyroidism, abnormal placenta
Suryanarayana, 2017[109]	India	Prospective cohort	446	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	HemoCue analyzer (HemoCue Hb 301), capillary blood sample	LBW	OR	Adjusted but unspecified
Swain, 1994[566]	India	Prospective cohort	484	Tertiary care	Hb > 11.01 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW	RR	N/A
Symington, 2019[567]	South Africa	Prospective cohort	595	Tertiary care	Hb >= 11 g/dL, Hb >= 10.5 g/dL	Hb < 11 g/dL, Hb < 10.5 g/dL	First and second trimesters, Second trimester, Third trimester	Unspecified	LBW, PTB	OR	Age, gestational age at birth, newborn sex, parity, socio-economic status
Tabrizi, 2015[568]	Iran (Islamic Republic of)	Prospective cohort	1405	Community based	Hb > 10 g/dL	Hb 6.5 - 8 g/dL, Hb 8.1 - 10 g/dL	Second trimester, Third trimester	Cyanomethemoglobin, unspecified blood sample	BW (continuous)	MD	N/A
Tabrizi, 2019[569]	Iran (Islamic Republic of)	Retrospective cohort	1360	Other	Hb >= 10.5 g/dL	Hb < 10.5 g/dL	First and second trimesters	Calibrated laboratory machine (ADVIA 2120 hematology system, SIEMENS health care), venous blood sample	LBW, PTB	OR	Age, family size, education, number of parities, pre-pregnancy BMI, maternal weight gain, food supplemented

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Tabussum, 1994[570]	Pakistan	Case-control	300	Other	Hb >= 10 g%	Hb < 10 g%	Prenatal	Unspecified	PTB	OR	N/A
Tadese, 2021[571]	Ethiopia	Case-control	453	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	LBW	OR	N/A
Tadesse, 2023[572]	Ethiopia	Cross-sectional	337	Community based	Hb >= 11 mg/dl	Hb < 11 mg/dl	Prenatal	Unspecified	LBW	OR	Adjusted but unspecified
Tagbor, 2010[573]	Ghana	Retrospective cohort	3333	Other	Hb > 8 g/dL	Hb 5 - 7.99 g/dL	Second trimester	Capillary blood sample	LBW	RR	Treatment group, gravity, baseline parasitemia, age category
Tahir, 2019[574]	Pakistan	Cross-sectional	200	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	BW (continuous)	MD	N/A
Tamura, 1996[575]	United States of America	Case-control	1500	Community based	SFe > 42 ug/L, Other	SFe < 41.9 ug/L, Other	Second trimester	Immunoassay, Nanorid radial immunidiffusion kits, venous blood sample	PTB (<32 wk)	OR	N/A
Tang, 2024[576]	China	Retrospective cohort	454815	Community based	Hb 110 - 119.99 g/L	Hb < 100 g/L, Hb 100 - 109.99 g/L, Hb 120 - 129.99 g/L, Hb 130 - 139.99 g/L, Hb > 140 g/L	First trimester	N/A	PTB, Stillbirth, LBW, SGA	OR	N/A
Tao, 2022[577]	China	Retrospective cohort	3566	Community based	SFe < 12.1 ng/ml	SFe 12.11 - 24.35 ng/ml, SFe 24.351 - 50.609 ng/ml, SFe > 50.61 ng/ml	Prenatal	Unspecified	SGA, SGA (<4.99 percentile), SGA (<9 percentile), LBW	OR	Iron supplements in pregnancy, age at delivery, parity, pre-pregnancy body-mass index, HDOP, gestational diabetes mellitus, education, newborn sex
Thakre, 2018[578]	India	Retrospective cohort	297	Community based	Hb >= 10 g/dL	Hb < 9.9 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Tian, 2022[209]	China	Retrospective	519	Tertiary care	Hb >= 110 g/L,	Hb 100 - 109	First and third	Hematology	PTB	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort			Hb 100 - 109 g/L	g/L, Hb < 99 g/L	trimesters	analyzer, unspecified blood sample	(unspecified GA), BW (unspecified BW), Birthweight for age (unspecified)		
Tian, 2024[110]	China	Prospective cohort, Retrospective cohort	362023	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Unspecified	Birthweight for age (unspecified)	RR	N/A
Tilahun, 2021[579]	N/A	Case-control	480	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	LBW	OR	N/A
Tiwari, 2021[580]	India	Retrospective cohort	124	Community based	Hb 4 - 7 g%	Hb < 4 g%	Third trimester	Unspecified	Neonatal mortality	OR	N/A
Tomashek, 2006[581]	United States of America	Retrospective cohort	5474	Community based	Hb 11 - 14.59 g/dL, Hb 10.5 - 14.59 g/dL	Hb < 11 g/dL, Hb 10 - 10.99 g/dL, Hb 9 - 9.99 g/dL, Hb > 14.6 g/dL, Hb < 10.49 g/dL, Hb 9.5 - 10.49 g/dL, Hb 8.5 - 9.49 g/dL	First trimester, Second trimester	Abstracted from medical records	Stillbirth	HR	Age, height, parity, smoking, cohabiting status, diabetes, anemia, preeclampsia, SGA, placental abruption
Toshimitsu, 2023[582]	Japan	Cross-sectional	10535	Community based	Hb 11.5 - 12.49 g/dL, Hb 10.5 - 11.49 g/dL	Hb < 9.49 g/dL, Hb 9.5 - 10.49 g/dL, Hb 10.5 - 11.49 g/dL, Hb 12.5 - 13.49 g/dL, Hb > 13.5 g/dL, Hb 11.5 - 12.49 g/dL, Hb > 12.5 g/dL	First trimester, Second trimester, Third trimester	Unspecified	PTB (unspecified GA), SGA	OR	Placenta previa, SGA excluded from analysis, placenta previa, PTB excluded from analysis
Tunkyi, 2018[162]	South Africa	Prospective cohort	1433	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified instrument, venous blood sample	PTB (unspecified GA), Stillbirth, BW (unspecified BW), Neonatal mortality	RR, MD	N/A
Turner, 2012[583]	United States of America	Retrospective cohort	685	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Abstracted from medical records	PTB, PTB (<34.99 wk), PTB (<31.99	RR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
									wk), LBW, SGA		
Tzur, 2012[112]	Israel	Retrospective cohort	33897	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	First trimester	Unspecified	Perinatal mortality, PTB, PTB (<34 wk), LBW, LBW (< 1499 g)	OR	Gestational age, malformations, IUGR, age, ethnicity, previous PTB, cervical incompetence, HDOP, labor induction, PTB <37 weeks, hypertension
Uberos, 2000[584]	Spain	Retrospective cohort	226	Tertiary care	SFe < 13 ng/ml	SFe >= 13 ng/ml	Third trimester	Fluorimetric enzyme immunoassay, Baxter diagnostics, unspecified blood sample	Birthweight for age (unspecified)	HR	N/A
Ulaganeethi, 2024[585]	India	Prospective cohort	650	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	First trimester, Third trimester	N/A	PTB, LBW	RR	N/A
Uneke, 2007[586]	Nigeria	Prospective cohort	300	Tertiary care	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	LBW, BW (> 4 kg)	RR	N/A
Urdaneta, 2015[587]	Venezuela (Bolivarian Republic of)	Cross-sectional	200	Other	Hb >= 11 g/dL	Hb < 11 g/dL	Third trimester	Unspecified	LBW	OR	N/A
Uzunov, 2022[588]	Romania	Retrospective cohort	172	Community based	Hb >= 11 g/dL	Hb < 11 g/dL, Hb 9 - 10.9 g/dL, Hb 7 - 8.9 g/dL	Prenatal	Unspecified	PTB, BW (continuous), LBW, LBW (< 999 g)	RR, MD	N/A
Vakili, 2018[589]	Iran (Islamic Republic of)	Retrospective cohort	550	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	First and second trimesters	Unspecified	LBW, BW (> 4001 g), PTB	RR	N/A
Vazirinejad, 2007[590]	Iran (Islamic Republic of)	Cross-sectional	140	Community based	SFe 15 - 49.9 ug/L	SFe < 15 ug/L	Third trimester	Unspecified	LBW	RR	N/A
Verhoeff, 2001[591]	Malawi	Prospective cohort, Retrospective cohort	4104	Tertiary care	Hb >= 8 g/dL	Hb < 8 g/dL	First and second trimesters, Third trimester	Unspecified	PTB	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Vilchez, 2013[592]	Cuba	Case-control	150	Community based	Hb >= 110 g/L	Hb < 110 g/L	Third trimester	Unspecified	LBW	OR	N/A
Villalva-Luna, 2020[593]	Peru	Case-control	214	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	LBW	OR	N/A
Villamonte-Calanche, 2024[594]	Peru	Retrospective cohort	707	Tertiary care	Hb < 14.5 g/dL	Hb > 14.51 g/dL	Third trimester	N/A	SGA	OR	N/A
Viplava, 2022[26]	India	Retrospective cohort	160	Tertiary care	Hb >= 11 g%	Hb < 7 g%	Third trimester	Unspecified	PTB (unspecified GA), Stillbirth, Perinatal mortality, LBW	OR	N/A
Vogel, 2014[595]	Global	Cross-sectional	308392	Community based	Hb >= 7 mg/dL	Hb < 7 mg/dL	Prenatal	Unspecified	Perinatal mortality	OR	Age, marital status, maternal education, number of previous births, number of previous caesarean sections, fetal presentation, congenital malformation, newborn sex, gestational age category, facility capacity index, facility, country
vonTempelhoff, 2008[633]	Germany	Retrospective cohort	4985	Tertiary care	Continous	Continous	Second trimester	Abstracted from medical records	LBW, PTB (<36 wk)	OR	Age, smoking, mean second trimester systolic blood pressure, mean second trimester diastolic blood pressure, weight before pregnancy
Vural, 2016[596]	Türkiye	Retrospective cohort	39587	Community based	Hb >= 11 g/dL	Hb < 10 g/dL, Hb 10 - 10.99 g/dL	First trimester, Second trimester, Third trimester	Coulter counter and cyanmethemoglobin method,	LBW, PTB, BW (continuous)	RR, MD	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
								venous blood sample			
Wagura, 2018[598]	Kenya	Prospective cohort	322	Community based	Hb >= 10 g/dL	Hb < 9.9 g/dL	Prenatal	Unspecified	PTB	OR	N/A
Wahabi, 2022[599]	Saudi Arabia	Prospective cohort	10600	Community based	Hb >= 11 g/dL	Hb 10 - 10.9 g/dL, Hb 7 - 9.9 g/dL	Second trimester	Unspecified	PTB, PTB (<31.9 wk), PTB (<33.9 wk), LBW, Stillbirth	OR	Age, parity
Walker, 2003[600]	Jamaica	Retrospective cohort	1390742	Community based	Hb > 9.5 g/dL	Hb < 9.4 g/dL	Second trimester	Unspecified	LBW	OR	N/A
Wang, 2007[601]	China	Retrospective cohort	95102	Community based	Hb 90 - 99.999 g/L	Hb < 709 g/L, Hb 70 - 79.999 g/L, Hb 80 - 89.999 g/L, Hb 100 - 109.999 g/L, Hb 110 - 119.999 g/L, Hb 120 - 129.999 g/L, Hb 130 - 139.999 g/L	Third trimester	Unspecified	LBW, PTB	OR	Age, occupation, education level, number of pregnancies, number of prenatal checkups, HDOP
Wang, 2016[602]	China	Retrospective cohort	17705	Other	Hb 100 - 132 g/L	Hb 133 - 145 g/L, Hb > 145.01 g/L	First and second trimesters	HemoCue AB, capillary blood sample	PTB (unspecified GA), BW (continuous)	MD, RR	N/A
Wang, 2018[164]	China	Retrospective cohort	21577	Community based	Hb >= 110 g/L	Hb < 110 g/L	First trimester	Unspecified	PTB	OR	N/A
Wassie, 2020[603]	Ethiopia	Case-control	312	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	N/A	PTB	OR	N/A
Watson-Jones, 2007[604]	United Republic of Tanzania	Retrospective cohort	1688	Community based	PCV >= 37 %	PCV < 37 %	Third trimester	N/A	Stillbirth, LBW, PTB, Birthweight for age (unspecified)	OR	N/A
Weiner, 2003[605]	Kenya	Retrospective cohort	910	Community based	Hb >= 11 g/dL	Hb < 7 g/dL, Hb 7 - 10.9 g/dL	Third trimester	Unspecified	Perinatal mortality	OR	N/A
Williams, 1997[606]	Australia	Retrospective cohort	2900	Tertiary care	Hb >= 110 g/L	Hb < 109.9 g/L	Third trimester	Unspecified	BW (continuous)	MD	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
Wu, 2022[607]	China	Retrospective cohort	1911	Tertiary care	Hb 110 - 119 g/L	Hb < 110 g/L, Hb 120 - 129 g/L, Hb > 130 g/L	Second trimester, Third trimester	Automatic analyzer, venous blood sample	PTB, LBW, SGA	OR	Age, BMI, education, conception method, parity, history of miscarriage, GDM
Xiao, 2002[608]	United States of America	Nested case-control	736	Tertiary care	SFe > 26 ng/ml	SFe 26 - 41 ng/ml, SFe 41.1 - 64.5 ng/ml, SFe > 64.51 ng/ml, SFe > 96.01 ng/ml	Second trimester	chemiluminometric immunoassay, unspecified blood sample	PTB, PTB (<36 wk), PTB (<33.99 wk)	OR	Age, race/ethnicity, parity, Medicaid payment status, smoking during pregnancy
Xiong, 2003[610]	China	Retrospective cohort	16936	Community based	Hb >= 10 g/dL	Hb < 10 g/dL, Hb 8 - 9.99 g/dL	First trimester, Third trimester, Second and third trimesters	Unspecified	Perinatal mortality, PTB, SGA, LBW	OR	Hospital stays, gestational age at the first prenatal visit, prior spontaneous abortion
Xiong, 2023[609]	China	Cross-sectional	1029	Community based	Hb >= 110 g/L	Hb 100 - 109 g/L, Hb 70 - 99 g/L, Hb < 70 g/L	Prenatal	Unspecified	LBW	OR	Age, education, parity, gestational age of delivery, newborn sex, maternal smoking, the number of ANC visits
Xu, 2022[611]	China	Prospective cohort	3233	Community based	Hb 110 - 119 g/L	Hb < 110 g/L, Hb 120 - 129 g/L, Hb > 130 g/L	Second and third trimesters	Unspecified	SGA	RR	Gestational weight gain, gestational weight gain, preeclampsia
Yahia, 2020[612]	Yemen	Retrospective cohort	2478	Tertiary care	Hb 10 - 10.9 g/dL	Hb 7 - 9.9 g/dL, Hb < 7 g/dL	Prenatal	Unspecified	PTB, LBW	RR	N/A
Yamada, 2014[613]	Brazil	Prospective cohort	46	Tertiary care	Continous	Continous	Third trimester	Unspecified	PTB (unspecified GA)	MD	N/A
Yatich, 2010[614]	Ghana	Retrospective cohort	784	Tertiary care	Hb >= 11 g/dL	Hb 8 - 10.9 g/dL, Hb < 8 g/dL	Prenatal	Unspecified instrument, venous blood	Stillbirth	OR	Single infections, coinfections

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
								sample			
Yazdani, 2004[615]	Iran (Islamic Republic of)	Retrospective cohort	2000	Tertiary care	Hb > 14 g/dL	Hb < 10.5 g/dL	Prenatal	Unspecified	PTB, LBW, Birthweight for age (unspecified)	RR	N/A
Young, 2023[616]	Viet Nam	Prospective cohort	1579	Community based	Hb >= 12 g/dL, Hb > 10.81 g/dL	Hb < 12 g/dL, Hb < 10.809 g/dL	Pre-conception	Unspecified	BW (continuous), PTB, PTB (unspecified GA), SGA	correlation coefficient, OR	Age, minority status, education, socioeconomic status, newborn sex, intervention group, duration of time prior to conception
Younis, 1981[617]	Egypt	Retrospective cohort	6990	Community based	Hb > 11 mg/dl	Hb < 6 mg/dl, Hb 7 - 10 mg/dl	Prenatal	Unspecified	Perinatal mortality	RR	N/A
Yousaf, 2011[618]	Pakistan	Prospective cohort	818	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Abstracted from medical records	PTB, LBW, SGA, Perinatal mortality, Stillbirth	RR	N/A
Yovera-Aldana, 2022[619]	Peru	Retrospective cohort	221	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	first trimester	N/A	LBW	RR	N/A
Yuan, 2019[620]	China	Retrospective cohort	11581	Other	SFe > 12 ug/L, STfe < 4 g/L, ST/SF log < 5.72 ratio, SFe < 8.3 ug/L, STfe < 3.64 g/L, ST/SF log < 5.28 ratio	SFe < 11.9 ug/L, STfe > 4.1 g/L, ST/SF log > 5.73 ratio, SFe 8.3 - 11.5 ug/L, SFe 11.6 - 20.2 ug/L, SFe > 20.3 ug/L, STfe 3.64 - 4.08 g/L, STfe 4.09 - 4.58 g/L, STfe > 4.59 g/L, ST/SF log 5.28 - 5.54 ratio, ST/SF log 5.55 - 5.72 ratio	Third trimester	UniCel DxI 800 Access, unspecified blood sample	PTB, LBW, BW (> 4000 g), SGA, LGA	OR	Age, BMI, gravidity, parity, high sensitivity CRP, GDM, intrahepatic cholestasis of pregnancy, preeclampsia, PIH, systolic/diastolic BP, newborn sex
Yuniati, 2020[621]	Indonesia	Prospective cohort	294	Community based	Continous	Continous	First trimester	Sysmex analyzer, venous blood sample	BW (continuous), SGA	MD, OR	Vitamin D, SFe
Zagre, 2002[622]	Burkina Faso	Retrospective	380	Community	Hb >= 110 g/L	Hb < 109.9 g/L	Third trimester	Unspecified	LBW	OR	N/A

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
		cohort		based							
Zar, 2019[623]	South Africa	Prospective cohort, Retrospective cohort	1137	Tertiary care	Hb >= 10 g/dL	Hb < 10 g/dL	Third trimester	Unspecified	BW (continuous)	correlation coefficient	N/A
Zaren, 1997[624]	Western Europe	Prospective cohort	1037	Tertiary care	Hb 10.701 - 13.2 g/dL, SFe > 12.01 ug/L, Hb 12.2 - 13.4 g/dL, Hb 11.1 - 12.2 g/dL, Hb 11.3 - 12.5 g/dL	Hb < 10.699 g/dL, Hb > 13.201 g/dL, SFe < 12 ug/L, Hb < 12.1 g/dL, Hb > 13.5 g/dL, Hb < 11 g/dL, Hb > 12.3 g/dL, Hb < 11.2 g/dL, Hb > 12.6 g/dL	Third trimester, First trimester, Second trimester	Cyanmethemoglobin, capillary blood sample, Magic Ferritin assay	BW (continuous)	MD	N/A
Zaveri, 2020[625]	India	Cross-sectional	147762	Community based	Hb >= 12 g/dL	Hb < 11.9 g/dL	Prenatal	Unspecified	LBW	OR	Age, age at marriage, income, food diversity, BMI, ANC, supplements, pregnancies, complications, delivery, proximity to ANC
Zewde, 2020[626]	Ethiopia	Cross-sectional	325	Community based	Hb >= 11 g/dL	Hb < 11 g/dL	Prenatal	Unspecified	PTB	OR	N/A
Zhang, 1993[627]	China	Case-control	1049	Community based	Hb > 10.01 mg/dL	Hb 8.01 - 10 mg/dL, Hb < 8 mg/dL	Prenatal	Unspecified	Neonatal mortality	OR	N/A
Zhang, 2009[628]	China	Prospective cohort	170885	Community based	Hb >= 10 g/dL	Hb < 10 g/dL	Prenatal	Unspecified	PTB, PTB (<31.99 wk), PTB (<33 wk), PTB (<36 wk)	OR	N/A
Zhang, 2018[629]	China	Retrospective cohort	2722274	Community based	Hb 110 - 149 g/L	Hb < 70 g/L, Hb 70 - 99 g/L, Hb 100 - 109 g/L, Hb 150 - 159 g/L, Hb 160 - 169 g/L, Hb > 170 g/L	Prenatal	Unspecified	PTB, PTB (<31.99 wk)	OR	Ethnicity, occupation, region with GDP per capita, history of adverse pregnancy outcomes,

Author/Year	Country	Analytical Study Design	Sample Size	Sampling Frame	Reference Group Definition	Exposure Group Definition	Exposure Assessment Timepoint	Exposure Measurement	Outcome Definition	Measure of Association	Covariates Adjusted
											thyroid dysfunction
Zhang, 2018[630]	China	Retrospective cohort	N/A	Other	Hb 130 - 139 g/L, Hb > 130 g/L	Hb 100 - 119 g/L, Hb 120 - 129 g/L, Hb > 140 g/L, Hb < 129 g/L, Hb > 130.1 g/L	First trimester, Second trimester, First and second trimesters	N/A	PTB	OR	N/A
Zhao, 2022[119]	China	Retrospective cohort	1206	Community based	SFe >= 20 ug/L, Hb >= 110 g/L	SFe < 20 ug/L, Hb < 110 g/L	Prenatal	Unspecified	PTB (unspecified GA)	RR	N/A
Zhou, 1998[631]	China	Prospective cohort	829	Other	Hb 110 - 119 g/L	Hb > 130 g/L, Hb 120 - 129 g/L, Hb 100 - 109 g/L, Hb 90 - 99 g/L, Hb < 90 g/L, Hb < 110 g/L	First trimester	Unspecified	PTB, LBW, SGA	RR	Age, gravidity, parity, height, weight, BMI, blood pressure, newborn sex

Section 2.2.1. References

1. Ali SA, Tikmani SS, Saleem S, Patel AB, Hibberd PL, Goudar SS, Dhaded S, Derman RJ, Moore JL, McClure EM, Goldenberg RL. Hemoglobin concentrations and adverse birth outcomes in South Asian pregnant women: findings from a prospective Maternal and Neonatal Health Registry. Reprod Health 17(Suppl 2), 154 (2020).
2. Ambedkar D, Mishra C, Sharma R, Kumar V, Yadav YK. Antepartum and Intrapartum Complications in Anemic and Non-Anemic Women. Eur J Mol Clin Med 8(4), 2617-2625 (2021).
3. Bizuayew H, Abebe H, Mullu G, Bewuket L, Tsega D, Alemye T. Post-cesarean section surgical site infection and associated factors in East Gojjam zone primary hospitals, Amhara region, North West Ethiopia, 2020. PLoS One 16(12), e0261951 (2021).
4. Dacho AM, Angelo AT. Magnitude of Post Caesarean Section Surgical Site Infection and its Associated Factors among Mothers who Underwent Caesarean Section in Mizan Tepi University Teaching Hospital, South West Ethiopia, 2017. J Nurs Care 7(2), 1-6 (2018).
5. Daru J, Zamora J, Fernández-Félix BM, Vogel J, Oladapo OT, Morisaki N, Tunçalp Ö, Torloni MR, Mittal S, Jayaratne K, Lumbiganon P, Togoobaatar G, Thangaratinam S, Khan KS. Risk of maternal mortality in women with severe anaemia during pregnancy and post partum: a multilevel analysis. Lancet Glob Health 6(5), e548-e554 (2018).
6. Edelson PK, Cao D, James KE, Ngonzi J, Roberts DJ, Bebell LM, Boatin AA. Maternal anemia is associated with adverse maternal and neonatal outcomes in Mbarara, Uganda. J Matern Fetal Neonatal Med 36(1), 2190834 (2023).
7. Flores-Venegas SR, Germes-Pialta F, Levario-Carrillo M. Obstetric and perinatal complications in anemic patients. Ginecol Obstet Mex 87(2), 85-92 (2019).
8. Gelaw KA, Aweke AM, Astawesegn FH, Demissie BW, Zeleke LB. Surgical site infection and its associated factors following cesarean section: a cross sectional study from a public hospital in Ethiopia. Patient Saf Surg 11(18), 1-7 (2017).
9. Gonzales GF, Tapia V, Gasco M, Carrillo CE, Fort AL. Association of hemoglobin values at booking with adverse maternal outcomes among Peruvian populations living at different altitudes. Int J Gynaecol Obstet 117(2), 134-9 (2012).
10. Huang XA, Yang P, Li D, Liu Q, Xia MZ. Pathogenic bacteria characteristics and influencing factors of puerperal infection in lying-in women. Chin J Nosocomiol 28(7), 1089-92 (2018).
11. Kajeguka DC, Mrema NR, Mawazo A, Malya R, Mgabo MR. Factors and Causes of Puerperal Sepsis in Kilimanjaro, Tanzania: A Descriptive Study among Postnatal Women who Attended Kilimanjaro Christian Medical Centre. East Afr Health Res J 4(2), 158-163 (2020).
12. Ma Y, Zhang L, Wang X, Qiu L, Hesketh T, Wang X. Low Incidence of Maternal Near-Miss in Zhejiang, a Developed Chinese Province: A Cross-Sectional Study Using the WHO Approach. Clin Epidemiol 12, 405-414 (2020).
13. Malhotra M, Sharma JB, Batra S, Sharma S, Murthy NS, Arora R. Maternal and perinatal outcome in varying degrees of anemia. Int J Gynaecol Obstet 79(2), 93–100 (2002).
14. Mamo T, Abebe TW, Chichiabellu TY, Anjulo AA. Risk factors for surgical site infections in obstetrics: a retrospective study in an Ethiopian referral hospital. Patient Saf Surg 11(24), 1-9 (2017).
15. Ojiyi EC, Dike EI, Okeudo C, Ejikem EC, Nzewuihe AEC. Wound Infection following Caesarean Section in a University Teaching Hospital in South-East Nigeria. Orient J Med 25(1-2), 8-13 (2013).
16. Parks S, Hoffman MK, Goudar SS, Patel A, Saleem S, Ali SA, Goldenberg RL, Hibberd PL, Moore J, Wallace D, McClure EM, Derman RJ. Maternal anaemia and maternal, fetal, and neonatal outcomes in a prospective cohort study in India and Pakistan. BJOG 126(6), 737-743 (NA).
17. Parveen R, Sultana H, Nazir S. Maternal Sepsis and associated factors: A multi-central study from two tertiary care hospitals of South Punjab, Pakistan. Pak J Med Sci 41(1), 281-285 (2025).
18. Rose AF, Fekad B, Moore JN, Graham WJ. Post-caesarean section surgical site infections: A retrospectiveaudit and case note review at an Ethiopian referral hospital. Obstet Gynecol Rep 2(2), 1-6 (2018).
19. Rukuni R, Bhattacharya S, Murphy MF, Roberts D, Stanworth SJ, Knight M. Maternal and neonatal outcomes of antenatal anemia in a Scottish population: a retrospective cohort study. Acta Obstet Gynecol Scand 95(5), 555-64 (2016).

20. Sehgal R, Kriplani A, Vanamail P, Maiti L, Kandpal S, Kumar N. Assessment and comparison of pregnancy outcome among anaemic and non anaemic primigravida mothers. Indian J Public Health 60(3), 188-94 (2016).
21. Shanbhag ER, Veena P. Surgical Site Infections Following Cesarean Section: A Longitudinal Study. J South Asian Fed Obstet Gynecol 13(3), 77-80 (2021).
22. Shen W, Zhu L. Analysis of Risk Factors for Urinary Tract Infections in Pregnant Women: A Retrospective Study. Arch Esp Urol 77(5), 525-530 (2024).
23. Shrivastava C, Bansal R, Goyal N. Fetomaternal Outcomes of Severe Anemia in Pregnancy: A Prospective Observational Study. Cureus 16(11), e73834 (2024).
24. Singal, N, Setia, G, Taneja, B K, Singal, K K. Maternal outcome in pregnant women with anaemia. Bangladesh J Med Sci 17, 446-454 (2018).
25. Tandu-Umba B, Mbangama AM. Association of maternal anemia with other risk factors in occurrence of Great obstetrical syndromes at university clinics, Kinshasa, DR Congo. BMC Pregnancy Childbirth 15(183), 183 (2015).
26. Viplava A, Shireesha S, Regalla L. A Study on Maternal and Fetal Outcome in Women with Severe Anaemiain Labour. Eur J Mol Clin Med 3(3), 825-834 (2022).
27. Wodajo S, Belayneh M, Gebremedhin S. Magnitude and Factors Associated With Post-Cesarean Surgical Site Infection at Hawassa University Teaching and Referral Hospital, Southern Ethiopia: A Cross-sectional Study. Ethiop J Health Sci 27(3), 283-290 (2017).
28. Yuya M, Tura AK, Girma S, Ahmed R, Knight M, van den Akker T. Factors associated with maternal mortality in eastern Ethiopia: A multicenter case-control study. Int J Gynaecol Obstet 169(2), 630-638 (2025).
29. Akinlusi, F M, Rabiu, K A, Durojaiye, I A, Adewunmi, A A, Ottun, T A, Oshodi, Y A. Caesarean delivery-related blood transfusion: correlates in a tertiary hospital in Southwest Nigeria. BMC Pregnancy Childbirth 18 (2018).
30. Al-Zirqi I, Vangen S, Forsen L, Stray-Pedersen B. Prevalence and risk factors of severe obstetric haemorrhage. BJOG 115(10), 1265-127 (2008).
31. Ambedkar D, Mishra C, Sharma R, Kumar V, Yadav YK. Puerperal Complications: Its Association with Anemia. Int J Pharm Clin Res 13(6), 683-687 (2021).
32. Ashwini MN, Kamatar SC, Ramya G. Feto maternal outcome in pregnancy with anaemia in a tertiary hospital. Indian J Public Health Res Dev 9(3), 140-145 (2018).
33. Attali E, Gabbai D, Reicher L, Baruch Y, Lavie A, Yogev Y, Many A. Is Grand Multiparity an Independent Risk Factor for Blood Transfusion?. Reprod Sci 31(4), 1117-1121 (2024).
34. Atukunda EC, Siedner MJ, Obua C, Mugyenyi GR, Twagirumukiza M, Agaba AG. Sublingual Misoprostol versus Intramuscular Oxytocin for Prevention of Postpartum Hemorrhage in Uganda: A Double-Blind Randomized Non-Inferiority Trial. PLoS Med 11(11), e1001752 (2014).
35. Awan SM, Khanum F, Rana NK, Afreen U, Karim Faisal SFE, Nayyar S. Association of Anemia with Postpartum Haemorrhage. Pak J Med Health Sci 16(10), 902-904 (2022).
36. Aziz Karim, S, Khurshid, M, Rizvi, J H, Jafaery, S N, Memon, A M. Abruptio placentaea - Nutritional disorder of the underdeveloped world?. J Obstet Gynaecol 14, 301-304 (1994).
37. Bachou H, Tumwine JK, Mwadime RKN, Tylleskär T. Risk factors in hospital deaths in severely malnourished children in Kampala, Uganda. BMC Pediatr 6, 7 (2006).
38. Banavathu HB, Kolluru K, Hasamnis VA. Maternal and perinatal outcome in anaemic pregnancies with iron deficiency and non-anemic pregnancies. European Journal of Cardiovascular Medicine 15(3), 474-480 (2025).
39. Barut A, Mohamud DO. The association of maternal anaemia with adverse maternal and foetal outcomes in Somali women: a prospective study. BMC Womens Health 23(1), 193 (2023).
40. Bazirete O, Nzayirambaho M, Umubyeyi A, Karangwa I, Evans M. Risk factors for postpartum haemorrhage in the Northern Province of Rwanda: A case control study. PLoS One 17(2), e0263731 (2022).
41. Bestman PL, Nget M, Kolleh EM, Moeng E, Brhane T, Fang JQ, Luo J. A comparative analysis of Postpartum Hemorrhage incidence and influencing factors between nulliparous and multiparous women in Hunan Province, China: A multicenter retrospective cohort study. Prev Med Rep 38, 102580 (2024).
42. Biradar B, Arasu S, Ramesh N. Anemia burden in pregnancy and birth outcomes among women receiving antenatal care services from a secondary level hospital in South India: A record review. J Fam Med Prim Care 12(10), 2352-2358 (2023).

43. Bloch, E M, Crookes, R L, Hull, J, Fawcus, S, Gangaram, R, Anthony, J, Ingram, C, Ngcobo, S, Croxford, J, Creel, D V, Murphy, E L, Int Component, Nhlbi Recipient. The impact of human immunodeficiency virus infection on obstetric hemorrhage and blood transfusion in South Africa. Transfusion 55, 1675-1684 (2015).
44. Bloch, E M, Ingram, C, Hull, J, Fawcus, S, Anthony, J, Green-Thompson, R, Crookes, R L, Ngcobo, S, Creel, D V, Courtney, L, Bellairs, G R M, Murphy, E L, Nhlbi. Risk factors for peripartum blood transfusion in South Africa: a case-control study. Transfusion 58, 2149-2156 (2018).
45. Bone JN, Bellad M, Goudar S, Mallapur A, Charantimath U, Ramadurg U, Katageri G, Lesperance M, Woo Kinshella M-L, Suleman R, Vidler M, Sharma S, Derman R, Magee LA, von Dadelszen P, Clip working group. Anemia and adverse outcomes in pregnancy: subgroup analysis of the CLIP cluster-randomized trial in India. BMC Pregnancy Childbirth 22(1) (2022).
46. Borovac-Pinheiro, A, Ribeiro, F M, Pacagnella, R C. Risk Factors for Postpartum Hemorrhage and its Severe Forms with Blood Loss Evaluated Objectively - A Prospective Cohort Study. Rev Bras Ginecol Obstet 43, 113-118 (2021).
47. Bukhari IA, Alzahrani NM, Alanazi GA, Al-Taleb MA, AlOtaibi HS. Anemia in Pregnancy: Effects on Maternal and Neonatal Outcomes at a University Hospital in Riyadh. Cureus 14(7), e27238 (2022).
48. Butwick, A J, Ramachandran, B, Hegde, P, Riley, E T, El-Sayed, Y Y, Nelson, L M. Risk Factors for Severe Postpartum Hemorrhage After Cesarean Delivery: Case-Control Studies. Anesth Analg 125, 523-532 (2017).
49. Buzaglo N, Harlev A, Sergienko R, Sheiner E. Risk factors for early postpartum hemorrhage (PPH) in the first vaginal delivery, and obstetrical outcomes in subsequent pregnancy. J Matern Fetal Neonatal Med 28(8), 932-7 (2015).
50. Çakmak BD, Türker UA, Öztaş S, Arik M, Üstünyurt E. The effect of first trimester hemoglobin levels on pregnancy outcomes. Turk J Obstet Gynecol 15(3), 165-170 (2018).
51. Cheng TS, Zahir F, Solomi C 5th, Verma A, Rao S, Choudhury SS, Deka G, Mahanta P, Kakoty S, Medhi R, Chhabra S, Rani A, Bora A, Roy I, Minz B, Bharti OK, Deka R, Opondo C, Churchill D, Knight M, Kurinczuk JJ, Nair M. Does induction or augmentation of labor increase the risk of postpartum hemorrhage in pregnant women with anemia? A multicenter prospective cohort study in India. Int J Gynaecol Obstet 169(1), 299-309 (2025).
52. Chu FC, Shaw SW, Lo LM, Hsieh TT, Hung TH. Association between maternal anemia at admission for delivery and adverse perinatal outcomes. J Chin Med Assoc 83(4), 402-7 (2020).
53. Detlefs SE, Jochum MD, Salmanian B, McKinney JR, Aagaard KM. The impact of response to iron therapy on maternal and neonatal outcomes among pregnant women with anemia. Am J Obstet Gynecol MFM 4(2) (2022).
54. Dewi RK, Budihastuti UR, Pamungkasari EP. Biopsychosocial Factors Associated with Postpartum Haemorrhage in Surakarta, Central Java. J Matern Child Health 3(3), 207-15 (2018).
55. Drukker L, Hants Y, Farkash R, Ruchlemer R, Samueloff A, Grisaru-Granovsky S. Iron deficiency anemia at admission for labor and delivery is associated with an increased risk for Cesarean section and adverse maternal and neonatal outcomes. Transfusion 55(12), 2799-2806 (2015).
56. Dutta M, Sarkar G. Profile of Iron Status in Pregnancy and its Correlation with Intranatal Events and Perinatal Outcome. J Evol Med Dent Sci 7(48), 5188-91 (2018).
57. Ehrenthal DB, Chichester ML, Cole OS, Jiang XZ. Maternal Risk Factors for Peripartum Transfusion. J Womens Health (Larchmt) 21(7), 792-7 (2012).
58. Ernawati E, Sari KAK, Budiana GN, Ani LS. Anemia as a risk factor of postpartum hemorrhage at dr. R. Soedjono Hospital, Selong, East Lombok. Public Health Prev Med Arch 6(2), 124-7 (2018).
59. Fareh OI, Rizk DEE, Thomas L, Berg B. Obstetric impact of anaemia in pregnant women in United Arab Emirates. J Obstet Gynaecol 25(5), 440-444 (2005).
60. Feng N, Huang XK. Investigation and analysis of high-risk factors of postpartum hemorrhage in singleton primiparous women: a cross-sectional study. Int J Clin Exp Med 16(2), 31-40 (2023).
61. Flores CJ, Yong A, Knights E, Grech J, Saxon B, Markus C, Sinha R, Osborn K. Maternity iron, anaemia and blood management in South Australia: a practice-based evidence for clinical practice improvement. Vox Sang 115(8), 735-744 (2020).
62. Gabbai D, Many A, Lerner-Geva L, Attali E. Risk factors for blood component therapy in parturients-Case-control study. Int J Gynaecol Obstet 162(3), 906-912 (2023).

63. Geelhoed D, Agadzi F, Visser L, Ablordeppey E, Asare K, O'Rourke P, Van Leeuwen JS, Van Roosmalen J. Maternal and fetal outcome after severe anemia in pregnancy in rural Ghana. Acta Obstet Gynecol Scand 85(1), 49–55 (2006).
64. Gimono P, Aljezawi M, Alkhawaldeh A, ALBashtawy M, Salameh B, Batran A, Ayed A, Khalifeh A, Oweidat IA, Rababa M, Suliman M, Abdalrahim A, Bani Hani S, ALBashtawy Z. Factors contributing to preterm birth: A cross-sectional study among women in Jordan. Br J Midwifery 32(9), 484-491 (2024).
65. Goundan, A, Kalra, J K, Raveendran, A, Bagga, R, & Aggarwal, N. Descriptive study of blood transfusion practices in women undergoing cesarean delivery: Blood transfusion during cesarean section. J Obstet Gynaecol Res 37(10), 1277-1282 (2011).
66. Guignard J, Deneux Tharaux C, Seco A, Beucher G, Kayem G, Bonnet MP. Gestational anaemia and severe acute maternal morbidity: a population-based study. Anaesthesia 76(1), 61--71 (2020).
67. Hasegawa J, Nakamura M, Hamada S, Ichizuka K, Matsuoka R, Sekizawa A, Okai T. Capable of identifying risk factors for placental abruption. J Matern Fetal Neonatal Med 27(1), 52-6 (2014).
68. Hews-Girard JC, Galica J, Goldie C, James P, Tranmer JE. Identifying the effect of inherited bleeding disorders on the development of postpartum hemorrhage: a population-based, retrospective cohort study. Res Pract Thromb Haemost 7(2), 100104 (2023).
69. Jaleel R, Khan A. Post-partum haemorrhage-a risk factor analysis. Mymensingh Med J 19(2), 282-9 (2010).
70. Kaul I, Sunil I, Gupta A. Maternal haemoglobin and perinatal outcome in a tertiary care hospital in Jammu city, India. Int J Reprod Contracept Obstet Gynecol 6(11), 5060-6 (2017).
71. Kavle JA, Stoltzfus RJ, Witter F, Tielsch JM, Khalfan SS, Caulfield LE. Association between anaemia during pregnancy and blood loss at and after delivery among women with vaginal births in Pemba Island, Zanzibar, Tanzania. J Health Popul Nutr 26(2), 232-40 (2008).
72. Keren A, Akhtar H, Khan AA. Impact of Iron Deficit Anemia on Health and Life of Female with Pregnancy. Indo Am J Pharm Sci 06(05), 11154-11159 (2019).
73. Labib H, Ahmed A, Abdelmoaty M. Effect of moderate iron deficiencyanemia during pregnancy on maternal and fetal outcome. Al Azhar Med J 2(7), 41-45 (2021).
74. Lao TT, Hui SYA, Wong LL, Sahota DS. Iron deficiency anaemia associated with increased placenta praevia and placental abruption: a retrospective case-control study. Eur J Clin Nutr 76(8), 1172-1177 (2022).
75. Lao TT, Pun TC. Anaemia in pregnancy-is the current definition meaningful?. Eur J Obstet Gynecol Reprod Biol 68(1-2), 53-58 (1996).
76. Lao, T T, Wong, L L L, Hui, S Y A, Sahota, D S. Iron Deficiency Anaemia and Atonic Postpartum Haemorrhage Following Labour. Reprod Sci 29, 1102-1110 (2022).
77. Liu CN, Yu FB, Xu YZ, Li JS, Guan ZH, Sun MN, Liu CA, He F, Chen DJ. Prevalence and risk factors of severe postpartum hemorrhage: a retrospective cohort study. BMC Pregnancy Childbirth 21(1), 332 (2021).
78. Lokeshwari K, Arpana A, Mudigubba MK. A clinical study of impact of anaemia in pregnancy on maternal and neonatal outcome. Int J Reprod Contracept Obstet Gynecol 8(1), 273-8 (2018).
79. Luik K, Rull K. [Anaemia and iron supplement usage in pregnancy: association with pregnancy complications]. Eest Arst 100(2), 79-89 (2021).
80. Luis J, Fadel MG, Lau GY, Houssein S, Ravikumar N, Yoong W. The effects of severe iron-deficiency anaemia on maternal and neonatal outcomes: A case-control study in an inner-city London hospital. J Obstet Gynaecol 36(4), 473-475 (2016).
81. Lumbanraja SN, Yaznil MR, Siregar DIS, Sakina A. The correlation between hemoglobin concentration during pregnancy with the maternal and neonatal outcome. Open Access Maced J Med Sci 7(7), 594-598 (2019).
82. Mahmood T, Rehman AUR, Tserenpil G, Siddiqui F, Ahmed M, Siraj F, Kumar B. The Association between Iron-deficiency Anemia and Adverse Pregnancy Outcomes: A Retrospective Report from Pakistan. Cureus 11(10), e5854 (2019).
83. Mehrnoush V, Ranjbar A, Farashah MV, Darsareh F, Shekari M, Jahromi MS. Prediction of postpartum hemorrhage using traditional statistical analysis and a machine learning approach. AJOG Glob Rep 3(2) (2023).

84. Moges S, Kussa S, Endale A, Lajore BA, Mekango DE. Understanding Anemia and Predictors of Adverse Maternal and Neonatal Outcomes: A Multicenter Prospective Cohort Study in Southern Ethiopia. Matern Fetal Med 7(2), 76-84 (2025).
85. Movva VC, Bringman J, Young A, Gray C, Mackeen AD, Paglia MJ. Comparison of three antepartum risk assessment tools to predict significant postpartum hemorrhage in livebirths. Transfusion 63(5), 1005-1010 (2023).
86. Nair M, Chhabra S, Choudhury SS, Deka D, Deka G, Kakoty SD, Kumar P, Mahanta P, Medhi R, Rani A, Rao SR, Roy I, Solomi VC, Talukdar RK, Zahir F, Kansal N, Arora A, Opondo C, Armitage J, Laffan M, Stanworth S, Quigley M, Baigent C, Knight M, Kurinczuk JJ, MaatHRI Collaborators. Relationship between anaemia, coagulation parameters during pregnancy and postpartum haemorrhage at childbirth: a prospective cohort study. BMJ Open 11(10), e050815 (2021).
87. Nair M, Choudhury MK, Choudhury SS, Kakoty SD, Sarma UC, Webster P, Knight M. Association between maternal anaemia and pregnancy outcomes: a cohort study in Assam, India. BMJ Glob Health 1, e000026 (2016).
88. Negesa Beyene B, Jara Boneya D, Gelchu Adola S, Abebe Sori S, Dinku Jiru H, Sirage N, Awol A, Melesse GT, Wayessa ZJ, Jemalo A, Kebede A, Eshetu D, Dejene Y. Factors associated with postpartum hemorrhage in selected Southern Oromia hospitals, Ethiopia, 2021: an unmatched case-control study. Front Glob Womens Health 5, 1332719 (2024).
89. Nur, R, Sarina, H S, Patui, N S, Radhiah, S, Suwendro, N I, Ariani, Salmawati, L. Postpartum hemorrhage in maternal mothers at Anutapura Public Hospital in Palu, 2017. Gac Sanit 35, S148-S151 (2021).
90. Nyfløt LT, Sandven I, Stray-Pedersen B, Pettersen S, Al-Zirqi I, Rosenberg M, Jacobsen AF, Vangen S. Risk factors for severe postpartum hemorrhage: a case-control study. BMC Pregnancy Childbirth 17(1), 17 (2017).
91. Okunade KS, Adejimi AA, Olumodeji AM, Olowe A, Oyedeji OA, Ademuyiwa IY, Adelabu H, Toks-Omage E, Okoro AC, Davies N, Adenekan MA, Ojo T, Rabiu KA, Oshodi YA, Ugwu AO, Olowoselu FO, Akinmola OO, Olamijulo JA, Oluwole AA. Prenatal anaemia and risk of postpartum haemorrhage: a cohort analysis of data from the Predict-PPH study. BMC Public Health 24(1), 1028 (2024).
92. Okunade KS, Ugwu AO, Adenekan MA, Olumodeji A, Oshodi YA, Ojo T, Adejimi AA, Ademuyiwa IY, Adaramoye V, Okoro AC, Olowe A, Akinmola OO, John-Olabode SO, Adelabu H, Henriquez R, Decroo T, Lynen L. Development of antepartum risk prediction model for postpartum hemorrhage in Lagos, Nigeria: A prospective cohort study (Predict-PPH study). Int J Gynaecol Obstet 166(1), 343-352 (2024).
93. Orlandini C, Torricelli M, Spirito N, Alaimo L, Di Tommaso M, Severi FM, Ragusa A, Petraglia F. Maternal anemia effects during pregnancy on male and female fetuses: are there any differences?. J Matern Fetal Neonatal Med 30(14), 1704-8 (2017).
94. Owiredu WKBA, Osakunor DNM, Turpin CA, Owusu-Afriyie O. Laboratory prediction of primary postpartum haemorrhage: a comparative cohort study. BMC Pregnancy Childbirth 16 (2016).
95. Prata N, Hamza S, Bell S, Karasek D, Vahidnia F, Holston M. Inability to predict postpartum hemorrhage: insights from Egyptian intervention data. BMC Pregnancy Childbirth 11 (2011).
96. Randall DA, Patterson JA, Gallimore F, Morris JM, McGee TM, Ford JB, Obstetric Transfusion Steering Group. The association between haemoglobin levels in the first 20 weeks of pregnancy and pregnancy outcomes. PLoS One 14(11), e0225123 (2019).
97. Randall DA, Patterson JA, Gallimore F, Morris JM, Simpson JM, McGee TM, Ford JB. Haemoglobin trajectories during pregnancy and associated outcomes using pooled maternity and hospitalization data from two tertiary hospitals. Vox Sang 114(8), 842-852 (2019).
98. Ray JG, Davidson A, Berger H, Dayan N, Park AL. Haemoglobin levels in early pregnancy and severe maternal morbidity: population-based cohort study. BJOG 127(9), 1154-64 (2020).
99. Saadah M, Respati SH, Aristin OP. Multilevel Analysis on the Risk Factors of Post Partum Hemorrhage in Bondowoso Central Java. J Matern Child Health 1(4), 205-13 (2016).
100. Safarzadeh S, Banihashemi F, Montazeri F, Roozbeh N, Darsareh F. Maternal and Neonatal Outcomes of Iron Deficiency Anemia: A Retrospective Cohort Study. Cureus 15(12), e51365 (2023).
101. Salomon C, de Moreuil C, Hannigsberg J, Trémouilhac C, Drugmanne G, Gatineau F, Nowak E, Anouilh F, Briend D, Moigne EL, Merviel P, Abgrall JF, Lacut K, Petesch BP. Haematological parameters

associated with postpartum haemorrhage after vaginal delivery: Results from a French cohort study. J Gynecol Obstet Hum Reprod 50(9), 102168 (2021).
102. Salunkhe AH, Pratinidhi A, Salunkhe JA, Kakade SV. Impact of antenatal maternal morbidity on birth weight and gestational age of the baby. J Krishna Inst Med Sci Univ 10(2), 67-75 (2021).
103. Satriyandari Y, Hariyati NR. Faktor-faktor yang mempengaruhi kejadian perdarahan postpartum. J Health Stud 1(1), 49-64 (2017).
104. Shi H, Chen L, Wang Y, Sun M, Guo Y, Ma S, Wang X, Jiang H, Wang X, Lu J, Ge L, Dong S, Zhuang Y, Zhao Y, Wei Y, Ma X, Qiao J. Severity of Anemia During Pregnancy and Adverse Maternal and Fetal Outcomes. JAMA Netw Open 5(2), e2147046 (2022).
105. Singh K, Fong YF, Arulkumaran S. Anaemia in pregnancy - A cross-sectional study in Singapore. Eur J Clin Nutr 52(1), 65-70 (1998).
106. Skjeldestad FE, Oian P. Blood loss after cesarean delivery: a registry-based study in Norway, 1999-2008. Am J Obstet Gynecol 206(1), e1-7 (2012).
107. Smith C, Teng F, Branch E, Chu S, Joseph KS. Maternal and Perinatal Morbidity and Mortality Associated with Anemia in Pregnancy. Obstet Gynecol 134(6), 1234-1244 (2019).
108. Soltan MH, El-Gendi E, Imam HH, Fathi O. Different Doses of Sublingual Misoprostol versus Methylergometrine for the Prevention of Atonic Postpartum Haemorrhage. Int J Health Sci (Qassim) 1(2), 229-36 (2007).
109. Soltan MH, Ibrahim EM, Tawfek M, Hassan H, Farag F. Raised nitric oxide levels may cause atonic postpartum hemorrhage in women with anemia during pregnancy. Int J Gynaecol Obstet 116(2), 143-147 (2012).
110. Suryanarayana R, Chandrappa M, Santhuram AN, Prathima S, Sheela SR. Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. J Fam Med Prim Care 6(4), 739-743 (2017).
111. Tian ML, Ma GJ, Du LY, Xiao YG, Zhang YK, Tang ZJ. Prevalence and adverse perinatal outcomes of anaemia in the third trimester of pregnancy in Hebei Province, China. Int Health 16(1), 91-96 (2024).
112. Tsu VD. Postpartum haemorrhage in Zimbabwe: a risk factor analysis. Br J Obstet Gynaecol 100(4), 327-333 (1993).
113. Tzur T, Weintraub AY, Sergienko R, Sheiner E. Can anemia in the first trimester predict obstetrical complications later in pregnancy?. J Matern Fetal Neonatal Med 25(11), 2454-2457 (2012).
114. Ummah, N, Ngadiyono, N, & Ulfiana, E. Faktor resiko penyebab perdarahan postpartum di Puskesmas Pamotan Kabupaten Rembang. J Kebidanan 7(15), 39-49 (2018).
115. Wang Y, Gao H, Bao T, Yang L, Ding G, Ba D, Sun S, Lin Y, Yao S. Ethnic disparities in postpartum hemorrhage after cesarean delivery: a retrospective case-control study. J Anesth 35(2), 197-205 (2021).
116. Wetta LA, Szychowski JM, Seals S, Mancuso MS, Biggio JR, Tita ATN. Risk factors for uterine atony/postpartum hemorrhage requiring treatment after vaginal delivery. Am J Obstet Gynecol 209(1), e1-6 (2013).
117. Xing, Z, He, Y, Ji, C, Xu, C, Zhang, W, Li, Y, Tan, X, Zhao, P, Wang, Q, & Zheng, L. Establishing a perinatal red blood cell transfusion risk evaluation model for obstetric patients: a retrospective cohort study. Transfusion 59(5), 1667-1674 (2019).
118. Yang L, Zhou F, Zhao R, Li R, Liu D, Wang Y, Zhang J, Liu J, Zhou R, Zeng G. [A longitudinal study of anemia status and its association with postpartum hemorrhage among pregnant women in Chengdu, China]. J Hyg Res 45(6), 927-931 (2016).
119. Yuliati A, Soejoenoes A, Suwondo A, Anies A, Kartasurya MI. Beberapa Faktor Kejadian Perdarahan Postpartum Ibu Bersalin yang Dirawat Di Rumah Sakit. J Epidemiol Kesehat Komunitas 3(1), 7-17 (2018).
120. Zhao DX, Zhang CC, Ma J, Li J, Li ZY, Huo CX. Risk factors for iron deficiency and iron deficiency anemia in pregnant women from plateau region and their impact on pregnancy outcome. Am J Transl Res 14(6), 4146-4153 (2022).
121. Abumohsen H, Bustami B, Almusleh A, Yasin O, Farhoud A, Safarini O, Thabaleh A, Sukhon M, Nazzal Z, Damiri B. The Association Between High Hemoglobin Levels and Pregnancy Complications, Gestational Diabetes and Hypertension, Among Palestinian Women. Cureus 13(10), e18840 (2021).

122. Adam I, Haggaz AD, Mirghani OA, Elhassan EM. Placenta previa and pre-eclampsia: analyses of 1645 cases at medani maternity hospital, Sudan. Front Physiol 4(32), 1-4 (2013).
123. Aghamohammadi A, Zafari M, Tofighi M. High maternal hemoglobin concentration in first trimester as risk factor for pregnancy induced hypertension. Caspian J Intern Med 2(1), 194-7 (2011).
124. Ajori, L., Ghanbari, M., Ghanbari, A., Adib, M., Dehghani, Z. Comparison of pregnancy outcomes in pregnant women (third trimester) with and without anemia: a Case-control study study from Iran. Int Arch Health Sci 11(1), 16-21 (2024).
125. Ali AA, Rayis DA, Abdallah TM, Elbashir MI, Adam I. Severe anaemia is associated with a higher risk for preeclampsia and poor perinatal outcomes in Kassala hospital, eastern Sudan. BMC Res Notes 4, 311 (2011).
126. Ameliai E, Sutarno M. Influence of anemia on the event of preeclampsia in maternal. Sci Midwifery 10(2), 1250-1254 (2022).
127. Asres AW, Samuel S, Daga WB, et al. Association between iron-folic acid supplementation and pregnancy-induced hypertension among pregnant women in public hospitals, Wolaita Sodo, Ethiopia 2021: a case- control study. BMC Public Health 23(1), 843 (2023).
128. Aweke MN, Almaw H, Alemu GG, Mengistu B, Mengistu W, Mulugeta Y. Relationship between maternal anemia during pregnancy and the risk of preeclampsia: A multicenter case-control study. Nutr Health NA, 2601060241287002 (2024).
129. Bilano VL, Ota E, Ganchimeg T, Mori R, Souza JP. Risk factors of pre-eclampsia/eclampsia and its adverse outcomes in low- and middle-income countries: a WHO secondary analysis. PLoS One 9(3), e91198 (2014).
130. Cevher Akdulum MF, Arık Alpçetin SI, Demirdağ E, Erdem M, Erdem A. Preeclampsia development and neonatal outcomes in pregnant women who were anemic in the first trimester : Preeclampsia and maternal anemia. J Surg Med 6(12), 1004-6 (2022).
131. Chen C, Grewal J, Betran AP, Vogel JP, Souza JP, Zhang J. Severe anemia, sickle cell disease, and thalassemia as risk factors for hypertensive disorders in pregnancy in developing countries. Pregnancy Hypertens 13, 141-147 (2018).
132. Endeshaw M, Abebe F, Bedimo M, Asart A. Diet and Pre-eclampsia: A Prospective Multicentre Case-Control Study in Ethiopia. Midwifery 31(6), 617-24 (2015).
133. Endeshaw M, Abebe F, Bedimo M, Asrat A, Gebeyehu A, Keno A. Family history of hypertension increases risk of preeclampsia in pregnant women: a case-control study. Univers Medicina 35(3), 181-191 (2016).
134. Fatima N, Islam F, Noor L, Das SR, Zeba D, Zesmin F. Serum Ferritin in Preeclampsia and Eclampsia: A Case Control Study. Faridpur Med Coll J 8(1), 18-21 (2013).
135. Gaillard R, Eilers PH, Yassine S, Hofman A, Steegers EA, Jaddoe VW. Risk Factors and Consequences of Maternal Anaemia and Elevated Haemoglobin Levels during Pregnancy: a Population-Based Prospective Cohort Study. Paediatr Perinat Epidemiol 28(3), 213-226 (2014).
136. Gonzales GF, Tapia V, Fort AL. Maternal and perinatal outcomes in second hemoglobin measurement in nonanemic women at first booking: effect of altitude of residence in peru. ISRN Obstet Gynecol 2012, 368571 (2012).
137. Gonzales GF, Tapia V, Gasco M. Correcting haemoglobin cut-offs to define anaemia in high-altitude pregnant women in Peru reduces adverse perinatal outcomes. Arch Gynecol Obstet 290(1), 65-74 (2014).
138. Hämäläinen H, Hakkarainen K, Heinonen S. Anaemia in the first but not in the second or third trimester is a risk factor for low birth weight. Clin Nutr 22(3), 271-275 (2003).
139. Harding K, Evans S, Newnham JP. The prediction of pregnancy outcome by haemoglobin measurement before 20 weeks gestation. J Obstet Gynaecol 17(1), 33-38 (1997).
140. Harrison RK, Lauhon SR, Colvin ZA, McIntosh JJ. Maternal anemia and severe maternal morbidity in a US cohort. Am J Obstet Gynecol MFM 3(5), 100395 (2021).
141. Jain SM, Deshmukh P, Mor SS, Shivkumar PV, Tembhare A. Determinants of Hypertensive Disorders of Pregnancy in Rural Women in Central India: A Community-Based Cohort Study. J Obstet Gynaecol India 75(2), 148-154 (2025).

142. Knottnerus JA, Delgado LR, Knipschild PG, Essed GGM, Smits F. Haematologic parameters and pregnancy outcome A prospective cohort study in the third trimester. J Clin Epidemiol 43(5), 461-466 (1990).
143. Kumsa H, Mergiyaw D. Obstetrical and perinatal outcomes of women with preeclampsia at Woldia Comprehensive Specialized Hospital, Northeast Ethiopia. Front Med (Lausanne) 11, 1326333 (2024).
144. Larsen S, Bjelland EK, Haavaldsen C, Eskild A. Placental weight in pregnancies with high or low hemoglobin concentrations. Eur J Obstet Gynecol Reprod Biol 206(2016), 48-52 (2016).
145. Lin L, Wei Y, Zhu W et al. Prevalence, risk factors and associated adverse pregnancy outcomes of anaemia in Chinese pregnant women: a multicentre retrospective study. BMC Pregnancy Childbirth 18(1), 111-111 (2018).
146. Mardani M, Rezapour S, Ahmadipour S, Mohsenzadeh A, Khalkhali Rad AH, Roosta S, Ebrahimzadeh F. Prevalence of anemia and its risk factors among pregnant women in Khorramabad (Iran) 2010-2014. J Matern Fetal Neonatal Med 30(7), 826-829 (2017).
147. Mehrabian F, Hosseini SM. Comparison of gestational diabetes mellitus and pre-eclampsia in women with high hemoglobin in the first trimester of pregnancy: A longitudinal study. Pak J Med Sci 29(4), 986-90 (2013).
148. Mogaddam, MR, Nastaran, SA, Nourossadat K. The relation between the incidence rate of second and third trimester hemoglobin and the incidence of preeclampsia and gestational diabetes: a cohort study. Crescent J Med Biol Sci 6(1), 85-90 (2019).
149. Murphy JF, O'Riordan J, Newcombe RG, Coles EC, Pearson JF. Relation of haemoglobin levels in first and second trimesters to outcome of pregnancy. Lancet 1(8488), 992–5 (1986).
150. Nanda AW, Semarawisma A. Association between anemia and preeclampsia: a case control study in Gorontalo region, Indonesia. International Journal of Research in Medical Sciences 10(1), 31-35 (2022).
151. Nordenvall M, Sandstedt B. Placental lesions and maternal hemoglobin levels. A comparative investigation. Acta Obstet Gynecol Scand 69(2), 127-133 (1990).
152. Özgen G, Aydın GA, Özgen L. The effects of first-trimester hemoglobin on adverse pregnancy outcomes. J Surg Med 4(8), 640-644 (2020).
153. Phaloprakarn C, Tangjitgamol S. Impact of high maternal hemoglobin at first antenatal visit on pregnancy outcomes: a cohort study. J Perinat Med 36(2), 115-119 (2008).
154. Prakash S, Kandoria M, Pal A. A study of effects of anemia on maternal and perinatal outcomes. Int J Reprod Contracept Obstet Gynecol 7(7), 2719-23 (2018).
155. Prasetya PAC, Winardi B, Nuswantoro D. Anemia in the first trimester is associated with anemia during pregnancy in Sidotopo Wetan Community Health Center, Surabaya. Maj Obs Gin 28(1), 16-19 (2020).
156. Ratna P, Moonajilin MS, Sarker SK, Paul H, Pal S, Pal S, Zahan RR, Begum N. Association between Serum Ferritin and Pre-eclampsia. Bangladesh Med J 47(3), 18-24 (2018).
157. Ridho HR, Akbar MIA, Fatmaningrum W, Santoso B. Correlation between anemia and preeclampsia in Universitas Airlangga Hospital in 2017. Jurnal Ilmiah Mahasiswa Kedokteran Universitas AIrlangga 12(2), 61-65 (2021).
158. Sarin A. Severe anemia of pregnancy, recent experience. Int J Gynaecol Obstet 50(Suppl 2), 45-49 (1995).
159. Savajols E, Burguet A, Grimaldi M, Godoy F, Sagot P, Semama DS. Maternal haemoglobin and short-term neonatal outcome in preterm neonates. PLoS One 9(2), e89530 (2014).
160. Savige J. Pregnancy-associated hypertension in Papua New Guinea. Trop Doct 15(1), 34-7 (1985).
161. Sutan R, Aminuddin NA, Mahdy ZA. Prevalence, maternal characteristics, and birth outcomes of preeclampsia: A cross-sectional study in a single tertiary healthcare center in greater Kuala Lumpur Malaysia. Front Public Health 10(973271), 1-14 (2022).
162. Taeubert MJ, Wiertsema CJ, Vermeulen MJ, Quezada-Pinedo HG, Reiss IK, Muckenthaler MU, Gaillard R. Maternal Iron Status in Early Pregnancy and Blood Pressure Throughout Pregnancy, Placental Hemodynamics, and the Risk of Gestational Hypertensive Disorders. J Nutr 152(2), 525-534 (2022).
163. Tunkyi K, Moodley J. Anemia and pregnancy outcomes: a longitudinal study. J Matern Fetal Neonatal Med 31(19), 2594-2598 (2018).
164. Ulfah M, Masrul, M, Amir A Peranan Kadar. [The role of serum ferritin levels in the incidence of preeclampsia]. J Kesehat Andalas 4(3), 781-785 (2015).

165. Wang C, Lin L, Su R, Zhu W, Wei Y, Yan J, Feng H, Li B, Li S, Yang H. Hemoglobin levels during the first trimester of pregnancy are associated with the risk of gestational diabetes mellitus, pre-eclampsia and preterm birth in Chinese women: a retrospective study. BMC Pregnancy Childbirth 18(1), 263 (2018).
166. Wu J, Alifu X, Cheng H, Chi P, Zhuang Y, Si S, Peng Z, Zhou H, Liu H, Yu Y. The correlation between hemoglobin concentration and blood pressure during pregnancy in different trimesters. BMC Pregnancy Childbirth 24(1), 873 (2024).
167. Zhang Q, Li Z, Ananth CV. Prevalence and risk factors for anaemia in pregnant women: a population-based prospective cohort study in China. Paediatr Perinat Epidemiol 23(4), 282-291 (2009).
168. Adler L, Azuri J. Maternal perinatal depression and health services utilisation in the first 2 years of life: A cohort study. BMJ Open 11(11) (2021).
169. Aishwarya S, Vinodhini VM, Renuka P, Saravanan RA, Anuradha M, Gomathi T, Amuthavalli V. Investigating the impact of endocrine-disrupting compounds on antepartum mental health at the nexus of genetic insights and maternal-fetal outcomes: a prospective study. Gen Hosp Psychiatry 94, 174-183 (2025).
170. Al Khames Aga QA, Bataineh YA, Saadeh MJ, Ismael NS, Kurji HA, Al-Jaidi BA, Nagaraja S, Attimarad M. Perinatal depression. Prevalence, suicidal idea, and associated factors. J Pharm Sci Res 12(1), 112-8 (2020).
171. Albacar G, Sans T, Martín-Santos R, García-Esteve L, Guillamat R, Sanjuan J, Cañellas F, Gratacòs M, Cavalle P, Arija V, Gaviria A, Gutiérrez-Zotes A, Vilella E. An association between plasma ferritin concentrations measured 48h after delivery and postpartum depression. J Affect Disord 131(1-3), 136-42 (2011).
172. Alfayumi-Zeadna S, Ghalion HA, O'Rourke N, Azbarga Z, Daoud N. Direct and indirect predictors of postpartum depression symptoms among indigenous Bedouin mothers in Israel. Res Nurs Health NA, 1-11 (2023).
173. Alharbi A AH. Risk factors associated with postpartum depression in the Saudi population. Neuropsychiatr Dis Treat 10, 311-6 (2014).
174. Anjum F, Batool Z. An analytical study of contributory factors of postpartum depression among women in Punjab, Pakistan. Rawal Med J 44(1), 130-3 (2019).
175. Armony-Sivan R, Shao J, Li M, Zhao G, Zhao Z, Xu G, Zhou M, Zhan J, Bian Y, Ji C, Li X, Jiang Y, Zhang Z, Richards BJ, Tardif T, Lozoff B. No relationship between maternal iron status and postpartum depression in two samples in China. J Pregnancy 2012, 521431 (2012).
176. Aubuchon-Endsley NL, Thomas DG, Kennedy TS, Grant SL, Valtr T. Interactive Relations Among Maternal Depressive Symptomatology, Nutrition, and Parenting. Women Health 52(3), 197-213 (2012).
177. Babah OA, Beňová L, Larsson EC, Hanson C, Afolabi BB. Is an improvement in anaemia and iron levels associated with the risk of early postpartum depression? A cohort study from Lagos, Nigeria. BMC Public Health 25(1), 808 (2025).
178. Babandi F, Habib Z, Umar M, Gudaji M, Salihu A, Habib M, Inuwa S, Inuwa K, Bakare A, Abubakar A. A Comparison of Antenatal Depressive Disorders in Urban and Rural Pregnant Women in Nigeria. Int Neuropsychiatr Dis J 20(1), 9-28 (2023).
179. Babu GR, Murthy GVS, Singh N, Nath A, Rathnaiah M, Saldanha N, Deepa R, Kinra S. Sociodemographic and Medical Risk Factors Associated With Antepartum Depression. Front Public Health 6, 127 (2018).
180. Bae HS, Kim SY, Ahnv HS, Cho YK. Comparison of nutrient intake, life style variables, and pregnancy outcomes by the depression degree of pregnant women. Nutr Res Pract 4(4), 323-31 (2010).
181. Bansil P, Kuklina EV, Meikle SF, Posner SF, Kourtis AP, Ellington SR, Jamieson DJ. Maternal and fetal outcomes among women with depression. J Womens Health (Larchmt) 19(2), 329-34 (2010).
182. Basutkar RS, Eipe T, Divya P, Sivasankaran P. Correlation of antenatal depression among the iron and s-25(OH)D deficient pregnant women: An observational study in a south Indian population. Int J Pharm Res 13(2), 3414-20 (2021).
183. Basutkar RS, Sudarsan P, Vinod CE, Varghese R, Perumal D, Sivasankaran P. Association between iron-deficiency anemia and antenatal depression in a semi-urban population of south India: A cross-sectional study. Int J Acad Med 8(3), 137-144 (2022).

184. Beard JL, Hendricks MK, Perez EM, Murray-Kolb LE, Berg A, Vernon-Feagans L, Irlam J, Isaacs W, Sive A, Tomlinson M. Maternal iron deficiency anemia affects postpartum emotions and cognition. J Nutr 135(2), 267-72 (2005).
185. Chandrasekaran NS, De Souza LR, Urquia ML,Young B, McLeod A, Windrim R, Berger H. Is anemia an independent risk factor for postpartum depression in women who have a cesarean section? - A prospective observational study. BMC Pregnancy Childbirth 18(1), 400 (2018).
186. Cheng Z, Karra M, Guo M, Patel V, Canning D. Exploring the Relationship between Anemia and Postpartum Depression: Evidence from Malawi. Int J Environ Res Public Health 20(3178), 1-12 (2023).
187. Corwin EJ, Murray-Kolb LE, Beard JL. Low hemoglobin level is a risk factor for postpartum depression. J Nutr 133(12), 4139-42 (2003).
188. Dama M, Van Lieshout RJ, Mattina G, Steiner M. Iron Deficiency and Risk of Maternal Depression in Pregnancy: An Observational Study. J Obstet Gynaecol Can 40(6), 698-703 (2018).
189. Eckerdal P, Kollia N, Löfblad J, Hellgren C, Karlsson L, Högberg U, Wikström AK, Skalkidou A. Delineating the association between heavy postpartum haemorrhage and postpartum depression. PLoS One 11(1) (2016).
190. Evanchuk JL, Kozyrskyj A, Vaghef-Mehrabani E, Lamers Y, Giesbrecht GF, Letourneau N, Aghajafari F, Dewey D, Leung B, Bell RC, Field CJ. Maternal Iron and Vitamin D Status during the Second Trimester Is Associated with Third Trimester Depression Symptoms among Pregnant Participants in the APrON Cohort. J Nutr 154(1), 174-184 (2024).
191. Goshtasebi A, Mozhgan A, Gandevani SB. Association between maternal anaemia and postpartum depression in an urban sample of pregnant women in Iran. J Health Popul Nutr 31(3), 398-402 (2013).
192. Hameed S, Ihab A, Al Ghussein MA, Ellulu MS. Is iron deficiency a risk factor for postpartum depression? A case-control study in the Gaza Strip, Palestine. Public Health Nutr 25(6), 1631-8 (2022).
193. Hasdemir OK, Bilgic D, Altun IK. Relationship Between Gestasyonel Depression and Iron Deficiency Anemia In Pregnancy: A Case-Control Study. Int J Caring Sci 15(2), 1545-1555 (2022).
194. Hochman E, Feldman B, Weizman A, Krivoy A, Gur S, Barzilay E, Gabay H, Levinkron-Fisch O, Lawrence G. Gestational hemodilution as a putative risk factor for postpartum depression: A large-scale nationwide longitudinal cohort study. J Affect Disord 15(325), 444-452 (2023).
195. Kariman NS, Asl Toughiri M, Ghaleheiha A, Akbari AA, Alavi Majd H. [Study of the relationship between anemia and postpartum depression]. J Sabzevar Univ Med Sci 15(1), 33-9 (2008).
196. Kemppinen L, Mattila M, Ekholm E, et al. Gestational anemia and maternal antenatal and postpartum psychological distress in a prospective FinnBrain Birth Cohort Study.. BMC Pregnancy Childbirth 22(1), 704 (2022).
197. Kemppinen L, Mattila M, Ekholm E, Perasto L, Karlsson H, Mäkikallio K, Karlsson L. Effect of gestational anemia on breastfeeding- a prospective follow-up -study. BMC Pregnancy Childbirth 25(1), 653 (2025).
198. Kim HW, Jung YY. [Effects of Antenatal Depression and Antenatal Characteristics of Pregnant Women on Birth Outcomes: A Prospective Cohort Study]. J Korean Acad Nurs 42(4), 477-85 (2012).
199. Kwak DW, Kim S, Lee SY, Kim MH, Park HJ, Han YJ, Cha DH, Kim MY, Chung JH, Park B, Ryu HM. Maternal Anemia during the First Trimester and Its Association with Psychological Health. Nutrients 14(17), 3505 (2022).
200. Kwak DW, Kim S, Lee SY, Park HJ, Han YJ, Kim MY, Chung JH, Lim JH, Ryu HM. Effects of anaemia development during pregnancy on maternal psychological health. BMJ Ment Health 28(1) (2025).
201. La Verde M, Luciano M, Fordellone M, Brandi C, Carbone M, Di Vincenzo M, Lettieri D, Palma M, Marrapodi MM, Scalzone G, Torella M. Is there a correlation between prepartum anaemia and an increased likelihood of developing postpartum depression? A prospective observational study. Arch Gynecol Obstet 310(2), 1099-1108 (2024).
202. Lukose A, Ramthal A, Thomas T, Bosch R, Kurpad AV, Duggan C, Srinivasan K. Nutritional Factors Associated with Antenatal Depressive Symptoms in the Early Stage of Pregnancy Among Urban South Indian Women. Matern Child Health J 18(1), 161-70 (2014).

203. Maeda Y, Ogawa K, Morisaki N, Tachibana Y, Horikawa R, Sago H. Association between perinatal anemia and postpartum depression: A prospective cohort study of Japanese women. Int J Gynaecol Obstet 148(1), 48-52 (2020).
204. Ohsuga T, Egawa M, Kii M, et al. Association between non-anemic iron deficiency in early pregnancy and perinatal mental health: A retrospective pilot study. J Obstet Gynaecol Res 48(11), 2730-2737 (2022).
205. Parhizkar A. The Relation between Anemia and Postpartum Depression in Pregnant Women Who Referred to Health and Medical Centers of Sanandaj in 2011-2012. Life Sci J 10, 308-12 (2013).
206. Paterson JA, Davis J, Gregory M, Holt SJR, Pachulski A, Stamford DEC, Wothers JB, Jarrett A. A study on the effects of low haemoglobin on postnatal women. Midwifery 10(2), 77-86 (1994).
207. Raisanen S, Lehto SM, Nielsen HS, Gissler M, Kramer MR, Heinonen S. Risk factors for and perinatal outcomes of major depression during pregnancy: a population-based analysis during 2002-2010 in Finland. BMJ Open 4(11) (2014).
208. Sparling TM, Waid JL, Wendt AS, Gabrysch S. Depression among women of reproductive age in rural Bangladesh is linked to food security, diets and nutrition. Public Health Nutr 23(4), 660-73 (2020).
209. Tian Q, Chen S, Jiang D. Effects of anemia during the third trimester of pregnancy on postpartum depression and pregnancy outcomes in pregnant women older than 35 years: a retrospective cohort study. Ann Palliat Med 11(3), 1048-57 (2022).
210. Titi I, Ahmead M, Abed Y, El-Sharif N. Prevalence and Risk Factors of Postpartum Depression in Palestinian Women in the Hebron Governorate, Palestine. Clin Pract Epidemiol Ment Health 20, e17450179338712 (2024).
211. Tran TD, Biggs BA, Tran T, Casey GJ, Hanieh S, Simpson JA, Dwyer T, Fisher J. Psychological and Social Factors Associated with Late Pregnancy Iron Deficiency Anaemia in Rural Viet Nam: A Population-Based Prospective Study. PLoS One 8(10) (2013).
212. Vindhya J, Nath A, Murthy GVS, Metgud C, Sheeba B, Shubhashree V, Srinivas P. Prevalence and risk factors of anemia among pregnant women attending a public-sector hospital in Bangalore, South India. J Fam Med Prim Care 8(1), 37-43 (2019).
213. Woldetensay YK, Belachew T, Biesalski HK, Ghosh S, Lacruz ME, Scherbaum V, Kantelhardt EJ. The role of nutrition, intimate partner violence and social support in prenatal depressive symptoms in rural Ethiopia: community based birth cohort study. BMC Pregnancy Childbirth 18(1), 374 (2018).
214. Yilmaz E, Yilmaz Z, Cakmak, Gultekin IB, Cekmez Y, Mahmutoglu S, Kucukozkan T. Relationship between anemia and depressive mood in the last trimester of pregnancy. J Matern Fetal Neonatal Med 30(8), 977-82 (2017).
215. Aballo J, Adokiya MN, Boah M. Trimester-specific trends in gestational anaemia and associations with neonatal outcomes: a retrospective facility-based study in Ghana. Discover Public Health 22, 175 (2025).
216. Abdelmoneim I. A study of determinants of low birth weight in Abha, Saudi Arabia. Afr J Med Med Sci 33(2), 145-148 (2004).
217. Abdullah AZ, Naiem MF, Mahmud NU. Risk Factor of Early Neonatal Mortality in the Maternity Hospital. Kesmas Natl Public Health J 6(6), 283-288 (2012).
218. Abera Z, Ejara D, Gebremedhin S. Nutritional and non-nutritional factors associated with low birth weight in Sawula Town, Gamo Gofa Zone, Southern Ethiopia. BMC Res Notes 12(1), 540 (2019).
219. Abeysena C, Jayawardana P, Seneviratne RA. Maternal haemoglobin level at booking visit and its effect on adverse pregnancy outcome. Aust N Z J Obstet Gynaecol 50(5), 423-427 (2010).
220. Abioye AI, Hughes MD, Sudfeld CR, Premji Z, Aboud S, Hamer DH, Roberts DJ, Duggan CP, Fawzi WW. The effect of iron supplementation on maternal iron deficiency anemia does not differ by baseline anemia type among Tanzanian pregnant women without severe iron deficiency anemia. Eur J Nutr 62(2), 987-1001 (2023).
221. Adam Z, Ameme DK, Nortey P, Afari EA, Kenu E. Determinants of low birth weight in neonates born in three hospitals in Brong Ahafo region, Ghana, 2016- an unmatched case-control study. BMC Pregnancy Childbirth 19(1), 174 (2019).
222. Adane T, Dachew BA. Low birth weight and associated factors among singleton neonates born at Felege Hiwot referral hospital, North West Ethiopia. Afr Health Sci 18(4), 1204-1213 (2018).

223. Adjei-Gyamfi S, Musah B, Asirifi A, Hammond J, Aryee PA, Miho S, Aiga H. Maternal risk factors for low birthweight and macrosomia: a cross-sectional study in Northern Region, Ghana. J Health Popul Nutr 42(1), 87 (2023).
224. Adjei-Gyamfi S, Zakaria MS, Asirifi A, Issahaku S, Ibrahim MA, Aryee PA. Maternal anaemia and polycythaemia during pregnancy and risk of inappropriate birth weight for gestational age babies: a retrospective cohort study in the northern belt of Ghana. BMJ Open 14(8), e082298 (2024).
225. Agrawal M, Bhatnagar K. Maternal determinants affecting perinatal mortality: a multivariate statistical approach. Int J Reprod Contracept Obstet Gynecol 6(3), 1052 (2017).
226. Ahankari A, Bapat S, Myles P, Fogarty A, Tata L. Factors Associated with Preterm Delivery and Low Birth Weight: a Study from Rural Maharashtra, India. F1000Res 6, 72 (2017).
227. Ahankari AS, Myles PR, Dixit JV, Tata LJ, Fogarty AW. Risk factors for maternal anaemia and low birth weight in pregnant women living in rural India: a prospective cohort study. Public Health 151(2017), 63-73 (2017).
228. Ahmad N, Iqbal HU, Shah S. A Comparative Study between Anaemic and Non Anaemic Pregnant Women of Fetal Birth Weight. Int J Adv Biotechnol Res 8(4), 788-793 (2017).
229. Ahmad U, Fehmida Asmatullah Z, Alam J, Ghafoor A,Khan AB. Maternal Anemia as a Risk Factor for Preterm Delivery and Low Birth Weight. Pak J Med Health Sci 16(1), 78-79 (2022).
230. Ahmad Z Jr, Jaafar R, Mohd Hassan M, Othman M, Hashim A. Anaemia during pregnancy in rural Kelantan. Malays J Nutr 3(1), 83-90 (1997).
231. Ahmed S, Hassen K, Wakayo T. A health facility based case-control study on determinants of low birth weight in Dassie town, Northeast Ethiopia: the role of nutritional factors. Nutr J 17(1), 103 (2018).
232. Ahn TG, Li L, Lee SJ, Hu YH, Kim C, Hwang JY. Serum Ferritin Concentration in the Early Third Trimester of Pregnancy and Risk of Preterm Birth and Low Birth Weight Based on Gestational Age. J Korean Soc Matern Child Health 25(1), 55-62 (2021).
233. Aimakhu CO, Olayemi O. Maternal haematocrit and pregnancy outcome in Nigerian women. West Afr J Med 22(1), 18–21 (2003).
234. Al-Sibai MH, Khwaja SS, MRCOG, Al-Suleiman SA, Magbool G. The low birth-weight infants of Saudi adolescents: maternal implications. Aust N Z J Obstet Gynaecol 27(4), 320-322 (1987).
235. Alemu B, Gashu D. Association of maternal anthropometry, hemoglobin and serum zinc concentration during pregnancy with birth weight. Early Hum Dev 142(2020), 104949 (2020).
236. Alemu T, Umeta M. Prevalence and Predictors of "Small Size" Babies in Ethiopia: In-depth Analysis of the Ethiopian Demographic and Health Survey, 2011. Ethiop J Health Sci 26(3), 243-250 (2016).
237. Alizadeh L, Akbarzade M, Ramzi M, Zare N. The correlation between infants' birth weight and apgar score and maternal hemoglobin concentration. Iran J Blood Cancer 7(1), 19-24 (2014).
238. Alizadeh L, Raoofi A, Salehi L, Ramzi M. Impact of maternal hemoglobin concentration on fetal outcomes in adolescent pregnant women.. Iran Red Crescent Med J 16(8), e19670 (2014).
239. Alvarez Cortes JT, Perez Hechavarria G, Selva Capdesuner A, Reve Sigler L, Raos Vega LE. [Risk factors associated to low birth weight at "Ramón López Peña" Polyclinic, Santiago de Cuba]. Correo Cient Med Holguin 23(2), 361-378 (2019).
240. Alwan NA, Cade JE, McArdle HJ, Greenwood DC, Hayes HE, Simpson NA. Maternal iron status in early pregnancy and birth outcomes: insightsfrom the Baby's Vascular health and Iron in Pregnancy study. Br J Nutr 113(12), 1985-1992 (2015).
241. Anchang-Kimbi J K, Kalaji L N, Mbacham H F, Wepnje G B, Apinjoh T O, Ngole Sumbele I U, Dionne-Odom J, Tita A T N, Achidi E A. Coverage and effectiveness of intermittent preventive treatment in pregnancy with sulfadoxine-pyrimethamine (IPTp-SP) on adverse pregnancy outcomes in the Mount Cameroon area, South West Cameroon. Malar J 19(1), 1-12 (2020).
242. Appiah PC, Arhin-Wiredu K, Adjei MR, Noora CL, Baafi JV, Letsa TS, Yawson AE. Stillbirths in Primary Level Hospitals in Sunyani, Ghana: A Retrospective Data Analysis. Asian J Pregnancy Childbirth 2(1), 113-20 (2020).
243. Arafa M, Abou-Zied H, Attia AF, Youssof M. Maternal haemoglobin and premature child delivery. East Mediterr Health J 4(3), 480-486 (1998).

244. Aranda N, Ribot B, Viteri F, Cavallo P, Arija V. Predictors of haemoconcentration at delivery: association with low birth weight. Z Ernahrungswiss 52(6), 1631-1639 (2013).
245. Arbedili NS, Kariman N. The relationship between the incidence of second and third trimester hemoglobin and the incidence of preterm birth and birth weight. International Journal of Womens Health and Reproduction Sciences 12(4), 184-189 (2024).
246. Ardic C, Usta O, Omar E, Yıldız C, Memis E, Oztürk GZ. Relationship between anaemia during pregnancy and preterm delivery. J Obstet Gynaecol 39(7), 903-906 (2019).
247. Ashley, D.; Greenwood, R.; McCaw-Binns, A.; Thomas, P.; Golding, J. Medical conditions present during pregnancy and risk of perinatal death in Jamaica. Paediatr Perinat Epidemiol 8(Suppl 1), 66-85 (1994).
248. Awor S, Byanyima R, Abola B, Kiondo P, Orach CG, Ogwal-Okeng J, Kaye D, Nakimuli A. Prediction of stillbirth low resource setting in Northern Uganda. BMC Pregnancy Childbirth 22(1), 855 (2022).
249. Aynie AA, Kassa TB, Abie DD. Prevalence of Low Birth Weight and Its Determinants in Bahir Dar City, Amhara Region, North West Ethiopia: Health Facility Based Cross-Sectional Study. Biomed Stat Inform 5(1), 1-8 (2020).
250. Aziz S, Najmusahar S, Anwer S, Baloch N. Maternal anemia during pregnancy and its association with preterm birth. Pak J Med Health Sci 15(8), 2216-2219 (2021).
251. Badi N, Almoula H, Idris N, Hamadalnil Y, Handady S. Relation Ship of Maternal Haemoglobin Concentration Measured in Labour with Neonatal Outcome among Sudanese Women. Open J Obstet Gynecol 11(2), 131-139 (2021).
252. Bakacak M, Avci F, Ercan O, Kostu B, Serin S, Kiran G, Bostanci MS, Bakacak Z. The effect of maternal hemoglobin concentration on fetal birth weight according to trimesters. J Matern Fetal Neonatal Med 28(17), 2106-10 (2015).
253. Bakari A, Bell AJ, Oppong SA, et al. Neonatal near-misses in Ghana: a prospective, observational, multi-center study. BMC Pediatr 19(1), 10 (2019).
254. Bakhtiar U, Khan Y, Nasar R. Relationship between Maternal Related Hemoglobin and Perintal Outcome. Rawal Med J 32(2), 102-104 (2007).
255. Bakhtiar UJ, Khan Y, Nasar R. Relationship between maternal hemoglobin and Perinatal outcome. Rawal Med J 32(2), 102-102 (2011).
256. Bánhidy F, Ács N, Puhó EH, Czeizel AE. Iron deficiency anemia: pregnancy outcomes with or without iron supplementation. Nutrition 27(1), 65-72 (2011).
257. Bassiouny HK, Al-Maktari MT. Malaria in late pregnancy in Al Hodeidah Governorate, Yemen. East Mediterr Health J 11(4), 606-617 (2005).
258. Becerra C, Gonzales GF, Villena A, de la Cruz D, Florián A. [Prevalence of anemia in pregnant women, Pucallpa Regional Hospital, Peru]. Rev Panam Salud Publica 3(5), 285-292 (1998).
259. Bener A, Al-Nufal M, Vachhani PJ, Ali AI, Samson N, Saleh NM. Maternal complications and neonatal outcome in Arab women of a fast developing country. J Fam Community Med 20(1), 27-34 (2013).
260. Bernhardt GV, Jhancy M, Bernhardt LK, Shivappa P, Kumar S, Pinto JRT. Cord blood neutrophil phagocytic index in neonates born to anemic mothers and in neonates born with risk of early-onset sepsis. J South Asian Fed Obstet Gynecol 13(1), 26-30 (2021).
261. Beta J, Issat T, Nowicka MA, Andziak M, Jakimiuk AJ. Early spontaneous preterm deliveries before 34 weeks' gestation in a tertiary care centre: analysis of maternal factors and obstetric history. J Matern Fetal Neonatal Med 26(7), 720-723 (2013).
262. Bhalerao A, Kawthalkar A, Ghike S, Joshi S. Anemia during pregnancy: Most preventable yet most prevalent. J South Asian Fed Obstet Gynecol 3(2), 75-77 (2011).
263. Bian Y, Zhang Z, Liu Q, Wu D, Wang S. Maternal risk factors for low birth weight for term births in a developed region in China: a hospital-based study of 55,633 pregnancies. J Biomed Res 27(1), 14-22 (2013).
264. Bique Osman S, Folgosa E, Gonzalez C, Bergstrom S. Low birth weight and genital infections. An incident case-referent study. Gynecol Obstet Invest 40(3), 183-189 (1995).
265. Bondevik GT, Lie RT, Ulstein M, Kvåle G. Maternal hematological status and risk of low birth weight and preterm delivery in Nepal. Acta Obstet Gynecol Scand 80(5), 402-8 (2001).

266. Boo YY, Bora AK, Chhabra S, Choudhury SS, Deka G, Kakoty S, Kumar P, Mahanta P, Minz B, Rani A, Rao S, Roy I, Solomi V C, Verma A, Zahir F, Deka R, Kurinczuk JJ, Nair M, MaatHRI collaborators. Maternal and fetal factors associated with stillbirth in singleton pregnancies in 13 hospitals across six states in India: A prospective cohort study. Int J Gynaecol Obstet 165(2), 462-473 (2024).
267. Bora R, Sable C, Wolfson J, Boro K, Rao R. Prevalence of anemia in pregnant women and its effect on neonatal outcomes in Northeast India. J Matern Fetal Neonatal Med 27(9), 887-891 (2014).
268. Brabin B, Piper C. Anaemia- and malaria-attributable low birthweight in two populations in Papua New Guinea. Ann Hum Biol 24(6), 547-55 (1997).
269. Brabin BJ, Ginny M, Sapau J, Galme K, Paino J. Consequences of maternal anaemia on outcome of pregnancy in a malaria endemic area in Papua New Guinea. Ann Trop Med Parasitol 84(1), 11-24 (1990).
270. Briand V, Le Hesran JY, Mayxay M, et al. Prevalence of malaria in pregnancy in southern Laos: a cross-sectional survey. Malar J 15(1), 436 (2016).
271. Broekhuis A, Koenen SV, Broeren MAC, Krabbe JG, Pop VJM. High first trimester ferritin levels differ according to parity and are independently related to preterm birth: A prospective cohort study. Acta Obstet Gynecol Scand 103(7), 1437-1443 (2024).
272. Brummaier T, Kabeer BSA, Wilaisrisak P, Pimanpanarak M, et al. Cohort profile: molecular signature in pregnancy (MSP): longitudinal high-frequency sampling to characterise cross-omic trajectories in pregnancy in a resource-constrained setting. BMJ Open 10(10), e041631 (2020).
273. Carboo JA, Ngounda J, Baumgartner J, Robb L, Jordaan M, Walsh CM. Iron status, anemia, and birth outcomes among pregnant women in urban Bloemfontein, South Africa: the NuEMI study. BMC Pregnancy Childbirth 24(1), 650 (2024).
274. Carpenter RM, Billah SM, Lyons GR, et al. U-Shaped Association between Maternal Hemoglobin and Low Birth Weight in Rural Bangladesh. Am J Trop Med Hyg 106(2), 424-431 (2021).
275. Casanueva E, Viteri FE, Mares-Galindo M, Meza-Camacho C, Loría A, Schnaas L, Valdés-Ramos R. Weekly iron as a safe alternative to daily supplementation for nonanemic pregnant women. Arch Med Res 37(5), 674-682 (2006).
276. Chang S-C, O'Brien KO, Nathanson MS, Mancini J, Witter FR. Hemoglobin concentrations influence birth outcomes in pregnant African-American adolescents. J Nutr 133(7), 2348-55 (2003).
277. Chanie H, Afenigus A. Prevalence of Low Birth Weight and Associated Factors Among Women Delivered in Debre Markos Referral Hospital, East Gojam, Ethiopia. J Health Med Nursing (IISTE) 53(10), 89-98 (2017).
278. Charan GS, Kalia R, Khurana MS. Prevalence of anemia and comparison of perinatal outcomes among anemic and nonanemic mothers. J Educ Health Promot 12(445), 1-7 (2023).
279. Chasekwa B, Ntozini R, Church JA, Majo FD et al. Prevalence, risk factors and short-term consequences of adverse birth outcomes in Zimbabwean pregnant women: a secondary analysis of a cluster-randomized trial. Int J Epidemiol 51(6), 1785-1799 (2021).
280. Chaudhary N, Yadav SN, Kalra SK, Pathak S et al. Prognostic factors associated with small for gestational age babies in a tertiary care hospital of Western Nepal: A cross-sectional study. Health Sci Rep 4(1), e250 (2021).
281. Chen Y, Zhong T, Song X, Zhang S, Sun M, Liu X, Wei J, Shu J, Liu Y, Qin J. Maternal anaemia during early pregnancy and the risk of neonatal outcomes: a prospective cohort study in Central China. BMJ Paediatr Open 8(e001931), 1-10 (2024).
282. Chen Y, Zhong T, Song X, Zhang S, Sun M, Liu X, Wei J, Shu J, Liu Y, Qin J. Maternal anaemia during early pregnany and the risk of neonatal outcomes: a prospective cohort study in Central China. BMJ Paediatr Open 8, e001931 (2024).
283. Chhabra S, Chopra S. Maternal Hemoglobin, Preterm Pains, Failure of Tocolysis, Preterm Birth, Small for Gestational Age Neonate. J Pregnancy Child Health 3(2), 235 (2016).
284. Chumak EL, Grijbovsky AM. Anemia in pregnancy and its association with pregnancy outcomes in the Arctic Russian town of Monchegorsk, 1973-2002. Int J Circumpolar Health 69(3), 265-277 (2010).
285. Col Madendag I, Eraslan Sahin M, Madendag Y, Sahin E, Demir MB, Acmaz B, Acmaz G, Muderris II. The Effect of Iron Deficiency Anemia Early in the Third Trimester on Small for Gestational Age and Birth

Weight: A Retrospective Cohort Study on Iron Deficiency Anemia and Fetal Weight. Biomed Res Int 2019, 7613868 (2019).
286. Correa-mesa IC, Montoya SM, Villada Ochoa OA. Prevalence of anemia in pregnancy and its association with birth weight. Rev Bras Saude Mater Infant 23(e20220333), 1-10 (2023).
287. Cozzi GD, Blanchard CT, Edwards JT Jr ?>, Szychowski JM, Subramaniam A, Battarbee AN. Optimal predelivery hemoglobin to reduce transfusion and adverse perinatal outcomes. Am J Obstet Gynecol MFM 5(2), 100810 (2023).
288. Cross JH, Jarjou O, Mohammed NI, Gomez SR, Touray BJB, Prentice AM, Cerami C. Early postnatal hypoferremia in low birthweight and preterm babies: A prospective cohort study in hospital-delivered Gambian neonates. EBioMedicine 52(2020), 102613 (2020).
289. Cung TG, Paus AS, Aghbar A, Kiserud T, Hinderaker SG. Stillbirths at a hospital in Nablus, 2010: a cohort study. Glob Health Action 7, 25222 (2014).
290. Damanhuri NH, Hairi NN, Ismail M, Jeganathan R, Karalasingam SD, Nasir MJM, Soelar SA, Musa KI, Tengku Ismail TA. Spontaneous Preterm Births in Malaysia: Are There Modifiable Antenatal Risk Factors?. Cureus 16(4), e59152 (2024).
291. Dane B, Arslan N, Batmaz G, Dane C. Does maternal anemia affect the newborn?. Turk Pediatri Ars 48(3), 195-199 (2013).
292. De A, Biswas P, Ray S, Hosen SF, Ghosh H, Bhowmik S. COVID-19 exposure during pregnancy and low birth weight in community development blocks, Purba Bardhaman: A retrospective cohort study. J Fam Med Prim Care 11(11), 7322-7327 (2022).
293. de Sá SA, Willner E, Duraes Pereira TA, de Souza VR, Teles Boaventura G, Blondet de Azeredo V. Anemia in pregnancy: impact on weight and in the development of anemia in newborn. Nutr Hosp 32(5), 2071-2079 (2015).
294. Delpisheh A, Brabin L, Drummond S, Brabin BJ. Prenatal smoking exposure and asymmetric fetal growth restriction. Ann Hum Biol 35(6), 573-583 (2008).
295. Demmouche A, Lazrag A, Moulessehoul S. Prevalence of anaemia in pregnant women during the last trimester: Consequense for birth weight. Eur Rev Med Pharmacol Sci 15(4), 436-445 (2011).
296. Deriba BS, Jemal K. Determinants of Low Birth Weight Among Women Who Gave Birth at Public Health Facilities in North Shewa Zone: Unmatched Case-Control Study. Inquiry 58, 469580211047199 (2021).
297. Dessu S, Dawit Z. Perinatal Mortality and Associated Factors Among Antenatal Care Attended Pregnant Mothers at Public Hospitals in Gamo Zone, Southern Ethiopia. Front Pediatr 8, 586747 (2020).
298. Deswal BS, Singh JV, Kumar D. A Study Of Risk Factors For Low Birth Weight. Indian J Community Med 24(3), 127-131 (1999).
299. Devaguru A, Gada S, Potpalle D, Dinesh Eshwar M, Purwar D. The Prevalence of Low Birth Weight Among Newborn Babies and Its Associated Maternal Risk Factors: A Hospital-Based Cross-Sectional Study. Cureus 15(5), e38587 (2023).
300. Dhar B, Mowlah G, Kabir D. Newborn anthropometry and its relationship with maternal factors. Bangladesh Med Res Counc Bull 29(2), 48-58 (2003).
301. Díaz-Granda RC, Díaz-Granda LE. [Cross Sectional Research: Maternal Anemia During the Third Trimester and its Relationship with Prematurity and Neonatal Anthropometry at Vicente Corral Moscoso Hospital, Cuenca – Ecuador, 2016 - 2017]. Rev Med HJCA 11(1), 40-46 (2019).
302. Dolan, G.; Terkuile, F. O.; Jacoutot, V.; White, N. J.; Luxemburger, C.; Malankirii, L.; Chongsuphajaisiddhi, T.; Nosten, F. Bed Nets for the Prevention of Malaria and Anemia in Pregnancy. Trans R Soc Trop Med Hyg 87(6), 620-626 (1993).
303. Domple VK, Doibale MK, Nair A, Rajput PS. Assessment of maternal risk factors associated with low birth weight neonates at a tertiary hospital, Nanded, Maharashtra. Niger Med J 57(1), 37-43 (2016).
304. Dos Santos CC, da Silva SL, Costa Caminha MF, Maia SB, Figueiroa JN, Batista Filho M. Anemia in pregnant women according to two different assessment criteria (WHO versus CDC). Int J Gynaecol Obstet 159(3), 928-937 (2022).
305. Dubey DK, Nath DC. An Epidemiological Model Investigating the Association between Mothers Nutritional Status and Low Birth Weight in India. Health 8(3), 251-61 (2016).

306. Dündar Ö, Çÿftpinar T, Tütüncü L, Ergür AR, Atay MV, Müngen E, Yergök YZ. Second Trimester Maternal Hemoglobin Level Effect on Birth Weight and Week. Trak Univ Tip Fak Derg 27(2), 156-160 (2010).
307. Ekubagewargies DT, Kassie DG, Takele WW. Maternal HIV infection and preeclampsia increased risk of low birth weight among newborns delivered at University of Gondar specialized referral hospital, Northwest Ethiopia, 2017. Ital J Pediatr 45(1), 7 (2019).
308. El-Moselhy EA, Khalifa HO, Nada IS, Mohammad KI. Low birth weights: I- maternal risk factors a hospital- based study in Cairo city, Egypt. Egypt J Hosp Med 49(1), 555-572 (2012).
309. Elhassan EM, Abbaker AO, Haggaz Abderahuim D, Abubaker MS, Adam I. Anaemia and low birth weight in Medani, Hospital Sudan. BMC Res Notes 3(1), 181 (2010).
310. Elmugabil A, Al-Nafeesah A, AlEed A, AlHabardi N, Adam I. Prevalence of Low Birth Weight and its Association With Anemia in White Nile State, Sudan: A Cross-Sectional Study. SAGE Open Nurs 9, 1-7 (2023).
311. Elmugabil A, Alhabrdi NM, Rayis DA, Al-Wutayd O, Adam I. Evaluation of the association between haemoglobin levels and preterm birth at Khartoum, Sudan: A hospital-based study. Front Nutr 9(933557), 1-7 (2022).
312. Eng C, Karki S, Trivedi AN. Risk factors of stillbirths in Victoria (Australia): A caseâ"control study. J Obstet Gynaecol 36(6), 754-757 (2016).
313. Engidaw MT, Eyayu T, Tiruneh T. The effect of maternal anaemia on low birth weight among newborns in Northwest Ethiopia. Sci Rep 12(1), 15280 (2022).
314. Essen B, Hanson B, Per-Olof OS, Lindquist PG, Gudmundsson S. Increased perinatal mortality among sub-Saharan immigrants in a city-population in Sweden. Acta Obstet Gynecol Scand 79(9), 737-743 (2000).
315. Essome H, Bounyom MB, Kondo AN, Ilick IDO, Ekoube CE, Betoko RB, Iyawa H, Nkwele FM, Njamen TN, Tchounzou R, Nyong AN, Mboe CICE, Bilkissou M, Yaneu JN, Akam MVN, Ngouhouo GM, Toutou GT, Ekono MR, Noubi N, Foumane P. Low birth weight in Cameroon: research and analysis of factors associated with their occurrence in Douala maternity wards. Open J Obstet Gynecol 14, 758-778 (2024).
316. Eweis M, Farid EZ, El-Malky N, Abdel-Rasheed M, Salem S, Shawky S. Prevalence and determinants of anemia during the third trimester of pregnancy. Clin Nutr ESPEN 44, 194-199 (2021).
317. Fajriana A, Buanasita A. [Risk Factors Associated with Low Birth Weight at Semampir District, Surabaya]. Media Gizi Indones 13(1), 71-80 (2018).
318. Feleke BE, Feleke TE. The Effect of Pregnancy in the Hemoglobin Concentration of Pregnant Women: A Longitudinal Study. J Pregnancy 2020(1), 2789536 (2020).
319. Figueiredo ACMG, Gomes-Filho IS, Batista JET, Orrico GS, Porto ECL, Cruz Pimenta RM, et al. Maternal anemia and birth weight: A prospective cohort study. PLoS One 14(3), e0212817 (2019).
320. Finkelstein JL, Kurpad AV, Bose B, Thomas T, Srinivasan K, Duggan C. Anaemia and iron deficiency in pregnancy and adverse perinatal outcomes in Southern India. Eur J Clin Nutr 74(1), 112-125 (2020).
321. Fite MB, Tura AK, Yadeta TA, Oljira L, Roba KT. Prevalence, predictors of low birth weight and its association with maternal iron status using serum ferritin concentration in rural Eastern Ethiopia: a prospective cohort study. BMC Nutr 8(1), 70 (2022).
322. Frøen JF, Møyland RA, Saugstad OD, Stray-Pedersen B. Maternal health in sudden intrauterine unexplained death: Do urinary tract infections protect the fetus?. Obstet Gynecol 100(5), 909-915 (2002).
323. Fukushima M, Watanabe H. An observation on pregnancy outcomes in relation to haemoglobin levels. Fukushima J Med Sci 37(1), 23-27 (1991).
324. Gamini BS, Charki S, Patil MM, Bidri SR, Patil N, Kalyanshetta SS, Patil SV. Late preterm births and associated neonatal outcomes in a tertiary care center: A prospective observational study. Curr Pediatr Res 25(7), 677-684 (2021).
325. Ganesh KS, Harsha Kumar HN, Jayaram S, Kotia MS. Determinants of low birth weight: a case control study in a district hospital in Karnataka. Indian J Pediatr 77(1), 87-89 (2010).

326. Gann P, Nghiem L, Warner S. Pregnancy characteristics and outcomes of Cambodian refugees. Am J Public Health (N Y) 79(9), 1251-1258 (1989).
327. Gazali AS, Sukadi A. Risk factors for low birth weight infants in pregnant women before delivery at the Hasan Sadikin Hospital Bandung. Paediatr Indones 27(21), 91 (1987).
328. Gebrehawerya T, Gebreslasie K, Admasu E, Gebremedhin TG. Determinants of Low Birth Weight among Mothers Who Gave Birth in Debremarkos Referral Hospital, Debremarkos Town, East Gojam, Amhara Region, Ethiopia. Neonatal Pediatr Med 4(1), 1000145 (2018).
329. Geda A, Shemsu S, Debalke R. Determinants of Perinatal Mortality in Public Hospitals of Iluu Abbaa Boor Oromia Region, South West Ethiopia, 2019: Unmatched Case-Control Study. Res Rep Neonatol 11, 57-66 (2021).
330. Gerety MK, Kim DK, Carpenter RM, Ma JZ, Chisholm C, Taniuchi M, Islam MO, Pholwat S, Platts-Mills JA, Siraj MS, Billah SM, Haque R, Petri WA Jr. Systemic inflammation, enteropathogenic E. Coli, and micronutrient insufficiencies in the first trimester as possible predictors of preterm birth in rural Bangladesh: a prospective study. BMC Pregnancy Childbirth 24(1), 82 (2024).
331. Getiye Y, Fantahun M. Factors associated with perinatal mortality among public health deliveries in Addis Ababa, Ethiopia, an unmatched case control study. BMC Pregnancy Childbirth 17(245), 1 - 7 (2017).
332. Gnanasekaran S, Jakanattane V, Rajendran R. Study on the effect of maternal anemia on birth weight of term neonates among rural population India. Int J Contemp Pediatrics 6(3), 1255-1258 (2019).
333. Go H, Hashimoto K, Kyozuka H, Maeda H, Nishigori H, Sato A, Ogata Y, Kuse M, Fujimori K, Yasumura S, Hosoya M, Japan Environment and Children's Study (JECS) Group. Maternal hemoglobin levels and neonatal outcomes: the Japan Environment and Children's Study. J Matern Fetal Neonatal Med 35(26), 10472-10480 (2022).
334. Goldenberg RL, Tamura T, DuBard M, Johnston KE, Copper RL, Neggers Y. Plasma ferritin and pregnancy outcome. Am J Obstet Gynecol 175(5), 1356-1359 (1996).
335. Gonzales GF, Steenland K, Tapia V. Maternal hemoglobin level and fetal outcome at low and high altitudes. Am J Physiol Regul Integr Comp Physiol 297(5), R1477-1485 (2009).
336. Gonzales GF, TapiaV, Gasco M, Carrillo CE. Maternal hemoglobin concentration and adverse pregnancy outcomes at low and moderate altitudes in Peru. J Matern Fetal Neonatal Med 25(7), 1105-1110 (2012).
337. Govil P, Singh A, Thomas VA. Low maternal hemoglobin levels as predictor for low birth weight and preterm delieveries. Indian J Public Health Res Dev 9(3), 107-112 (2018).
338. Guevara Cosme JA, Montero Hechavarría E, Fernández Miralles RM, Cordero Isaac R, Villamil Blanco Y. [Risk factors of low birth weight in Palma Soriano Maternal Hospital during a triennium]. MEDISAN 13(2) (2009).
339. Gyimah LA, Annan RA, Apprey C, Asamoah-Boakye O, et al. Nutritional Status and Birth Outcomes among Pregnant Adolescents in Ashanti Region, Ghana. Hum Nutr Metab 26, 200130 (2021).
340. Habe S, Haruna M, Yonezawa K, Usui Y, Sasaki S, Nagamatsu T, Fujita M, Suetsugu Y, Ohori R, Tanaka M, Aoyama S. Factors Associated with Anemia and Iron Deficiency during Pregnancy: A Prospective Observational Study in Japan. Nutrients 16(3) (2024).
341. Habib MA, Greenow CR, Ariff S, Soofi S. Factors associated with low birthweight in term pregnancies: a matched case-control study from rural Pakistan. East Mediterr Health J 23(11), 754-763 (2017).
342. Haggaz AD, Radi EA, Adam I. Anaemia and low birthweight in western Sudan. Trans R Soc Trop Med Hyg 104(3), 234-236 (2010).
343. Hameed NN, ALZubaidi MA, HKadhim S. Risk Factors of Small for Gestational Age Newborn Babies. Iraqi Postgrad Med J 10(1), 54-60 (2011).
344. Hansen R, Spangmose AL, Sommer VM, Holm C, Jørgensen FS, Krebs L, Pinborg A. Maternal first trimester iron status and its association with obstetric and perinatal outcomes. Arch Gynecol Obstet 306(4), 1359-1371 (2022).
345. Harrison MS, Thorsten VR, Dudley DJ, Parker CB, Koch MA, Hogue CJR, et al. Stillbirth, Inflammatory Markers, and Obesity: Results from the Stillbirth Collaborative Research Network. Am J Perinatol 35(11), 1071-1078 (2018).

346. Hasin A, Begum R, Khan MR, Ahmed F. Relationship between birth weight and biochemical measures of maternal nutritional status at delivery in Bangladeshi urban poors. Int J Food Sci Nutr 47(3), 273-9 (1996).
347. Hassen HY, Gebreyesus SH, Endris BS, Roro MA, Van Geertruyden JP. Development and validation of a risk score to predict low birthweight using characteristics of the mother: Analysis from bunmap cohort in ethiopia. J Clin Med 9(5), 1587 (2020).
348. Heilmann L, Hojnacki B, Herrle B, Tempelhoff VG, Kriechbaum A. Haemoglobin - An obstetrical risk factor. Geburtshilfe Frauenheilkd 53(4), 235-239 (1993).
349. Heydarpour F, Soltani M, Najafi F, Tabatabaee HR, Etemad K, Hajipour M, Babanejad M, Valadbeigi T, Yaghoobi H, Rezaeian S. Maternal anemia in various trimesters and related pregnancy outcomes: Results from a large cohort study in Iran. Iran J Pediatr 29(1), e69741 (2019).
350. Hirve SS, Ganatra BR. Determinants of low birth weight: a community based prospective cohort study. Indian Pediatr 31(10), 1221-1225 (1994).
351. Hong JGS, Fadzleeyanna MYN, Omar SZ, Tan PC. HbA1c at term delivery and adverse pregnancy outcome. BMC Pregnancy Childbirth 22(1), 679 (2022).
352. Hosain GM, Chatterjee N, Begum A, Saha SC. Factors associated with low birthweight in rural Bangladesh. J Trop Pediatr 52(2), 87-91 (2006).
353. Hou J, Cliver SP, Tamura T, Johnston KE, Goldenberg R. Maternal serum ferritin and fetal growth. Obstet Gynecol 95(3), 447-452 (2000).
354. Howard N, Enayatullah S, Mohammad N, Mayan I, Shamszai Z, Rowland M, Leslie T. Towards a strategy for malaria in pregnancy in Afghanistan: Analysis of clinical realities and women's perceptions of malaria and anaemia. Malar J 14(1), 431 (2015).
355. Hsu TY, Lin H, Lan KC, Ou CY, Tsai CC, Cheng BH, Yang KD, Wong YH, Hung TH, Hsiao PY, Kao HF. High interleukin-16 concentrations in the early second trimester amniotic fluid: an independent predictive marker for preterm birth. J Matern Fetal Neonatal Med 26(3), 285-9 (2013).
356. Huang L, Purvarshi G, Wang S, Zhong L, Tang H. The influence of iron-deficiency anemia during the pregnancy on preterm birth and birth weight in south China. J Food Nutr Res (Newark) 3(9), 570-574 (2015).
357. Huang S, Tian J, Liu C, Long Y, Cao D, Wei L et al. Elevated C-reactive protein and complement C3 levels are associated with preterm birth: a nested case-control study in Chinese women. BMC Pregnancy Childbirth 20(1), 131 (2020).
358. Hwang HS, Kim YH, Kwon JY, Park YW. Uterine and umbilical artery Doppler velocimetry as a predictor for adverse pregnancy outcomes in pregnant women with anemia. J Perinat Med 38(5), 467-471 (2010).
359. Ibsen CP, Scavenius C, Frederiksen KD, Wonsbek L, Ammitzbøll ILA, Vojdeman FJ, Glenthøj A, Noer MC, Lauenborg J, Mandrup CM, Clausen TD. Impact of second trimester iron deficiency on maternal and infant outcomes: A Danish cohort study. Eur J Obstet Gynecol Reprod Biol 311, 114004 (2025).
360. Ilunga PM, Mukuku O, Mawaw PM, Mutombo AM, Lubala TK, Shongo Ya Pongombo M, Kakudji Luhete P, Wembonyama SO, Mutombo Kabamba A, Luboya Numbi O. Risk factors for low birth weight in Lubumbashi, Democratic Republic of the Congo. Med Sante Trop 26(4), 20 (2016).
361. Iqbal R, Qayyum A, Tahir S. Association of Preterm Delivery with Maternal Anemia in Females Presenting in Active Labour for Delivery. Pak J Med Health Sci 14(4), 1008-1010 (2020).
362. Jackson RT, Jackson FLC, Yu S. THE RELATIONSHIP BETWEEN 3RD TRIMESTER MATERNAL WEIGHT-GAIN, HEMATOLOGIC STATUS AND INFANT BIRTH-WEIGHT IN LIBERIAN MOTHERS. Ecol Food Nutr 30(3-Jan), 309-319 (1993).
363. Jahedbozorgan T, Yaghmaei M, Naserieh M. Comparison of serum ferritin levels in pregnant women with preterm and term deliveries. Immunopathologia Persa 6(2), e25 (2020).
364. Jamshed S, Khan F, Begum A, Barkat Ali B, Akram Z, Ariff M. Frequency of Low Birth Weight and its Relationship With Maternal Nutritional and Dietary Factors: A Cross-Sectional Study. Cureus 12(6), e8731 (2020).
365. Jasim SK, Al-Momen H, Al-Asadi F. Maternal anemia prevalence and subsequent neonatal complications in Iraq. Open Access Maced J Med Sci 8(B), 71-75 (2020).

366. Javadi M, Zarei S, Shiri-Shahsavar MR, Jafarimanesh H, Tola HH, Ranjbaran M. Association between Maternal Hemoglobin, other Maternal Attributes and Neonatal Birth Weight: A Case-control Study. Curr Pediatr Rev 19(3), 312-317 (2023).
367. Jehan I, McClure EM, Salat S, Rizvi S, Pasha O, Harris H, Moss N, Goldenberg RL. Stillbirths in an urban community in Pakistan. Am J Obstet Gynecol 197(3), 257e1–8 (2007).
368. Jember DA, Menji ZA, Yitayew YA. Low Birth Weight and Associated Factors Among Newborn Babies in Health Institutions in Dessie, Amhara, Ethiopia. J Multidiscip Healthc 13, 1839-1848 (2020).
369. Jessani S, Saleem S, Hoffman MK, Goudar SS, Derman RJ, Moore JL, Garces A, Figueroa L, Krebs NF, Okitawutshu J, Tshefu A, Bose CL, Mwenechanya M, Chomba E, Carlo WA, Das PK, Patel A, Hibberd PL, Esamai F, Goldenberg RL. Association of hemoglobin levels in the first trimester and at 26 to 30 weeks with fetal and neonatal outcomes: A secondary analyses of the Global Network for Women's and Children's Health's ASPIRIN Trial. BJOG 128(9), 1487-1496 (2021).
370. Jusoh N, Ismail TAT, Daud A. Anemia Among Teenage Pregnancy In Northwestern Malaysia: What Are The Factors?. Int J Collab Res Intern Med Public Health 7(12), 196-205 (2015).
371. Kant S, Kaur R, Goel AD, Malhotra S, Haldar P, Kumar R. Anemia at the time of delivery and its association with pregnancy outcomes: A study from a secondary care hospital in Haryana, India. Indian J Public Health 62(4), 315-318 (2018).
372. Kargbo DK, Nyarko K, Sackey S, Addo-Lartey A, Kenu E, Anto F. Determinants of low birth weight deliveries at five referral hospitals in Western Area Urban district, Sierra Leone. Ital J Pediatr 47(1), 212 (2021).
373. Kashyap A, Kaur P, Srivastava P, Singh V. Association of new-born birth weight with maternal parameters. Int J Reprod Contracept Obstet Gynecol 8(9), 3453-3458 (2019).
374. Kasuga Y, Ikenoue S, Tamagawa M, Oishi M, Endo T, Sato Y, Iida M, Sato Y, Tanaka M, Ochiai D. What are the causes for low birthweight in Japan? A single hospital-based study. PLoS One 16(6), e0253719 (2021).
375. Kattula, D.; Sarkar, R.; Sivarathinaswamy, P.; Velusamy, V.; Venugopal, S.; Naumova, E. N.; Muliyil, J.; Ward, H.; Kang, G. The first 1000â...days of life: prenatal and postnatal risk factors for morbidity and growth in a birth cohort in southern India. BMJ Open 4(7), e005404 (2014).
376. Kaur M, Chauhan A, Manzar MD, Rajput MM. Maternal anaemia and neonatal outcome: A prospective study on urban pregnant women. J Clin Diagn Res 9(12), QC04-QC08 (2015).
377. Kelkay B, Omer A, Teferi Y, Moges Y. Factors Associated with Singleton Preterm Birth in Shire Suhul General Hospital, Northern Ethiopia, 2018. J Pregnancy 2019, 4629101 (2019).
378. Kemppinen L, Mattila M, Ekholm E, et al. Gestational iron deficiency anemia is associated with preterm birth, fetal growth restriction, and postpartum infections. J Perinat Med 49(4), 431-438 (2020).
379. Khambalia AZ, Collins CE, Roberts CL, et al. High maternal serum ferritin in early pregnancy and risk of spontaneous preterm birth. Br J Nutr 114(3), 455-461 (2015).
380. Khambalia AZ, Collins CE, Roberts CL, Morris JM, Powell KL, Tasevski V, Nassar N. Iron deficiency in early pregnancy using serum ferritin and soluble transferrin receptor concentrations are associated with pregnancy and birth outcomes. Eur J Clin Nutr 70(3), 358-363 (2016).
381. Khan EEA, Hairon SM, Hashim N, Kasri MRM, Hamid NAA. Adverse Birth Outcomes among Indigenous in Kelantan, Malaysia for the Years 2018-2020: Proportions and Associated Maternal Factors. J Health Care Poor Underserved 34(3), 972-988 (2023).
382. Khan NS, Ashraf RN, Noor S, et al. Association of Maternal Periodontitis with Low Birth Weight in Newborns in a Tertiary Care Hospital. J Ayub Med Coll Abbottabad 28(1), 120-125 (2016).
383. Khatana A, Verma S, Sehra RN, Yadav K. Moderate to severe maternal anaemia in pregnancy and its impact on. Int J Reprod Contracept Obstet Gynecol 9(4), 1487-1492 (2020).
384. Kheir AEM, Ali RBA, Musa EA. Maternal Anaemia and Neonatal Outcome in a Tertiary Care Hospital in Sudan. J Dis Glob Health 7(4), 169-173 (2016).
385. Khezri R, Askari S, Jahanian S, Ashayeri N. Preterm birth and public health challenges: Incidence and risk factors. Public Health 242, 186-191 (2025).
386. Khezri R, Salarilak S, Jahanian S. The association between maternal anemia during pregnancy and preterm birth. Clin Nutr ESPEN 56, 13-17 (2023).

387. Kibret Y, Bunie AM, Mohammed S, Tamene TD, Dejene TM. Magnitude of preterm birth and associated factors Among mothers who gave birth in Debre Berhan comprehensive specialized hospital. Front Glob Womens Health 5, 1375196 (2024).
388. Kidanto H, Msemo G, Mmbando D, Rusibamayila N, Ersdal H, Perlman J. Predisposing factors associated with stillbirth in Tanzania. Int J Gynaecol Obstet 130(1), 70–3 (2015).
389. Kidanto HL, Mogren I, Lindmark G, Massawe S, Nystrom L. Risks for preterm delivery and low birth weight are independently increased by severity of maternal anaemia. S Afr Med J 99(2), 98-102 (2009).
390. Kim I, Hungerford DW, Yip R, Kuester SA, Zyrkowski C, Trowbridge FL. Pregnancy Nutrition Surveillance System-United States, 1979-1990. MMWR CDC Surveill Summ 41(SS-7), 25-41 (1992).
391. Kim MJ, Sohn JA, Kim JY, Ahn DH. Relationship between Maternal Hemoglobin Concentration and Birth Weight of Newborns. J Korean Soc Neonatol 5(2), 167-171 (1998).
392. Klebanoff MA, Shiono PH, Berendes HW, Rhoads GG. Facts and artifacts about anemia and preterm delivery. JAMA 262(4), 511-515 (1989).
393. Koh K, Lee C, Oh H, Chang Y, Hur E, Park J, Lee W, Park C. A hospital based case-control study for the effects of maternal anemia on the preterm birth and adverse pregancy outcomes. Korean J Obstet Gynecol 40(5), 979-988 (1997).
394. Komicha MA, Egata G, Abdo M, Kure MA, Roba KT. Magnitude of Low Birth Weight and Associated Factors among Women who gave Birth in Public Hospitals of Harari Regional State, Eastern Ethiopia. J Womens Health Care 10(6), 534 (2021).
395. Koura GK, Ouedraogo S, Le Port A, Watier L, Cottrell G, Guerra J, Choudat I, Rachas A, Bouscaillou J, Massougbodji A, Garcia A. Anaemia during pregnancy: impact on birth outcome and infant haemoglobin level during the first 18 months of life. Trop Med Int Health 17(3), 283-291 (2012).
396. Koyuncu K, Turgay B, Şükür YE, Yıldırım B, Ateş C, Söylemez F. Third trimester anemia extends the length of hospital stay after delivery. Turk J Obstet Gynecol 14(3), 166-169 (2017).
397. Kulmala T, Vaahtera M, Ndekha M, Koivisto A-M, Cullinan T, Salin M-L, Ashorn P. The importance of preterm births for peri- and neonatal mortality in rural Malawi. Paediatr Perinat Epidemiol 14(3), 219-26 (2000).
398. Kumar A, Chaudhary K, Prasad S. Maternal indicators and obstetric outcome in the north Indian population: a hospital-based study. J Postgrad Med 56(3), 192-195 (2010).
399. Kumar KJ, Asha N, Murthy DS, Sujatha MS, Manjunath VG. Maternal anemia in various trimesters and its effect on newborn weight and maturity: An observational study. Int J Prev Med 4(2), 193-199 (2013).
400. Kumar M, Verma R, Khanna P, Bhalla K, Kumar R, Dhaka R, Chayal V. Prevalence and associate factors of low birth weight in North Indian babies: a rural based study. Int J Community Med Public Health 4(9), 3212-3217 (2017).
401. Kumar N, Yadav A. High-risk pregnancy and perinatal outcome: An observational study. Curr Womens Health Rev 16(4), 318-326 (2020).
402. Kumari S, Garg N, Kumar A, Guru PKI, Ansari S, Anwar S, Singh KP, Kumari P, Mishra PK, Gupta BK, Nehar S, Sharma AK, Raziuddin M, Sohail M. Maternal and severe anaemia in delivering women is associated with risk of preterm and low birth weight: A cross sectional study from Jharkhand, India. One Health 2019(8), 100098 (2019).
403. Lake EA, Olana Fite R. Low Birth Weight and Its Associated Factors among Newborns Delivered at Wolaita Sodo University Teaching and Referral Hospital, Southern Ethiopia, 2018. Int J Pediatr 2019, 4628301 (2019).
404. Lao TT, Pun TC. Anaemia in pregnancy - Is the current definition meaningful?. Eur J Obstet Gynecol Reprod Biol 68(1), 53-58 (1996).
405. Lee HS, Kim MS, Kim MH, Kim YJ, Kim WY. Iron status and its association with pregnancy outcome in Korean pregnant women. Eur J Clin Nutr 60(9), 1130-1135 (2006).
406. Lemlem GA, Mezen MK, Atinafu A, Abitew ZA. Maternal factors associated with low birth weight in governmental hospitals of Wollo district, Northeast Ethiopia: a cross-sectional study. PAMJ One Health 4(18) (2021).

407. Levy A, Fraser D, Katz M, Mazor M, Sheiner E. Maternal anemia during pregnancy is an independent risk factor for low birthweight and preterm delivery. Eur J Obstet Gynecol Reprod Biol 122(2), 182-186 (2005).
408. Li M, Lv Y, Ying J, Xu L, Chen W, Zheng Q, Ji C, Shao J. Effect of Daily Iron Supplementation on Infantile Iron Homeostasis in Preterm Infants. Front Pediatr 9(5), 687119 (2021).
409. Li X, Zhang Z, Cai W, Zhou X, Zhang Y, Wu C, Xu X, Wu H. Association Between Serum Ferritin Levels in Early Pregnancy and Thyroid Function and Pregnancy Outcomes in Chinese Population. Int J Womens Health 15, 1951-1957 (2023).
410. Lieberman E, Ryan KJ, Monson RR, Schoenbaum SC. Association of maternal hematocrit with premature labor. Am J Obstet Gynecol 159(1), 107-114 (1988).
411. Little MP, Brocard P, Elliott P, Steer PJ. Hemoglobin concentration in pregnancy and perinatal mortality: a London-based cohort study. Am J Obstet Gynecol 193(1), 220–6 (2005).
412. Liu D, Li S, Zhang B, Kang Y et al. Maternal Hemoglobin Concentrations and Birth Weight, Low Birth Weight (LBW), and Small for Gestational Age (SGA): Findings from a Prospective Study in Northwest China. Nutrients 14(4), 858 (2022).
413. Liu X, An H, Li N, Li Z, Zhang Y, Zhang L, Li H, Liu J, Ye R. Preconception Hemoglobin Concentration and Risk of Low Birth Weight and Small-for-Gestational-Age: A Large Prospective Cohort Study in China. Nutrients 14(271), 1-11 (2022).
414. Locks LM, Patel A, Katz E, Simmons E, Hibberd P. Seasonal trends and maternal characteristics as predictors of maternal undernutrition and low birthweight in Eastern Maharashtra, India. Matern Child Nutr 17(2), e13087 (2021).
415. Lolaso T, Weldekidan F, Abera T, Mekonnen T, Chewaka L. Stillbirth and associated factors among women delivered in public hospitals, Southwest Ethiopia. Ethiop J Repro Health 13(2), 46-54 (2021).
416. Lone FW, Qureshi RN, Emmanuel F. Maternal anaemia and its impact on perinatal outcome in a tertiary care hospital in Pakistan. East Mediterr Health J 10(6), 801-7 (2004).
417. Lu ZM, Goldenberg RL, Cliver SP, Cutter G, Blankson M. The relationship between maternal hematocrit and pregnancy outcome. Obstet Gynecol 77(2), 190-194 (1991).
418. Ma AG, Schouten E, Wang Y, et al. Anemia prevalence among pregnant women and birth weight in five areas in China. Med Princ Pract 18(5), 368-372 (2009).
419. Magahed MAE. Ecology of Low Birth Weight in Sharjah. Emir Med J 4(3), 182-187 (1986).
420. Maghsoudlou S, Cnattingius S, Stephansson O, Aarabi M, Semnani S, Montgomery SM, Bahmanyar S. Maternal haemoglobin concentrations before and during pregnancy and stillbirth risk: a population-based case-control study. BMC Pregnancy Childbirth 16(135) (2016).
421. Mahajan SD, Singh S, Shah P, Gupta N, Kochupillai N. Effect of maternal malnutrition and anemia on the endocrine regulation of fetal growth. Endocr Res 30(2), 189-203 (2004).
422. Mahamuda B, Tanira S, Feroza W, Perven HA, Shamim A. Effects of maternal anaemia on neonatal outcomes - a study done in the specialized urban hospital set up in Bangladesh. Bangladesh J Med Sci 10(3), 177-180 (2011).
423. Mamidi RS, Banjara SK, Manchala S, Babu CK, Geddam JJB, Boiroju NK, Varanasi B, Neeraja G, Reddy GVR, Ramalakshmi BA, Hemalatha R, Meur G. Maternal Nutrition, Body Composition and Gestational Weight Gain on Low Birth Weight and Small for Gestational Age-A Cohort Study in an Indian Urban Slum. Children (Basel) 9(10), 1-17 (2022).
424. Mamun AA, Padmadas SS, Khatun M. Maternal health during pregnancy and perinatal mortality in Bangladesh: evidence from a large-scale community-based clinical trial. Paediatr Perinat Epidemiol 20(6), 482–90 (2006).
425. Marahatta R. Study of anaemia in pregnancy and its outcome in Nepal Medical College Teaching Hospital, Kathmandu, Nepal. Nepal Med Coll J 9(4), 270-4 (2007).
426. Marchant T, Schellenberg JA, Nathan R, Abdulla S, Mukasa O, Mshinda H, Lengeler C. Anaemia in pregnancy and infant mortality in Tanzania. Trop Med Int Health 9(2), 262-266 (2004).
427. Mardones F, Duran E, Villarroel L, et al. [Maternal anemia in Concepcion province, Chile: association with maternal nutritional status and fetal growth]. Arch Latinoam Nutr 58(2), 132-138 (2008).

428. Martí A, Peña-Martí G, Muñoz S, Lanas F, Comunian G. Association between prematurity and maternal anemia in Venezuelan pregnant women during third trimester at labor. Arch Latinoam Nutr 5(1), 44-48 (2001).
429. Masukume G, Khashan AS, Kenny LC, Baker PN, Nelson G, & SCOPE Consortium. Risk factors and birth outcomes of anaemia in early pregnancy in a nulliparous cohort. PLoS One 10(4), e0122729 (2015).
430. Mau G. Hemoglobin changes during pregnancy and growth disturbances in the neonate. J Perinat Med 5(4), 172-177 (1977).
431. Mayorga DLG, Rodríguez E, Ortiz JA, Rivera WI, Duarte NH. Perfil epidemiolÃgico y factores de riesgo en recien nacidos prematuros, Hospital Regional, Gracias, Lempira. Rev Med Hondur 80(4), 145-152 (2012).
432. McFarlane J, Parker B, Soeken K. Abuse during pregnancy: associations with maternal health and infant birth weight. Nurs Res 45(1), 37-42 (1996).
433. Meda N, Dao Y, Touré B, Yameogo B, Cousens S, Graham W. [Assessing severe maternal anemia and its consequences: the value of a simple examination of the coloration of palpebral conjunctiva]. Sante 9(1), 12-7 (1999).
434. Meis PJ, Michielutte R, Peters TJ, Wells HB, Sands RE, Coles EC, Johns K. Factors associated with preterm birth in Cardiff, Wales. I. Univariable and multivariable analysis. Am J Obstet Gynecol 173(2), 590-596 (1995).
435. Mekie M, Taklual W. Magnitude of low birth weight and maternal risk factors among women who delivered in Debre Tabor Hospital, Amhara Region, Ethiopia: a facility based cross-sectional study. Ital J Pediatr 45(1), 86 (2019).
436. Mekonen DG, Yismaw AE, Nigussie TS, Ambaw WM. Proportion of Preterm birth and associated factors among mothers who gave birth in Debretabor town health institutions, northwest, Ethiopia. BMC Res Notes 12(1), 2 (2019).
437. Mekuriyaw AM, Mihret MS, Yismaw AE. Determinants of Preterm Birth among Women Who Gave Birth in Amhara Region Referral Hospitals, Northern Ethiopia, 2018: Institutional Based Case Control Study. Int J Pediatr 2020(1), 1854073 (2020).
438. Meng K, Lee SY, Lee HC. [A Case-Control Study on the Risk Factors of the Low Birth Weight]. Korean J Prev Med 17(1), 251-257 (1984).
439. Mengesha S, Dangisso MH. Burden of stillbirths and associated factors in Yirgalem Hospital, Southern Ethiopia: a facility based cross-sectional study. BMC Pregnancy Childbirth 20(1), 591 (2020).
440. Menon KC, Ferguson EL, Thomson CD, Gray AR, Zodpey S, Saraf A, Das PK, Skeaff SA. Effects of anemia at different stages of gestation on infant outcomes. Nutrition 32(1), 61-65 (2016).
441. Meuris S, Piko BB, Eerens P, Vanbellinghen AM, Dramaix M, Hennart P. Gestational malaria: Assessment of its consequences on fetal growth. Am J Trop Med Hyg 48(5), 603-609 (1993).
442. Mezen MK, Lemlem GA, Biru YB. The Effect of Gestational Weight Gain on Low Birth Weight, Case-Control Study in Northeast Amhara Regional State, Ethiopia, 2019. Int J Child Health Nutr 11(3), 171-177 (2022).
443. Mingude AB, Gebretsadik W, Misker D, Woldeamanuel GG. Determinants of low birth weight among live birth newborns delivered at public hospitals in Gamo Gofa Zone, South Ethiopia: Unmatched case control study. SAGE Open Med 8, 2050312120940544 (2020).
444. Mir MK, Yousaf S, Ilyas A, Tahir S. Maternal anemia is a risk factor for low birth weight babies at term. Pak J Med Health Sci 10(3), 741-743 (2016).
445. Misra A, Ray S, Patrikar S. A longitudinal study to determine association of various maternal factors with neonatal birth weight at a tertiary care hospital. Med J Armed Forces India 71(3), 270-273 (2015).
446. Mitsuda N, J-P NA, Eitoku M, Maeda N, Fujieda M, Suganuma N, Japan Environment and Children's Study (JECS) Group. Association between maternal hemoglobin concentration and placental weight to birthweight ratio: The Japan Environment and Children's Study (JECS). Placenta 101, 132-138 (2020).
447. Moakhar HK, Sovizi B, Yazdi ME. The Relationship between Maternal Haemoglobin and Haematocrit with Low Birth Weight and Preterm Labour. J Midwifery Reprod Health 7(1), 1584-90 (2019).
448. Mohamed EAB. A Community- Based Cohort Study for the Risk Factors of Low Birth Weights, in an Upper Egypt Governorate. J Am Sci 8(6), 600-607 (2012).

449. Mohamed MA, Ahmad T, Macri C, Aly H. Racial disparities in maternal hemoglobin concentrations and pregnancy outcomes. J Perinat Med 40(2), 141-149 (2012).
450. Mohammed S, Bonsing I, Yakubu I, Wondong WP. Maternal obstetric and socio-demographic determinants of low birth weight: A retrospective cross-sectional study in Ghana. Reprod Health 2019(16), 70 (2019).
451. Mola G, Permezel M, Amoa AB, Klufio CA. Anaemia and perinatal outcome in Port Moresby. Aust N Z J Obstet Gynaecol 39(1), 31-4 (1999).
452. Morgan-Ortiz F, Cinco-Sánchez A, Douriet-Marín FA, Báez-Barraza J, Muñoz-Acosta J, Osuna-Ramirez I. [Sociodemographic and obstetric factors associated with preterm birth]. Ginecol Obstet Mex 78(2), 103-109 (2010).
453. Morisaki N, Togoobaatar G, Vogel JP, Souza JP, Rowland Hogue CJ, Jayaratne K, Ota E, Mori R. Risk factors for spontaneous and provider-initiated preterm delivery in high and low Human Development Index countries: a secondary analysis of the World Health Organization Multicountry Survey on Maternal and Newborn Health. BJOG 121(Suppl 1), 101-109 (2014).
454. Moyambe JN, Bernard P, Khang'Mate F, Nkoy AM, Mukalenge FC, et al. Risk factors for intra-uterine growth retardation in Lubumbashi. Pan Afr Med J 14(4), 4 (2013).
455. Musrifa, Wulandari LPL, Wirawan DN. Tobacco Smoke Exposure as Risk Factor in Early Neonatal Death in Mataram, Nusa Tenggara Barat (NTB). Public Health Prev Med Arch 2(1), 70-75 (2014).
456. Mwanyumba F, Claeys P, Gaillard P, Verhofstede C, Chohan V et al. Correlation between maternal andinfant HIV infection and low birth weight: a study in Mombasa, Kenya,. J Obstet Gynaecol 21(1), 27-31 (2001).
457. Nair M, Churchill D, Robinson S, Nelson-Piercy C, Stanworth SJ, Knight M. Association between maternal haemoglobin and stillbirth: acohort study among a multi-ethnic population in England. Br J Haematol 179(5), 829-837 (2017).
458. Narang A, Chaudhuri MK, Kumar P. Small for gestational age babies: Indian scene. Indian J Pediatr 64(2), 221-224 (1997).
459. Nasiri AF, Hajiahmadi M. Maternal hematocrit status and pregnancy outcome. J Gorgan Univ Med Sci 9(2), 29-34 (2007).
460. Nasiri-Amiri F, Hajiahmadi M, Basirat Z. Maternal hematocrit status affecting pregnancy outcome. Iran Red Crescent Med J 9(2), 104-108 (2007).
461. Navali N. Assessment of relationship between Iron deficiency and preterm labor. Life Sci J 9(4), 1778-1781 (2012).
462. Nguyen LTT, Tran CD, Nguyen HTT, Phan HT, Nguyen LT, Nguyen HLT, Ta AHT, Pho CQT, Do KN, Dang AK, Le HT. Nutritional status of Vietnamese infants assessed by Fenton growth chart and related factors: A cross-sectional study. Pediatr Investig 7(4), 254-262 (2023).
463. Novikova P, Salimo H, Murti B. The Effect of Biological, Social, Economic, and Nutritional Factors on Low Birth Weight: A New Path Analysis Evidence from Madiun Hospital, East Java, Indonesia. J Matern Child Health 3(3), 166-175 (2018).
464. Nsereko E, Uwase A, Mukabutera A, Muvunyi CM, Rulisa S, Ntirushwa D, Moreland P, Corwin EJ, Santos N, Nzayirambaho M, Wojcicki JM. Maternal genitourinary infections and poor nutritional status increase risk of preterm birth in Gasabo District, Rwanda: a prospective, longitudinal, cohort study. BMC Pregnancy Childbirth 20(1), 345 (2020).
465. Nwabueze AI. Serum Ferritin as an Indicator of Neonatal Anaemia. Int Blood Res Rev 14(4), 8-16 (2023).
466. O'Brien HT, Santure M, Maziade J. The association of low and high ferritin levels and anemia with pregnancy outcome. Can J Diet Pract Res 61(3), 121-127 (2000).
467. Oaks BM, Jorgensen JM, Baldiviez LM, Adu-Afarwuah S, et al. Prenatal Iron Deficiency and Replete Iron Status Are Associated with Adverse Birth Outcomes, but Associations Differ in Ghana and Malawi. J Nutr 149(3), 513-521 (2019).
468. Oh CH, Namgung R, Park MS, Park KI, Lee C. Iron Parameters and Soluble Transferrin Receptor in Neonates. J Korean Soc Neonatol 10(2), 185-192 (2003).

469. Ohuma EO, Jabin N, Young MF, Epie T, Martorell R, Peña-Rosas JP, Garcia-Casal MN, INTERBIO-21st Consortium, Papageorghiou AT, Kennedy SH, Villar J. Association between maternal haemoglobin concentrations and maternal and neonatal outcomes: the prospective, observational, multinational, INTERBIO-21st fetal study. Lancet Haematol 10(9), e756-e766 (2023).
470. Oladeinde HB, Oladeinde OB, Omoregie R, Onifade AA. Prevalence and determinants of low birth weight: the situation in a traditional birth home in Benin City, Nigeria. Afr Health Sci 15(4), 1123-9 (2015).
471. Olga L, Sovio U, Wong H, Smith GCS, Aiken CEM. Association between maternal hemoglobin concentration and educational attainment in mid-childhood in a high-resource obstetric setting: a prospective cohort study. Am J Obstet Gynecol MFM 6(5), 101357 (2024).
472. Omar AI, Mohamed AD, Farah MG, Mahad IA, Mohamed SA, Dimbil AH, Mohamud NS, Abshir FA, Abdulkadir UA. Maternal Risk Factors Associated with Preterm Births among Pregnant Women in Mogadishu, Somalia. Children (Basel) 9(10), 1-11 (2022).
473. Onadeko MO, Avokey F, Lawoyin TO. Observations of stillbirths, birthweight and maternal haemoglobin in teenage pregnancy in Ibadan, Nigeria. Afr J Med Med Sci 25(1), 81-6 (1996).
474. Ota E, Ganchimeg T, Morisaki N, et al. Risk factors and adverse perinatal outcomes among term and preterm infants born small-for-gestational-age: secondary analyses of the WHO Multi-Country Survey on Maternal and Newborn Health. PLoS One 9(8), e105155 (2017).
475. Padda P, Kishore S, Srivastava A. IMPACT OF BIOSOCIAL CHARACTERISTICS OF THE MOTHER ON BIRTH WEIGHT OF THE NEWBORN. Indian J Community Health 23 (2011).
476. Pal A, Manna S, Das B, Dhara PC. The risk of low birth weight and associated factors in West Bengal, India: a community based cross-sectional study. Gaz Egypt Paediatr Assoc 68, 27 (2020).
477. Pardilawati CY, Supardi S, Andrajati R. The effect of insufficient iron consumption during pregnancy on the risk of low birth weight in RSUD kota depok and bekasi. Asian J Pharm Clin Res 10(SI October), 97-101 (2017).
478. Patel A, Prakash AA, Das PK, Gupta S, Pusdekar YV, Hibberd PL. Maternal anemia and underweight as determinants of pregnancy outcomes: cohort study in eastern rural Maharashtra, India. BMJ Open 8(8), e021623 (2018).
479. Patel S, Verma NR, Padhi P, et al. Retrospective analysis to identify the association of various determinants on birth weight. J Fam Med Prim Care 10(1), 496-501 (2021).
480. Pattanapisalsak C. Obstetric outcomes of teenage pimigravida in Su-Ngai Kolok Hospital, Narathiwat, Thailand. J Med Assoc Thai 94(2), 139-46 (2011).
481. Perveen S, Soomro TK. Sideropaenic anaemia: Impact on perinatal outcome at tertiary care hospital. J Pak Med Assoc 66(8), 952-956 (2016).
482. Peters HR, Vince JD, Friesen H. Low birthweight at a Papua New Guinea Highlands Hospital. J Trop Pediatr 47(1), 17-23 (2001).
483. Pinho-Pompeu M, Surita FG, Pastore DA, Paulino DSM, Pinto E Silva JL. Anemia in pregnant adolescents: impact of treatment on perinatal outcomes. J Matern Fetal Neonatal Med 30(10), 1158-62 (2017).
484. Poespoprodjo JR, Fobia W, Kenangalem E, Lampah DA, Warikar N, Seal A, McGready R, Sugiarto P, Tjitra E, Anstey NM, Price RN. Adverse pregnancy outcomes in an area where multidrug-resistant plasmodium vivax and Plasmodium falciparum infections are endemic. Clin Infect Dis 46(9), 1374-81 (2008).
485. Prema K, Neelakumari S, Ramalakshmi BA. Anaemia and adverse obstetric outcome. Nutr Report Int 23(4), 637-643 (1981).
486. Prioreschi A, Wrottesley SV, Adair L, Ward KA, Norris SA. The triple burden of obesity, HIV, and anaemia during pregnancy and associations with delivery outcomes in urban South Africans. South Afr J Clin Nutr 38(2), 91-100 (2025).
487. Puerto A, Trojan A, Alvis-Zakzuk NR, et al. Iron status in late pregnancy is inversely associated with birth weight in Colombia. Public Health Nutr 24(15), 5090-5100 (2021).
488. Radoń-Pokracka M, Huras H, Spaczyńska J, Janas P, Ossowski P. Influence of antenatal anemia on the route of delivery and neonatal outcomes. Ginekol Położ 11(3), 48-51 (2016).
489. Rahbar N, Ghorbani R, Ahvanoei FR. Prevalence of iron deficiency anemia and its complications in pregnant women referred to medical-health centers in Semnan. Iran J Obstet Gynecol Infertil 17(128), 12-17 (2014).

490. Rahfiludin M, Dharmawan Y. Risk Factors Associated with Low Birth Weight. Kesmas Natl Public Health J 13(2), 75-80 (2018).
491. Rahman SM, Siraj MS, Islam MR, Rahman A, et al. Association between Maternal Plasma Ferritin Level and Infants' Size at Birth: A Prospective Cohort Study in Rural Bangladesh. Glob Health Action 14(1), 1870421 (2021).
492. Räisänen S, Kancherla V, Gissler M, Kramer MR, Heinonen S. Adverse perinatal outcomes associated with moderate or severe maternal anaemia based on parity in Finland during 2006-10. Paediatr Perinat Epidemiol 28(5), 372-380 (2014).
493. Räisänen S, Kancherla V, Gissler M, Kramer MR, Heinonen S. Contribution of risk factors to extremely, very and moderately preterm births - register-based analysis of 1,390,742 singleton births. PLoS One 8(4), e60660 (2013).
494. Ramadani M, Utomo B, Achadi EL, Gunardi H. Prenatal Secondhand Smoke Exposure: Correlation Between Nicotine in Umbilical Cord Blood and Neonatal Anthropometry. Osong Public Health Res Perspect 10(4), 234-239 (2019).
495. Ramazanali F, Dastjerdi MV, Beigi A, Moini A. The relationship between Maternal HCT levels, birth weight and risk of low birth weight. Iran J Pediatr 16(4), 447-453 (2006).
496. Ramya HS, Prasad RTC, Ahamed NAR, Awati M. Correlation of maternal hemoglobin with outcome of neonatal gestational age and birth weight. Int J Contemp Pediatrics 6(3), 1349-1353 (2019).
497. Ranaei F, Shahoei R, Zaheri F. Prevalence of Low Hemoglobin and its Correlation with Maternal Factors and Pregnancy Outcomes in Pregnant Women in Health Centers of Sanandaj in 2009. Life Sci J 10(2S), 298-303 (2013).
498. Rao CR, Bhat P, KE V, Kamath V, Kamath A, Nayak D, Shenoy RP, Bhat SK. Assessment of risk factors and predictors for spontaneous pre-term birth in a South Indian antenatal cohort. Clin Epidemiol Glob Health 6, 10-16 (2018).
499. Rashid HU, Khan MN, Imtiaz A, Ullah N, Dherani M, Rahman A. Post-traumatic stress disorder and association with low birth weight in displaced population following conflict in Malakand division, Pakistan: a case control study. BMC Pregnancy Childbirth 20(1), 166 (2020).
500. Rasmussen S, Oian P. First- and second-trimester hemoglobin levels: Relation to birth weight and gestational age. Acta Obstet Gynecol Scand 72(4), 246-51 (1993).
501. Rawat N, Kharakwal S. Prevalence of anemia in women in Bundhelkhand region, India: It's maternal and neonatal outcomes. Internal Journal of Advanced Research 13(1), 1107-1116 (2025).
502. Razmy AM. Significance of Initial Maternal Hemoglobin Concentration during Pregnancy in Birth Weight and Preterm Delivery in Sri Lanka. OAlib 3(12), 1-8 (2016).
503. Ren A, Wang J, Ye RW, Li S, Liu JM, Li Z. Low first-trimester hemoglobin and low birth weight, preterm birth and small for gestational age newborns. Int J Gynaecol Obstet 98(2), 124-8 (2007).
504. Restu S, Dasuki D, Z RDSN. The influence of iron supplementation in pregnant women to the occurrence of low birth weight (LBW) babies in Palu, Central Sulawesi. Berkala Ilmu Kedokteran 46(1), 41-51 (2014).
505. Riaz M, Shaikh F, Fawwad A, Hakeem R, Shera AS, Hitman GA, Bhowmik B, do Vale Moreira NC, Basit A, Hussain A. Maternal Nutrition during Early Pregnancy and Cardiometabolic Status of Neonates at Birth. J Diabetes Res 2018, 7382946 (2018).
506. Ribot B, Aranda N, Viteri F, Hernandez-Martinez C, Canals J, Arija V. Depleted iron stores without anaemia early in pregnancy carries increased risk of lower birthweight even when supplemented daily with moderate iron. Hum Reprod 27(5), 1260-1266 (2012).
507. Ribot B, Isern R, Hernández-Martínez C, Canals J, Aranda N, Arija V. Effects of tobacco habit, second-hand smoking and smoking cessation during pregnancy on newborn's health. Med Clin (Barc) 143(2), 57-63 (2014).
508. Riu DS, Mappaware NA, Fujiyanto, Asmi MN, Tansil AR. Maternal hemoglobin concentration and birth weight: A report from mother and child tertiary hospital. Enferm Clin 30(S2), 92-95 (2020).
509. Rocha D da S, Netto MP, Priore SE, Lima NMM de, Rosado LEFP de L, Franceschini S do CC. Nutritional status and iron-deficiency anemia in pregnant women: Relationship with the weight of the child at birth. Rev Nutr 18(4), 481-489 (2005).

510. Rogerson SJ, Chaluluka E, Kanjala M, Mkundika P, Mhango C, Molyneux ME. Intermittent sulfadoxine-pyrimethamine in pregnancy: Effectiveness against malaria morbidity in Blantyre, Malawi, in 1997-99. Trans R Soc Trop Med Hyg 94(5), 549-553 (2000).
511. Rondo PH, Abbott R, Rodrigues LC, Tomkins A. The influence of maternal nutritional factors on intrauterine growth retardation in Brazil. Paediatr Perinat Epidemiol 11(1), 152-66 (1997).
512. Rondo PH, Abbott R, Rodrigues LC, Tomkins AM. Vitamin A, folate, and iron concentrations in cord and maternal blood of intra-uterine growth retarded and appropriate birth weight babies. Eur J Clin Nutr 49(6), 391-9 (1995).
513. Rondó PH, Tomkins AM. Maternal iron status and intrauterine growth retardation. Trans R Soc Trop Med Hyg 93(4), 423-426 (1999).
514. Ronnenberg AG, Wood RJ, Wang X, et al. Preconception hemoglobin and ferritin concentrations are associated with pregnancy outcome in a prospective cohort of Chinese women. J Nutr 134(10), 2586-2591 (2004).
515. Roopnarine NC, Maharaj RG. Risk factors for low birthweight in Southwest Trinidad: A case-control study. West Indian Med J 66(1), 88-94 (2017).
516. Sachdeva S, Nanda S, Sachdeva R. Comparative analysis of birth weight in a hospital Over a Decade: Low birth weight still a major problem. J Nepal Paediatr Soc 33(1), 15-20 (2013).
517. Saeed OAM, Ahmed HA, Ibrahim AMF, Mahmood EAA, Abdu-Allah TOA. Risk factors of low birth weight at three hospitals in Khartoum State, Sudan. Sudan J Paediatr 14(2), 22-28 (2014).
518. Sagen N, Nilsen ST, Kim HC, Bergsjø P, Koller O. Maternal Hemoglobin Concentration Is Closely Related to Birth Weight in Normal Pregnancies. Acta Obstet Gynecol Scand 63(3), 245-8 (1984).
519. Sah SK, Sunuwar DR, Baral JR, Singh DR, Chaudhary NK, Gurung G. Maternal hemoglobin and risk of low birth weight: A hospital-based cross-sectional study in Nepal. Heliyon 8(12), e12174 (2022).
520. Saleh A, Salimo H, Sulaeman ES. Relationship of Gestational Age, Folic Acid intake and Haemoglobin Level of Third-Trimester Pregnancy with infant Birth Weight in Ende Regency, East Nusa Tenggara Province, indonesia. Indian J Public Health Res Dev 10(9), 950-957 (2019).
521. Salman EA, Qasim IK, Al-Haidari T. Maternal hemoglobin concentration and pregnancy outcome in a sample of iraqi women. Medico Legal Update 20(4), 848-854 (2020).
522. Salunkhe AH, Pratinidhi AK, Salunkhe JA, Kakade SV, Mohite VR, Patange RP. Antenatal Risk Scoring Scale for Predication of Low Birth Weight and Its Validity. Indian J Community Med 44(2), 97-101 (2019).
523. Santure M, Turgeon-O'Brien H, Maziade J. High hemoglobin and hematocrit levels and pregnancy outcomes. Top Clin Nutr 14(2), 25-33 (1999).
524. Saragih NS, Siregar FA, Lubis Z, Sudaryati E, Lumbanraja S. RELATIONSHIP BETWEEN MATERNAL AND OBSTETRIC FACTORS WITH LOW BIRTH WEIGHT EVENTS IN NEWBORNS IN REGIONAL GENERAL HOSPITAL DR. PIRNGADI MEDAN. Int J Public Health Clin Sci 7(2), 60-70 (2020).
525. Saraswati E, Sumarno I. [Risks of pregnant women with chronic energy deficiency (ced) and anemia to give birth to babies with low birth weight (lbw)]. Nutr Food Res 21, 41-9 (1998).
526. Savaliya K, Sharma N, Surani R, Dhakar V, Gupta A. Multigravida Women With Moderate to Severe Anaemia in Third Trimester: Fetomaternal Outcomes. Cureus 13(12), e20493 (2021).
527. Scanlon KS, Yip R, Schieve LA, Cogswell ME. High and low hemoglobin levels during pregnancy: differential risks for preterm birth and small for gestational age. Obstet Gynecol 96(5 Pt 1), 741-8 (2000).
528. Scaria L, Soman B, George B, Ahamed Z, Hariharan S, Jeemon P. Determinants of very low birth weight in India: The National Family Health Survey - 4. Wellcome Open Res 7(20), 1202024 (2022).
529. Schmiegelow C, Minja D, Oesterholt M, Pehrson C, Suhrs HE, Boström S, Lemnge M, Magistrado P, Rasch V, Lusingu J, Theander TG, Bruun Nielsen B. Factors associated with and causes of perinatal mortality in northeastern Tanzania. Acta Obstet Gynecol Scand 91(9), 1061-8 (2012).
530. Scholl T, Hediger M. Anemia and iron-deficiency anemia: compilation of data on pregnancy outcome. Am J Clin Nutr 59(2), 492S-501S (1994).
531. Scholl TO. High third-trimester ferritin concentration: associations with very preterm delivery, infection, and maternal nutritional status. Obstet Gynecol 92(2), 161-166 (1998).

532. Scholl TO, Hediger ML, Fischer RL, Shearer JW. Anemia vs iron deficiency: increased risk of preterm delivery in a prospective study. Am J Clin Nutr 55(5), 985-988 (1992).
533. Sebastian T, Yadav B, Jeyaseelan L, Vijayaselvi R, Jose R. Small for gestational age births among South Indian women: Temporal trend and risk factors from 1996 to 2010. BMC Pregnancy Childbirth 15(7), 10 (2015).
534. Seedidhi A, Ponnada GK. Risk Effect of Maternal Nutrition on Birth Weight of Baby- A Prospective Study. J Evol Med Dent Sci 6(76), 5431-4 (2017).
535. Seid S, Wondafrash B, Gali N, Ali A, Mohammed B, Kedir S. Determinants of Low Birth Weight Among Newborns Delivered in Silte Zone Public Health Facilities, Southern Ethiopia: A Case-Control Study. Res Rep Neonatol 12, 19-29 (2022).
536. Seifi M, Farshbaf-khalili A, Aghaee H, Pourzeinali S. The Relationship of Iron Deficiency Anemia with Preterm delivery in Pregnant Women Referred to Health Centers of Tabriz: A Case-Control Study. Iran J Obstet Gynecol Infertil 18(159), 8-17 (2015).
537. Seijas-Chávez JA, Nolan MS, Lynn MK, et al. Causal effects on low Apgar at 5-min and stillbirth in a malaria maternal-fetal health outcome investigation: a large perinatal surveillance study in the Brazilian Amazon. Malar J 20(1), 444 (2021).
538. Sekhavat L, Davar R, Hosseinidezoki S. Relationship between maternal hemoglobin concentration and neonatal birth weight. Hematology 16(6), 373-376 (2013).
539. Senn M, Baiwog F, Winmai J, Mueller I, Rogerson S, Senn N. Betel nut chewing during pregnancy, Madang province, Papua New Guinea. Drug Alcohol Depend 105(1-2), 126-131 (2009).
540. Serour GI, Younis NM, Hefnawi F, El-Bahy M, Dagistany HF, Nawar M. Perinatal mortality in an Egyptian maternity hospital. Int J Gynaecol Obstet 19(6), 447-451 (1981).
541. Shah T, Khaskheli MS, Ansari S, et al. Gestational Anemia and its effects on neonatal outcome, in the population of Hyderabad, Sindh, Pakistan. Saudi J Biol Sci 29(1), 83-87 (2022).
542. Shah T, Warsi J, Laghari Z. Effect of maternal anemia on the anthropometric indices of newborn. J Liaquat Univ Med Health Sci 19(3), 191-194 (2020).
543. Shams S. Low birth weight: Frequency and association of maternal factors. Pak Pediatr J 36(4), 192-198 (2012).
544. Shankar H, Kumar N, Sandhir R, et al. Association of dietary intake below recommendations and micronutrient deficiencies during pregnancy and low birthweight. J Perinat Med 47(7), 724-731 (2019).
545. Sharma A, Patnaik R, Garg S, Ramachandran P. Detection & management of anaemia in pregnancy in an urban primary health care institution. Indian J Med Res 128(1), 45-51 (2008).
546. Sharma SR, Giri S, Timalsina U, Bhandari SS, Basyal B, Wagle K, Shrestha L. Low birth weight at term and its determinants in a tertiary hospital of nepal:A case-control study. PLoS One 10(4), e0123962 (2015).
547. Shin Y, Yeon H, Lee O, Kim E, Kyeong K, Jeong E. Association of maternal iron status with birthweight at third trimester in pregnant women. J Biomed Res 15(3), 129-134 (2014).
548. Shobeiri F, Begum K, Nazari, M. A prospective study of maternal hemoglobin status of Indian women during pregnancy and pregnancy outcome. Nutr Res 26(5), 209-213 (2006).
549. Siega-Riz AM, Adair LS, Hobel C. Maternal hematologic changes during pregnancy and the effect of iron status on preterm delivery in a West Los Angeles population. Am J Perinatol 15(9), 515-622 (1998).
550. Singal N, Taneja BK, Setia G, Singal KK. Foetal outcome in pregnant women with anaemia. Bangladesh J Med Sci 18(1), 63-72 (2019).
551. Singh A, Arya S, Chellani H, Aggarwal KC, Pandey RM. Prediction model for low birth weight and its validation. Indian J Pediatr 81(1), 24-28 (2014).
552. Singh G, Chouhan R, Sidhu K. Maternal factors for low birth weight babies. Med J Armed Forces India 65(1), 12-Oct (2009).
553. Singh K, Fong YF, Arulkumaran S. Anaemia in pregnancy--a cross-sectional study in Singapore. Eur J Clin Nutr 52(1), 65-70 (1998).
554. Singh K, Sekhon AS, Singh J. A Study of Early Neonatal Morbidity. Indian J Community Med 22(2), 58-62 (1997).

555. Singla PN, Tyagi M, Kumar A, Dash D, Shankar R. Fetal Growth in Maternal Anaemia. J Trop Pediatr 43(2), 89-92 (1997).
556. Skhvitaridze N, Gamkrelidze A, Manjavidze T, Brenn T, Anda EE, Rylander C. Anemia during pregnancy and adverse maternal outcomes in Georgia-A birth registry-based cohort study. PLoS One 20(1), e0294832 (2025).
557. Smithers LG, Gialamas A, Scheil W, Brinkman S, Lynch JW. Anaemia of pregnancy, perinatal outcomes and children's developmental vulnerability: a whole-of-population study. Paediatr Perinat Epidemiol 28(5), 381-90 (2014).
558. Soubasi V, Petridou S, Sarafidis K, et al. Association of increased maternal ferritin levels with gestational diabetes and intra-uterine growth retardation. Diabetes Metab 36(1), 58-63 (2010).
559. Spinillo A, Capuzzo E, Piazzi G, Nicola S, Colonna L, Iasci A. Maternal high-risk factors and severity of growth deficit in small for gestational age infants. Early Hum Dev 38(1), 35-43 (1994).
560. Srikrishna SR, Stephen C. Birth weights in a Bangalore hospital: Is the city women in the phase of a nurtition transition?. Health Popul Perspect Issues 26(2), 74-86 (2003).
561. Steer P, Alam MA, Wadsworth J, Welch A. Relation between maternal haemoglobin concentration and birth weight in different ethnic groups. BMJ 310(6978), 489-491 (1995).
562. Stephansson O, Dickman PW, Johansson A, Cnattingius S. Maternal hemoglobin concentration during pregnancy and risk of stillbirth. JAMA 284(20), 2611–7 (2000).
563. Stephen G, Mgongo M, Hussein Hashim T, Katanga J, Stray-Pedersen B, Msuya SE. Anaemia in Pregnancy: Prevalence, Risk Factors, and Adverse Perinatal Outcomes in Northern Tanzania. Anemia 2018(1), 14-Mar (2018).
564. Suleman M, Khizar U, Awan MN. ANEMIA IN PREGNANCY; A CAUSE OF LOW NEONATAL BIRTH WEIGHT. Indo Am J Pharm Sci 5(5), 3471-3474 (2018).
565. Sun Y, Shen ZZ, Huang FL, et al. Association of gestational anemia with pregnancy conditions and outcomes: A nested case-control study. World J Clin Cases 9(27), 8008-8019 (2021).
566. Sureshbabu RP, Aramthottil P, Anil N, et al. Risk Factors Associated with Preterm Delivery in Singleton Pregnancy in a Tertiary Care Hospital in South India: A Case Control Study. Int J Womens Health 13, 369-377 (2021).
567. Swain S, Singh S, Bhatia BD, Pandey S, Krishna M. Maternal hemoglobin and serum albumin and fetal growth. Indian Pediatr 31(7), 777-82 (1994).
568. Symington EA, Baumgartner J, Malan L, Wise AJ, Ricci C, Zandberg L, Smuts CM. Maternal iron-deficiency is associated with premature birth and higher birth weight despite routine antenatal iron supplementation in an urban South African setting: The NuPED prospective study. PLoS One 14(9), e0221299 (2019).
569. Tabrizi FM, Barjasteh S. Maternal Hemoglobin Levels during Pregnancy and their Association with Birth Weight of Neonates. Iran J Ped Hematol Oncol 5(4), 211-217 (2015).
570. Tabrizi JS, Asghari A, Pourali F, Kousha H, Nikniaz L. Effects of Food Supplementation During Pregnancy on Maternal Weight Gain, Hemoglobin Levels and Pregnancy Outcomes in Iran. Matern Child Health J 23(2), 258-264 (2019).
571. Tabussum G, Karim SA, Khan S, Naru TY. Preterm birth-its etiology and outcome. J Pak Med Assoc 44(3), 68-70 (1994).
572. Tadese M, Minhaji AS, Mengist CT, Kashun F, Mulu GB. Determinants of low birth weight among newborns delivered at Tirunesh Beijing General Hospital, Addis Ababa, Ethiopia: a case-control study. BMC Pregnancy Childbirth 21, 794 (2021).
573. Tadesse T, Abebe M, Molla W, Ahmed Mahamed A, Mebratu A. Magnitude and associated factors of low birth weight among term newborns delivered in Addis Ababa public hospitals, Ethiopia, 2021. J Obstet Gynaecol 43(1), 2114332 (2023).
574. Tagbor H, Bruce J, Agbo M, Greenwood B, Chandramohan D. Intermittent screening and treatment versus intermittent preventive treatment of malaria in pregnancy: a randomised controlled non-inferiority trial. PLoS One 5(12), e14425 (2010).

575. Tahir N, Sattar L, Hayat S. A CROSS SECTIONAL AND COMPARATIVE STUDY TO DETERMINE RELATIONSHIP OF ANEMIA IN PREGNANCY WITH THE BIRTH WEIGHT OF NEW BORN. Indo Am J Pharm Sci 6(5), 10615-10618 (2019).
576. Tamura T, Goldenberg RL, Johnston KE, Cliver SP, Hickey CA. Serum ferritin: a predictor of early spontaneous preterm delivery. Obstet Gynecol 87(3), 360-365 (1996).
577. Tang L, Luo Y, Sheng Y, Lai T, Song W, Yang X, Yang L. Hemoglobin concentrations in early pregnancy and their associations with adverse pregnancy outcomes in Western China: a population-based study. BMC Pregnancy Childbirth 24(1), 761 (2024).
578. Tao Y, Kang J, Liu J, Duan J, Wang F, Shi Y, Li Y, Wang C, Xu D, Qu X, Guo J, Ma J and Zhang Y. Association of low birthweight and small for gestational age with maternal ferritin levels: A retrospective cohort study in China. Front Nutr 9(1002702), 1-9 (2022).
579. Thakre SS, Thakre AC, Kaware H, Adikane SB. Predictors of low birth weight babies born in tribal tertiary health care setting: a cross sectional study. Int J Community Med Public Health 5(7), 3049-3055 (2018).
580. Tilahun T, Hailemariam H. Risk factors for low birth weight in Sidama Zone government hospitals, Southern Ethiopia, a case-control study. Res Sq NA (2021).
581. Tiwari A, Patre S. ASSESSMENT OF THE SEVERE ANAEMIA PREVALENCE AND ASSOCIATED FETO-MATERNAL OUTCOMES IN FEMALES ADMITTED FOR LABOR: A PROSPECTIVE CLINICAL STUDY. Eur J Mol Clin Med 8(4), 2367-2372 (2021).
582. Tomashek KM, Ananth CV, Cogswell ME. Risk of stillbirth in relation to maternal haemoglobin concentration during pregnancy. Matern Child Nutr 2(1), 19-28 (2006).
583. Toshimitsu M, Ueki N, Hara K, Takeda J, Makino S, Kato K, Kumasawa K, Iriyama T, Nagamatsu T, Osuga Y. Gestational stage-specific association of hemoglobin concentration with the risk of preterm birth and small for gestational age. Hypertens Res Pregnancy 11(2), 25-35 (2023).
584. Turner S, Seybold D, Celestine C, Williams D. I. Incidence of Anemia Among Obstetric Patients in an Appalachian Teaching Clinic. Mil Med 177(10), 1212-1216 (2012).
585. Uberos J, Molina A, Muñoz A. Blood ferritin levels in pregnant women as an estimator of low birth weight?. Prenat Neonatal Med 5(3), 177-181 (2000).
586. Ulaganeethi R, Dorairajan G, Rajkumari N, Jayaraman S, Subramanian S, Saya GK. Soil-transmitted helminth infection and perinatal outcomes in pregnant women in primary care settings in South India: A cohort study. Indian J Community Med 49, 719-25 (2024).
587. Uneke CJ, Sunday-Adeoye I, Iyare FE, Ugwuja EI, Duhlinska DD. Impact of maternal Plasmodium falciparum malaria and haematological parameters on pregnancy and its outcome in southeastern Nigeria. J Vector Borne Dis 44(4), 285-90 (2007).
588. Urdaneta Machado J, Lozada Reyes R, Cepeda de Villalobos M, Garcia I J, Villalobos N, Contreras Benetez A, Ruiz AG, Briceño-Polacre O. Maternal anemia and birth weight in products of term pregnancies. Rev Chil Obstet Ginecol 80(4), 297-305 (2015).
589. Uzunov AV, Cîrstoiu MM, Secară DC, Crîngu-Ionescu A, Matei A, Mehedințu C, Varlas VN. Mode of Delivery and Neonatal Outcome in Adolescent Pregnancy (13-16 Years Old) Associated with Anemia. Medicina (Kaunas) 58(12) (2022).
590. Vakili M, Mardani Z, Mirzaei M. Frequency of Anemia in the Pregnant Women Referring to the Health Centers in Yazd, Iran (2016-2017). Iran J Obstet Gynecol Infertil 21(2), 9-15 (2018).
591. Vazirinejad R, Esmaeili A, Vazirinejad H, Hassanshahi G. Ferritin concentration and pregnancy outcome: linear models for predicting birthweight and birth length. Food Nutr Bull 28(4), 419-25 (2007).
592. Verhoeff FH, Brabin BJ, van Buuren S, Chimsuku L, Kazembe P, Wit JM, Broadhead RL. An analysis of intra-uterine growth retardation in rural Malawi. Eur J Clin Nutr 55(8), 682-9 (2001).
593. Vilchez AR, Rodriguez Fuentes A, Cabrera Iznaga AC, Avila Piata D. [Maternal Nutritional Factors and Low Birth Weight in a Health Area]. Finlay 3(1), 9 (2013).
594. Villalva-Luna JL, Villena-Prado JJ. [Relationship between gestants with anemia in a maternal age of risk and low weight at birth in a social security hospital of Peru]. Rev Fac Med Hum 20(4), 581-588 (2020).

595. Villamonte-Calanche W, Salazar-Zegarra MA, De-la-Torre-Dueñas C, Villamonte-Jerí A, Vera-Luza A, Bustinza-Apaza MH, Huanca-Huirse N. Maternal erythrocytosis as a risk factor for small for gestational age at term in high altitude. Rev Bras Ginecol Obstet 46 (2024).
596. Vogel JP, Souza JP, Mori R, Morisaki N, Lumbiganon P, Laopaiboon M, Ortiz-Panozo E, Hernandez B, Pérez-Cuevas R, Roy M, Mittal S, Cecatti JG, Tunçalp Ö, Gülmezoglu AM; WHO Multicountry Survey on Maternal and Newborn Health Research Network. Maternal complications and perinatal mortality: findings of the World Health Organization Multicountry Survey on Maternal and Newborn Health. BJOG 121(Supp 1), 76-88 (2014).
597. vonTempelhoff G-F, Heilmann L, Rudig L, Pollow K, Hommel G, Koscielny J. Mean Maternal Second-Trimester Hemoglobin Concentration and Outcome of Pregnancy: A Population-Based Study. Clin Appl Thromb Hemost 14(1), 19-28 (2008).
598. Vural T, Toz E, Ozcan A, Biler A, Ileri A, Inan AH. Can anemia predict perinatal outcomes in different stages of pregnancy?. Pak J Med Sci 32(6), 1354-1359 (2016).
599. W. SM, Raharjo S, Mustadjab I, Warouw N. Some Risk Factors for Low Birthweight Infants at Manado Hospital. Paediatr Indones 35(3-4), 94-100 (2018).
600. Wagura P, Wasunna A, Laving A, Wamalwa D, Ng'ang'a P. Prevalence and factors associated with preterm birth at kenyatta national hospital. BMC Pregnancy Childbirth 18(1), 8 (2018).
601. Wahabi HA, Esmaeil S, Elmorshedy H, Bakhsh H, Abdelrahman A, Fayed A. Iron deficiency anemia in pregnancy: Subgroup analysis from Riyadh mother and baby multicenter cohort study (RAHMA). J Appl Hematol 13(1), 47-53 (2022).
602. Walker SP, Ewan-Whyte C, Chang SM, Powell CA, Fletcher H, McDonald D,Grantham-McGregor, SM. Factors associated with size and proportionality at birth in term Jamaican infants. J Health Popul Nutr 21(2), 117-130 (2003).
603. Wang J, Ren AG, Ye RW, Zheng JC, Li S, Liu JM, Yang RL, Zhang FR, Zhang T, Zhang JB, Li Z. Study on the third trimester hemoglobin concentrations and the risk of low birth weight and preterm delivery. Chin J Epidemiol 28(1), 15-8 (2007).
604. Wang L, Mei Z, Li H, Zhang Y, Liu J, Serdula MK. Modifying effects of maternal Hb concentration on infant birth weight in women receiving prenatal iron-containing supplements: a randomised controlled trial. Br J Nutr 115(4), 644-9 (2016).
605. Wassie M, Manaye Y, Abeje G, Tifrie M, Worku G. Determinants of preterm birth among newbowns delivered in Bahir Dar city public hospitals, North West Ethiopia. Res Sq NA (2020).
606. Watson-Jones D, Weiss HA, Changalucha JM, Todd J, Gumodoka B, Bulmer J, Balira R, Ross D, Mugeye K, Hayes R, Mabey D. Adverse birth outcomes in United Republic of Tanzania - Impact and prevention of maternal risk factors. Bull World Health Organ 85(1), 18-Sep (2007).
607. Weiner R, Ronsmans C, Dorman E, Jilo H, Muhoro A, Shulman C. Labour complications remain the most important risk factors for perinatal mortality in rural Kenya. Bull World Health Organ 81(8), 561–6 (2003).
608. Williams LA, Evans SF, Newnham JP. Prospective cohort study of factors influencing the relative weights of the placenta and the newborn infant. BMJ 314(7098), 1864-1868 (1997).
609. Wu L, Sun R, Liu Y, Liu Z, Chen H, Shen S. High hemoglobin level is a risk factor for maternal and fetal outcomes of pregnancy in Chinese women: A retrospective cohort study. BMC Pregnancy Childbirth 22(1), 9 (2022).
610. Xiao R, Sorensen TK, Frederick IO, El-Bastawissi A, King IR, Leisenring WM, Williams MA. Maternal second-trimester serum ferritin concentrations and subsequent risk of preterm delivery. Pediatr Perinat Epidemiol 16(4), 297-304 (2002).
611. Xiong J, Zhou W, Huang S, Xu K, Xu Y, He X. Maternal anaemia and birth weight: a cross-sectional study from Jiangxi Province, China. Fam Pract 40(5-6), 722-727 (2023).
612. Xiong X, Buekens P, Fraser WD, Guo Z. Anemia during pregnancy in a Chinese population. Int J Gynaecol Obstet 83(2), 159-64 (2003).
613. Xu S, Wang W, Li Q, et al. Association of Maternal Longitudinal Hemoglobin with Small for Gestational Age during Pregnancy: A Prospective Cohort Study. Nutrients 14(7), 8 (2022).

614. Yahia MTB, Saeed GA, Ba-Saddik IA. Anemia in Pregnancy and its Outcome at Al-Sadaqa Teaching Hospital Aden, Yemen. Neonatal Pediatr Med 6(2), 195 (2020).
615. Yamada RT, Leone Rodrigues C. Hematological and iron content evolution in exclusively breastfed late-preterm newborns. Clinics (Sao Paulo) 69(12), 792-798 (2014).
616. Yatich NJ, Funkhouser E, Ehiri JE, Agbenyega T, Stiles JK, Rayner JC, Turpin A, Ellis WO, Jiang Y, Williams JH, Afriyie-Gwayu E, Phillips T, Jolly PE. Malaria, intestinal helminths and other risk factors for stillbirth in Ghana. Infect Dis Obstet Gynecol 2010, 350763 (2010).
617. Yazdani M, Tadbiri M, Shakeri S. Maternal hemoglobin level, prematurity, and low birth weight. Int J Gynaecol Obstet 85(2), 163-164 (2004).
618. Young MF, Nguyen P, Tran LM, Khuong LQ, Martorell R, Ramakrishnan U. Long-Term Association Between Maternal Preconception Hemoglobin Concentration, Anemia, and Child Health and Development in Vietnam. J Nutr 153(5), 1597-1606 (2023).
619. Younis MN, Bahy M, Serour GI, Daghistany HF, Hefnawi F, Ahmed AK. A study of the biosocial factors affecting perinatal mortality in an Egyptian maternity hospital. Popul Sci NA(2), 71-90 (1981).
620. Yousaf F, Haider G, Shaikh RB, Haider A, Muhammad N. Impact of maternal anemia on perinatal outcome. Pak Armed Forces Med J 61(4), 610-613 (2011).
621. Yovera-Aldana M, Reátegui-Estrada X, Acuña-Hualpa E. [Relationship between first trimester anemia and low birth weight in four mother-and-child health centers in Lima sur during 2019]. Acta Médica Peru 38(4), 264-272 (2022).
622. Yuan X, Hu H, Zhang M, Long W, Liu J, Jiang J, Yu B. Iron deficiency in late pregnancy and its associations with birth outcomes in Chinese pregnant women: a retrospective cohort study. Nutr Metab (Lond) 16, 30 (2019).
623. Yuniati T, Judistiani RT, Natalia YA, Irianti S, Madjid TH, Ghozali M, et al. First trimester maternal vitamin D, ferritin, hemoglobin level and their associations with neonatal birthweight: Result from cohort study on vitamin D status and its impact during pregnancy and childhood in Indonesia. J Neonatal Perinat Med 13(1), 63-69 (2020).
624. Zagre N, Nkondjock A, Soula A, Kaba I. [Intra uterine growth retardation: Prevalence and risk factors in a health district in Burkina Faso]. Cah Nutr Diet 37(3), 183-90 (2002).
625. Zar HJ, Pellowski JA, Cohen S, Barnett W, Vanker A, Koen N, Stein DJ. Maternal health and birth outcomes in a South African birth cohort study. PLoS One 14(11), e0222399 (2019).
626. Zaren B, Lindmark G, Bergsjo P. Hemoconcentration in smoking mothers is associated with impaired fetal growth. Acta Obstet Gynecol Scand 76(10), 933-941 (1997).
627. Zaveri A, Paul P, Saha J, Barman B, Chouhan P. Maternal determinants of low birth weight among Indian children: Evidence from the National Family Health Survey-4, 2015-16. PLoS One 15(12), e0244562 (2020).
628. Zewde GT. Preterm Birth and Associated Factors Among Mother Who Gave Birth in Public Health Hospitals in Harar Town Eastern Ethiopia 2019. Int J Pharm Phytopharm Res 10(2), 134-41 (2020).
629. Zhang J, Cai WW, Lee DJ. Pregnancy-induced hypertension and early neonatal death: a case-control study. Am J Perinatol 10(5), 401-3 (1993).
630. Zhang Q, Ananth CV, Li Z, Smulian JC. Maternal anaemia and preterm birth: a prospective cohort study. Int J Epidemiol 38(5), 1380-1389 (2009).
631. Zhang X, Xu Q, Yang Y, et al. Preconception Hb concentration and risk of preterm birth in over 2Â7 million Chinese women aged 20-49 years: A population-based cohort study. Br J Nutr 120(5), 508-516 (2018).
632. Zhang Y, Li Z, Li H, Jin L, Zhang Y, Zhang L, Liu J, Ye R, Liu J, Ren A. Maternal haemoglobin concentration and risk of preterm birth in a Chinese population. J Obstet Gynaecol 38(1), 32-37 (2018).
633. Zhou LM, Yang WW, Hua JZ, Deng CQ, Tao X, Stoltzfus RJ. Relation of hemoglobin measured at different times in pregnancy to preterm birth and low birth weight in Shanghai, China. Am J Epidemiol 148(10), 998-1006 (1998).

Section 2.3. Data processing approaches and quality control

Section 2.3.1. Post-extraction data cleaning and errors identification

Data from eligible sources were extracted using either Microsoft Excel (e.g., low birthweight, gestational age, small-for-gestational age, neonatal sepsis, all-cause neonatal mortality, peripartum depression, maternal hemorrhage) or RedCap (e.g., all-cause maternal mortality, maternal sepsis, hypertensive disorders of pregnancy). All post-extraction data cleaning and processing, as outlined below, was performed using R.

For Excel-based extractions, a master spreadsheet, containing consolidated extraction sheets, underwent thorough review to ensure proper integration of rows, columns, and values. Data cleaning included identifying missing key variables, detecting mislabeled outcomes by examining summaries, and generating variable counts. Missing information was investigated by revisiting original studies to determine whether the data was missing due to extraction errors or simply unreported.

For RedCap-based extractions, data was exported using RedCap's Export Data tool, a dataset with a corresponding data dictionary. Data cleaning involved populating shared instances across the rows and columns of the dataset, decoding numeric identifiers into string labels using the data dictionary and addressing missing fields. RedCap's built-in validation features significantly minimized the risk of missingness and other extraction errors, but any remaining gaps were resolved by cross-checking with original extractions or source studies.

Along with missing variables, additional checks were conducted across all datasets to identify and correct inconsistencies, implausible values, and duplicates. All corrections were applied to the original extraction files, which were subsequently re-exported and re-processed to ensure accuracy and completeness. Observations missing critical variables, such as risk, outcome, or effect size, were excluded from the final analysis dataset.

Section 2.3.2. Creating bias covariates.

In assessing low or high hemoglobin as a potential risk factor for maternal and neonatal outcomes, the burden-of-proof framework accounts for sources of study-level bias that may influence observed effect sizes. We thus created binary bias covariates, assigning a score of one to indicate the presence and 0 the absence of potential sources of bias. These biases may stem from issues related to the representativeness of the study population, the quality of exposure and outcome data, the adequacy of confounder controls, selection bias and the temporality between risk and outcome. A full list of general and risk-outcome-specific bias covariates is detailed in Supplementary Tables 39-40.

Section 2.3.3. Age bound imputation

The BoP methodology requires each observation to specify a population age range. When the lower and/or upper bounds of participants' ages were missing, we estimated the range based on the available data. For instance, if the mean and standard deviation of the age distribution were reported, we calculated the 2.5^{th} and 97.5^{th} percentiles of the age distribution to approximate the lower and upper age bounds. If the median and interquartile range were provided, we first approximated mean and standard deviation, then extended these estimates to the 2.5^{th} and 97.5^{th} percentiles to approximate the bounds. When age measures were reported separately for exposed and non-exposed groups, we used the lowest of the calculated lower bounds and the highest of the calculated upper bounds across groups. All estimated ages were constrained to a range of 10 to 54 years to align with the reproductive age of women—our population of interest. Similarly, if no age-related information was reported, we imputed a default range of 10 to 54 years.

Section 2.3.4. Hemoglobin bound imputation and elevation adjustment

To assess the risks of maternal and neonatal outcomes across varying hemoglobin levels, the Burden of Proof (BoP) framework requires precise upper and lower bounds for both the reference (e.g., normal hemoglobin) category and the alternative (e.g., anemic or high hemoglobin) category for each observation. However, many studies report only a single cutoff point for anemia or high hemoglobin (e.g., hemoglobin <110 g/L or >140 g/L) without specifying the full range of hemoglobin levels, leading to data gaps—specifically, the lower bound of the anemic category and the upper bound of the high hemoglobin or non-anemic category. To address these gaps, we imputed missing hemoglobin bounds using age-, sex-, location-, and year-specific distributions of elevation-adjusted hemoglobin concentrations

from the Global Burden of Disease (GBD) Study. For studies that did not explicitly adjust for elevation, we applied location-specific, population-weighted elevation adjustments to reported thresholds. This adjustment is crucial because hemoglobin levels increase at higher elevations in response to lower oxygen availability, potentially leading to an underestimation of anemia prevalence in high-altitude regions and, consequently, globally. Our approaches to the hemoglobin bound imputation and elevation adjustment using two data sources—the extraction and GBD datasets—are outlined below.

Section 2.3.4.1. Data processing and elevation adjustment: Extraction dataset

We ensured proper recording of hemoglobin thresholds and bounds in the extraction dataset. For example, when an anemia cutoff was reported as hemoglobin <110 g/L, we recorded 110 g/L as the upper bound of the non-anemic category and 109.99 g/L as the lower bound of the anemic category. To adjust reported hemoglobin values for elevation, we used the updated WHO elevation-adjustment formula [1], consistent with findings from the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) study[2]. The adjustment was applied using population-weighted mean elevation values derived by resampling the National Oceanic and Atmospheric Administration (NOAA)'s elevation raster[3] over WorldPop's population raster[4]. For studies that reported using elevation adjustment, we assumed they used the older WHO adjustment method. We corrected these thresholds accordingly to align with the updated WHO guidelines. Additionally, the extraction dataset was standardized to align with the age and location categorizations used in the GBD framework, facilitating seamless integration of the different datasets.

Section 2.3.4.2. Data processing: GBD datasets

We utilized GBD datasets on mean and standard deviation of elevation-adjusted hemoglobin distributions for pregnant women, as well as population demographics, to estimate population-specific hemoglobin distributions. The methodology for modeling anemia prevalence and hemoglobin distribution in the GBD has been previously published [5]. To estimate hemoglobin levels in pregnant women, we applied a 0.92 multiplier to hemoglobin levels in non-pregnant women of reproductive age, reflecting the lower mean hemoglobin in pregnant populations. This multiplier was derived from a meta-regression that compared hemoglobin concentrations and anemia prevalence between pregnant and non-pregnant women of the same age and location within the GBD population dataset. The GBD datasets were then merged with the processed extraction dataset by unique combinations of age, sex, location, and year.

Section 2.3.4.3. Imputation and reclassification of hemoglobin exposure categories

Using a combination of 40% gamma and 60% mirrored Gumbel distributions, we generated 1,000 draws of hemoglobin values for each age-, sex-, location-, and year-specific combination. For studies with missing hemoglobin bounds, we imputed the population means of the 2.5th percentile (for the lower bound) and 97.5th percentile (for the upper bound) of these simulated distributions, weighted by the age and sex distributions of the study's location and year. To maintain biological relevance, the imputed upper bound was capped at 141 g/L, or its elevation-adjusted equivalent, consistent with the 97th percentile of hemoglobin levels in healthy pregnant women observed in the INTERGROWTH-21st population-based study [6]. If the imputed lower bound for the anemic category exceeded its corresponding upper bound, we recalculated the lower bound by subtracting the median difference between the upper and lower bounds from all reported studies from the upper bound. Similarly, if the imputed upper bound for the high hemoglobin category was less than its corresponding lower bound, we adjusted the upper bound by adding the median difference to ensure consistency and limiting this upper bound at 160 g/L to ensure with biological plausibility. These adjustments ensured coherence across exposure categories while preserving the epidemiologic and physiologic validity of modeled hemoglobin ranges in the absence of reported values. To further standardize modeled hemoglobin ranges and ensure conceptual consistency across exposure categories, we reclassified some studies: those originally assessing high hemoglobin but with an alternative category lower bound <130 g/L were reclassified as low hemoglobin studies by inverting the exposure and reference groups; conversely, studies assessing low hemoglobin with an alternative category upper bound >130 g/L were reclassified as high hemoglobin studies using the same inversion approach.

Section 2.3.5. References

1. World Health Organization. Guideline on Haemoglobin Cutoffs to Define Anaemia in Individuals and Populations. https://www.who.int/publications/i/item/9789240088542 (2024).
2. Sharma, A. J., Addo, O. Y., Mei, Z. & Suchdev, P. S. Reexamination of hemoglobin adjustments to define anemia: altitude and smoking. Annals of the New York Academy of Sciences 1450, 190–203 (2019).
3. David A Hastings, Paula K Dunbar, & National Geophysical Data Center. Global Land One-kilometer Base Elevation (GLOBE). National Geophysical Data Center, NOAA https://doi.org/10.7289/V52R3PMS (1999).
4. Geography and Environmental Science, University of Southampton. Age and Sex Structures, Global Per Country 2000-2020. WorldPop https://doi.org/10.5258/SOTON/WP00654 (2018).
5. Gardner, W. M. et al. Prevalence, years lived with disability, and trends in anaemia burden by severity and cause, 1990–2021: findings from the Global Burden of Disease Study 2021. The Lancet Haematology 10, e713–e734 (2023).
6. Ohuma, E. O. et al. International values for haemoglobin distributions in healthy pregnant women. EClinicalMedicine 29–30, 100660 (2020).

Section 2.4. Observation-level effect sizes for model inputs

Supplemental Table 12. Observation-level effect sizes - All-cause maternal mortality

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
179	Ali, 2020	992	16,163	Low Hb	70	80	111	129		0.71 (0.10, 5.24)	No	Prenatal
180	Ali, 2020	42,460	16,163	Low Hb	90	100	111	129		0.68 (0.41, 1.13)	No	Prenatal
181	Ali, 2020	43,530	16,163	Low Hb	100	110	111	129		0.76 (0.46, 1.25)	No	Prenatal
182	Ali, 2020	8,037	16,163	Low Hb	80	90	111	129		1.57 (0.85, 2.91)	No	Prenatal
183	Ali, 2020	1,255	3,054	Low Hb	60	70	110	129	Exposed lower	2.16 (0.84, 5.59)	No	Prenatal
184	Ali, 2020	3,715	3,054	Low Hb	100	109	110	129		1.00 (0.42, 2.42)	No	Prenatal
185	Ali, 2020	4,486	3,054	Low Hb	90	99	110	129		0.60 (0.23, 1.57)	No	Prenatal
186	Ali, 2020	1,911	3,054	Low Hb	70	79	110	129		1.78 (0.72, 4.36)	No	Prenatal
187	Ali, 2020	3,379	3,054	Low Hb	80	89	110	129		1.61 (0.71, 3.63)	No	Prenatal
188	Ali, 2020	1,284	16,163	High Hb	131	139	110	130	Exposed upper	2.19 (0.76, 6.32)	No	Prenatal
189	Ali, 2020	354	3,054	High Hb	130	145	110	129	Exposed upper	2.88 (0.78, 10.57)	No	Prenatal
177	Daru, 2018	4,189	8,281	Low Hb	60	70	70	120	Exposed lower	4.58 (2.87, 7.31)	Yes	Prenatal
178	Daru, 2018	4,189	8,281	Low Hb	60	70	70	120	Exposed	1.86	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(1.39, 2.49)		
169	Gonzales, 2012	5,128	285,484	Low Hb	70	96	117	145		6.06 (3.16, 11.60)	Yes	Prenatal
170	Gonzales, 2012	63,202	285,484	Low Hb	90	116	117	145		1.07 (0.65, 1.77)	No	Prenatal
171	Gonzales, 2012	552	285,484	Low Hb	66	76	117	145	Exposed lower	8.54 (2.06, 35.42)	Yes	Prenatal
172	Gonzales, 2012	25,450	285,484	High Hb	152	160	110	152	Exposed upper	2.01 (1.12, 3.61)	No	Prenatal
173	Parks, NA	35,001	11,291	Low Hb	100	109	110	140	Ref upper	0.89 (0.50, 1.60)	No	Prenatal
174	Parks, NA	45,334	11,291	Low Hb	70	99	110	140	Ref upper	1.11 (0.65, 1.91)	No	Prenatal
175	Parks, NA	621	11,291	Low Hb	60	70	110	140	Ref upper; Exposed lower	1.70 (0.43, 6.65)	No	Prenatal
176	Rukuni, 2016	7,475	72,947	Low Hb	99	100	101	141	Ref upper; Exposed lower	2.07 (0.22, 19.36)	No	Prenatal

Supplemental Table 13. Observation-level effect sizes - Postpartum hemorrhage

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,146	Al, 2008	3,501	303,914	Low Hb	90	91	91	142	Ref upper; Exposed lower	2.20 (1.63, 3.15)	No	Prenatal
1,199	Ashwini, 2018	200	200	Low Hb	68	73	113	139	Ref upper; Exposed lower	16.79 (3.95, 71.39)	No	Third trimester
1,200	Atukunda, 2014	76	494	Low Hb	73	126	127	148	Ref upper; Exposed lower	1.75 (1.15, 2.66)	No	Third trimester
1,190	Awan, 2022	64	84	Low Hb	78	104	104	145	Ref upper; Exposed lower	2.54 (1.29, 4.98)	No	Third trimester
1,191	Awan, 2022	34	47	Low Hb	78	104	104	145	Ref upper; Exposed lower	1.93 (0.78, 4.78)	No	Third trimester
1,192	Awan, 2022	31	45	Low Hb	78	104	104	145	Ref upper; Exposed lower	2.00 (0.79, 5.06)	No	Third trimester
1,193	Awan, 2022	90	118	Low Hb	78	104	104	145	Ref upper; Exposed lower	2.58 (1.46, 4.56)	No	Third trimester
1,194	Awan, 2022	95	129	Low Hb	78	104	104	145	Ref upper; Exposed lower	2.35 (1.36, 4.04)	No	Third trimester
1,195	Awan, 2022	61	82	Low Hb	78	104	104	145	Ref upper; Exposed lower	2.68 (1.34, 5.38)	No	Third trimester
1,196	Awan, 2022	51	67	Low Hb	78	104	104	145	Ref upper; Exposed lower	2.34 (1.11, 4.95)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,197	Awan, 2022	95	129	Low Hb	78	104	104	145	Ref upper; Exposed lower	2.35 (1.36, 4.04)	No	Third trimester
1,198	Awan, 2022	5	11	Low Hb	78	104	104	145	Ref upper; Exposed lower	1.62 (1.05, 2.49)	No	Third trimester
1,134	Bachou, 2006	79	123	Low Hb	70	91	111	142	Ref upper	4.67 (0.49, 44.12)	No	Prenatal
1,135	Bachou, 2006	34	123	Low Hb	66	71	111	142	Ref upper; Exposed lower	3.62 (0.23, 56.35)	No	Prenatal
1,243	Banavathu, 2025	100	100	Low Hb	68	101	101	137	Ref upper; Exposed lower	7.00 (0.88, 55.87)	No	Prenatal
1,227	Barut, 2023	49	417	Low Hb	65	71	112	143	Ref upper; Exposed lower	41.30 (12.90, 132.20)	No	Prenatal
1,228	Barut, 2023	460	417	Low Hb	70	101	112	143	Ref upper	4.93 (1.68, 14.50)	No	Prenatal
1,229	Barut, 2023	260	417	Low Hb	100	111	112	143	Ref upper	1.24 (0.22, 6.86)	No	Prenatal
1,147	Bazirete, 2022	62	361	Low Hb	85	119	119	150	Ref upper; Exposed lower	1.52 (1.00, 2.31)	No	Third trimester
1,241	Bestman, 2024	24,489	59,670	Low Hb	93	111	111	142	Ref upper; Exposed lower	6.78 (5.98, 7.69)	Yes	Prenatal
1,242	Bestman, 2024	16,228	44,458	Low Hb	93	111	111	142	Ref upper; Exposed	8.41 (7.34, 9.64)	Yes	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
1,225	Biradar, 2023	174	128	Low Hb	71	111	111	138	Ref upper; Exposed lower	2.94 (0.64, 13.62)	No	Third trimester
1,148	Bone, 2022	3,690	1,304	Low Hb	100	113	113	140	Ref upper	1.34 (0.60, 3.00)	No	First trimester
1,149	Bone, 2022	6,023	1,304	Low Hb	70	103	113	140	Ref upper	1.53 (0.69, 3.40)	No	First trimester
1,150	Bone, 2022	68	1,304	Low Hb	65	73	113	140	Ref upper; Exposed lower	4.82 (1.27, 18.30)	No	First trimester
1,151	Borovac, 2021	22	218	Low Hb	82	113	113	144	Ref upper; Exposed lower	2.82 (1.06, 7.47)	No	Third trimester
1,152	Borovac, 2021	84	218	Low Hb	82	113	113	144	Ref upper; Exposed lower	1.60 (0.81, 3.15)	No	Third trimester
1,153	Bukhari, 2022	84	244	Low Hb	100	113	113	144	Ref upper	4.36 (1.84, 10.29)	No	Third trimester
1,154	Bukhari, 2022	72	244	Low Hb	70	103	113	144	Ref upper	2.12 (0.72, 6.27)	No	Third trimester
1,237	Buzaglo, 2015	11,306	29,243	Low Hb	91	101	101	142	Ref upper; Exposed lower	1.66 (1.32, 2.09)	No	Prenatal
1,238	Buzaglo, 2015	16,548	39,846	Low Hb	91	101	101	142	Ref upper; Exposed lower	6.34 (5.16, 7.80)	Yes	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,247	Cheng, 2025	5,864	2,229	Low Hb	70	101	101	138	Ref upper	2.12 (1.12, 4.01)	No	Third trimester
1,248	Cheng, 2025	1,199	2,229	Low Hb	71	71	101	138	Ref upper; Exposed lower	3.66 (1.80, 7.45)	No	Third trimester
1,223	Chu, 2020	1,795	11,231	Low Hb	97	108	108	141	Ref upper; Exposed lower	1.12 (1.01, 1.26)	No	Third trimester
1,224	Chu, 2020	628	12,398	Low Hb	97	99	99	141	Ref upper; Exposed lower	1.39 (1.12, 1.72)	No	Third trimester
1,155	Detlefs, 2022	3,402	13,274	Low Hb	96	110	111	142	Ref upper; Exposed lower	1.56 (1.18, 2.05)	No	Prenatal
1,156	Dewi, 2018	77	123	Low Hb	85	111	111	142	Ref upper; Exposed lower	9.01 (4.28, 18.97)	No	Prenatal
1,203	Drukker, 2015	6,145	67,683	Low Hb	100	110	111	142	Ref upper	1.13 (0.94, 1.37)	No	Third trimester
1,204	Drukker, 2015	1,823	67,683	Low Hb	95	100	111	142	Ref upper; Exposed lower	1.33 (0.98, 1.81)	No	Third trimester
1,205	Dutta, 2018	36	22	Low Hb	100	109	110	136	Ref upper	1.22 (0.12, 12.70)	No	Third trimester
1,206	Dutta, 2018	22	22	Low Hb	70	99	110	136	Ref upper	3.00 (0.34, 26.66)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,207	Ernawati, 2018	203	73	Low Hb	86	101	102	142	Ref upper; Exposed lower	16.32 (7.69, 34.64)	No	Prenatal
1,188	Feng, 2023	232	257	Low Hb	91	110	111	141	Ref upper	2.29 (0.80, 6.59)	No	Prenatal
1,189	Feng, 2023	43	257	Low Hb	68	90	111	141	Ref upper; Exposed lower	5.71 (1.64, 19.85)	No	Prenatal
1,179	Flores, 2020	352	2,589	Low Hb	95	111	111	142	Ref upper; Exposed lower	1.22 (0.99, 1.49)	No	Prenatal
1,136	Geelhoed, 2006	142	132	Low Hb	67	81	110	142	Ref upper; Exposed lower	0.93 (0.48, 1.78)	No	Prenatal
1,246	Gimono, 2024	454	269	Low Hb	89	111	111	140	Ref upper; Exposed lower	2.19 (1.11, 4.34)	No	Third trimester
1,130	Gonzales, 2012	5,128	285,484	Low Hb	70	93	114	145		2.62 (2.03, 3.38)	No	Third trimester
1,131	Gonzales, 2012	63,202	285,484	Low Hb	90	113	114	145		1.01 (0.88, 1.15)	Yes	Third trimester
1,132	Gonzales, 2012	552	285,484	Low Hb	51	73	114	145	Exposed lower	6.15 (3.86, 9.78)	No	Third trimester
1,133	Gonzales, 2012	25,450	285,484	High Hb	149	160	110	149	Exposed upper	0.84 (0.67, 1.05)	No	Third trimester
1,157	Guignard, 2020			Low Hb	100	111	111	142	Ref upper; Exposed lower	1.80 (1.50, 2.10)	No	Prenatal
1,158	Guignard, 2020			Low Hb	94	101	111	142	Ref upper; Exposed	1.70 (1.20, 2.30)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
1,232	Hews, 2023	68,744	533,029	Low Hb	90	111	111	142	Ref upper; Exposed lower	2.14 (2.08, 2.20)	Yes	Third trimester
1,233	Hews, 2023			Low Hb	90	111	111	142	Ref upper; Exposed lower	1.99 (1.90, 2.08)	No	Third trimester
1,234	Hews, 2023			Low Hb	90	111	111	142	Ref upper; Exposed lower	2.40 (2.33, 2.48)	Yes	Third trimester
1,159	Jaleel, 2010			Low Hb	68	92	112	143	Ref upper; Exposed lower	4.28 (2.38, 7.69)	No	Prenatal
1,169	Kaul, 2017	574	193	Low Hb	65	115	116	136	Ref upper; Exposed lower	4.37 (1.60, 11.93)	No	Third trimester
1,208	Keren, 2019	54	89	Low Hb	10	31	71	90		0.82 (0.36, 1.91)	No	Second and third trimester
1,209	Keren, 2019	162	89	Low Hb	40	61	71	90		1.65 (0.95, 2.85)	No	Second and third trimester
1,236	Labib, 2021	50	50	Low Hb	70	100	110	141	Ref upper	5.00 (0.61, 41.28)	No	Prenatal
1,220	Lao, 1996	353	4,935	Low Hb	87	101	101	142	Ref upper; Exposed lower	0.76 (0.37, 1.53)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,221	Lao, 1996	464	5,190	Low Hb	87	101	101	142	Ref upper; Exposed lower	1.48 (0.96, 2.29)	No	Prenatal
1,184	Liu, 2021	3,112	30,222	Low Hb	68	90	90	141	Ref upper; Exposed lower	2.37 (1.88, 3.00)	No	Third trimester
1,143	Luik, 2021			Low Hb	93	110	110	141	Ref upper; Exposed lower	0.70 (0.30, 1.50)	No	First trimester
1,144	Luik, 2021			Low Hb	93	105	105	141	Ref upper; Exposed lower	1.20 (0.70, 1.90)	No	Second trimester
1,145	Luik, 2021			Low Hb	93	110	110	141	Ref upper; Exposed lower	1.80 (1.40, 2.40)	No	Third trimester
1,160	Luis, 2016	106	106	Low Hb	58	80	110	140	Ref upper; Exposed lower	2.25 (1.21, 4.20)	No	Prenatal
1,210	Lumbanraja, 2019	105	95	Low Hb	63	111	112	143	Ref upper; Exposed lower	1.04 (0.58, 1.87)	No	Prenatal
1,161	Mahmood, 2019	235	387	Low Hb	70	102	102	143	Ref upper; Exposed lower	7.96 (4.37, 14.50)	No	Third trimester
1,162	Mahmood, 2019	235	387	Low Hb	70	102	102	143	Ref upper; Exposed lower	2.84 (2.39, 3.39)	No	Third trimester
1,180	Mehrnoush, 2023	235	8,631	Low Hb	70	106	106	147	Ref upper	5.94 (2.81, 8.34)	No	Prenatal
1,181	Mehrnoush, 2023	22	8,631	Low Hb	54	76	106	147	Ref upper; Exposed	6.01 (3.89,	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	11.09)		
1,245	Moges, 2025	220	239	Low Hb	82	121	121	152	Ref upper; Exposed lower	2.90 (1.20, 7.91)	No	Third trimester
1,163	Movva, 2023	232	11,447	Low Hb	97	101	101	142	Ref upper; Exposed lower	3.75 (2.97, 4.76)	No	Prenatal
1,185	Nair, 2016	21	656	Low Hb	66	70	100	140	Ref upper; Exposed lower	9.45 (2.62, 34.05)	No	Prenatal
1,186	Nair, 2016	329	656	Low Hb	70	99	100	140	Ref upper	1.50 (0.80, 2.80)	No	Prenatal
1,164	Nair, 2021	66	709	Low Hb	71	71	101	138	Ref upper; Exposed lower	5.11 (1.19, 21.93)	No	Third trimester
1,165	Nair, 2021	390	709	Low Hb	70	101	101	138	Ref upper	1.82 (0.66, 5.01)	No	Third trimester
1,240	Negesa, 2024	122	211	Low Hb	81	121	121	152	Ref upper; Exposed lower	5.68 (3.13, 10.32)	No	Prenatal
1,182	Nur, 2021	35	115	Low Hb	91	112	112	143	Ref upper; Exposed lower	7.86 (3.51, 17.58)	No	Prenatal
1,183	Nyfløt, 2017	112	3,011	Low Hb	69	91	91	142	Ref upper; Exposed lower	4.27 (2.79, 6.54)	No	First trimester
1,231	Okunade, 2024	556	633	Low Hb	84	110	110	136	Ref upper; Exposed lower	1.35 (1.02, 1.78)	No	Prenatal
1,235	Okunade, 2024	570	652	Low Hb	84	110	110	136	Ref upper;	1.32	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(1.02, 1.72)		
1,166	Owiredu, 2016	55	216	Low Hb	66	101	111	142	Ref upper; Exposed lower	3.14 (1.21, 8.14)	No	Third trimester
1,137	Parks, NA	35,001	11,291	Low Hb	100	110	110	140	Ref upper	1.56 (1.24, 1.97)	No	Prenatal
1,138	Parks, NA	45,334	11,291	Low Hb	70	100	110	140	Ref upper	0.82 (0.66, 1.02)	Yes	Prenatal
1,139	Parks, NA	621	11,291	Low Hb	48	70	110	140	Ref upper; Exposed lower	5.10 (3.43, 7.58)	No	Prenatal
1,211	Prata, 2011	399	1,387	Low Hb	84	110	110	140	Ref upper; Exposed lower	2.73 (1.43, 5.23)	No	Prenatal
1,212	Randall, 2019	360	5,633	Low Hb	82	111	111	130		1.01 (0.86, 1.18)	Yes	Prenatal
1,213	Randall, 2019	908	5,633	High Hb	131	153	110	131	Exposed upper	0.51 (0.43, 0.59)	No	Prenatal
1,214	Randall, 2019	1,282	27,356	Low Hb	95	110	111	139	Exposed lower	1.16 (1.01, 1.32)	No	First and second trimester
1,215	Randall, 2019	3,268	27,356	High Hb	141	153	110	140	Exposed upper	1.10 (1.01, 1.20)	No	First and second trimester
1,167	Rukuni, 2016	7,432	72,439	Low Hb	99	99	100	141	Ref upper; Exposed lower	1.19 (0.91, 1.56)	No	Prenatal
1,168	Rukuni, 2016	7,475	72,947	Low Hb	99	99	100	141	Ref upper; Exposed	0.92 (0.86, 0.98)	Yes	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
1,230	Safarzadeh, 2023	257	8,631	Low Hb	86	111	111	147	Ref upper; Exposed lower	1.02 (0.71, 2.11)	No	Third trimester
1,239	Salomon, 2021	47	2,554	Low Hb	95	101	101	142	Ref upper; Exposed lower	2.28 (0.89, 5.87)	No	Third trimester
1,140	Shi, 2022	1,713,722	15,578,790	Low Hb	100	112	112	143	Ref upper	1.45 (1.43, 1.47)	No	Prenatal
1,141	Shi, 2022	497,363	15,578,790	Low Hb	70	102	112	143	Ref upper	3.53 (3.47, 3.60)	No	Prenatal
1,142	Shi, 2022	40,458	15,578,790	Low Hb	50	72	112	143	Ref upper; Exposed lower	15.65 (15.10, 16.22)	Yes	Prenatal
1,244	Shrivastava, 2024	26	76	Low Hb	20	42	42	70	Exposed lower	0.45 (0.11, 1.86)	No	Third trimester
1,170	Singal, 2018	200	200	Low Hb	63	100	111	140	Ref upper; Exposed lower	8.03 (1.81, 35.58)	No	Prenatal
1,174	Singh, 1998	571	3,157	Low Hb	88	110	110	141	Ref upper; Exposed lower	0.92 (0.68, 1.23)	No	Third trimester
1,216	Skjeldestad, 2012			Low Hb	68	90	91	142	Ref upper; Exposed lower	2.50 (1.30, 5.10)	No	Prenatal
1,217	Skjeldestad, 2012			Low Hb	68	90	91	142	Ref upper; Exposed lower	11.90 (5.00, 28.50)	No	Prenatal
1,218	Skjeldestad, 2012			Low Hb	68	90	91	142	Ref upper; Exposed	1.70 (0.70, 4.00)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
1,175	Soltan, 2007	66	200	Low Hb	80	105	105	141	Ref upper; Exposed lower	2.27 (0.52, 9.89)	No	Prenatal
1,187	Suryanarayana, 2017	161	266	Low Hb	68	114	114	145	Ref upper; Exposed lower	9.91 (1.20, 81.60)	No	Prenatal
1,226	Tian, 2024	126,636	235,387	Low Hb	92	111	111	142	Ref upper; Exposed lower	5.36 (4.99, 5.75)	Yes	Third trimester
1,176	Tsu, 1993			Low Hb	72	124	124	147	Ref upper; Exposed lower	2.80 (1.10, 6.70)	No	Prenatal
1,222	Tzur, 2012	1,718	32,170	Low Hb	92	100	101	142	Ref upper; Exposed lower	1.77 (1.20, 2.70)	No	First trimester
1,177	Wang, 2021	93	237	Low Hb	89	105	105	146	Ref upper; Exposed lower	4.84 (2.44, 9.60)	No	Prenatal
1,178	Wetta, 2013	118	1,680	Low Hb	69	91	91	142	Ref upper; Exposed lower	2.46 (0.92, 6.56)	No	Prenatal
1,171	Yang, 2016			Low Hb	91	114	114	145	Ref upper; Exposed lower	0.73 (0.09, 5.91)	No	Second trimester
1,172	Yang, 2016			Low Hb	91	114	114	145	Ref upper; Exposed lower	6.47 (1.22, 34.23)	No	Third trimester
1,173	Yang, 2016			Low Hb	91	114	114	145	Ref upper; Exposed	1.20 (0.06,	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	24.85)		
1,219	Yuliati, 2018			Low Hb	85	110	111	142	Ref upper; Exposed lower	3.58 (1.23, 10.98)	No	Third trimester
1,201	Çakmak, 2018	490	673	Low Hb	83	112	113	129	Exposed lower	2.34 (1.59, 3.45)	No	First trimester
1,202	Çakmak, 2018	143	673	High Hb	133	144	110	132	Exposed upper	1.65 (0.90, 3.03)	No	First trimester

Supplemental Table 14. Observation-level effect sizes - Antepartum hemorrhage

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
113	Biradar, 2023	174	128	Low Hb	71	111	111	138	Ref upper; Exposed lower	5.15 (0.64, 41.33)	No	Third trimester
109	Bone, 2022	3,690	1,304	Low Hb	100	113	113	140	Ref upper	1.20 (0.63, 2.29)	No	First trimester
110	Bone, 2022	6,023	1,304	Low Hb	70	103	113	140	Ref upper	0.65 (0.30, 1.39)	No	First trimester
111	Randall, 2019	1,282	27,356	Low Hb	95	110	111	139	Exposed lower	1.39 (1.09, 1.76)	No	First and second trimester
112	Randall, 2019	3,268	27,356	High Hb	141	153	110	140	Exposed upper	1.19 (1.00, 1.40)	No	First and second trimester

Supplemental Table 15. Observation-level effect sizes - Preeclampsia (maternal hypertension)

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
682	Bone, 2022			Low Hb	100	111	111	138	Ref upper	0.75 (0.70, 0.80)	No	First trimester
683	Bone, 2022			Low Hb	70	101	111	138	Ref upper	0.69 (0.55, 0.86)	Yes	First trimester
684	Bone, 2022			Low Hb	69	71	111	138	Ref upper; Exposed lower	1.37 (1.01, 1.88)	No	First trimester
699	Cevher, 2022	87	277	Low Hb	84	113	113	144	Ref upper; Exposed lower	1.72 (1.07, 2.76)	No	First trimester
692	Gaillard, 2014	798	5,883	Low Hb	97	110	110	130	Exposed lower	0.60 (0.40, 1.00)	No	First and second trimester
693	Gaillard, 2014	700	2,157	High Hb	132	151	111	132	Exposed upper	1.10 (0.80, 1.50)	No	First and second trimester
694	Gaillard, 2014	559	5,883	High Hb	130	151	110	130	Exposed upper	1.40 (0.80, 2.30)	No	First and second trimester
704	Gonzales, 2012			Low Hb	90	116	117	148	Ref upper	1.06 (0.99, 1.14)	No	Second trimester
685	Hämäläinen, 2003	272	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	1.00 (0.49, 2.03)	No	Second trimester
686	Hämäläinen, 2003	69	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	0.48 (0.07, 3.50)	No	First trimester
695	Larsen, 2016	679	54,849	Low Hb	71	91	91	135	Exposed lower	2.30 (1.71, 3.09)	Yes	First and second

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
												trimester
696	Larsen, 2016	1,534	54,849	High Hb	136	151	90	136	Exposed upper	3.22 (2.70, 3.85)	Yes	First and second trimester
700	Mogaddam, 2019			Low Hb	86	117	117	124	Exposed lower	0.95 (0.31, 2.90)	No	Second trimester
701	Mogaddam, 2019			Low Hb	86	117	117	124	Exposed lower	1.86 (0.58, 6.10)	No	Second trimester
702	Mogaddam, 2019			High Hb	132	143	110	131	Exposed upper	1.33 (0.66, 2.66)	No	Second trimester
703	Mogaddam, 2019			High Hb	132	143	110	131	Exposed upper	2.33 (1.16, 4.66)	No	Second trimester
687	Nordenvall, 1990	40	271	High Hb	130	152	110	130	Exposed upper	2.54 (1.06, 6.11)	No	Second trimester
688	Phaloprakarn, 2008			Low Hb*	110	124	125	145	Exposed upper	0.26 (0.50, 0.14)	No	First and second trimester
705	Prasetya, 2020	13	85	Low Hb	85	111	111	142	Ref upper; Exposed lower	3.90 (1.01, 15.30)	No	First trimester
698	Ulfah, 2015	17	23	Low Hb	84	111	112	143	Ref upper; Exposed lower	4.50 (1.17, 17.37)	No	Second and third trimester
689	Wang, 2018			Low Hb	92	112	112	129	Exposed lower	1.42 (0.69, 2.94)	No	First trimester
690	Wang, 2018			High Hb	132	149	110	131		1.30 (1.01, 1.69)	No	First trimester
691	Wang, 2018			High Hb	152	160	110	131	Exposed	2.38	No	First

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									upper	(1.20, 4.69)		trimester
697	Zhang, 2009			Low Hb	88	102	102	143	Ref upper; Exposed lower	1.13 (1.06, 1.19)	No	First and second trimester

Supplemental Table 16. Observation-level effect sizes - Maternal sepsis and other infections

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
249	Ambedkar, 2021	75	200	Low Hb	100	110	111	139	Ref upper	2.00 (1.14, 3.58)	No	Prenatal
250	Ambedkar, 2021	40	200	Low Hb	40	70	111	139	Ref upper	5.00 (2.44, 10.23)	No	Prenatal
251	Ambedkar, 2021	145	200	Low Hb	70	100	111	139	Ref upper	4.25 (2.68, 6.73)	No	Prenatal
252	Ambedkar, 2021	16	200	Low Hb	17	41	111	139	Ref upper; Exposed lower	9.00 (2.78, 29.17)	No	Prenatal
258	Bizuayew, 2021	27	595	Low Hb	88	113	113	154	Ref upper; Exposed lower	3.22 (1.25, 8.31)	No	Third trimester
260	Daru, 2018	4,687	307,594	Low Hb	46	70	70	120	Exposed lower	16.74 (14.95, 18.75)	Yes	Prenatal
254	Flores, 2019	172	879	Low Hb	93	117	118	149	Ref upper; Exposed lower	0.84 (0.64, 1.11)	Yes	Third trimester
262	Gelaw, 2017	55	329	Low Hb	83	111	111	152	Ref upper; Exposed lower	2.44 (0.67, 8.85)	No	Third trimester
265	Kajeguka, 2020	21	100	Low Hb	110	124	125	146	Ref upper	0.66 (0.08, 5.70)	No	Third trimester
266	Kajeguka, 2020	62	100	Low Hb	71	114	125	146	Ref upper; Exposed lower	3.52 (1.32, 9.41)	No	Third trimester
246	Malhotra, 2002	79	123	Low Hb	70	90	111	142	Ref upper	3.11 (0.80,	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
										12.09)		
247	Malhotra, 2002	31	123	Low Hb	67	71	111	142	Ref upper; Exposed lower	3.97 (0.84, 18.71)	No	Prenatal
248	Malhotra, 2002	214	123	Low Hb	90	102	111	142	Ref upper	1.15 (0.29, 4.52)	No	Prenatal
263	Mamo, 2017			Low Hb	79	81	121	152	Ref upper; Exposed lower	6.40 (1.02, 40.14)	No	Third trimester
261	Ojiyi, 2013	26	483	Low Hb	72	101	101	129	Ref upper; Exposed lower	4.91 (2.07, 11.63)	No	Third trimester
268	Parveen, 2025	59	15	Low Hb	70	101	101	142	Ref upper; Exposed lower	8.13 (1.05, 63.10)	No	Prenatal
253	Rukuni, 2016	7,475	72,947	Low Hb	99	100	101	141	Ref upper; Exposed lower	1.89 (1.39, 2.57)	No	Prenatal
264	Sehgal, 2016	149	179	Low Hb	80	110	111	142	Ref upper	1.20 (0.08, 19.04)	No	Second trimester
255	Shanbhag, 2021	130	110	Low Hb	100	111	111	139	Ref upper	0.60 (0.19, 1.88)	No	Third trimester
256	Shanbhag, 2021	32	110	Low Hb	69	71	111	139	Ref upper; Exposed lower	3.45 (0.98, 12.16)	No	Third trimester
257	Shanbhag, 2021	276	110	Low Hb	70	101	111	139	Ref upper	0.63 (0.24, 1.64)	No	Third trimester
269	Shen, 2024	198	402	Low Hb	91	109	109	150	Ref upper; Exposed	8.02 (4.53,	Yes	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	14.32)		
267	Shrivastava, 2024	26	76	Low Hb	18	42	42	70	Exposed lower	9.78 (0.97, 98.65)	No	Third trimester
259	Tandu, 2015	220	192	Low Hb	71	104	104	145	Ref upper; Exposed lower	1.60 (1.00, 2.50)	No	Third trimester

Supplemental Table 17. Observation-level effect sizes - Peripartum depression

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
249	Alharbi, 2014	111	241	Low Hb	86	113	113	144	Ref upper; Exposed lower	1.44 (0.89, 2.34)	No	Prenatal
251	Babah, 2025	331	79	Low Hb	70	101	102	109		1.72 (0.50, 5.90)	No	First trimester
270	Babah, 2025	3	79	Low Hb	57	72	102	109	Exposed lower	3.12 (0.13, 72.94)	Yes	First trimester
269	Eckerdal, 2016			Low Hb	96	110	110	141	Ref upper; Exposed lower	2.29 (1.15, 4.58)	No	postpartum
248	Goshtasebi, 2013			Low Hb	83	115	116	147	Ref upper; Exposed lower	4.64 (1.33, 16.08)	Yes	Third trimester
246	Kariman, 2008	24	38	Low Hb	90	105	106	109		1.10 (0.56, 2.16)	No	Third trimester
247	Kariman, 2008	8	38	Low Hb	80	95	106	109		1.83 (0.91, 3.66)	No	Third trimester
264	Kemppinen, 2022	167	972	Low Hb	93	109	110	141	Ref upper; Exposed lower	1.01 (0.54, 1.85)	No	Second and third trimester
265	Kemppinen, 2022	139	972	Low Hb	93	109	110	141	Ref upper; Exposed lower	1.32 (0.75, 2.31)	No	Second and third trimester
266	Kemppinen, 2022	189	972	Low Hb	93	109	110	141	Ref upper; Exposed lower	0.96 (0.59, 1.57)	No	Second and third trimester
267	Kemppinen, 2025	80	676	Low Hb	94	110	110	141	Ref upper; Exposed	1.63 (0.70, 3.79)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
263	Kwak, 2022	119	3,948	Low Hb	96	109	110	141	Ref upper; Exposed lower	1.61 (0.93, 2.80)	No	First trimester
262	Kwak, 2025	176	2,609	Low Hb	96	110	110	141	Ref upper; Exposed lower	1.22 (0.89, 1.67)	No	Third trimester
268	La, 2024	55	195	Low Hb	95	110	111	142	Ref upper; Exposed lower	1.76 (0.67, 5.32)	No	Third trimester
252	Maeda, 2020	196	781	Low Hb	81	106	118	135		1.27 (0.78, 2.07)	No	Second trimester
253	Maeda, 2020	196	781	Low Hb	106	112	118	135		1.37 (0.85, 2.20)	No	Second trimester
254	Maeda, 2020	196	781	Low Hb	112	118	118	135		0.96 (0.59, 1.57)	No	Second trimester
255	Maeda, 2020	196	781	Low Hb	54	104	118	140		1.09 (0.67, 1.77)	No	Third trimester
256	Maeda, 2020	196	781	Low Hb	104	111	118	140		1.25 (0.78, 2.02)	No	Third trimester
257	Maeda, 2020	196	781	Low Hb	111	118	118	140		1.38 (0.87, 2.17)	No	Third trimester
258	Maeda, 2020	196	781	Low Hb	47	92	109	135		1.92 (1.19, 3.10)	No	postpartum
259	Maeda, 2020	196	781	Low Hb	92	101	109	135		1.61 (0.99, 2.64)	No	postpartum
260	Maeda, 2020	196	781	Low Hb	101	109	109	135		1.28 (0.77, 2.11)	No	postpartum

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
261	Tian, 2022	238	281	Low Hb	92	100	100	110	Exposed lower	4.75 (1.55, 14.54)	Yes	Third trimester
250	Woldetensay, 2018			Low Hb	80	112	113	152	Ref upper; Exposed lower	1.30 (1.04, 1.61)	No	Prenatal

Supplemental Table 18. Observation-level effect sizes - All-cause neonatal mortality

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,276	Abdullah, 2012	73	87	Low Hb	86	111	111	142	Ref upper; Exposed lower	32.80 (7.55, 142.67)	Yes	Prenatal
1,322	Abioye, 2023	108	538	Low Hb	69	115	115	146	Ref upper; Exposed lower	1.23 (0.45, 2.91)	No	Prenatal
1,323	Abioye, 2023	108	538	Low Hb	69	115	115	146	Ref upper; Exposed lower	0.86 (0.18, 4.08)	No	Prenatal
1,302	Agrawal, 2017	54	1,406	Low Hb	72	81	92	139	Ref upper; Exposed lower	3.98 (2.38, 6.68)	Yes	Third trimester
1,303	Agrawal, 2017	44	1,406	Low Hb	81	91	92	139	Ref upper	2.63 (1.29, 5.35)	No	Third trimester
1,308	Ali, 2020	3,839	16,319	Low Hb	100	110	110	129		1.08 (0.93, 1.26)	No	Prenatal
1,309	Ali, 2020	8,116	16,319	Low Hb	80	90	110	129		1.44 (1.15, 1.81)	No	Prenatal
1,310	Ali, 2020	4,531	3,084	Low Hb	90	100	110	129		1.13 (0.95, 1.34)	No	Prenatal
1,311	Ali, 2020	1,936	3,084	Low Hb	70	80	110	129		1.11 (0.83, 1.50)	No	Prenatal
1,312	Ali, 2020	42,853	16,319	Low Hb	90	100	110	129		1.29 (1.12, 1.50)	No	Prenatal
1,313	Ali, 2020	3,420	3,084	Low Hb	80	90	110	129		1.12 (0.88, 1.43)	No	Prenatal
1,314	Ali, 2020	3,755	3,084	Low Hb	100	110	110	129		0.88 (0.71, 1.09)	No	Prenatal
1,315	Ali, 2020	6	16,319	Low Hb	70	80	110	129		1.84 (1.27, 2.67)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,316	Ali, 2020	1,269	3,084	Low Hb	56	70	110	129	Exposed lower	1.42 (1.05, 1.93)	No	Prenatal
1,317	Ali, 2020	269	16,319	Low Hb	56	70	110	129	Exposed lower	2.30 (1.36, 3.91)	No	Prenatal
1,318	Ali, 2020	359	3,084	High Hb	130	140	110	129	Exposed upper	1.64 (1.07, 2.50)	No	Prenatal
1,319	Ali, 2020	1,293	16,319	High Hb	130	140	110	129	Exposed upper	0.93 (0.60, 1.44)	No	Prenatal
1,278	Ashley, 1994			Low Hb	100	110	111	129		1.46 (1.16, 1.83)	No	Prenatal
1,279	Ashley, 1994			Low Hb	80	81	111	129	Exposed lower	2.05 (1.28, 3.29)	No	Prenatal
1,280	Ashley, 1994			Low Hb	80	100	111	129		1.47 (1.11, 1.95)	No	Prenatal
1,281	Ashley, 1994			High Hb	131	142	110	130	Exposed upper	1.06 (0.77, 1.48)	No	Prenatal
1,264	Badi, 2021	70	158	Low Hb	78	103	103	144	Ref upper; Exposed lower	3.39 (0.99, 11.62)	No	Third trimester
1,304	Bakhtiar, 2011	402	458	Low Hb	68	112	112	143	Ref upper; Exposed lower	3.99 (0.83, 19.09)	No	Prenatal
1,265	Chasekwa, 2021	599	2,383	Low Hb	75	126	126	147	Ref upper; Exposed lower	1.98 (1.02, 3.90)	No	Prenatal
1,263	Chu, 2020	628	12,398	Low Hb	97	99	99	141	Ref upper; Exposed lower	0.93 (0.40, 2.12)	No	Third trimester
1,320	Cozzi, 2023	5,444	12,913	Low Hb	95	111	111	141	Ref upper; Exposed lower	0.68 (0.38, 1.20)	No	Prenatal
1,248	Detlefs, 2022	3,402	13,274	Low Hb	96	110	111	142	Ref upper;	1.60	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(0.68, 3.52)		
1,282	Dolan, 1993	12	174	Low Hb	70	84	84	142	Ref upper; Exposed lower	3.80 (1.90, 7.40)	No	Third trimester
1,260	Dutta, 2018	10	22	Low Hb	72	110	110	136	Ref upper; Exposed lower	21.00 (1.99, 222.01)	No	Third trimester
1,307	Edelson, 2023	17	335	Low Hb	74	106	107	148	Ref upper; Exposed lower	4.38 (1.02, 18.72)	No	Third trimester
1,266	Essen, 2000	663	14,976	Low Hb	90	100	100	141	Ref upper; Exposed lower	1.50 (0.60, 3.50)	No	Prenatal
1,267	Geda, 2021	61	303	Low Hb	81	121	121	152	Ref upper; Exposed lower	2.80 (1.40, 5.71)	No	Prenatal
1,228	Geelhoed, 2006	117	151	Low Hb	67	81	110	142	Ref upper; Exposed lower	2.20 (0.70, 6.30)	No	Prenatal
1,229	Geelhoed, 2006	117	151	Low Hb	80	109	110	142	Ref upper; Exposed lower	2.20 (0.70, 6.30)	No	Prenatal
1,230	Geelhoed, 2006	78	151	Low Hb	67	71	110	142	Ref upper; Exposed lower	3.10 (1.00, 9.40)	No	Prenatal
1,231	Geelhoed, 2006	25	151	Low Hb	37	51	110	142	Ref upper; Exposed lower	5.60 (1.40, 22.20)	No	Prenatal
1,232	Geelhoed, 2006	47	151	Low Hb	47	61	110	142	Ref upper; Exposed lower	5.40 (1.70, 16.70)	No	Prenatal
1,233	Geelhoed,	32	151	Low Hb*	67	110	110	143	Ref lower;	1.43	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
	2006								Exposed upper	(10.00, 0.17)		
1,268	Heydarpour, 2019	756	1,986	Low Hb	84	115	117	147	Ref upper; Exposed lower	1.08 (0.82, 1.44)	No	Third trimester
1,269	Heydarpour, 2019	1,038	2,463	Low Hb	84	115	117	147	Ref upper; Exposed lower	1.63 (1.25, 2.13)	No	First trimester
1,292	Jessani, 2021		4,696	Low Hb	90	111	111	129		0.99 (0.63, 1.54)	No	First trimester
1,293	Jessani, 2021		4,696	Low Hb	70	91	111	129		0.65 (0.20, 2.09)	No	First trimester
1,294	Jessani, 2021		1,671	Low Hb	70	92	112	129	Exposed upper	0.89 (0.39, 2.04)	No	First trimester
1,295	Jessani, 2021		1,533	Low Hb	90	112	112	129		0.88 (0.40, 1.90)	No	Third trimester
1,296	Jessani, 2021		1,533	Low Hb	70	92	112	129		1.20 (0.66, 2.18)	No	First trimester
1,297	Jessani, 2021		1,533	Low Hb	69	71	112	129	Exposed upper	1.29 (0.29, 5.68)	No	First trimester
1,298	Jessani, 2021		1,533	Low Hb	90	112	112	129		1.34 (0.81, 2.21)	No	First trimester
1,299	Jessani, 2021		4,696	High Hb	131	138	110	130	Exposed upper	1.15 (0.59, 2.22)	No	First trimester
1,300	Jessani, 2021		1,533	High Hb	132	146	110	131	Exposed upper	3.13 (0.38, 25.85)	No	Third trimester
1,301	Jessani, 2021		1,533	High Hb	132	146	110	131	Exposed upper	2.74 (1.17, 6.38)	No	First trimester
1,321	Khan, 2023	192	135	Low Hb	92	110	110	141	Ref upper; Exposed lower	0.70 (0.04, 11.14)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,305	Khatana, 2020	50	175	Low Hb	70	91	112	141	Ref upper	0.35 (0.11, 1.09)	No	Prenatal
1,306	Khatana, 2020	10	90	Low Hb	67	71	112	141	Ref upper; Exposed lower	0.54 (0.15, 1.92)	No	Prenatal
1,219	Kidanto, 2009	671	547	Low Hb	90	115	115	146	Ref upper	3.00 (1.10, 8.10)	No	First and second trimester
1,220	Kidanto, 2009	100	547	Low Hb	65	75	115	146	Ref upper; Exposed lower	3.60 (0.84, 3.50)	No	First and second trimester
1,221	Kidanto, 2009	403	547	Low Hb	70	95	115	146	Ref upper	2.50 (0.82, 7.50)	No	First and second trimester
1,237	Kulmala, 2000	391	393	Low Hb	64	118	118	146	Ref upper; Exposed lower	2.20 (0.80, 6.20)	No	Prenatal
1,288	Kumar, 2020	20	1,752	Low Hb	62	70	111	140	Ref upper; Exposed lower	17.52 (2.14, 143.26)	No	Third trimester
1,289	Kumar, 2020	55	1,752	Low Hb	70	100	111	140	Ref upper	12.74 (2.53, 64.24)	Yes	Third trimester
1,283	Lao, 1996	464	5,190	Low Hb	88	100	101	142	Ref upper; Exposed lower	0.33 (0.04, 2.62)	No	First and third trimester
1,284	Lao, 1996	353	4,935	Low Hb	88	100	101	142	Ref upper; Exposed lower	1.34 (0.39, 4.55)	No	First and third trimester
1,250	Lokeshwari, 2018	44	156	Low Hb	39	53	53	80	Exposed lower	1.81 (0.32, 10.22)	No	Prenatal
1,249	Mahmood, 2019	235	387	Low Hb	70	102	102	143	Ref upper; Exposed lower	4.32 (1.95, 9.60)	Yes	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,324	Moges, 2025	220	239	Low Hb	82	121	121	152	Ref upper; Exposed lower	1.57 (0.70, 5.29)	No	Third trimester
1,234	Murphy, 1986	6,051	24,397	Low Hb	98	104	105	132	Exposed upper	1.21 (0.98, 1.50)	No	First trimester
1,235	Murphy, 1986	1,543	8,876	High Hb	134	139	104	133	Exposed upper	1.51 (1.10, 2.08)	No	First and second trimester
1,244	Nair, 2017	769	11,598	Low Hb	101	108	110	141	Ref upper	0.58 (0.18, 1.85)	No	First and second trimester
1,245	Nair, 2017	3,019	7,859	Low Hb	101	108	110	141	Ref upper	1.27 (0.68, 2.38)	No	Third trimester
1,246	Nair, 2017	279	11,598	Low Hb	86	99	110	141	Ref upper; Exposed lower	5.16 (2.53, 10.52)	Yes	First and second trimester
1,247	Nair, 2017	998	7,869	Low Hb	86	99	110	141	Ref upper; Exposed lower	2.60 (1.23, 5.51)	No	Third trimester
1,238	Parks, NA	45,334	11,291	Low Hb	70	99	110	140	Ref upper	1.17 (0.99, 1.38)	No	Prenatal
1,239	Parks, NA	35,001	11,291	Low Hb	100	109	110	140	Ref upper	0.93 (0.79, 1.09)	No	Prenatal
1,240	Parks, NA	35,001	11,291	Low Hb	100	109	110	140	Ref upper	0.98 (0.84, 1.13)	No	Prenatal
1,241	Parks, NA	45,334	11,291	Low Hb	70	99	110	140	Ref upper	1.16 (0.99, 1.37)	No	Prenatal
1,242	Parks, NA	621	11,291	Low Hb	55	69	110	140	Ref upper; Exposed lower	2.31 (1.53, 3.47)	No	Prenatal
1,243	Parks, NA	621	11,291	Low Hb	55	69	110	140	Ref upper; Exposed	2.16 (1.45, 3.22)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
1,290	Patel, 2018	30,601	6,939	Low Hb	100	112	112	140	Ref upper	1.28 (1.05, 1.57)	No	Prenatal
1,291	Patel, 2018	35,210	6,939	Low Hb	64	102	112	140	Ref upper; Exposed lower	1.67 (1.33, 2.08)	No	Prenatal
1,270	Prema, 1981	443	1,783	Low Hb	50	81	112	143	Ref upper	2.92 (2.11, 4.02)	No	Third trimester
1,271	Prema, 1981	1,202	1,783	Low Hb	80	111	112	143	Ref upper	1.43 (1.05, 1.94)	No	Third trimester
1,272	Prema, 1981	312	1,783	Low Hb	38	52	112	143	Ref upper; Exposed lower	8.92 (6.92, 11.50)	Yes	Third trimester
1,325	Rawat, 2025	57	123	Low Hb	90	111	111	138	Ref upper	1.80 (0.57, 5.65)	No	Third trimester
1,326	Rawat, 2025	112	123	Low Hb	70	91	111	138	Ref upper	2.38 (0.94, 6.05)	No	Third trimester
1,327	Rawat, 2025	8	123	Low Hb	57	71	111	138	Ref upper; Exposed lower	7.69 (2.35, 25.20)	No	Third trimester
1,251	Rukuni, 2016	7,475	72,947	Low Hb	99	100	101	141	Ref upper; Exposed lower	1.17 (0.76, 1.79)	No	First trimester
1,273	Räisänen, 2014	3,003	119,325	Low Hb	93	99	100	141	Ref upper; Exposed lower	2.00 (0.92, 4.35)	No	First trimester
1,274	Räisänen, 2014	3,827	163,812	Low Hb	93	99	100	141	Ref upper; Exposed lower	1.12 (0.54, 2.32)	No	First trimester
1,252	Smith, 2019			Low Hb	90	111	111	142	Ref upper; Exposed lower	4.88 (3.28, 7.26)	Yes	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,253	Smith, 2019			Low Hb	90	110	111	142	Ref upper	0.90 (0.72, 1.11)	No	Third trimester
1,254	Smith, 2019			Low Hb	70	90	111	142	Ref upper	0.90 (0.72, 1.11)	Yes	Third trimester
1,255	Smith, 2019			Low Hb	70	90	111	142	Ref upper	0.61 (0.53, 0.70)	Yes	Third trimester
1,256	Smith, 2019			Low Hb	90	111	111	142	Ref upper; Exposed lower	3.65 (2.88, 4.64)	Yes	Third trimester
1,257	Smith, 2019			Low Hb	90	110	111	142	Ref upper	0.61 (0.53, 0.70)	Yes	Third trimester
1,258	Smith, 2019			Low Hb	57	71	111	142	Ref upper; Exposed lower	7.14 (1.64, 31.00)	No	Third trimester
1,259	Smith, 2019			Low Hb	57	71	111	142	Ref upper; Exposed lower	5.69 (2.28, 14.20)	No	Third trimester
1,222	Statistical, NA	5,455	55,039	Low Hb	95	105	115	125		0.85 (0.37, 1.96)	No	Second trimester
1,223	Statistical, NA	24,194	55,039	Low Hb	105	115	115	125		0.96 (0.63, 1.47)	No	Second trimester
1,224	Statistical, NA	1,282	55,039	Low Hb	81	95	115	125	Exposed lower	1.21 (0.30, 4.92)	No	Second trimester
1,225	Statistical, NA	12,060	55,039	High Hb	135	145	115	125		1.54 (0.97, 2.45)	No	Second trimester
1,227	Statistical, NA	1,277	55,039	High Hb	145	159	115	125	Exposed upper	1.82 (0.57, 5.78)	No	Second trimester
1,226	Statistical, NA	45,087	55,039	Low Hb*	115	125	125	135		0.75 (1.03, 0.54)	No	Second trimester
1,275	Tiwari, 2021	33	81	Low Hb	28	42	42	70	Exposed lower	5.16 (0.45, 58.98)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,285	Tunkyi, 2018	403	1,030	Low Hb	78	114	115	146	Ref upper; Exposed lower	5.48 (1.32, 22.82)	No	Third trimester
1,262	Tzur, 2012	1,718	32,179	Low Hb	93	101	101	142	Ref upper; Exposed lower	1.18 (0.80, 1.80)	No	First trimester
1,261	Viplava, 2022	80	80	Low Hb	63	72	112	143	Ref upper; Exposed lower	4.94 (1.03, 23.66)	No	Third trimester
1,236	Vogel, 2014	4,385	3,730	Low Hb	56	70	70	141	Ref upper; Exposed lower	1.37 (1.07, 1.77)	No	Prenatal
1,218	Xiong, 2003	3,001	12,942	Low Hb	86	100	100	141	Ref upper; Exposed lower	1.24 (0.84, 1.82)	No	Third trimester
1,277	Yousaf, 2011	407	411	Low Hb	62	110	110	141	Ref upper; Exposed lower	3.00 (0.80, 11.10)	No	Prenatal
1,286	Zhang, 1993	173	631	Low Hb	80	100	100	141	Ref upper	1.30 (0.90, 1.80)	No	Prenatal
1,287	Zhang, 1993	61	631	Low Hb	66	80	100	141	Ref upper; Exposed lower	1.50 (0.90, 2.50)	No	Prenatal

Supplemental Table 19. Observation-level effect sizes - Stillbirth

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,208	Barut, 2023	260	417	Low Hb	100	111	112	143	Ref upper	1.31 (0.65, 2.67)	No	Prenatal
1,209	Barut, 2023	460	417	Low Hb	70	101	112	143	Ref upper	1.57 (0.94, 2.63)	No	Prenatal
1,210	Barut, 2023	49	417	Low Hb	65	71	112	143	Ref upper; Exposed lower	4.02 (1.79, 8.98)	No	Prenatal
1,190	Gonzales, 2012	45,590	222,958	Low Hb	100	116	117	144		1.09 (0.97, 1.20)	No	Prenatal
1,191	Gonzales, 2012	1,143	222,958	Low Hb	70	86	117	144		3.25 (2.42, 3.63)	Yes	Prenatal
1,192	Gonzales, 2012	3,635	222,958	Low Hb	80	96	117	144		1.84 (1.47, 2.30)	No	Prenatal
1,193	Gonzales, 2012	14,604	222,958	Low Hb	90	106	117	144		1.39 (1.21, 1.59)	No	Prenatal
1,194	Gonzales, 2012	484	222,958	Low Hb	60	76	117	144	Exposed lower	7.80 (5.81, 10.40)	Yes	Prenatal
1,195	Gonzales, 2012	7,237	222,958	High Hb	152	160	110	151	Exposed upper	1.31 (1.08, 1.58)	No	Prenatal
1,205	Gonzales, 2014	789	10,614	Low Hb	90	113	114	148	Ref upper	1.44 (1.23, 1.67)	No	Prenatal
1,206	Gonzales, 2014	154	10,614	Low Hb	70	93	114	148	Ref upper	2.69 (1.99, 3.63)	No	Prenatal
1,207	Gonzales, 2014	38	10,614	Low Hb	57	73	114	148	Ref upper; Exposed lower	6.70 (3.97, 11.30)	No	Prenatal
1,196	Jessani, 2021		1,671	Low Hb	70	97	117	129		2.54 (0.34, 19.26)	No	First trimester
1,197	Jessani, 2021		1,671	Low Hb	90	117	117	129		0.80 (0.18, 3.49)	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
1,198	Jessani, 2021		4,696	Low Hb	70	91	111	129		1.81 (0.80, 4.07)	No	First trimester
1,199	Jessani, 2021		4,696	Low Hb	90	111	111	129		1.09 (0.68, 1.76)	No	First trimester
1,200	Jessani, 2021		1,533	Low Hb	70	92	112	129		1.69 (0.85, 3.38)	No	First trimester
1,201	Jessani, 2021		1,533	Low Hb	90	112	112	129		1.54 (0.82, 2.87)	No	First trimester
1,202	Jessani, 2021		1,671	High Hb	137	160	110	136	Exposed upper	0.89 (0.39, 2.04)	No	First trimester
1,203	Jessani, 2021		4,696	High Hb	131	138	110	130	Exposed upper	1.43 (0.73, 2.81)	No	First trimester
1,204	Jessani, 2021		1,533	High Hb	132	146	110	131	Exposed upper	1.29 (0.29, 5.68)	No	First trimester
1,187	Shi, 2022	1,713,222	15,578,790	Low Hb	100	111	112	143	Ref upper	0.59 (0.58, 0.61)	Yes	Prenatal
1,188	Shi, 2022	497,363	15,578,790	Low Hb	70	101	112	143	Ref upper	0.79 (0.76, 0.81)	No	Prenatal
1,189	Shi, 2022		15,578,790	Low Hb	55	71	112	143	Ref upper; Exposed lower	1.86 (1.75, 1.98)	No	Prenatal
1,211	Tang, 2024	6,285	82,722	Low Hb	93	104	114	120	Exposed lower	1.07 (0.77, 1.50)	No	First trimester
1,212	Tang, 2024	20,105	82,722	Low Hb	100	114	114	120		1.06 (0.86, 1.30)	No	First trimester
1,214	Tang, 2024	131,205	82,722	High Hb	134	140	110	124		0.99 (0.87, 1.11)	No	First trimester
1,215	Tang, 2024	131,205	82,722	High Hb	144	150	110	124		0.99 (0.87, 1.11)	No	First trimester
1,213	Tang, 2024	174,261	82,722	Low Hb*	110	124	124	130		1.03	No	First

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
										(1.15, 0.92)		trimester

Supplemental Table 20. Observation-level effect sizes - Preterm birth

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,703	Aballo, 2025	80	309	Low Hb	68	111	111	142	Ref upper; Exposed lower	1.37 (0.75, 2.50)	No	First trimester
7,704	Aballo, 2025	127	262	Low Hb	68	111	111	142	Ref upper; Exposed lower	1.21 (0.71, 2.07)	No	Second trimester
7,705	Aballo, 2025	26	363	Low Hb	68	111	111	142	Ref upper; Exposed lower	1.05 (0.38, 2.89)	No	Third trimester
7,344	Abeysena, 2010	20	639	Low Hb	81	105	105	139	Exposed lower	0.64 (0.08, 5.15)	No	First and second trimester
7,345	Abeysena, 2010	35	639	High Hb	141	144	104	140	Exposed upper	0.37 (0.05, 2.80)	No	First and second trimester
7,628	Abioye, 2023	108	538	Low Hb	69	115	115	146	Ref upper; Exposed lower	1.54 (0.94, 2.45)	No	Prenatal
7,315	Ahankari, 2017	356	35	Low Hb	64	111	112	140	Ref upper; Exposed lower	0.61 (0.17, 2.20)	No	Third trimester
7,494	Ahmad, 2022	20	80	Low Hb	100	121	122	143	Ref upper	1.29 (0.35, 4.75)	No	Prenatal
7,495	Ahmad, 2022	80	80	Low Hb	72	122	122	143	Ref upper; Exposed lower	2.48 (1.15, 5.36)	No	Prenatal
7,496	Ahmad, 2022	15	80	Low Hb	72	82	122	143	Ref upper; Exposed lower	23.33 (6.53, 83.33)	No	Prenatal
7,497	Ahmad, 2022	20	80	Low Hb	80	101	122	143	Ref upper	1.29 (0.35, 4.75)	No	Prenatal
7,276	Ali, 2011	303	303	Low Hb	70	112	113	144	Ref upper	3.20	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
										(1.50, 6.60)		
7,277	Ali, 2011	303	303	Low Hb	59	73	113	144	Ref upper; Exposed lower	6.60 (2.70, 16.30)	No	Prenatal
7,353	Alwan, 2015			Low Hb	97	105	105	139	Ref upper; Exposed lower	0.20 (0.04, 1.00)	No	First trimester
7,354	Alwan, 2015			Low Hb	97	110	110	139	Ref upper; Exposed lower	1.30 (0.30, 6.20)	No	First trimester
7,346	Arafa, 1998			Low Hb	100	109	110	141	Ref upper	1.60 (0.94, 2.62)	No	First trimester
7,347	Arafa, 1998			Low Hb	79	89	110	141	Ref upper; Exposed lower	0.86 (0.11, 6.72)	No	Third trimester
7,348	Arafa, 1998			Low Hb	90	99	110	141	Ref upper	2.63 (1.48, 4.71)	No	First trimester
7,349	Arafa, 1998			Low Hb	100	109	110	141	Ref upper	1.40 (0.88, 2.51)	No	Third trimester
7,350	Arafa, 1998			Low Hb	90	99	110	141	Ref upper	2.03 (1.08, 3.83)	No	Third trimester
7,351	Arafa, 1998			Low Hb	79	89	110	141	Ref upper; Exposed lower	4.01 (2.28, 7.03)	No	First trimester
7,682	Arbedili, 2024	322	237	Low Hb	86	117	117	124	Exposed lower	1.16 (0.73, 1.84)	No	Third trimester
7,683	Arbedili, 2024	154	316	Low Hb	86	117	117	124	Exposed lower	1.89 (1.15, 3.01)	No	Second trimester
7,684	Arbedili, 2024	41	237	High Hb	132	143	110	131	Exposed upper	1.19 (0.49, 2.80)	No	Third trimester
7,685	Arbedili, 2024	78	316	High Hb	132	143	110	131	Exposed	0.71	No	Second

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									upper	(0.32, 1.60)		trimester
7,358	Ardic, 2019			Low Hb	100	112	113	144	Ref upper	1.63 (0.93, 4.18)	No	First and second trimester
7,359	Ardic, 2019			Low Hb	83	102	113	144	Ref upper; Exposed lower	2.06 (1.98, 4.03)	No	First and second trimester
7,328	Ashwini, 2018	183	200	Low Hb	40	74	114	145	Ref upper	8.61 (4.24, 17.47)	No	Third trimester
7,329	Ashwini, 2018	17	200	Low Hb	30	44	114	145	Ref upper; Exposed lower	13.23 (5.87, 29.86)	No	Third trimester
7,355	Badi, 2021	80	166	Low Hb	78	103	103	144	Ref upper; Exposed lower	1.99 (1.22, 3.26)	No	Third trimester
7,610	Bakhtiar, 2011	402	458	Low Hb	68	112	112	143	Ref upper; Exposed lower	3.92 (2.36, 6.52)	No	Prenatal
7,275	Bener, 2013	246	1,186	Low Hb	86	110	110	141	Ref upper; Exposed lower	0.96 (0.62, 1.51)	No	Third trimester
7,352	Bhalerao, 2011	787	413	Low Hb	63	111	112	140	Ref upper; Exposed lower	2.23 (1.54, 3.24)	No	Prenatal
7,619	Biradar, 2023	174	128	Low Hb	71	111	111	138	Ref upper; Exposed lower	0.74 (0.10, 5.15)	No	Third trimester
7,295	Bondevik, 2001	440	424	Low Hb	103	115	118	120		0.90 (0.50, 1.60)	No	Prenatal
7,296	Bondevik, 2001	72	424	Low Hb	93	105	118	120		0.60 (0.20, 2.10)	No	Prenatal
7,297	Bondevik,	72	424	Low Hb	83	95	118	120		0.60	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
	2001									(0.20, 2.10)		
7,298	Bondevik, 2001	39	424	Low Hb	58	85	118	120	Exposed lower	3.60 (1.50, 8.70)	No	Prenatal
7,300	Bondevik, 2001	34	424	High Hb	138	151	113	125	Exposed upper	1.40 (0.40, 4.70)	No	Prenatal
7,299	Bondevik, 2001	440	424	Low Hb*	113	125	128	130		1.11 (2.00, 0.62)	No	Prenatal
7,356	Bánhidy, 2011	6,358	31,793	Low Hb	91	106	106	139	Ref upper; Exposed lower	0.97 (0.88, 1.07)	No	First trimester
7,700	Carboo, 2024	178	249	Low Hb	79	115	115	146	Ref upper; Exposed lower	0.64 (0.26, 1.54)	No	Prenatal
7,289	Chang, 2003	64	163	Low Hb	93	105	106	120	Exposed lower	0.85 (0.31, 2.32)	No	Second trimester
7,290	Chang, 2003	65	225	Low Hb	93	95	96	105	Exposed lower	2.06 (1.01, 4.19)	No	Third trimester
7,291	Chang, 2003	290	400	Low Hb	93	105	106	120	Exposed lower	0.73 (0.46, 1.14)	No	Third trimester
7,292	Chang, 2003	479	225	Low Hb*	96	105	105	145	Exposed upper	0.54 (0.93, 0.31)	No	Third trimester
7,293	Chang, 2003	79	400	Low Hb*	106	120	120	145	Exposed upper	0.69 (1.22, 0.39)	No	Third trimester
7,294	Chang, 2003	63	163	Low Hb*	106	120	120	145	Exposed upper	0.43 (0.93, 0.20)	No	Second trimester
7,357	Chasekwa, 2021	609	2,421	Low Hb	75	126	126	147	Ref upper; Exposed lower	1.26 (1.01, 1.56)	No	Prenatal
7,668	Chen, 2024	1,769	28,515	Low Hb	70	100	111	142	Ref upper	1.55 (1.36, 1.77)	No	First trimester
7,669	Chen, 2024	3,703	28,515	Low Hb	100	110	111	142	Ref upper	1.37	Yes	First

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
										(1.24, 1.51)		trimester
7,670	Chen, 2024	100	28,515	Low Hb	57	70	111	142	Ref upper; Exposed lower	4.05 (2.68, 6.12)	No	First trimester
7,706	Chen, 2024	1,769	28,515	Low Hb	70	101	111	142	Ref upper	1.55 (1.36, 1.77)	No	First trimester
7,707	Chen, 2024	3,703	28,515	Low Hb	100	111	111	142	Ref upper	1.37 (1.24, 1.51)	Yes	First trimester
7,708	Chen, 2024	100	28,515	Low Hb	58	71	111	142	Ref upper; Exposed lower	4.05 (2.68, 6.12)	No	First trimester
7,337	Chu, 2020	628	12,398	Low Hb	97	99	99	141	Ref upper; Exposed lower	1.31 (0.98, 1.77)	No	Third trimester
7,360	Chumak, 2010	13,920	10,605	Low Hb	88	111	111	142	Ref upper; Exposed lower	0.66 (0.58, 0.75)	Yes	Prenatal
7,624	Damanhuri, 2024			Low Hb	70	90	110	141	Ref upper	1.18 (1.06, 1.32)	No	Prenatal
7,625	Damanhuri, 2024			Low Hb	90	110	110	141	Ref upper	1.01 (0.93, 1.09)	No	Prenatal
7,626	Damanhuri, 2024			Low Hb	57	70	110	141	Ref upper; Exposed lower	1.11 (0.52, 2.36)	No	Prenatal
7,321	Detlefs, 2022	3,402	13,274	Low Hb	96	110	111	142	Ref upper; Exposed lower	1.45 (1.26, 1.67)	Yes	Prenatal
7,616	Dos Santos, 2022	79	658	Low Hb	92	107	107	143	Ref upper; Exposed lower	1.20 (0.69, 2.10)	No	Second trimester
7,330	Drukker, 2015	7,977	67,683	Low Hb	95	110	111	142	Ref upper; Exposed	1.54 (1.36, 1.76)	Yes	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
7,620	Díaz, 2019	136	292	Low Hb	93	116	116	147	Ref upper; Exposed lower	1.35 (1.01, 1.81)	No	Third trimester
7,361	Dündar, 2010	104	1,012	Low Hb	77	93	93	144	Ref upper; Exposed lower	2.44 (1.02, 5.82)	No	Second trimester
7,660	Elmugabil, 2022	322	644	Low Hb	90	103	103	110		0.59 (0.38, 0.91)	No	Prenatal
7,661	Elmugabil, 2022	137	644	Low Hb	80	93	103	110		0.41 (0.22, 0.77)	No	Prenatal
7,662	Elmugabil, 2022	25	644	Low Hb	78	83	103	110	Exposed lower	0.13 (0.01, 1.03)	No	Prenatal
7,665	Elmugabil, 2022	207	644	High Hb	133	143	100	113	Exposed upper	1.48 (0.83, 2.63)	No	Prenatal
7,663	Elmugabil, 2022	301	644	Low Hb*	100	113	113	120		1.89 (2.78, 1.30)	No	Prenatal
7,664	Elmugabil, 2022	207	644	Low Hb*	100	113	123	130		0.62 (0.94, 0.41)	No	Prenatal
7,362	Finkelstein, 2020	75	174	Low Hb	65	113	113	140	Ref upper; Exposed lower	2.67 (1.43, 5.00)	No	First trimester
7,364	Fukushima, 1991	83	308	High Hb	136	146	110	135	Exposed upper	1.85 (0.57, 6.01)	No	Prenatal
7,363	Fukushima, 1991	88	308	Low Hb	85	111	111	134	Exposed lower	3.06 (1.14, 8.21)	No	Prenatal
7,513	Gaillard, 2014	998	5,288	Low Hb	96	110	110	132	Exposed lower	1.45 (0.93, 2.54)	No	Prenatal
7,514	Gaillard, 2014	1,027	5,288	High Hb	132	152	110	132	Exposed upper	1.30 (1.00, 1.70)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,617	Gamini, 2021			Low Hb	70	103	103	138	Ref upper; Exposed lower	2.34 (1.15, 4.78)	No	Prenatal
7,365	Gann, 1989	42	402	Low Hb	91	100	100	141	Ref upper; Exposed lower	1.36 (0.45, 4.07)	No	Prenatal
7,621	Gerety, 2024	104	272	Low Hb	81	110	110	141	Ref upper; Exposed lower	2.56 (1.26, 5.17)	No	Prenatal
7,689	Gimono, 2024	454	269	Low Hb	89	111	111	140	Ref upper; Exposed lower	2.19 (1.03, 4.66)	No	Third trimester
7,652	Go, 2022	3,133	27,019	Low Hb	90	109	110	129		1.46 (1.23, 1.74)	No	First trimester
7,653	Go, 2022	107	27,019	Low Hb	88	89	110	129	Exposed lower	3.20 (1.69, 6.09)	No	First trimester
7,654	Go, 2022	6,823	25,620	Low Hb	90	109	110	129		1.13 (0.98, 1.30)	No	Second trimester
7,655	Go, 2022	138	25,620	Low Hb	88	89	110	129	Exposed lower	2.30 (1.19, 4.42)	No	Second trimester
7,656	Go, 2022	1,178	27,019	High Hb	140	150	110	129	Exposed upper	1.25 (0.98, 1.60)	No	First trimester
7,657	Go, 2022	1,178	27,019	High Hb	130	139	110	129	Exposed upper	1.25 (0.98, 1.60)	No	First trimester
7,658	Go, 2022	7,647	27,019	High Hb	130	139	110	129		1.04 (0.92, 1.17)	No	First trimester
7,659	Go, 2022	209	25,620	High Hb	140	150	110	129	Exposed upper	1.73 (1.06, 2.83)	No	Second trimester
7,301	Gonzales, 2009	396	13,130	Low Hb	83	94	114	129	Exposed lower	2.50 (1.90, 3.20)	Yes	Prenatal
7,302	Gonzales, 2009	3,564	13,130	Low Hb	90	114	114	129		1.20	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
										(1.10, 1.40)		
7,303	Gonzales, 2009	18,359	13,130	High Hb	134	144	110	133	Exposed upper	0.90 (0.80, 1.01)	No	Prenatal
7,338	Gonzales, 2012	3,635	222,958	Low Hb	80	96	117	144		1.64 (1.48, 1.81)	Yes	Prenatal
7,339	Gonzales, 2012	1,143	222,958	Low Hb	70	86	117	144		2.25 (1.91, 2.65)	Yes	Prenatal
7,340	Gonzales, 2012	45,590	222,958	Low Hb	100	116	117	144		1.04 (1.00, 1.08)	No	Prenatal
7,341	Gonzales, 2012	14,604	222,958	Low Hb	90	106	117	144		1.16 (1.09, 1.23)	No	Prenatal
7,342	Gonzales, 2012	484	222,958	Low Hb	62	76	117	144	Exposed lower	2.87 (2.29, 3.59)	Yes	Prenatal
7,343	Gonzales, 2012	7,237	222,958	High Hb	152	160	110	151	Exposed upper	1.14 (1.05, 1.25)	No	Prenatal
7,604	Gonzales, 2014	789	10,614	Low Hb	90	113	114	148	Ref upper	1.24 (1.14, 1.34)	No	Prenatal
7,605	Gonzales, 2014	154	10,614	Low Hb	70	93	114	148	Ref upper	2.28 (1.90, 2.73)	Yes	Prenatal
7,606	Gonzales, 2014	38	10,614	Low Hb	60	73	114	148	Ref upper; Exposed lower	4.07 (2.77, 5.09)	Yes	Prenatal
7,366	Gyimah, 2021	168	128	Low Hb	70	110	111	142	Ref upper; Exposed lower	1.40 (0.70, 2.90)	No	First trimester
7,666	Habe, 2024	110	56	Low Hb	90	110	110	141	Ref upper; Exposed lower	0.41 (0.11, 1.46)	No	Prenatal
7,602	Harding, 1997	134	944	Low Hb	98	108	109	134	Exposed lower	0.82 (0.22, 1.44)	No	First and second trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,603	Harding, 1997	149	944	High Hb	135	137	109	134	Exposed upper	0.95 (0.67, 1.35)	No	First and second trimester
7,498	Heilmann, 1993	615	92	High Hb	131	148	90	131	Ref lower; Exposed upper	1.48 (1.00, 2.19)	No	Prenatal
7,370	Heydarpour, 2019	1,038	2,463	Low Hb	84	115	117	147	Ref upper; Exposed lower	1.19 (0.90, 1.60)	No	First trimester
7,371	Heydarpour, 2019	756	1,986	Low Hb	84	115	117	147	Ref upper; Exposed lower	2.15 (1.60, 2.91)	No	Third trimester
7,515	Hsu, 2013	176	174	Low Hb	95	119	119	141	Ref upper; Exposed lower	2.96 (1.52, 5.78)	No	First trimester
7,516	Hsu, 2013	182	168	Low Hb	95	118	118	141	Ref upper; Exposed lower	1.43 (0.76, 2.67)	No	First trimester
7,372	Hwang, 2010	377	3,183	Low Hb	91	100	100	141	Ref upper; Exposed lower	1.70 (1.50, 1.90)	Yes	Third trimester
7,367	Hämäläinen, 2003	256	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	1.53 (0.88, 2.64)	No	Third trimester
7,368	Hämäläinen, 2003	69	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	1.80 (0.72, 4.49)	No	First trimester
7,369	Hämäläinen, 2003	272	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	0.97 (0.53, 1.78)	No	Second trimester
7,373	Iqbal, 2020	45	58	Low Hb	72	102	102	143	Ref upper; Exposed lower	1.28 (0.58, 2.86)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,374	Iqbal, 2020	46	45	Low Hb	68	102	102	143	Ref upper; Exposed lower	3.75 (1.57, 8.92)	No	Prenatal
7,375	Iqbal, 2020	49	37	Low Hb	71	102	102	143	Ref upper; Exposed lower	4.07 (1.63, 10.14)	No	Prenatal
7,517	Jahedbozorgan, 2020	6	294	Low Hb	95	105	106	147	Ref upper	0.96 (0.19, 4.83)	No	Prenatal
7,559	Jessani, 2021		1,671	Low Hb	66	76	117	129	Exposed lower	0.49 (0.07, 3.38)	No	Third trimester
7,560	Jessani, 2021		1,671	Low Hb	90	117	117	129		0.99 (0.71, 1.37)	No	Third trimester
7,561	Jessani, 2021		1,671	Low Hb	70	97	117	129		1.06 (0.65, 1.74)	No	Third trimester
7,562	Jessani, 2021		4,696	Low Hb	70	91	111	129		1.03 (0.69, 1.56)	No	First trimester
7,563	Jessani, 2021		4,696	Low Hb	90	111	111	129		0.94 (0.77, 1.14)	No	First trimester
7,564	Jessani, 2021		1,533	Low Hb	90	112	112	129		0.96 (0.77, 1.20)	No	First trimester
7,565	Jessani, 2021		1,533	Low Hb	70	92	112	129		1.16 (0.91, 1.49)	No	First trimester
7,566	Jessani, 2021		1,533	Low Hb	90	112	112	129		1.71 (1.06, 2.78)	No	Third trimester
7,567	Jessani, 2021		1,533	Low Hb	69	71	112	129	Exposed lower	1.95 (1.11, 3.43)	No	Third trimester
7,568	Jessani, 2021		1,533	Low Hb	70	92	112	129		1.68 (1.03, 2.72)	No	Third trimester
7,569	Jessani, 2021		1,671	High Hb	137	160	110	136	Exposed upper	1.46 (0.74, 2.88)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,570	Jessani, 2021		4,696	High Hb	131	138	110	130	Exposed upper	1.27 (0.96, 1.67)	No	First trimester
7,571	Jessani, 2021		1,533	High Hb	132	146	110	131	Exposed upper	3.58 (1.26, 10.14)	No	Third trimester
7,572	Jessani, 2021		1,533	High Hb	132	146	110	131	Exposed upper	1.10 (0.65, 1.85)	No	First trimester
7,376	Kaur, 2015	50	50	Low Hb	68	111	111	142	Ref upper; Exposed lower	1.45 (0.87, 2.48)	No	Second and third trimester
7,615	Kelkay, 2019	48	277	Low Hb	85	121	121	152	Ref upper; Exposed lower	2.44 (1.14, 5.22)	No	Prenatal
7,518	Kemppinen, 2020	215	11,545	Low Hb	94	100	100	141	Ref upper; Exposed lower	1.80 (1.15, 2.81)	No	Prenatal
7,627	Khan, 2023	192	135	Low Hb	92	110	110	141	Ref upper; Exposed lower	1.71 (0.73, 4.00)	No	Prenatal
7,671	Khezri, 2023	267	534	Low Hb	83	116	116	147	Ref upper; Exposed lower	2.69 (1.46, 4.95)	No	First and second trimester
7,701	Khezri, 2025	84	330	Low Hb	86	113	113	149	Ref upper; Exposed lower	2.29 (1.41, 3.73)	No	Second trimester
7,702	Khezri, 2025	41	372	Low Hb	86	117	118	149	Ref upper; Exposed lower	4.92 (1.30, 18.71)	No	First trimester
7,667	Kibret, 2024	59	257	Low Hb	87	122	123	154	Ref upper; Exposed lower	3.12 (1.42, 6.89)	No	Prenatal
7,304	Kidanto, 2009	100	547	Low Hb	65	75	115	146	Ref upper; Exposed lower	4.10 (2.50, 6.60)	No	First and second trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,305	Kidanto, 2009	671	547	Low Hb	70	95	115	146	Ref upper	1.40 (1.01, 1.90)	No	First and second trimester
7,306	Kidanto, 2009	671	547	Low Hb	90	115	115	146	Ref upper	1.40 (1.01, 1.90)	No	First and second trimester
7,377	Kim, 1998	223	600	Low Hb	85	94	115	124		1.27 (0.80, 2.01)	No	Second and third trimester
7,378	Kim, 1998	518	600	Low Hb	95	104	115	124		1.39 (0.97, 1.97)	No	Second and third trimester
7,379	Kim, 1998	706	600	Low Hb	105	114	115	124		1.28 (0.92, 1.80)	No	Second and third trimester
7,380	Kim, 1998	104	600	Low Hb	71	84	115	124	Exposed lower	1.70 (0.99, 2.90)	No	Second and third trimester
7,381	Kim, 1998	92	600	High Hb	135	144	115	124		0.90 (0.42, 1.91)	No	Second and third trimester
7,383	Kim, 1998	31	600	High Hb	145	149	115	124	Exposed upper	3.04 (1.58, 5.83)	No	Second and third trimester
7,382	Kim, 1998	312	600	Low Hb*	115	124	125	134		1.15 (1.85, 0.72)	No	Second and third trimester
7,519	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.50 (1.10, 2.10)	No	Third trimester
7,520	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.60 (1.20, 2.20)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,521	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	0.60 (0.50, 0.80)	No	Third trimester
7,522	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.10 (0.80, 1.50)	No	Third trimester
7,523	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	0.80 (0.60, 1.10)	No	Third trimester
7,524	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	0.70 (0.50, 0.90)	No	Third trimester
7,525	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.20 (0.90, 1.50)	No	Third trimester
7,526	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	0.60 (0.50, 0.80)	No	Third trimester
7,527	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.10 (0.80, 1.50)	No	Third trimester
7,528	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.20 (0.90, 1.50)	No	Third trimester
7,529	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.90 (1.30, 2.70)	No	Third trimester
7,530	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.10 (0.80, 1.50)	No	Third trimester
7,531	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	2.10 (1.30, 3.30)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,532	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.60 (1.20, 2.20)	No	Third trimester
7,533	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.00 (0.80, 1.30)	No	Third trimester
7,534	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.30 (0.90, 1.80)	No	Third trimester
7,535	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	0.80 (0.60, 1.10)	No	Third trimester
7,536	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	0.90 (0.70, 1.20)	No	Third trimester
7,537	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.10 (0.80, 1.50)	No	Third trimester
7,538	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	0.70 (0.50, 0.90)	No	Third trimester
7,539	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.10 (0.80, 1.50)	No	Third trimester
7,540	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.00 (0.80, 1.30)	No	Third trimester
7,541	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	0.80 (0.60, 1.10)	No	Third trimester
7,542	Klebanoff, 1989			Low Hb	89	114	117	141	Ref upper; Exposed lower	1.00 (0.80, 1.30)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,577	Knottnerus, 1990	209	487	Low Hb	92	111	113	127	Exposed lower	1.10 (0.48, 2.50)	No	Third trimester
7,578	Knottnerus, 1990	100	487	Low Hb*	113	127	129	151	Exposed upper	0.39 (0.85, 0.18)	No	Third trimester
7,384	Koura, 2012	229	351	Low Hb	67	110	111	141	Ref upper; Exposed lower	1.30 (0.70, 2.40)	No	Prenatal
7,556	Kumar, 2020	25	1,774	Low Hb	62	70	111	140	Ref upper; Exposed lower	2.94 (1.64, 5.29)	No	Third trimester
7,557	Kumar, 2020	57	1,774	Low Hb	70	100	111	140	Ref upper	1.77 (1.03, 3.07)	No	Third trimester
7,558	Kumar, 2020	93	1,774	Low Hb	100	110	111	140	Ref upper	1.09 (0.61, 1.92)	No	Third trimester
7,612	Kumari, 2019	33	111	Low Hb	68	81	122	133	Ref upper; Exposed lower	4.86 (2.08, 11.36)	No	Prenatal
7,613	Kumari, 2019	265	111	Low Hb	80	101	122	133	Ref upper	3.18 (1.81, 5.58)	No	Prenatal
7,614	Kumari, 2019	106	111	Low Hb	100	121	122	133	Ref upper	3.66 (1.94, 6.92)	No	Prenatal
7,543	Lao, 1996	464	5,190	Low Hb	88	100	101	142	Ref upper; Exposed lower	0.84 (0.56, 1.27)	No	First and third trimester
7,544	Lao, 1996	353	4,935	Low Hb	88	100	101	142	Ref upper; Exposed lower	0.79 (0.51, 1.22)	No	First and third trimester
7,331	Lao, 2022	1,176	4,704	Low Hb	89	101	101	142	Ref upper; Exposed lower	0.70 (0.56, 0.88)	No	Prenatal
7,545	Lee, 2006	55	63	Low Hb	91	107	120	141	Ref upper; Exposed	4.20 (1.23, 14.29)	No	Second and third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			trimester
7,546	Lee, 2006	51	63	Low Hb	108	119	120	141	Ref upper	1.65 (0.39, 7.03)	No	Second and third trimester
7,385	Levy, 2005	12,677	140,192	Low Hb	80	101	101	142	Ref upper	1.20 (1.10, 1.30)	No	First trimester
7,386	Levy, 2005	527	140,192	Low Hb	67	81	101	142	Ref upper; Exposed lower	1.60 (1.30, 2.10)	No	First trimester
7,387	Lieberman, 1988	175	1,309	Low Hb	91	100	104	113	Exposed lower	2.95 (2.16, 4.03)	Yes	Prenatal
7,388	Lieberman, 1988	1,108	1,309	High Hb	137	147	103	114		0.21 (0.13, 0.33)	Yes	Prenatal
7,389	Lieberman, 1988	89	1,309	High Hb	150	160	103	114		0.40 (0.13, 1.25)	No	Prenatal
7,390	Lieberman, 1988			Low Hb*	103	114	117	133		2.32 (NA, NA)	Yes	
7,391	Lin, 2018	6,476	32,963	Low Hb	92	111	112	143	Ref upper; Exposed lower	1.68 (1.53, 1.85)	Yes	Third trimester
7,307	Lone, 2004	313	316	Low Hb	63	110	110	141	Ref upper; Exposed lower	4.00 (2.50, 6.30)	Yes	Second and third trimester
7,332	Lumbanraja, 2019	101	95	Low Hb	66	112	112	140	Ref upper; Exposed lower	0.38 (0.12, 1.16)	No	Second and third trimester
7,322	Mahmood, 2019	235	387	Low Hb	70	102	102	143	Ref upper; Exposed lower	2.64 (1.99, 3.51)	Yes	Third trimester
7,573	Masukume, 2015	125	5,484	Low Hb	93	109	110	141	Ref upper; Exposed lower	1.05 (0.57, 1.94)	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,574	Masukume, 2015	125	5,484	Low Hb	93	109	110	141	Ref upper; Exposed lower	1.30 (0.48, 3.50)	No	First trimester
7,392	Mayorga, 2012	12	75	Low Hb	90	113	113	144	Ref upper; Exposed lower	17.50 (3.08, 129.90)	No	Prenatal
7,278	Meda, 1999	16	82	Low Hb	68	72	112	139	Ref upper; Exposed lower	4.90 (1.50, 15.10)	No	Third trimester
7,279	Meda, 1999	90	82	Low Hb	70	101	112	139	Ref upper	1.70 (0.80, 3.50)	No	Third trimester
7,280	Meda, 1999	59	82	Low Hb	100	111	112	139	Ref upper	0.40 (0.10, 1.30)	No	Third trimester
7,393	Mekonen, 2019	52	496	Low Hb	86	123	123	154	Ref upper; Exposed lower	2.90 (1.30, 6.60)	No	Prenatal
7,611	Mekuriyaw, 2020	24	378	Low Hb	87	122	123	154	Ref upper; Exposed lower	2.75 (1.11, 7.31)	No	Prenatal
7,499	Menon, 2016			Low Hb	69	111	111	138	Ref upper; Exposed lower	3.86 (0.98, 15.18)	No	Third trimester
7,500	Menon, 2016			Low Hb	69	106	106	138	Ref upper; Exposed lower	1.36 (0.55, 3.37)	No	Second trimester
7,394	Moakhar, 2019	12	173	Low Hb	84	111	111	130	Exposed lower	1.60 (0.57, 4.53)	No	First trimester
7,395	Moakhar, 2019	61	262	Low Hb	84	116	116	133	Exposed lower	5.37 (2.96, 9.74)	No	Second trimester
7,396	Moakhar, 2019	18	242	Low Hb	84	116	116	133	Exposed lower	3.36 (1.58, 7.16)	No	First trimester
7,397	Moakhar, 2019	55	264	Low Hb	84	111	111	130	Exposed	6.60	No	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(3.71, 11.73)		trimester
7,398	Moakhar, 2019	113	215	Low Hb	84	116	116	133	Exposed lower	6.13 (3.01, 12.50)	No	Third trimester
7,399	Moakhar, 2019	20	291	Low Hb	84	111	111	130	Exposed lower	4.16 (2.19, 7.90)	No	Second trimester
7,400	Moakhar, 2019	11	262	High Hb	139	143	110	139	Exposed upper	2.98 (0.78, 11.38)	No	Second trimester
7,401	Moakhar, 2019	23	291	High Hb	136	143	105	136	Exposed upper	0.90 (0.23, 3.56)	No	Second trimester
7,402	Moakhar, 2019	74	242	High Hb	139	143	110	139	Exposed upper	1.09 (0.51, 2.32)	No	First trimester
7,403	Moakhar, 2019	149	173	High Hb	136	143	105	136	Exposed upper	0.34 (0.16, 0.73)	No	First trimester
7,688	Moges, 2025	220	239	Low Hb	82	121	121	152	Ref upper; Exposed lower	5.89 (3.78, 9.13)	Yes	Third trimester
7,404	Mohamed, 2012	256	4,081	Low Hb	79	90	110	119	Exposed lower	1.52 (1.12, 2.05)	No	Third trimester
7,405	Mohamed, 2012	622	4,081	Low Hb	90	99	110	119		1.60 (1.31, 1.97)	No	Third trimester
7,406	Mohamed, 2012	1,913	4,081	Low Hb	100	109	110	119		1.45 (1.26, 1.67)	No	Third trimester
7,407	Mohamed, 2012	1,057	4,081	High Hb	140	147	110	119	Exposed upper	0.53 (0.42, 0.67)	Yes	Third trimester
7,408	Mohamed, 2012	3,572	4,081	High Hb	130	139	110	119		0.64 (0.55, 0.73)	Yes	Third trimester
7,409	Mohamed, 2012			Low Hb*	110	119	120	129		1.43 (NA, NA)	Yes	

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,492	Morgan, 2010	309	1,194	Low Hb	90	110	110	141	Ref upper; Exposed lower	1.11 (0.80, 1.40)	No	Prenatal
7,313	Murphy, 1986	377	8,876	Low Hb	98	104	105	132	Exposed lower	1.33 (0.96, 1.84)	No	First and second trimester
7,314	Murphy, 1986	1,543	8,876	High Hb	134	139	104	133	Exposed upper	1.34 (1.13, 1.59)	No	First and second trimester
7,600	Nasiri-Amiri, 2007	69	293	Low Hb	83	113	114	133		3.90 (1.60, 9.60)	No	First trimester
7,601	Nasiri-Amiri, 2007	247	293	High Hb	134	142	113	134	Exposed upper	1.78 (0.87, 3.62)	No	First trimester
7,511	Nsereko, 2020	122	245	Low Hb	85	119	119	150	Ref upper; Exposed lower	4.35 (1.82, 10.38)	No	Third trimester
7,512	Nsereko, 2020	122	245	Low Hb	85	119	119	150	Ref upper; Exposed lower	5.80 (2.74, 12.12)	No	First trimester
7,629	Ohuma, 2023			Low Hb	105	106	110	111		1.07 (0.83, 1.38)	No	Second trimester
7,630	Ohuma, 2023			Low Hb	60	61	110	111		2.47 (1.23, 4.94)	No	Prenatal
7,631	Ohuma, 2023			Low Hb	65	66	110	111		2.25 (1.22, 4.94)	No	Prenatal
7,632	Ohuma, 2023			Low Hb	70	71	110	111		1.86 (1.18, 3.48)	No	Prenatal
7,633	Ohuma, 2023			Low Hb	75	76	110	111		1.86 (1.18, 3.48)	No	Prenatal
7,634	Ohuma, 2023			Low Hb	80	81	110	111		1.69 (1.16, 2.46)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,635	Ohuma, 2023			Low Hb	85	86	110	111		1.54 (1.15, 2.07)	No	Prenatal
7,636	Ohuma, 2023			Low Hb	90	91	110	111		1.40 (1.12, 1.74)	No	Prenatal
7,637	Ohuma, 2023			Low Hb	95	96	110	111		1.27 (1.10, 1.48)	No	Prenatal
7,638	Ohuma, 2023			Low Hb	100	101	110	111		1.16 (1.03, 1.31)	No	Second trimester
7,642	Ohuma, 2023			High Hb	130	131	110	111		0.98 (0.82, 1.17)	No	Third trimester
7,643	Ohuma, 2023			High Hb	135	136	110	111		1.05 (0.85, 1.32)	No	Prenatal
7,644	Ohuma, 2023			High Hb	140	141	110	111		1.17 (0.94, 1.45)	No	Prenatal
7,645	Ohuma, 2023			High Hb	145	146	110	111		1.31 (1.05, 1.62)	No	Prenatal
7,646	Ohuma, 2023			High Hb	150	151	110	111		1.47 (1.16, 1.85)	No	Prenatal
7,647	Ohuma, 2023			High Hb	155	156	110	111		1.64 (0.91, 2.95)	No	Second trimester
7,648	Ohuma, 2023			High Hb	160	160	110	111		1.84 (1.33, 2.54)	No	Prenatal
7,639	Ohuma, 2023			Low Hb*	110	111	115	116		1.04 (1.49, 0.89)	No	Second trimester
7,640	Ohuma, 2023			Low Hb*	110	111	120	121		1.06 (1.30, 0.87)	No	Prenatal
7,641	Ohuma, 2023			Low Hb*	110	111	125	126		1.06 (1.30, 0.87)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,649	Omar, 2022	40	108	Low Hb	65	71	112	143	Ref upper; Exposed lower	0.56 (0.22, 1.40)	No	Third trimester
7,650	Omar, 2022	140	108	Low Hb	70	91	112	143	Ref upper	1.09 (0.52, 2.28)	No	Third trimester
7,651	Omar, 2022	188	108	Low Hb	90	111	112	143	Ref upper	0.92 (0.47, 1.81)	No	Third trimester
7,318	Parks, NA	45,334	11,291	Low Hb	70	99	110	140	Ref upper	1.17 (1.09, 1.25)	No	Prenatal
7,319	Parks, NA	35,001	11,291	Low Hb	100	109	110	140	Ref upper	1.04 (0.97, 1.11)	No	Prenatal
7,320	Parks, NA	621	11,291	Low Hb	56	69	110	140	Ref upper; Exposed lower	1.57 (1.34, 1.84)	No	Prenatal
7,410	Phaloprakarn, 2008	426	448	Low Hb*	110	124	125	145	Exposed upper	0.56 (1.00, 0.29)	No	First trimester
7,411	Pinho, 2017	199	275	Low Hb	75	112	113	144	Ref upper; Exposed lower	1.12 (0.80, 1.57)	No	Prenatal
7,687	Prioreschi, 2025	175	173	Low Hb	79	115	115	146	Ref upper; Exposed lower	0.88 (0.56, 1.39)	No	First and second trimester
7,493	Radoń, 2016	90	360	Low Hb	92	111	111	142	Ref upper; Exposed lower	3.56 (1.93, 6.55)	No	Third trimester
7,414	Ramya, 2019	361	609	Low Hb	70	103	113	140	Ref upper	0.97 (0.76, 1.25)	No	Prenatal
7,415	Ramya, 2019	518	609	Low Hb	100	113	113	140	Ref upper	0.93 (0.74, 1.16)	No	Prenatal
7,416	Ramya, 2019	13	609	Low Hb	67	73	113	140	Ref upper; Exposed lower	1.06 (0.39, 2.91)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,333	Randall, 2019	1,282	27,356	Low Hb	95	110	111	139	Exposed lower	1.59 (1.35, 1.88)	Yes	First and second trimester
7,334	Randall, 2019	3,628	27,356	High Hb	141	153	110	140	Exposed upper	1.20 (1.07, 1.35)	No	First and second trimester
7,575	Rao, 2018	173	887	Low Hb	70	113	114	140	Ref upper; Exposed lower	0.86 (0.43, 1.70)	No	Second and third trimester
7,576	Rao, 2018	31	1,029	Low Hb	70	104	104	140	Ref upper; Exposed lower	0.54 (0.07, 3.73)	No	Second and third trimester
7,607	Rasmussen, 1993	8	99	Low Hb	87	111	111	140	Exposed lower	1.21 (0.63, 2.46)	No	First trimester
7,608	Rasmussen, 1993	10	335	High Hb	142	148	110	141	Exposed upper	1.58 (1.11, 2.27)	No	First trimester
7,690	Rawat, 2025	112	123	Low Hb	70	91	111	138	Ref upper	1.46 (0.98, 2.18)	No	Third trimester
7,691	Rawat, 2025	57	123	Low Hb	90	111	111	138	Ref upper	1.22 (0.74, 2.03)	No	Third trimester
7,692	Rawat, 2025	8	123	Low Hb	57	71	111	138	Ref upper; Exposed lower	2.56 (1.38, 4.77)	No	Third trimester
7,547	Razmy, 2016	560	2,568	Low Hb	80	106	106	125		1.30 (1.02, 1.66)	No	Prenatal
7,548	Razmy, 2016	38	2,568	Low Hb	79	81	106	125	Exposed lower	2.63 (1.53, 4.53)	No	Prenatal
7,549	Razmy, 2016	336	2,568	Low Hb*	105	126	126	146	Exposed upper	0.96 (1.33, 0.69)	No	Prenatal
7,308	Ren, 2007	19,329	68,820	Low Hb	80	111	112	143	Ref upper; Exposed lower	1.17 (1.09, 1.27)	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,309	Ren, 2007	3,828	44,028	Low Hb	80	101	112	119		1.34 (1.16, 1.55)	No	First trimester
7,310	Ren, 2007	110	44,028	Low Hb	69	82	112	119	Exposed lower	1.86 (0.90, 3.84)	No	First trimester
7,312	Ren, 2007	4,299	44,028	High Hb	142	159	110	121		0.91 (0.77, 1.06)	No	First trimester
7,311	Ren, 2007	35,687	44,028	Low Hb*	110	121	122	139		1.02 (1.10, 0.96)	No	First trimester
7,417	Ribot, 2014			Low Hb	91	107	107	143	Ref upper; Exposed lower	0.90 (0.20, 5.10)	No	Second trimester
7,418	Ribot, 2014			Low Hb	91	112	112	143	Ref upper; Exposed lower	2.80 (0.20, 41.30)	No	First trimester
7,419	Ribot, 2014			Low Hb	91	112	112	143	Ref upper; Exposed lower	7.10 (1.80, 27.30)	No	Third trimester
7,420	Ronnenberg, 2004	40	90	Low Hb	89	95	120	141	Ref upper; Exposed lower	2.90 (0.80, 11.30)	No	Prenatal
7,421	Ronnenberg, 2004	275	90	Low Hb	95	120	120	141	Ref upper	0.70 (0.30, 1.90)	No	Prenatal
7,323	Rukuni, 2016	7,475	72,947	Low Hb	99	100	101	141	Ref upper; Exposed lower	0.97 (0.88, 1.07)	No	First trimester
7,412	Räisänen, 2014	3,827	163,812	Low Hb	93	99	100	141	Ref upper; Exposed lower	1.32 (1.14, 1.53)	No	First trimester
7,413	Räisänen, 2014	3,003	119,325	Low Hb	93	99	100	141	Ref upper; Exposed lower	0.99 (0.84, 1.16)	No	First trimester
7,422	Salman, 2020	94	110	Low Hb	70	90	111	142	Ref upper	0.70	No	Second and

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
										(0.42, 1.18)		third trimester
7,423	Salman, 2020	64	110	Low Hb	90	110	111	142	Ref upper	1.97 (1.35, 2.88)	No	Second and third trimester
7,424	Salman, 2020	167	110	Low Hb	90	110	111	142	Ref upper	0.11 (0.04, 0.27)	Yes	Second and third trimester
7,425	Salman, 2020	65	110	Low Hb	57	70	111	142	Ref upper; Exposed lower	2.00 (1.37, 2.93)	No	Second and third trimester
7,335	Salunkhe, 2021	16	698	Low Hb	69	71	111	139	Ref upper; Exposed lower	0.86 (0.31, 2.41)	No	Prenatal
7,426	Scholl, 1992	217	562	Low Hb	91	109	110	141	Ref upper; Exposed lower	1.30 (0.86, 2.24)	No	First and second trimester
7,680	Seifi, 2015	162	162	Low Hb	83	111	111	147	Ref upper; Exposed lower	3.29 (1.36, 7.99)	No	Second and third trimester
7,681	Seifi, 2015	162	162	Low Hb	83	116	116	147	Ref upper; Exposed lower	0.99 (0.41, 2.46)	No	First trimester
7,427	Shah, 2022	206	194	Low Hb	72	112	112	143	Ref upper; Exposed lower	3.39 (1.73, 6.65)	No	Prenatal
7,686	Shrivastava, 2024	26	76	Low Hb	28	42	42	138	Ref upper; Exposed lower	4.00 (0.87, 18.37)	No	Prenatal
7,428	Siega, 1998	59	272	Low Hb	89	111	111	133	Exposed lower	1.17 (0.59, 2.31)	No	First and second trimester
7,429	Siega, 1998	44	463	Low Hb	89	111	111	133	Exposed	1.03	No	First and

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(0.33, 3.24)		second trimester
7,430	Siega, 1998	16	212	Low Hb	89	111	111	133	Exposed lower	1.79 (0.43, 7.22)	No	First and second trimester
7,431	Siega, 1998	483	4,711	Low Hb	89	111	111	133	Exposed lower	1.82 (1.36, 2.42)	No	Third trimester
7,432	Siega, 1998	532	5,246	Low Hb	89	111	111	133	Exposed lower	0.94 (0.66, 1.34)	No	First and second trimester
7,433	Siega, 1998	673	6,447	Low Hb	89	111	111	133	Exposed lower	1.05 (0.79, 1.40)	No	First and second trimester
7,434	Siega, 1998	19	185	Low Hb	89	111	111	133	Exposed lower	3.68 (1.26, 10.74)	No	Third trimester
7,435	Siega, 1998	604	5,597	Low Hb	89	111	111	133	Exposed lower	1.87 (1.46, 2.39)	No	Third trimester
7,436	Siega, 1998	39	419	Low Hb	89	111	111	133	Exposed lower	1.45 (0.64, 3.30)	No	Third trimester
7,437	Siega, 1998	51	235	Low Hb	89	111	111	133	Exposed lower	1.57 (0.78, 3.16)	No	Third trimester
7,438	Siega, 1998	22	264	High Hb	134	146	110	134	Exposed upper	0.41 (0.06, 2.86)	No	Third trimester
7,439	Siega, 1998			High Hb	134	146	110	134	Exposed upper	1.83 (1.21, 2.77)	No	Third trimester
7,440	Siega, 1998	25	482	High Hb	134	146	110	134	Exposed upper	1.21 (0.31, 4.78)	No	First and second trimester
7,441	Siega, 1998			High Hb	134	146	110	134	Exposed upper	0.78 (0.44, 1.39)	No	Third trimester
7,442	Siega, 1998	342	6,778	High Hb	134	146	110	134	Exposed upper	0.89 (0.58, 1.36)	No	First and second

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
												trimester
7,443	Siega, 1998	295	5,483	High Hb	134	146	110	134	Exposed upper	0.81 (0.49, 1.34)	No	First and second trimester
7,444	Siega, 1998	595	5,606	High Hb	134	146	110	134	Exposed upper	0.65 (0.43, 0.97)	No	Third trimester
7,445	Siega, 1998	32	426	High Hb	134	146	110	134	Exposed upper	1.40 (0.46, 4.30)	No	Third trimester
7,446	Siega, 1998	595	5,606	High Hb	134	146	110	134	Exposed upper	0.65 (0.43, 0.97)	No	Third trimester
7,447	Siega, 1998	11	320	High Hb	134	146	110	134	Exposed upper	2.09 (0.76, 5.78)	No	First and second trimester
7,698	Skhvitaridze, 2025	22,122	75,114	Low Hb	100	112	112	143	Ref upper	0.95 (0.87, 1.04)	No	Third trimester
7,699	Skhvitaridze, 2025	8,575	75,114	Low Hb	82	102	112	143	Ref upper; Exposed lower	0.93 (0.82, 1.06)	No	Third trimester
7,324	Smith, 2019			Low Hb	90	110	111	142	Ref upper	1.09 (1.05, 1.12)	No	Third trimester
7,325	Smith, 2019			Low Hb	70	90	111	142	Ref upper	2.26 (2.02, 2.54)	Yes	Third trimester
7,326	Smith, 2019			Low Hb	90	111	111	142	Ref upper; Exposed lower	2.27 (2.06, 2.50)	Yes	Third trimester
7,327	Smith, 2019			Low Hb	58	71	111	142	Ref upper; Exposed lower	2.58 (1.65, 4.02)	No	Third trimester
7,448	Steer, 1995	3,185	17,411	Low Hb	86	95	96	105		1.21 (1.05, 1.39)	No	Prenatal
7,449	Steer, 1995	499	17,411	Low Hb	72	85	96	105	Exposed	1.72	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(1.35, 2.18)		
7,453	Steer, 1995	1,477	17,411	High Hb	136	145	96	105		3.04 (2.60, 3.56)	Yes	Prenatal
7,454	Steer, 1995	121	17,411	High Hb	145	159	96	105	Exposed upper	5.61 (3.70, 8.49)	Yes	Prenatal
7,450	Steer, 1995	34,671	17,411	Low Hb*	96	105	116	125		0.67 (0.72, 0.62)	Yes	Prenatal
7,451	Steer, 1995			Low Hb*	96	105	126	135		0.46 (NA, NA)	Yes	
7,452	Steer, 1995	40,614	17,411	Low Hb*	96	105	106	115		0.89 (0.96, 0.83)	No	Prenatal
7,455	Sun, 2021	443	2,729	Low Hb	92	112	112	143	Ref upper; Exposed lower	2.04 (1.31, 3.16)	No	Prenatal
7,456	Sureshbabu, 2021	59	332	Low Hb	85	109	110	138	Ref upper; Exposed lower	2.54 (1.28, 5.03)	No	Prenatal
7,501	Symington, 2019			Low Hb	79	115	115	146	Ref upper; Exposed lower	0.60 (0.20, 1.84)	No	Second trimester
7,502	Symington, 2019			Low Hb	79	110	110	146	Ref upper; Exposed lower	1.06 (0.25, 4.55)	No	Third trimester
7,503	Symington, 2019			Low Hb	79	115	115	146	Ref upper; Exposed lower	1.59 (0.50, 5.04)	No	First and second trimester
7,504	Symington, 2019			Low Hb	79	115	115	146	Ref upper; Exposed lower	2.47 (0.44, 13.83)	No	Third trimester
7,505	Symington, 2019			Low Hb	79	110	110	146	Ref upper; Exposed lower	1.07 (0.34, 3.30)	No	Second trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,506	Symington, 2019			Low Hb	79	110	110	146	Ref upper; Exposed lower	1.93 (0.36, 10.40)	No	Third trimester
7,507	Tabrizi, 2019	424	936	Low Hb	82	111	111	147	Ref upper; Exposed lower	1.48 (1.02, 3.67)	No	First and second trimester
7,457	Tabussum, 1994	52	248	Low Hb	68	102	102	143	Ref upper; Exposed lower	8.14 (4.14, 16.02)	Yes	Prenatal
7,693	Tang, 2024	20,105	82,722	Low Hb	100	114	114	120		1.02 (0.95, 1.10)	No	First trimester
7,694	Tang, 2024	6,285	82,722	Low Hb	93	104	114	120	Exposed lower	1.15 (1.03, 1.29)	No	First trimester
7,696	Tang, 2024	39,237	82,722	High Hb	144	150	110	124	Exposed upper	1.20 (1.14, 1.26)	No	First trimester
7,697	Tang, 2024	131,205	82,722	High Hb	134	140	110	124		1.07 (1.02, 1.11)	No	First trimester
7,695	Tang, 2024	174,261	82,722	Low Hb*	110	124	124	130		0.99 (1.02, 0.95)	No	First trimester
7,458	Turner, 2012	244	441	Low Hb	93	112	112	143	Ref upper; Exposed lower	1.14 (0.78, 1.68)	No	Prenatal
7,336	Tzur, 2012	1,718	32,179	Low Hb	93	101	101	142	Ref upper; Exposed lower	1.35 (1.20, 1.60)	No	First trimester
7,709	Ulaganeethi, 2024	323	299	Low Hb	72	111	111	137	Ref upper; Exposed lower	2.31 (0.73, 7.30)	No	First trimester
7,710	Ulaganeethi, 2024	323	299	Low Hb	72	111	111	137	Ref upper; Exposed lower	2.31 (0.73, 7.30)	No	First trimester
7,679	Vakili, 2018	40	510	Low Hb	84	116	116	147	Ref upper;	11.33	Yes	First and

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(4.62, 27.77)		second trimester
7,316	Verhoeff, 2001	308	1,215	Low Hb	64	85	85	146	Ref upper; Exposed lower	1.20 (0.90, 1.60)	No	First and second trimester
7,317	Verhoeff, 2001	308	1,215	Low Hb	64	85	85	146	Ref upper; Exposed lower	1.20 (0.90, 1.60)	No	First and second trimester
7,459	Vural, 2016	1,050	7,233	Low Hb	79	103	113	144	Ref upper; Exposed lower	0.34 (0.31, 0.38)	Yes	Second trimester
7,460	Vural, 2016	327	8,511	Low Hb	79	103	113	144	Ref upper; Exposed lower	1.18 (0.92, 1.52)	No	First trimester
7,461	Vural, 2016	824	8,511	Low Hb	100	113	113	144	Ref upper	1.13 (0.96, 1.34)	No	First trimester
7,462	Vural, 2016	2,949	15,902	Low Hb	79	103	113	144	Ref upper; Exposed lower	1.15 (1.05, 1.25)	No	Third trimester
7,463	Vural, 2016	4,901	15,902	Low Hb	100	113	113	144	Ref upper	1.05 (0.97, 1.13)	No	Third trimester
7,464	Vural, 2016	2,527	7,233	Low Hb	100	113	113	144	Ref upper	0.27 (0.26, 0.29)	Yes	Second trimester
7,465	Wagura, 2018	79	195	Low Hb	83	107	108	149	Ref upper; Exposed lower	0.95 (0.48, 1.88)	No	Prenatal
7,466	Wahabi, 2022	1,532	7,339	Low Hb	70	102	113	144	Ref upper	1.14 (0.96, 1.37)	No	Second trimester
7,467	Wahabi, 2022	1,729	7,339	Low Hb	100	112	113	144	Ref upper	1.11 (0.93, 1.31)	No	Second trimester
7,672	Wang, 2007	659	13,006	Low Hb	70	82	92	100		1.00 (0.60, 1.50)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,673	Wang, 2007	3,584	13,006	Low Hb	80	92	92	100		1.10 (0.90, 1.30)	No	Third trimester
7,674	Wang, 2007	170	13,006	Low Hb	59	72	92	100	Exposed lower	1.80 (1.00, 3.30)	No	Third trimester
7,676	Wang, 2007	14,397	13,006	High Hb	132	140	90	102		1.20 (1.00, 1.30)	No	Third trimester
7,678	Wang, 2007	659	13,006	Low Hb	90	102	102	110		1.00 (0.60, 1.50)	No	Third trimester
7,675	Wang, 2007	14,397	13,006	Low Hb*	90	102	122	130		0.83 (1.00, 0.77)	No	Third trimester
7,677	Wang, 2007	3,584	13,006	Low Hb*	90	102	112	120		0.91 (1.11, 0.77)	No	Third trimester
7,468	Wang, 2018	11,341	9,392	Low Hb	92	111	112	143	Ref upper; Exposed lower	0.80 (0.70, 0.91)	No	First trimester
7,469	Wang, 2018	333	9,392	Low Hb	92	111	112	143	Ref upper; Exposed lower	0.38 (0.18, 0.77)	No	First trimester
7,470	Wang, 2018	586	9,392	Low Hb	92	111	112	143	Ref upper; Exposed lower	1.41 (1.01, 1.97)	No	First trimester
7,711	Wassie, NA	61	251	Low Hb	87	122	123	154	Ref upper; Exposed lower	3.89 (2.01, 7.51)	No	Prenatal
7,471	Watson, 2007			Low Hb	65	129	129	146	Ref upper; Exposed lower	1.42 (0.80, 2.40)	No	Third trimester
7,472	Wu, 2022	405	779	Low Hb	93	111	111	119	Exposed lower	1.05 (0.62, 1.77)	No	Second trimester
7,473	Wu, 2022	392	698	Low Hb	93	111	111	119	Exposed lower	1.51 (0.91, 2.51)	No	Third trimester
7,474	Wu, 2022	144	779	High Hb	131	151	110	120	Exposed	1.25	No	Second

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									upper	(0.61, 2.54)		trimester
7,477	Wu, 2022	212	698	High Hb	131	151	110	120	Exposed upper	1.64 (0.89, 3.01)	No	Third trimester
7,476	Wu, 2022	405	779	Low Hb	110	120	121	129	Exposed lower	1.05 (0.62, 1.77)	No	Second trimester
7,475	Wu, 2022	609	698	Low Hb*	110	120	121	129		1.27 (2.13, 0.75)	No	Third trimester
7,281	Xiong, 2003			Low Hb	80	100	100	141	Ref upper	0.64 (0.50, 0.84)	No	Second and third trimester
7,282	Xiong, 2003	3,001	12,942	Low Hb	86	100	100	141	Ref upper; Exposed lower	0.72 (0.56, 0.92)	No	Third trimester
7,283	Xiong, 2003	1,487	13,023	Low Hb	86	100	100	141	Ref upper; Exposed lower	1.01 (0.75, 1.37)	No	First trimester
7,508	Yahia, 2020	121	605	Low Hb	54	78	108	109	Exposed lower	1.71 (0.98, 2.96)	No	Prenatal
7,509	Yahia, 2020	1,752	605	Low Hb	70	107	108	109		1.13 (0.82, 1.56)	No	Prenatal
7,609	Yazdani, 2004	180	419	Low Hb	80	111	146	147	Ref upper; Exposed lower	104.75 (14.55, 754.10)	Yes	Prenatal
7,622	Young, 2023	313	1,234	Low Hb	89	109	109	141	Ref upper; Exposed lower	1.40 (0.70, 2.80)	No	Prenatal
7,623	Young, 2023	313	1,234	Low Hb	89	120	120	141	Ref upper; Exposed lower	1.16 (0.77, 1.75)	No	Prenatal
7,510	Yousaf, 2011	407	411	Low Hb	62	110	110	141	Ref upper; Exposed lower	3.92 (2.60, 5.90)	Yes	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,618	Zewde, 2020			Low Hb	81	121	121	152	Ref upper; Exposed lower	1.40 (0.30, 2.20)	No	Prenatal
7,579	Zhang, 2009	6,505	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.79 (0.69, 0.91)	No	Prenatal
7,580	Zhang, 2009	5,528	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.75 (0.47, 1.19)	No	Prenatal
7,581	Zhang, 2009	5,204	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.76 (0.63, 0.90)	No	Prenatal
7,582	Zhang, 2009	5,204	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.79 (0.68, 0.92)	No	Prenatal
7,583	Zhang, 2009	11,627	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.65 (0.58, 0.73)	Yes	Prenatal
7,584	Zhang, 2009	1,917	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	1.04 (0.84, 1.30)	No	Prenatal
7,585	Zhang, 2009	927	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.94 (0.35, 2.53)	No	Prenatal
7,586	Zhang, 2009	6,505	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.90 (0.61, 1.34)	No	Prenatal
7,587	Zhang, 2009	927	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.73 (0.50, 1.05)	No	Prenatal
7,588	Zhang, 2009	6,505	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.73 (0.62, 0.86)	Yes	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,589	Zhang, 2009	11,627	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.64 (0.56, 0.73)	Yes	Prenatal
7,590	Zhang, 2009	5,528	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	1.14 (1.01, 1.30)	No	Prenatal
7,591	Zhang, 2009	1,917	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	1.06 (0.83, 1.35)	No	Prenatal
7,592	Zhang, 2009	5,204	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.84 (0.53, 1.32)	No	Prenatal
7,593	Zhang, 2009	5,528	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	1.18 (1.03, 1.36)	No	Prenatal
7,594	Zhang, 2009	1,917	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.91 (0.45, 1.84)	No	Prenatal
7,595	Zhang, 2009	2,318	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.84 (0.67, 1.04)	No	Prenatal
7,596	Zhang, 2009	11,627	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.69 (0.49, 0.97)	No	Prenatal
7,597	Zhang, 2009	2,318	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.66 (0.31, 1.39)	No	Prenatal
7,598	Zhang, 2009	2,318	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.76 (0.58, 0.98)	No	Prenatal
7,599	Zhang, 2009	2,318	63,586	Low Hb	88	102	102	143	Ref upper; Exposed lower	0.76 (0.58, 0.98)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
7,478	Zhang, 2018	182,943	2,310,198	Low Hb	100	111	112	149		0.95 (0.93, 0.97)	No	Prenatal
7,479	Zhang, 2018	80,929	2,334,751	Low Hb	70	101	112	149		1.01 (0.99, 1.04)	Yes	Prenatal
7,480	Zhang, 2018	184,990	2,334,751	Low Hb	100	111	112	149		0.96 (0.94, 0.98)	No	Prenatal
7,481	Zhang, 2018	182,943	2,310,198	Low Hb	100	111	112	149		0.95 (0.93, 0.97)	No	Prenatal
7,482	Zhang, 2018	80,001	2,310,198	Low Hb	70	101	112	149		0.98 (0.95, 1.02)	Yes	Prenatal
7,483	Zhang, 2018			Low Hb	70	101	112	149		0.97 (0.95, 1.01)	Yes	Prenatal
7,484	Zhang, 2018	1,435	2,310,198	Low Hb	58	72	112	149	Exposed lower	1.22 (0.99, 1.50)	No	Prenatal
7,485	Zhang, 2018	19,565	2,334,751	Low Hb	58	72	112	149		1.11 (1.05, 1.17)	No	Prenatal
7,486	Zhang, 2018	1,453	2,334,751	Low Hb	58	72	112	149	Exposed lower	1.19 (0.98, 1.44)	No	Prenatal
7,487	Zhang, 2018	174,419	2,194,350	High Hb	152	159	110	151		1.05 (1.01, 1.10)	No	Prenatal
7,488	Zhang, 2018	88,503	2,334,751	High Hb	152	159	110	151		1.04 (1.01, 1.06)	No	Prenatal
7,489	Zhang, 2018	88,503	2,334,751	High Hb	152	159	110	151		1.04 (1.01, 1.06)	No	Prenatal
7,550	Zhang, 2018	6,714	1,667	High Hb*	132	143	90	131	Ref upper; Exposed lower	0.77 (1.04, 0.57)	No	First and second trimester
7,551	Zhang, 2018	671	1,667	High Hb*	132	143	90	131	Ref upper; Exposed lower	0.45 (0.67, 0.30)	No	First and second trimester
7,552	Zhang, 2018	441	1,129	High Hb*	132	143	90	131	Ref upper;	0.44	No	First and

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(0.73, 0.27)		second trimester
7,553	Zhang, 2018	2,068	556	High Hb*	132	143	90	131	Ref upper; Exposed lower	0.79 (1.30, 0.49)	No	First and second trimester
7,554	Zhang, 2018	233	556	High Hb*	132	143	90	131	Ref upper; Exposed lower	0.46 (0.90, 0.24)	No	First and second trimester
7,555	Zhang, 2018	4,171	1,129	High Hb*	132	143	90	131	Ref upper; Exposed lower	0.76 (1.10, 0.52)	No	First and second trimester
7,555	Zhang, 2018	1,195	1,129	High Hb*	132	143	90	131	Ref upper; Exposed upper	0.76 (1.19, 0.49)	No	First and second trimester
7,284	Zhou, 1998	263	239	Low Hb	100	109	110	119		1.64 (0.77, 3.47)	No	First trimester
7,285	Zhou, 1998	109	239	Low Hb	90	99	110	119		2.63 (1.17, 5.90)	No	First trimester
7,286	Zhou, 1998	32	239	Low Hb	85	90	110	119	Exposed lower	3.73 (1.36, 10.23)	No	First trimester
7,288	Zhou, 1998	57	239	High Hb	130	144	110	119	Exposed upper	2.52 (0.95, 6.64)	No	First trimester
7,287	Zhou, 1998	129	239	Low Hb*	110	119	120	129		0.90 (2.44, 0.33)	No	First trimester
7,490	Özgen, 2020	1,729	4,559	Low Hb	82	112	113	124	Exposed lower	1.10 (0.84, 1.44)	No	Prenatal
7,491	Özgen, 2020	1,281	3,408	Low Hb*	110	127	128	144	Exposed upper	0.89 (1.14, 0.69)	No	Prenatal

Supplemental Table 21. Observation-level effect sizes- Low birthweight

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,229	Aballo, 2025	26	363	Low Hb	68	111	111	142	Ref upper; Exposed lower	0.39 (0.05, 2.95)	No	Third trimester
23,230	Aballo, 2025	80	309	Low Hb	68	111	111	142	Ref upper; Exposed lower	3.25 (1.35, 7.82)	No	First trimester
23,231	Aballo, 2025	127	262	Low Hb	68	111	111	142	Ref upper; Exposed lower	0.94 (0.45, 1.99)	No	Second trimester
22,912	Abdelmoneim, 2004			Low Hb	82	113	113	144	Ref upper; Exposed lower	1.23 (1.06, 1.42)	No	Prenatal
22,913	Abera, 2019	66	292	Low Hb	80	121	121	152	Ref upper; Exposed lower	3.42 (1.73, 6.78)	No	Prenatal
22,904	Abeysena, 2010	20	639	Low Hb	81	105	105	139	Exposed lower	0.56 (0.07, 4.74)	No	First and second trimester
22,905	Abeysena, 2010	35	639	High Hb	141	144	104	140	Exposed upper	3.95 (1.30, 12.00)	No	First and second trimester
23,177	Abioye, 2023	108	538	Low Hb	69	115	115	146	Ref upper; Exposed lower	0.73 (0.34, 1.39)	No	Prenatal
22,914	Adam, 2019	193	164	Low Hb	66	111	111	142	Ref upper; Exposed lower	3.14 (1.50, 6.58)	No	First trimester
23,226	Adane, 2018	38	608	Low Hb	87	122	123	154	Ref upper; Exposed lower	2.50 (0.92, 6.71)	No	Prenatal
23,169	Adjei, 2023	158	192	Low Hb	68	111	111	131	Exposed lower	23.94 (7.44, 77.01)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,170	Adjei, 2023	160	177	Low Hb	68	111	111	131	Exposed lower	3.23 (1.37, 7.58)	No	First trimester
22,884	Ahankari, 2017	336	32	Low Hb	64	111	112	140	Ref upper; Exposed lower	0.75 (0.27, 2.10)	No	Third trimester
22,916	Ahankari, 2017	190	58	Low Hb	66	112	112	140	Ref upper; Exposed lower	0.34 (0.13, 0.92)	No	First and second trimester
22,832	Ahmad, 1997	3,505	5,558	Low Hb	90	109	111	141	Ref upper	0.96 (0.82, 1.13)	No	Third trimester
22,833	Ahmad, 1997	125	5,558	Low Hb	87	90	111	141	Ref upper; Exposed lower	0.73 (0.33, 1.60)	No	Third trimester
22,909	Ahmad, 2017	3	100	Low Hb	60	80	100	141	Ref upper; Exposed lower	25.00 (9.57, 65.31)	Yes	Prenatal
22,910	Ahmad, 2017	65	100	Low Hb	90	99	100	141	Ref upper	7.69 (2.75, 21.48)	No	Prenatal
22,911	Ahmad, 2017	32	100	Low Hb	80	89	100	141	Ref upper	21.09 (7.98, 55.74)	Yes	Prenatal
23,055	Ahmad, 2022	80	80	Low Hb	72	122	122	143	Ref upper; Exposed lower	4.06 (1.63, 10.12)	No	Prenatal
23,056	Ahmad, 2022	20	80	Low Hb	100	121	122	143	Ref upper	2.25 (0.59, 8.57)	No	Prenatal
23,057	Ahmad, 2022	15	80	Low Hb	72	82	122	143	Ref upper; Exposed lower	62.00 (16.27, 236.42)	Yes	Prenatal
23,058	Ahmad, 2022	20	80	Low Hb	80	101	122	143	Ref upper	2.25 (0.59, 8.57)	No	Prenatal
22,917	Ahmed, 2018	47	232	Low Hb	86	122	123	154	Ref upper; Exposed	3.54 (1.46, 8.61)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
22,918	Al, 1987	39	165	Low Hb	83	109	109	144	Ref upper; Exposed lower	2.66 (1.62, 4.38)	No	Prenatal
22,906	Alemu, 2020	51	90	Low Hb	88	113	114	155	Ref upper; Exposed lower	13.60 (6.50, 27.30)	Yes	First trimester
22,907	Alemu, 2020	51	90	Low Hb	88	113	114	155	Ref upper; Exposed lower	10.00 (5.00, 20.10)	No	Second trimester
22,822	Ali, 2011	303	303	Low Hb	70	112	113	144	Ref upper	2.50 (1.10, 5.70)	No	Prenatal
22,823	Ali, 2011	303	303	Low Hb	51	73	113	144	Ref upper; Exposed lower	8.00 (3.80, 16.00)	No	Prenatal
22,919	Alvarez, 2019	43	47	Low Hb	87	110	110	141	Ref upper; Exposed lower	2.59 (1.04, 6.40)	No	Prenatal
23,127	Anchang, 2020	265	150	Low Hb	75	113	113	144	Ref upper; Exposed lower	4.60 (1.03, 20.57)	No	Third trimester
23,135	Aynie, 2020	36	256	Low Hb	87	122	123	154	Ref upper; Exposed lower	6.10 (2.18, 17.01)	No	Third trimester
22,920	Badi, 2021	80	166	Low Hb	78	103	103	144	Ref upper; Exposed lower	2.55 (1.64, 3.98)	No	Third trimester
23,076	Bakacak, 2015	18	38	Low Hb	82	93	113	144	Ref upper; Exposed lower	0.26 (0.07, 1.03)	No	Second trimester
23,077	Bakacak, 2015	133	37	Low Hb	82	93	113	144	Ref upper; Exposed lower	0.23 (0.13, 0.41)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,078	Bakacak, 2015	147	87	Low Hb	82	93	113	144	Ref upper; Exposed lower	0.99 (0.59, 1.66)	No	Third trimester
23,079	Bakacak, 2015	22	103	Low Hb	82	93	113	144	Ref upper; Exposed lower	1.28 (0.59, 2.78)	No	Second trimester
23,080	Bakacak, 2015	62	68	Low Hb	82	93	113	144	Ref upper; Exposed lower	0.44 (0.21, 0.92)	No	First trimester
23,081	Bakacak, 2015	60	169	Low Hb	82	93	113	144	Ref upper; Exposed lower	0.35 (0.16, 0.78)	No	First trimester
23,171	Barut, 2023	260	417	Low Hb	100	111	112	143	Ref upper	1.04 (0.71, 1.53)	No	Prenatal
23,172	Barut, 2023	49	417	Low Hb	65	71	112	143	Ref upper; Exposed lower	3.45 (1.87, 6.35)	No	Prenatal
23,173	Barut, 2023	460	417	Low Hb	70	101	112	143	Ref upper	1.33 (0.97, 1.83)	No	Prenatal
22,922	Becerra, 1998	714	301	Low Hb	79	117	118	149	Ref upper; Exposed lower	1.09 (0.76, 1.56)	No	Third trimester
22,821	Bener, 2013	246	1,186	Low Hb	86	110	110	141	Ref upper; Exposed lower	1.50 (0.97, 2.33)	No	Third trimester
22,908	Bhalerao, 2011	787	413	Low Hb	63	111	112	140	Ref upper; Exposed lower	1.05 (0.74, 1.50)	No	Prenatal
22,923	Bian, 2013	2,777	52,856	Low Hb	90	100	100	141	Ref upper; Exposed lower	1.50 (1.16, 1.94)	No	First trimester
23,162	Biradar, 2023	174	128	Low Hb	71	111	111	138	Ref upper; Exposed	0.80 (0.38, 1.69)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
22,854	Bondevik, 2001	232	424	Low Hb	93	105	118	120		1.20 (0.80, 1.90)	No	Prenatal
22,855	Bondevik, 2001	72	424	Low Hb	83	95	118	120		1.40 (0.80, 2.60)	No	Prenatal
22,856	Bondevik, 2001	440	424	Low Hb	103	115	118	120		1.10 (0.80, 1.60)	No	Prenatal
22,857	Bondevik, 2001	39	424	Low Hb	58	85	118	120	Exposed lower	1.80 (0.90, 4.00)	No	Prenatal
22,859	Bondevik, 2001	34	424	High Hb	138	159	113	125	Exposed upper	0.90 (0.30, 2.50)	No	Prenatal
22,858	Bondevik, 2001	159	424	Low Hb*	113	125	128	130		1.43 (2.50, 0.77)	No	Prenatal
22,847	Brabin, 1990			Low Hb	71	85	85	146	Ref upper; Exposed lower	5.00 (1.40, 18.20)	No	Prenatal
22,839	Brabin, 1997	179	49	Low Hb	90	114	115	129		0.95 (0.56, 1.61)	No	Prenatal
22,840	Brabin, 1997	102	49	Low Hb	71	75	115	129	Exposed lower	1.48 (0.87, 2.50)	No	Prenatal
22,841	Brabin, 1997	56	675	Low Hb	70	95	115	129		2.12 (1.00, 4.51)	No	Prenatal
22,842	Brabin, 1997	11	675	Low Hb	71	75	115	129	Exposed lower	3.08 (0.85, 11.19)	No	Prenatal
22,843	Brabin, 1997	199	49	Low Hb	70	95	115	129		1.10 (0.66, 1.84)	No	Prenatal
22,844	Brabin, 1997	343	675	Low Hb	90	114	115	129		1.44 (0.91, 2.28)	No	Prenatal
22,845	Brabin, 1997	8	49	High Hb	135	147	110	134	Exposed upper	0.47 (0.07, 3.13)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
22,846	Brabin, 1997	301	675	High Hb	135	147	110	134	Exposed upper	1.41 (0.87, 2.28)	No	Prenatal
23,147	Briand, 2016	112	209	Low Hb	82	111	112	138	Ref upper; Exposed lower	1.25 (0.84, 1.87)	No	Third trimester
22,889	Bukhari, 2022	84	244	Low Hb	70	103	113	144	Ref upper	2.21 (1.28, 3.80)	No	Prenatal
22,890	Bukhari, 2022	72	244	Low Hb	100	113	113	144	Ref upper	1.08 (0.51, 2.30)	No	Prenatal
22,921	Bánhidy, 2011	6,358	31,793	Low Hb	91	106	106	139	Ref upper; Exposed lower	0.85 (0.74, 0.99)	No	First trimester
23,225	Carboo, 2024	178	249	Low Hb	79	115	115	146	Ref upper; Exposed lower	0.83 (0.32, 2.10)	No	Prenatal
23,137	Carpenter, 2021	421	370	Low Hb	70	99	100	110		0.96 (0.63, 1.45)	No	Prenatal
23,138	Carpenter, 2021	11	370	Low Hb	48	69	100	110	Exposed lower	2.73 (0.57, 10.20)	No	Prenatal
23,139	Carpenter, 2021	38	370	High Hb	131	143	100	110	Exposed upper	2.28 (1.01, 4.86)	No	Prenatal
23,140	Carpenter, 2021	823	370	Low Hb*	100	110	111	130		0.90 (1.28, 0.62)	No	Prenatal
23,136	Casanueva, 2006	7	109	High Hb	147	155	86	147	Ref lower; Exposed upper	6.23 (1.46, 26.57)	No	Third trimester
22,848	Chang, 2003	65	224	Low Hb	93	95	96	105	Exposed lower	1.91 (0.83, 4.39)	No	Third trimester
22,849	Chang, 2003	289	399	Low Hb	93	105	106	120	Exposed lower	0.70 (0.42, 1.15)	No	Third trimester
22,850	Chang, 2003	64	162	Low Hb	93	105	106	120	Exposed	1.48	No	Second

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(0.55, 3.98)		trimester
22,851	Chang, 2003	477	224	Low Hb*	96	105	105	145	Exposed upper	0.51 (0.91, 0.28)	No	Third trimester
22,852	Chang, 2003	78	399	Low Hb*	106	120	120	145	Exposed upper	0.53 (0.90, 0.31)	No	Third trimester
22,853	Chang, 2003	63	162	Low Hb*	106	120	120	145	Exposed upper	0.32 (0.74, 0.14)	No	Second trimester
23,157	Chanie, 2017	70	163	Low Hb	80	121	121	152	Ref upper; Exposed lower	0.13 (0.16, 1.01)	Yes	Prenatal
23,197	Chen, 2024	3,703	28,515	Low Hb	100	110	111	142	Ref upper	1.60 (1.43, 1.78)	Yes	First trimester
23,198	Chen, 2024	1,769	28,515	Low Hb	70	100	111	142	Ref upper	2.02 (1.76, 2.32)	Yes	First trimester
23,199	Chen, 2024	100	28,515	Low Hb	49	70	111	142	Ref upper; Exposed lower	6.25 (4.06, 9.61)	Yes	First trimester
23,232	Chen, 2024	3,703	28,515	Low Hb	100	111	111	142	Ref upper	1.60 (1.43, 1.78)	Yes	First trimester
23,233	Chen, 2024	1,769	28,515	Low Hb	70	101	111	142	Ref upper	2.02 (1.76, 2.32)	Yes	First trimester
23,234	Chen, 2024	100	28,515	Low Hb	50	71	111	142	Ref upper; Exposed lower	6.25 (4.06, 9.61)	Yes	First trimester
22,903	Chu, 2020	628	12,398	Low Hb	97	99	99	141	Ref upper; Exposed lower	1.27 (0.92, 1.75)	No	Third trimester
22,925	Dane, 2013	27	161	Low Hb	82	93	114	144	Ref upper; Exposed lower	5.94 (2.27, 15.65)	No	Third trimester
22,926	Dane, 2013	56	161	Low Hb	101	113	114	144	Ref upper	0.82	No	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
										(0.18, 3.84)		trimester
22,927	Dane, 2013	60	161	Low Hb	91	103	114	144	Ref upper	3.07 (1.16, 8.09)	No	Third trimester
23,126	Deriba, 2021	185	380	Low Hb	81	121	121	152	Ref upper; Exposed lower	2.34 (1.21, 4.53)	No	Prenatal
23,178	Devaguru, 2023	162	300	Low Hb	61	71	102	143	Ref upper; Exposed lower	4.55 (3.67, 5.62)	Yes	Prenatal
23,179	Devaguru, 2023	438	300	Low Hb	70	101	102	143	Ref upper	1.03 (0.78, 1.35)	No	Prenatal
22,928	Dhar, 2003	22	23	Low Hb	60	90	120	141	Ref upper; Exposed lower	1.07 (0.30, 3.77)	No	Prenatal
22,929	Dhar, 2003	32	23	Low Hb	100	109	120	141	Ref upper	0.89 (0.28, 2.90)	No	Prenatal
22,930	Dhar, 2003	41	23	Low Hb	90	99	120	141	Ref upper	0.84 (0.27, 2.58)	No	Prenatal
22,931	Dhar, 2003	55	23	Low Hb	110	119	120	141	Ref upper	0.51 (0.17, 1.56)	No	Prenatal
23,154	Dos Santos, 2022	78	646	Low Hb	92	107	107	143	Ref upper; Exposed lower	2.58 (1.48, 4.47)	No	Second trimester
22,896	Drukker, 2015	7,977	67,683	Low Hb	95	110	111	142	Ref upper; Exposed lower	1.14 (0.99, 1.30)	No	Third trimester
22,898	Dutta, 2018	14	22	Low Hb	70	99	110	136	Ref upper	3.38 (0.74, 15.35)	No	Third trimester
22,897	Dutta, 2018	33	22	Low Hb	100	109	110	136	Ref upper	1.21 (0.31, 4.76)	No	Third trimester
23,163	Díaz, 2019	136	292	Low Hb	93	116	116	147	Ref upper; Exposed	1.09	No	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(0.75, 1.58)		trimester
23,227	Ekubagewargies, 2019	40	200	High Hb*	133	154	86	132	Ref upper; Exposed lower	0.30 (1.00, 0.09)	No	Prenatal
23,051	El-Moselhy, 2012	221	259	Low Hb	87	100	100	140	Ref upper; Exposed lower	2.68 (1.82, 3.95)	No	Third trimester
22,932	Elhassan, 2010	92	102	Low Hb	75	113	113	144	Ref upper; Exposed lower	9.00 (3.40, 23.80)	No	Prenatal
23,200	Elmugabil, 2023	132	121	Low Hb	79	113	113	144	Ref upper; Exposed lower	4.70 (2.06, 10.94)	No	Prenatal
23,175	Engidaw, 2022	34	177	Low Hb	88	122	123	154	Ref upper; Exposed lower	3.51 (1.29, 9.55)	No	Prenatal
23,228	Essome, 2024	44	261	Low Hb	77	103	103	144	Ref upper; Exposed lower	2.94 (1.45, 11.95)	No	Third trimester
22,924	Fajriana, 2018	14	30	Low Hb	81	111	111	142	Ref upper; Exposed lower	2.31 (0.62, 9.30)	No	Prenatal
22,933	Finkelstein, 2020	73	170	Low Hb	65	113	113	140	Ref upper; Exposed lower	2.15 (1.20, 3.84)	No	First trimester
23,082	Gaillard, 2014	983	5,251	Low Hb	96	110	110	132	Exposed lower	0.98 (0.85, 2.02)	No	Prenatal
23,083	Gaillard, 2014	1,022	5,251	High Hb	132	152	110	132	Exposed upper	1.40 (1.00, 1.90)	No	Prenatal
22,934	Ganesh, 2010	100	350	Low Hb	67	112	113	137	Ref upper; Exposed lower	4.37 (2.01, 8.26)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
22,935	Gann, 1989	42	402	Low Hb	91	100	100	141	Ref upper; Exposed lower	2.41 (0.64, 9.13)	No	Prenatal
22,936	Gazali, 1987	199	829	Low Hb	76	102	102	135	Ref upper; Exposed lower	3.87 (3.06, 4.91)	Yes	Prenatal
23,059	Gebrehawerya, 2018	43	244	Low Hb	80	121	121	152	Ref upper; Exposed lower	3.91 (1.73, 8.87)	No	Prenatal
22,870	Geelhoed, 2006	138	151	Low Hb	67	81	110	142	Ref upper; Exposed lower	1.40 (0.70, 2.70)	No	Prenatal
22,871	Geelhoed, 2006	138	151	Low Hb	67	71	110	142	Ref upper; Exposed lower	1.40 (0.70, 2.70)	No	Prenatal
22,872	Geelhoed, 2006	24	151	Low Hb	67	81	110	142	Ref upper; Exposed lower	3.30 (1.30, 8.50)	No	Prenatal
22,873	Geelhoed, 2006	80	151	Low Hb	80	109	110	142	Ref upper	1.10 (0.50, 2.40)	No	Prenatal
22,874	Geelhoed, 2006	56	151	Low Hb	40	61	110	142	Ref upper; Exposed lower	2.50 (1.20, 5.40)	No	Prenatal
22,875	Geelhoed, 2006	30	151	Low Hb	30	51	110	142	Ref upper; Exposed lower	4.20 (1.80, 10.10)	No	Prenatal
22,876	Geelhoed, 2006	34	151	Low Hb*	67	110	110	143	Ref lower; Exposed upper	1.25 (5.00, 0.37)	No	Prenatal
22,937	Gnanasekaran, 2019	42	249	Low Hb	80	101	101	137	Ref upper	1.25 (0.63, 2.49)	No	Prenatal
23,180	Go, 2022	107	27,019	Low Hb	88	89	110	129	Exposed lower	2.21 (1.19, 4.09)	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,181	Go, 2022	6,823	25,620	Low Hb	90	109	110	129		1.07 (0.96, 1.19)	No	Second trimester
23,182	Go, 2022	138	25,620	Low Hb	88	89	110	129	Exposed lower	1.18 (0.59, 2.36)	No	Second trimester
23,183	Go, 2022	3,133	27,019	Low Hb	90	109	110	129		1.42 (1.24, 1.62)	No	First trimester
23,184	Go, 2022	209	25,620	High Hb	140	150	110	129	Exposed upper	1.69 (0.95, 3.01)	No	Second trimester
23,185	Go, 2022	7,647	27,019	High Hb	130	139	110	129		1.03 (0.93, 1.13)	No	First trimester
23,186	Go, 2022	1,178	27,019	High Hb	140	150	110	129	Exposed upper	1.09 (0.88, 1.33)	No	First trimester
23,187	Go, 2022	2,518	25,620	High Hb	130	139	110	129		1.30 (1.13, 1.50)	No	Second trimester
22,938	Govil, 2018	17	17	Low Hb	69	70	101	142	Ref upper; Exposed lower	1.50 (0.29, 7.87)	No	Prenatal
22,939	Govil, 2018	138	17	Low Hb	70	100	101	142	Ref upper	0.92 (0.23, 3.70)	No	Prenatal
23,153	Guevara, 2009			Low Hb	87	110	110	141	Ref upper; Exposed lower	1.64 (1.01, 2.54)	No	Prenatal
22,940	Gyimah, 2021	149	116	Low Hb	70	110	111	142	Ref upper; Exposed lower	1.50 (0.70, 3.20)	No	First trimester
23,190	Habe, 2024	110	56	Low Hb	90	110	110	141	Ref upper; Exposed lower	0.08 (0.03, 0.26)	Yes	Prenatal
22,941	Habib, 2017	527	423	Low Hb	68	111	112	143	Ref upper; Exposed lower	2.67 (1.65, 5.24)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
22,942	Haggaz, 2010			Low Hb	75	113	113	144	Ref upper; Exposed lower	5.10 (1.70, 15.20)	No	Third trimester
23,060	Heilmann, 1993	615	92	High Hb	131	148	90	131	Ref lower; Exposed upper	1.81 (0.93, 3.51)	No	Prenatal
22,946	Heydarpour, 2019	1,038	2,463	Low Hb	84	115	117	147	Ref upper; Exposed lower	0.82 (0.60, 1.10)	No	First trimester
22,947	Heydarpour, 2019	756	1,986	Low Hb	84	115	117	147	Ref upper; Exposed lower	0.66 (0.46, 0.93)	No	Third trimester
23,102	Hirve, 1994	408	1,514	Low Hb	70	91	91	142	Ref upper	1.14 (0.97, 1.34)	No	Prenatal
23,103	Hirve, 1994	408	1,514	Low Hb	70	91	111	142	Ref upper	1.53 (1.10, 2.10)	No	Prenatal
23,143	Hosain, 2006	167	183	Low Hb	57	80	80	141	Ref upper; Exposed lower	2.00 (1.18, 3.40)	No	First and second trimester
22,948	Howard, 2015	179	338	Low Hb	71	118	118	149	Ref upper; Exposed lower	1.09 (0.60, 1.96)	No	Third trimester
22,943	Hämäläinen, 2003	256	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	1.28 (0.63, 2.62)	No	Third trimester
22,944	Hämäläinen, 2003	272	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	0.61 (0.25, 1.48)	No	Second trimester
22,945	Hämäläinen, 2003	69	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	3.14 (1.35, 7.28)	No	First trimester
23,084	Ilunga, 2016	21	505	Low Hb	71	114	114	145	Ref upper; Exposed	7.60 (2.30, 24.80)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
23,167	Javadi, 2023	450	451	Low Hb	86	117	117	130	Exposed lower	1.38 (0.55, 3.46)	No	First trimester
23,168	Javadi, 2023	450	451	High Hb	137	143	110	137	Exposed upper	1.20 (0.79, 1.81)	No	First trimester
23,237	Jember, 2020	23	335	Low Hb	86	122	123	154	Ref upper; Exposed lower	0.87 (0.17, 4.56)	No	Prenatal
23,107	Jessani, 2021		1,671	Low Hb	90	117	117	129		0.90 (0.72, 1.13)	No	Third trimester
23,108	Jessani, 2021		1,671	Low Hb	70	97	117	129		1.15 (0.53, 2.53)	No	First trimester
23,109	Jessani, 2021		1,671	Low Hb	66	76	117	129	Exposed lower	0.82 (0.29, 2.32)	No	Third trimester
23,110	Jessani, 2021		1,671	Low Hb	70	97	117	129		0.98 (0.69, 1.39)	No	Third trimester
23,111	Jessani, 2021		4,696	Low Hb	90	117	117	129		1.07 (0.96, 1.19)	No	First trimester
23,112	Jessani, 2021		4,696	Low Hb	70	91	111	129		1.02 (0.81, 1.29)	No	First trimester
23,113	Jessani, 2021		4,696	Low Hb	90	111	111	129		1.07 (0.96, 1.19)	No	First trimester
23,114	Jessani, 2021		1,533	Low Hb	90	112	112	129		1.28 (0.87, 1.90)	No	Third trimester
23,115	Jessani, 2021		4,696	Low Hb	90	112	112	129		1.02 (0.81, 1.29)	No	First trimester
23,116	Jessani, 2021		1,533	Low Hb	70	92	112	129		1.30 (1.03, 1.64)	No	First trimester
23,117	Jessani, 2021		1,533	Low Hb	70	92	112	129		1.30 (1.03, 1.64)	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,118	Jessani, 2021		1,533	Low Hb	69	71	112	129	Exposed lower	1.69 (1.06, 2.68)	No	Third trimester
23,119	Jessani, 2021		4,696	High Hb	137	160	110	136	Exposed upper	1.13 (0.96, 1.34)	No	First trimester
23,120	Jessani, 2021		1,671	High Hb	137	160	110	136	Exposed upper	1.10 (0.65, 1.86)	No	Third trimester
23,121	Jessani, 2021		4,696	High Hb	131	138	110	130	Exposed upper	1.13 (0.96, 1.34)	No	First trimester
23,122	Jessani, 2021		1,533	High Hb	132	146	110	131	Exposed upper	1.25 (0.78, 2.00)	No	First trimester
23,123	Jessani, 2021		1,533	High Hb	132	146	110	131	Exposed upper	1.42 (0.25, 7.96)	No	Third trimester
22,949	Kant, 2018	5,132	1,527	Low Hb	63	110	111	138	Ref upper; Exposed lower	0.93 (0.84, 1.03)	Yes	Third trimester
22,950	Kargbo, 2021	146	292	Low Hb	58	111	111	142	Ref upper; Exposed lower	3.88 (1.90, 7.90)	No	Prenatal
23,148	Kashyap, 2019	82	79	Low Hb	100	110	111	140	Ref upper	0.79 (0.35, 1.80)	No	Third trimester
23,149	Kashyap, 2019	174	79	Low Hb	70	100	111	140	Ref upper	0.58 (0.27, 1.22)	No	Third trimester
23,150	Kashyap, 2019	55	79	Low Hb	62	71	111	140	Ref upper; Exposed lower	0.91 (0.38, 2.21)	No	Third trimester
22,951	Kasuga, 2021	145	3,099	Low Hb	90	100	100	141	Ref upper; Exposed lower	1.81 (1.08, 3.04)	No	Prenatal
22,952	Khan, 2016	80	80	Low Hb	70	102	102	143	Ref upper; Exposed lower	3.04 (1.05, 8.76)	No	Prenatal
23,174	Khan, 2023	192	135	Low Hb	92	110	110	141	Ref upper;	2.33	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(1.18, 4.61)		
22,860	Kidanto, 2009	403	547	Low Hb	70	95	115	146	Ref upper	1.70 (1.20, 2.60)	No	First and second trimester
22,861	Kidanto, 2009	100	547	Low Hb	65	75	115	146	Ref upper; Exposed lower	3.80 (2.30, 6.30)	No	First and second trimester
22,862	Kidanto, 2009	671	547	Low Hb	90	115	115	146	Ref upper	1.20 (0.85, 1.70)	No	First and second trimester
22,953	Kim, 1998	706	600	Low Hb	105	114	115	124		1.29 (0.89, 1.88)	No	Second and third trimester
22,954	Kim, 1998	518	600	Low Hb	95	104	115	124		1.16 (0.77, 1.75)	No	Second and third trimester
22,955	Kim, 1998	223	600	Low Hb	85	94	115	124		1.15 (0.68, 1.96)	No	Second and third trimester
22,956	Kim, 1998	104	600	Low Hb	63	84	115	124	Exposed lower	1.65 (0.90, 3.02)	No	Second and third trimester
22,957	Kim, 1998	31	600	High Hb	145	149	115	124	Exposed upper	5.07 (2.90, 8.85)	Yes	Second and third trimester
22,958	Kim, 1998	92	600	High Hb	135	144	115	124		0.93 (0.41, 2.13)	No	Second and third trimester
22,959	Kim, 1998	312	600	Low Hb*	115	124	125	134		0.91 (1.47, 0.56)	No	Second and third trimester
23,128	Knottnerus,	209	487	Low Hb	92	111	113	127	Exposed	1.23	No	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
	1990								lower	(0.58, 2.59)		trimester
23,129	Knottnerus, 1990	100	487	Low Hb*	113	127	129	151	Exposed upper	0.26 (0.50, 0.14)	No	Third trimester
23,133	Koh, 1997	259	751	Low Hb	84	100	100	141	Ref upper; Exposed lower	0.60 (0.40, 0.90)	No	Third trimester
22,960	Komicha, 2021	161	239	Low Hb	79	120	120	151	Ref upper; Exposed lower	2.30 (1.20, 4.40)	No	Prenatal
22,961	Koura, 2012	229	351	Low Hb	67	110	111	141	Ref upper; Exposed lower	1.20 (0.60, 2.20)	No	Prenatal
22,962	Kumar, 2010	506	1,521	Low Hb	68	101	102	142	Ref upper; Exposed lower	1.02 (0.83, 1.25)	No	First trimester
23,061	Kumar, 2017	14	45	Low Hb	61	70	111	139	Ref upper; Exposed lower	3.75 (1.51, 9.32)	No	Third trimester
23,062	Kumar, 2017	741	45	Low Hb	70	110	111	139	Ref upper	1.25 (0.58, 2.67)	No	Third trimester
23,144	Kumari, 2019	265	111	Low Hb	80	101	122	133	Ref upper	1.11 (0.69, 1.77)	No	Prenatal
23,145	Kumari, 2019	106	111	Low Hb	100	121	122	133	Ref upper	0.57 (0.31, 1.06)	No	Prenatal
23,146	Kumari, 2019	33	111	Low Hb	68	81	122	133	Ref upper; Exposed lower	2.50 (1.13, 5.52)	No	Prenatal
23,151	Lake, 2019	108	196	Low Hb	80	120	121	152	Ref upper; Exposed lower	3.81 (1.51, 9.59)	No	Prenatal
23,085	Lao, 1996	353	4,935	Low Hb	88	100	101	142	Ref upper; Exposed	0.77 (0.50, 1.17)	No	First and third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			trimester
23,086	Lao, 1996	464	5,190	Low Hb	88	100	101	142	Ref upper; Exposed lower	0.96 (0.63, 1.46)	No	First and third trimester
23,087	Lee, 2006	54	63	Low Hb	91	107	120	141	Ref upper; Exposed lower	6.42 (1.49, 27.69)	No	Second and third trimester
23,088	Lee, 2006	51	63	Low Hb	108	119	120	141	Ref upper	2.47 (0.47, 12.95)	No	Second and third trimester
23,240	Lemlem, 2021	137	490	High Hb*	133	154	87	132	Ref upper; Exposed lower	0.29 (0.56, 0.15)	No	Prenatal
22,963	Levy, 2005	12,677	140,192	Low Hb	80	101	101	142	Ref upper	1.10 (1.10, 1.20)	Yes	First trimester
22,964	Levy, 2005	527	140,192	Low Hb	60	81	101	142	Ref upper; Exposed lower	1.60 (1.20, 2.00)	No	First trimester
22,965	Lin, 2018	6,476	32,963	Low Hb	92	111	112	143	Ref upper; Exposed lower	1.47 (1.30, 1.66)	No	Third trimester
22,966	Liu, 2022	719	1,720	Low Hb	70	101	112	129		1.10 (0.76, 1.61)	No	Third trimester
22,967	Liu, 2022	989	1,720	Low Hb	100	111	112	129		0.88 (0.57, 1.37)	No	Third trimester
22,968	Liu, 2022	427	2,039	Low Hb	70	101	112	129		0.95 (0.44, 2.02)	No	Second trimester
22,969	Liu, 2022	421	1,883	Low Hb	100	111	112	129		0.77 (0.39, 1.54)	No	First trimester
22,970	Liu, 2022	730	2,039	Low Hb	100	111	112	129		0.79 (0.47, 1.34)	No	Second trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
22,971	Liu, 2022	203	1,883	Low Hb	70	101	112	129		0.67 (0.22, 2.06)	No	First trimester
22,972	Liu, 2022	12	1,720	Low Hb	50	71	112	129	Exposed lower	6.36 (2.07, 19.59)	No	Third trimester
22,973	Liu, 2022	308	1,720	High Hb	132	151	110	131	Exposed upper	1.51 (0.64, 3.54)	No	Third trimester
22,974	Liu, 2022	552	2,029	High Hb	132	151	110	131	Exposed upper	0.70 (0.35, 1.41)	No	Second trimester
22,975	Liu, 2022	1,241	1,883	High Hb	132	151	110	131	Exposed upper	0.91 (0.61, 1.38)	No	First trimester
23,192	Liu, 2022	27,619	36,114	Low Hb	80	111	122	129		1.24 (1.11, 1.38)	No	Prenatal
23,193	Liu, 2022	45,570	36,114	Low Hb	110	121	122	129		1.12 (1.02, 1.24)	No	Prenatal
23,194	Liu, 2022	164	36,114	Low Hb	60	81	122	129	Exposed lower	1.61 (0.66, 3.95)	No	Prenatal
23,195	Liu, 2022	4,062	36,114	High Hb	142	145	120	131	Exposed upper	1.36 (1.10, 1.68)	No	Prenatal
23,196	Liu, 2022	11,196	36,114	High Hb	132	139	120	131		1.05 (0.90, 1.23)	No	Prenatal
22,863	Lone, 2004	313	311	Low Hb	63	110	110	141	Ref upper; Exposed lower	1.90 (1.00, 3.40)	No	Second and third trimester
22,888	Luik, 2021	401	1,142	Low Hb	93	110	110	141	Ref upper; Exposed lower	0.60 (0.40, 0.80)	No	Third trimester
22,899	Lumbanraja, 2019	101	95	Low Hb	66	112	112	140	Ref upper; Exposed lower	0.34 (0.11, 1.04)	No	Second and third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,152	Magahed, 1986			Low Hb	86	110	110	141	Ref upper; Exposed lower	1.18 (0.67, 2.08)	No	Prenatal
22,891	Mahmood, 2019	235	387	Low Hb	70	102	102	143	Ref upper; Exposed lower	1.99 (1.65, 2.41)	No	Third trimester
22,877	Malhotra, 2002			Low Hb	66	76	97	105	Exposed lower	10.50 (4.50, 24.50)	Yes	Prenatal
22,878	Malhotra, 2002			Low Hb	76	86	97	105		4.40 (2.07, 9.43)	No	Prenatal
22,879	Malhotra, 2002			Low Hb	86	96	97	105		1.10 (0.54, 2.31)	No	Prenatal
22,880	Malhotra, 2002			Low Hb*	96	106	117	143	Exposed upper	0.19 (0.42, 0.09)	No	Prenatal
22,881	Malhotra, 2002			Low Hb*	96	106	107	115		0.62 (1.32, 0.30)	No	Prenatal
23,191	Mamidi, 2022	256	250	Low Hb	65	112	112	141	Ref upper; Exposed lower	1.19 (0.81, 1.74)	No	First trimester
23,124	Masukume, 2015	125	5,484	Low Hb	93	109	110	141	Ref upper; Exposed lower	1.31 (0.62, 2.76)	No	First trimester
22,976	McFarlane, 1996			Low Hb	89	110	111	142	Ref upper; Exposed lower	1.60 (0.90, 1.90)	No	Prenatal
22,977	Mekie, 2019	11	271	Low Hb	87	122	123	154	Ref upper; Exposed lower	9.82 (1.83, 52.73)	No	Prenatal
23,134	Meng, 1984			Low Hb	83	90	90	141	Ref upper; Exposed lower	22.33 (2.69, 185.27)	No	Prenatal
23,166	Mezen, 2022	99	352	High Hb*	133	154	87	132	Ref upper;	0.30	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(0.53, 0.17)		
23,155	Mingude, 2020	56	244	Low Hb	81	121	121	152	Ref upper; Exposed lower	4.40 (1.84, 10.50)	No	Prenatal
22,978	Moakhar, 2019	24	267	Low Hb	84	116	116	133	Exposed lower	2.09 (0.65, 6.66)	No	First trimester
22,979	Moakhar, 2019	66	293	Low Hb	84	111	111	130	Exposed lower	8.88 (3.73, 21.13)	No	Third trimester
22,980	Moakhar, 2019	75	288	Low Hb	84	116	116	133	Exposed lower	3.49 (1.54, 7.91)	No	Second trimester
22,981	Moakhar, 2019	23	328	Low Hb	84	111	111	130	Exposed lower	4.46 (1.79, 11.08)	No	Second trimester
22,982	Moakhar, 2019	24	267	Low Hb	84	116	116	133	Exposed lower	2.09 (0.65, 6.66)	No	First trimester
22,983	Moakhar, 2019	12	192	Low Hb	84	111	111	130	Exposed lower	3.69 (1.21, 11.22)	No	First trimester
22,984	Moakhar, 2019	170	192	High Hb	136	143	105	136	Exposed upper	0.43 (0.16, 1.19)	No	First trimester
22,985	Moakhar, 2019	83	267	High Hb	139	143	110	139	Exposed upper	0.40 (0.09, 1.71)	No	First trimester
22,986	Moakhar, 2019	83	267	High Hb	139	143	110	139	Exposed upper	0.40 (0.09, 1.71)	No	First trimester
23,216	Moges, 2025	220	239	Low Hb	82	121	121	152	Ref upper; Exposed lower	3.02 (1.23, 6.01)	No	Third trimester
22,987	Mohamed, 2012	622	4,081	Low Hb	90	99	110	119		1.38 (1.10, 1.73)	No	Third trimester
22,988	Mohamed, 2012	1,913	4,081	Low Hb	100	109	110	119		1.39 (1.20, 1.62)	No	Third trimester
22,989	Mohamed, 2012	256	4,081	Low Hb	79	90	110	119	Exposed	1.59	No	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(1.16, 2.19)		trimester
22,990	Mohamed, 2012	1,057	4,081	High Hb	140	147	110	119	Exposed upper	0.58 (0.45, 0.74)	Yes	Third trimester
22,991	Mohamed, 2012	3,572	4,081	High Hb	130	139	110	119		0.58 (0.50, 0.68)	Yes	Third trimester
23,089	Mohamed, 2012	287	226	Low Hb	87	109	110	140	Ref upper; Exposed lower	13.94 (7.55, 25.73)	Yes	Prenatal
22,992	Mohamed, 2012	5,825	4,081	Low Hb*	110	119	120	129		1.52 (1.73, 1.33)	Yes	Third trimester
22,993	Mohammed, 2019	373	558	Low Hb	66	111	111	142	Ref upper; Exposed lower	0.78 (0.63, 0.95)	Yes	Prenatal
22,882	Murphy, 1986	377	8,876	Low Hb	98	104	105	132	Exposed lower	1.18 (0.80, 1.75)	No	First and second trimester
22,883	Murphy, 1986	1,543	8,876	High Hb	134	139	104	133	Exposed upper	1.08 (0.87, 1.33)	No	First and second trimester
22,994	Mwanyumba, 2001	3,306	4,059	Low Hb	76	108	108	149	Ref upper; Exposed lower	1.31 (1.13, 1.57)	No	Third trimester
22,893	Nair, 2016	584	896	Low Hb	70	99	100	137	Ref upper	1.26 (1.04, 1.53)	No	Second and third trimester
22,894	Nair, 2016	584	604	Low Hb	68	69	100	137	Ref upper; Exposed lower	6.19 (1.44, 26.71)	No	Second and third trimester
23,130	Nasiri-Amiri, 2007	69	293	Low Hb	83	113	114	133		2.44 (1.11, 5.35)	No	First trimester
23,131	Nasiri-Amiri, 2007	247	293	High Hb	134	142	113	134	Exposed upper	1.13 (0.64, 2.01)	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,141	Novikova, 2018	59	141	Low Hb	80	110	111	142	Ref upper; Exposed lower	2.97 (1.31, 6.75)	No	Prenatal
23,125	Oladeinde, 2015	264	516	Low Hb	72	111	111	135	Ref upper; Exposed lower	2.80 (1.55, 5.03)	No	Third trimester
22,834	Onadeko, 1996	2,257	1,083	Low Hb	110	120	121	129		1.25 (1.00, 1.55)	No	Third trimester
22,835	Onadeko, 1996	1,003	1,083	Low Hb	100	110	121	129		1.58 (1.24, 2.00)	No	Third trimester
22,836	Onadeko, 1996	44	1,083	Low Hb	74	101	121	129	Exposed lower	3.94 (2.55, 6.07)	No	Third trimester
22,837	Onadeko, 1996	29	1,083	High Hb	141	149	120	130		0.75 (0.19, 2.88)	No	Third trimester
22,838	Onadeko, 1996	233	1,083	High Hb	131	139	120	130		0.84 (0.52, 1.35)	No	Third trimester
22,995	Pal, 2020	1,658	953	Low Hb	71	120	120	135	Ref upper; Exposed lower	3.33 (2.59, 4.28)	Yes	First trimester
23,098	Pardilawati, 2017	62	106	Low Hb	84	112	112	138	Ref upper; Exposed lower	1.71 (1.12, 2.60)	No	Prenatal
22,885	Parks, NA	45,334	11,291	Low Hb	70	99	110	140	Ref upper	1.31 (1.14, 1.52)	No	Prenatal
22,886	Parks, NA	35,001	11,291	Low Hb	100	109	110	140	Ref upper	1.05 (0.91, 1.21)	No	Prenatal
22,887	Parks, NA	621	11,291	Low Hb	48	69	110	140	Ref upper; Exposed lower	2.85 (2.07, 3.91)	No	Prenatal
23,105	Patel, 2018	30,601	6,939	Low Hb	100	112	112	140	Ref upper	1.08 (1.01, 1.15)	No	Prenatal
23,106	Patel, 2018	35,210	6,939	Low Hb	64	102	112	140	Ref upper;	1.26	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(1.18, 1.35)		
23,063	Patel, 2021	330	886	Low Hb	73	111	112	138	Ref upper; Exposed lower	4.70 (3.40, 6.70)	Yes	Prenatal
22,996	Pattanapisalsak, 2011			Low Hb	83	110	110	141	Ref upper; Exposed lower	0.84 (0.62, 1.15)	No	Prenatal
22,997	Peters, 2001	34	169	Low Hb	72	105	105	146	Ref upper; Exposed lower	1.03 (0.39, 2.72)	No	Prenatal
22,998	Peters, 2001	7	196	Low Hb	72	85	85	146	Ref upper; Exposed lower	3.84 (0.82, 18.00)	No	Prenatal
22,999	Phaloprakarn, 2008	426	448	Low Hb*	110	124	125	145	Exposed upper	1.43 (2.50, 0.71)	No	First trimester
23,000	Pinho, 2017	199	275	Low Hb	75	112	113	144	Ref upper; Exposed lower	2.97 (1.81, 4.89)	No	Prenatal
23,001	Prema, 1981	1,202	1,783	Low Hb	80	111	112	143	Ref upper	1.14 (1.01, 1.30)	No	Third trimester
23,002	Prema, 1981	443	1,783	Low Hb	50	81	112	143	Ref upper	1.66 (1.44, 1.92)	No	Third trimester
23,003	Prema, 1981	312	1,783	Low Hb	31	52	112	143	Ref upper; Exposed lower	2.70 (2.39, 3.04)	No	Third trimester
23,215	Prioreschi, 2025	175	173	Low Hb	79	115	115	146	Ref upper; Exposed lower	0.70 (0.45, 1.11)	No	First and second trimester
23,004	Puerto, 2021			Low Hb	79	116	117	148	Ref upper; Exposed lower	0.40 (0.20, 0.83)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,054	Radoń, 2016	90	360	Low Hb	92	111	111	142	Ref upper; Exposed lower	4.60 (2.15, 11.17)	No	Third trimester
23,005	Rahfiludin, 2018	35	34	Low Hb	84	111	111	142	Ref upper; Exposed lower	1.29 (0.31, 5.36)	No	First and second trimester
23,209	Ramazanali, 2006	136	819	Low Hb	82	116	126	130	Exposed lower	18.90 (9.50, 37.50)	Yes	Third trimester
23,210	Ramazanali, 2006	205	819	Low Hb	110	126	126	130		2.90 (1.40, 6.00)	No	Third trimester
23,211	Ramazanali, 2006	236	819	High Hb	136	140	120	136		3.50 (1.50, 7.90)	No	Third trimester
23,212	Ramazanali, 2006	23	819	High Hb	146	160	120	136	Exposed upper	13.70 (3.30, 58.00)	No	Third trimester
23,006	Ramya, 2019	330	537	Low Hb	70	103	113	140	Ref upper	1.03 (0.84, 1.26)	No	Prenatal
23,007	Ramya, 2019	478	537	Low Hb	100	113	113	140	Ref upper	0.96 (0.80, 1.17)	No	Prenatal
23,008	Ramya, 2019	11	537	Low Hb	67	73	113	140	Ref upper; Exposed lower	0.90 (0.34, 2.38)	No	Prenatal
23,009	Ranaei, 2013	92	179	Low Hb	82	119	119	150	Ref upper; Exposed lower	0.43 (0.29, 0.62)	Yes	Prenatal
23,156	Rashid, 2020	225	225	Low Hb	69	112	112	143	Ref upper; Exposed lower	1.07 (0.74, 1.55)	No	Prenatal
23,217	Rawat, 2025	112	123	Low Hb	70	91	111	138	Ref upper	1.65 (1.05, 2.58)	No	Third trimester
23,218	Rawat, 2025	57	123	Low Hb	90	111	111	138	Ref upper	2.25 (1.41, 3.57)	No	Third trimester
23,219	Rawat, 2025	8	123	Low Hb	49	71	111	138	Ref upper;	2.56	No	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(1.17, 5.59)		trimester
23,090	Razmy, 2016	38	2,568	Low Hb	79	81	106	125	Exposed lower	4.35 (3.11, 6.09)	Yes	Prenatal
23,091	Razmy, 2016	560	2,568	Low Hb	80	106	106	125		1.31 (1.04, 1.63)	No	Prenatal
23,092	Razmy, 2016	336	2,568	Low Hb*	105	126	126	146	Exposed upper	1.14 (1.59, 0.81)	No	Prenatal
22,864	Ren, 2007	19,219	68,820	Low Hb	80	111	112	143	Ref upper	1.15 (1.03, 1.29)	No	First trimester
22,865	Ren, 2007	3,828	44,028	Low Hb	80	101	112	119		1.44 (1.17, 1.78)	No	First trimester
22,866	Ren, 2007	110	44,028	Low Hb	61	82	112	119	Exposed lower	2.16 (0.79, 5.89)	No	First trimester
22,867	Ren, 2007	4,299	44,028	High Hb	142	159	110	121		0.90 (0.70, 1.17)	No	First trimester
22,868	Ren, 2007	35,687	44,028	Low Hb*	110	121	122	139		0.93 (1.03, 0.83)	No	First trimester
23,159	Riu, 2020	3,200	3,676	Low Hb	85	111	111	142	Ref upper; Exposed lower	1.70 (1.44, 2.00)	No	Third trimester
23,093	Rogerson, 2000	346	683	Low Hb	66	114	115	146	Ref upper; Exposed lower	1.57 (1.05, 2.35)	No	Third trimester
23,010	Ronnenberg, 2004	40	90	Low Hb	89	95	120	141	Ref upper; Exposed lower	6.50 (1.60, 26.70)	No	Prenatal
23,011	Ronnenberg, 2004	275	90	Low Hb	95	120	120	141	Ref upper	2.00 (0.70, 5.90)	No	Prenatal
23,012	Roopnarine, 2017	209	418	Low Hb	81	109	110	141	Ref upper; Exposed	0.92 (0.63, 1.35)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
22,892	Rukuni, 2016	7,475	72,947	Low Hb	99	100	101	141	Ref upper; Exposed lower	0.77 (0.68, 0.86)	Yes	First trimester
23,164	Sah, 2022	573	1,431	Low Hb	77	113	113	130	Exposed lower	3.77 (2.84, 5.01)	Yes	Prenatal
23,165	Sah, 2022	670	1,431	High Hb	133	148	110	133	Exposed upper	3.07 (2.23, 4.24)	Yes	Prenatal
23,104	Saleh, 2019	35	74	Low Hb	89	112	112	143	Ref upper; Exposed lower	13.74 (5.19, 36.36)	Yes	Third trimester
23,064	Salunkhe, 2019			Low Hb	71	111	111	140	Ref upper; Exposed lower	1.24 (1.08, 1.43)	No	First trimester
22,900	Salunkhe, 2021	16	698	Low Hb	69	71	111	139	Ref upper; Exposed lower	1.28 (0.67, 2.43)	No	Prenatal
23,013	Saragih, 2020	27	41	Low Hb	83	111	111	142	Ref upper; Exposed lower	3.12 (1.13, 8.64)	No	Prenatal
23,161	Saraswati, 1998	123	125	Low Hb	79	112	112	137	Ref upper; Exposed lower	3.08 (1.30, 7.31)	No	Second and third trimester
23,065	Scaria, 2022	31,822	48,880	Low Hb	69	100	111	139	Ref upper; Exposed lower	0.95 (0.89, 1.01)	Yes	Prenatal
23,066	Scaria, 2022	36,117	48,880	Low Hb	100	110	111	139	Ref upper	1.20 (1.13, 1.26)	No	Prenatal
23,014	Scholl, 1992	217	562	Low Hb	91	109	110	141	Ref upper; Exposed lower	1.55 (0.96, 2.51)	No	First and second trimester
23,015	Seedidhi, 2017	343	157	Low Hb	64	101	111	139	Ref upper;	1.44	No	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(1.24, 1.67)		trimester
23,201	Seid, 2022	39	213	Low Hb	81	121	121	152	Ref upper; Exposed lower	5.21 (1.92, 14.13)	No	Prenatal
23,016	Sekhavat, 2013	328	916	Low Hb	83	107	107	130	Exposed lower	1.40 (1.15, 2.06)	No	Third trimester
23,018	Shah, 2020	56	194	Low Hb	62	72	112	141	Ref upper; Exposed lower	1.72 (0.92, 3.21)	No	Third trimester
23,019	Shah, 2020	103	194	Low Hb	70	101	112	141	Ref upper	4.02 (2.43, 6.67)	No	Third trimester
23,020	Shah, 2020	47	194	Low Hb	100	111	112	141	Ref upper	1.13 (0.56, 2.27)	No	Third trimester
23,017	Shah, 2022	206	194	Low Hb	72	112	112	143	Ref upper; Exposed lower	3.07 (2.15, 4.40)	No	Prenatal
23,021	Shams, 2012	104	728	Low Hb	66	102	102	143	Ref upper; Exposed lower	8.84 (5.49, 14.24)	Yes	Prenatal
23,099	Shankar, 2019	159	150	Low Hb	66	111	111	142	Ref upper; Exposed lower	0.57 (0.33, 0.99)	No	Third trimester
23,100	Shankar, 2019	323	256	Low Hb	66	111	111	142	Ref upper; Exposed lower	0.58 (0.33, 1.02)	No	Third trimester
23,101	Shankar, 2019	228	462	Low Hb	66	106	106	142	Ref upper; Exposed lower	0.88 (0.47, 1.64)	No	Second trimester
23,022	Sharma, 2015	50	415	Low Hb	70	112	113	144	Ref upper; Exposed lower	0.51 (0.24, 1.07)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,214	Shrivastava, 2024	26	76	Low Hb	21	42	42	138	Ref upper; Exposed lower	1.53 (1.18, 1.99)	No	Prenatal
23,132	Singh, 1997	106	354	Low Hb	65	101	101	142	Ref upper; Exposed lower	1.46 (0.99, 2.15)	No	Prenatal
23,023	Singh, 2014			Low Hb	68	110	111	139	Ref upper; Exposed lower	20.00 (1.60, 246.50)	No	First and second trimester
23,158	Srikrishna, 2003	435	524	Low Hb	65	113	113	138	Ref upper; Exposed lower	1.14 (0.85, 1.52)	No	Prenatal
23,024	Steer, 1995	3,185	17,411	Low Hb	86	95	96	105		1.04 (0.89, 1.04)	No	Prenatal
23,025	Steer, 1995	499	17,411	Low Hb	64	85	96	105	Exposed lower	1.62 (1.27, 2.06)	No	Prenatal
23,029	Steer, 1995	1,477	17,411	High Hb	136	145	96	105		3.37 (2.88, 3.95)	Yes	Prenatal
23,030	Steer, 1995	121	17,411	High Hb	145	160	96	105	Exposed upper	7.54 (4.95, 11.10)	Yes	Prenatal
23,026	Steer, 1995	499	17,411	Low Hb*	96	105	116	125	Exposed lower	0.62 (0.79, 0.49)	Yes	Prenatal
23,027	Steer, 1995	11,072	17,411	Low Hb*	96	105	126	135		0.41 (0.45, 0.38)	Yes	Prenatal
23,028	Steer, 1995	40,614	17,411	Low Hb*	96	105	106	115		0.88 (0.94, 0.81)	Yes	Prenatal
22,895	Suryanarayana, 2017	255	172	Low Hb	69	114	114	141	Ref upper; Exposed lower	1.07 (0.69, 1.67)	No	Prenatal
22,831	Swain, 1994	69	178	Low Hb	65	111	111	142	Ref upper; Exposed lower	2.22 (1.50, 3.29)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,067	Symington, 2019			Low Hb	79	110	110	146	Ref upper; Exposed lower	1.82 (0.49, 6.83)	No	Third trimester
23,068	Symington, 2019			Low Hb	79	115	115	146	Ref upper; Exposed lower	0.59 (0.13, 2.67)	No	Second trimester
23,069	Symington, 2019			Low Hb	79	115	115	146	Ref upper; Exposed lower	0.33 (0.06, 1.79)	No	First and second trimester
23,070	Symington, 2019			Low Hb	79	115	115	146	Ref upper; Exposed lower	0.55 (0.09, 3.44)	No	Third trimester
23,071	Symington, 2019			Low Hb	79	110	110	146	Ref upper; Exposed lower	0.59 (0.13, 2.67)	No	Second trimester
23,072	Tabrizi, 2019	424	936	Low Hb	82	111	111	147	Ref upper; Exposed lower	1.37 (0.85, 3.15)	No	First and second trimester
23,239	Tadese, 2021	11	442	Low Hb	89	124	124	155	Ref upper; Exposed lower	1.11 (0.16, 7.46)	No	Prenatal
23,176	Tadesse, 2023	280	57	Low Hb	90	124	124	155	Ref upper; Exposed lower	0.23 (0.10, 0.50)	No	Prenatal
23,031	Tagbor, 2010	89	2,489	Low Hb	50	81	81	142	Ref upper	0.82 (0.45, 1.48)	No	Second trimester
23,220	Tang, 2024	20,105	82,722	Low Hb	100	114	114	120		1.07 (0.99, 1.17)	No	First trimester
23,221	Tang, 2024	6,285	82,722	Low Hb	93	104	114	120	Exposed lower	1.40 (1.24, 1.58)	No	First trimester
23,222	Tang, 2024	39,237	82,722	High Hb	144	150	110	124	Exposed upper	1.25 (1.17, 1.33)	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,224	Tang, 2024	20,105	82,722	High Hb	134	140	110	124		1.07 (0.99, 1.17)	No	First trimester
23,223	Tang, 2024	174,261	82,722	Low Hb*	110	124	124	130		0.97 (1.02, 0.93)	No	First trimester
22,915	Thakre, 2018	146	151	Low Hb	68	101	102	140	Ref upper; Exposed lower	1.56 (1.73, 3.31)	No	Third trimester
23,238	Tilahun, NA	72	408	Low Hb	86	123	123	154	Ref upper; Exposed lower	1.63 (0.38, 6.90)	No	Prenatal
23,032	Turner, 2012	244	441	Low Hb	93	112	112	143	Ref upper; Exposed lower	0.87 (0.56, 1.35)	No	Prenatal
22,902	Tzur, 2012	1,718	32,179	Low Hb	93	101	101	142	Ref upper; Exposed lower	1.19 (0.97, 1.50)	No	First trimester
23,235	Ulaganeethi, 2024	331	281	Low Hb	72	111	111	137	Ref upper; Exposed lower	1.24 (0.77, 1.99)	No	Third trimester
23,236	Ulaganeethi, 2024	323	297	Low Hb	72	111	111	137	Ref upper; Exposed lower	0.74 (0.42, 1.30)	No	First trimester
23,094	Uneke, 2007	21	102	Low Hb	65	111	111	130	Ref upper; Exposed lower	1.28 (0.54, 3.04)	No	Prenatal
23,160	Urdaneta, 2015	100	100	Low Hb	90	112	112	143	Ref upper; Exposed lower	1.59 (0.68, 1.73)	No	Third trimester
23,188	Uzunov, 2022	13	105	Low Hb	70	90	111	142	Ref upper	1.21 (0.42, 3.52)	No	Prenatal
23,189	Uzunov, 2022	48	105	Low Hb	90	110	111	142	Ref upper	1.20 (0.63, 2.31)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,213	Vakili, 2018	35	466	Low Hb	84	116	116	147	Ref upper; Exposed lower	2.80 (1.01, 7.79)	No	First and second trimester
23,033	Vilchez, 2013	68	82	Low Hb	87	109	110	141	Ref upper; Exposed lower	7.39 (3.19, 17.40)	No	Third trimester
23,095	Villalva, 2020	49	123	Low Hb	87	116	117	148	Ref upper; Exposed lower	6.30 (2.21, 18.03)	No	Prenatal
23,096	Villalva, 2020	72	142	Low Hb	87	116	117	148	Ref upper; Exposed lower	6.50 (2.41, 17.40)	No	Prenatal
22,901	Viplava, 2022	80	80	Low Hb	63	72	112	143	Ref upper; Exposed lower	4.00 (1.98, 8.07)	No	Third trimester
23,034	Vural, 2016	2,949	15,902	Low Hb	79	103	113	144	Ref upper; Exposed lower	1.09 (0.99, 1.21)	No	Third trimester
23,035	Vural, 2016	1,050	7,560	Low Hb	79	103	113	144	Ref upper; Exposed lower	1.54 (1.36, 1.74)	No	Second trimester
23,036	Vural, 2016	824	8,511	Low Hb	100	113	113	144	Ref upper	1.02 (0.83, 1.27)	No	First trimester
23,037	Vural, 2016	2,527	7,560	Low Hb	100	113	113	144	Ref upper	1.18 (1.07, 1.31)	No	Second trimester
23,038	Vural, 2016	327	8,511	Low Hb	79	103	113	144	Ref upper; Exposed lower	1.37 (1.03, 1.81)	No	First trimester
23,039	Vural, 2016	4,901	15,902	Low Hb	100	113	113	144	Ref upper	0.90 (0.82, 0.99)	No	Third trimester
23,040	Wahabi, 2022	1,532	7,339	Low Hb	70	102	113	144	Ref upper	1.04 (0.87, 1.23)	No	Second trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
23,041	Wahabi, 2022	1,729	7,339	Low Hb	100	112	113	144	Ref upper	1.10 (0.94, 1.30)	No	Second trimester
23,042	Walker, 2003			Low Hb	81	95	96	142	Ref upper; Exposed lower	3.16 (1.11, 8.98)	No	Second trimester
23,202	Wang, 2007	3,584	13,006	Low Hb	80	92	92	100		1.00 (0.80, 1.40)	No	Third trimester
23,203	Wang, 2007	659	13,006	Low Hb	70	82	92	100		1.10 (0.60, 2.00)	No	Third trimester
23,204	Wang, 2007	170	13,006	Low Hb	51	72	92	100	Exposed lower	4.00 (2.10, 7.50)	No	Third trimester
23,205	Wang, 2007	5,877	13,006	High Hb	132	140	90	102		1.50 (1.20, 1.90)	No	Third trimester
23,206	Wang, 2007	659	13,006	Low Hb*	90	102	102	110		0.91 (1.67, 0.50)	No	Third trimester
23,207	Wang, 2007	14,397	13,006	Low Hb*	90	102	122	130		0.71 (0.83, 0.59)	Yes	Third trimester
23,208	Wang, 2007	28,988	13,006	Low Hb*	90	102	112	120		0.77 (1.00, 0.67)	No	Third trimester
23,043	Watson, 2007			Low Hb	65	129	129	146	Ref upper; Exposed lower	1.40 (0.90, 2.10)	No	Third trimester
23,044	Wu, 2022	405	779	Low Hb	93	111	111	119	Exposed lower	1.29 (0.65, 2.57)	No	Second trimester
23,045	Wu, 2022	392	698	Low Hb	93	111	111	119	Exposed lower	1.40 (0.72, 2.72)	No	Third trimester
23,046	Wu, 2022	212	698	High Hb	131	151	110	120	Exposed upper	2.20 (1.07, 4.51)	No	Third trimester
23,048	Wu, 2022	144	779	High Hb	131	151	110	120	Exposed upper	2.54 (1.12, 5.76)	No	Second trimester
23,047	Wu, 2022	405	779	Low Hb*	110	120	121	129	Exposed	0.72	No	Second

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(1.41, 0.37)		trimester
23,049	Wu, 2022	609	698	Low Hb*	110	120	121	129		1.22 (2.38, 0.62)	No	Third trimester
22,824	Xiong, 2003	1,487	13,023	Low Hb	86	100	100	141	Ref upper; Exposed lower	0.75 (0.53, 1.07)	No	First trimester
22,825	Xiong, 2003	3,001	12,942	Low Hb	86	100	100	141	Ref upper; Exposed lower	0.90 (0.71, 1.16)	No	Third trimester
23,073	Yahia, 2020	1,752	605	Low Hb	70	107	108	109		1.01 (0.73, 1.40)	No	Prenatal
23,074	Yahia, 2020	121	605	Low Hb	54	78	108	109	Exposed lower	1.11 (0.58, 2.14)	No	Prenatal
23,142	Yazdani, 2004	180	419	Low Hb	80	111	146	147	Ref upper; Exposed lower	1.93 (1.40, 2.65)	No	Prenatal
23,075	Yousaf, 2011	407	411	Low Hb	62	110	110	141	Ref upper; Exposed lower	2.20 (1.40, 3.50)	No	Prenatal
23,097	Yovera, 2022	52	169	Low Hb	87	116	117	148	Ref upper; Exposed lower	11.10 (1.30, 97.20)	No	First trimester
22,869	Zagre, 2002	197	111	Low Hb	68	111	112	140	Ref upper; Exposed lower	1.20 (0.60, 2.30)	No	Third trimester
23,050	Zaveri, 2020	79,136	66,079	Low Hb	69	120	121	139	Ref upper; Exposed lower	1.06 (1.03, 1.09)	Yes	Prenatal
22,826	Zhou, 1998	263	239	Low Hb	100	109	110	119		2.73 (1.01, 7.39)	No	First trimester
22,827	Zhou, 1998	32	239	Low Hb	85	90	110	119	Exposed lower	2.99 (0.60, 14.76)	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
22,828	Zhou, 1998	109	239	Low Hb	90	99	110	119		3.27 (1.09, 9.77)	No	First trimester
22,830	Zhou, 1998	57	239	High Hb	130	144	110	119	Exposed upper	2.52 (0.62, 6.28)	No	First trimester
22,829	Zhou, 1998	129	239	Low Hb*	110	119	120	129		0.54 (1.82, 0.16)	No	First trimester
23,052	Özgen, 2020	2,047	4,559	Low Hb	82	112	113	124	Exposed lower	0.84 (0.64, 1.11)	No	Prenatal
23,053	Özgen, 2020	1,554	3,408	Low Hb*	110	127	128	144	Exposed upper	0.91 (1.15, 0.72)	No	Prenatal

Supplemental Table 22. Observation-level effect sizes - Small-for-gestational-age

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
2,802	Abeysena, 2010	15	605	Low Hb	81	105	105	139	Exposed lower	0.71 (0.10, 7.94)	No	First and second trimester
2,803	Abeysena, 2010	31	605	High Hb	141	144	104	140	Exposed upper	1.10 (0.28, 3.68)	No	First and second trimester
2,905	Abioye, 2023	108	538	Low Hb	69	115	115	146	Ref upper; Exposed lower	0.40 (0.18, 0.79)	No	Prenatal
2,944	Adjei, 2024	191	224	Low Hb	68	111	111	132	Exposed lower	5.56 (1.65, 48.10)	No	Third trimester
2,945	Adjei, 2024	301	106	Low Hb	68	111	111	132	Exposed lower	5.20 (0.63, 42.80)	No	Second trimester
2,946	Adjei, 2024	268	129	Low Hb	68	111	111	132	Exposed lower	1.91 (0.52, 7.06)	No	First trimester
2,947	Adjei, 2024	268	129	High Hb	133	150	110	133	Exposed upper	0.07 (0.01, 0.46)	No	First trimester
2,948	Adjei, 2024	301	106	High Hb	133	150	110	133	Exposed upper	0.15 (0.08, 0.64)	No	Second trimester
2,949	Adjei, 2024	191	224	High Hb	133	150	110	133	Exposed upper	0.12 (0.07, 0.15)	Yes	Third trimester
2,805	Alwan, 2015			Low Hb	97	105	105	139	Ref upper; Exposed lower	0.80 (0.40, 2.00)	No	First trimester
2,791	Ashwini, 2018	17	200	Low Hb	34	44	114	145	Ref upper; Exposed lower	7.06 (2.92, 17.06)	No	Third trimester
2,790	Ashwini, 2018	183	200	Low Hb	40	74	114	145	Ref upper	4.70 (2.43, 9.08)	No	Third trimester
2,804	Bhalerao, 2011	787	413	Low Hb	63	111	112	140	Ref upper; Exposed	0.73 (0.53, 1.01)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
2,806	Brummaier, 2020	61	285	Low Hb	85	100	100	141	Ref upper; Exposed lower	1.04 (0.62, 1.73)	No	Prenatal
2,807	Chasekwa, 2021	581	2,311	Low Hb	75	126	126	147	Ref upper; Exposed lower	0.95 (0.75, 1.22)	No	Prenatal
2,933	Chen, 2024	3,703	28,515	Low Hb	100	110	111	142	Ref upper	1.37 (1.24, 1.51)	Yes	First trimester
2,934	Chen, 2024	1,769	28,515	Low Hb	70	100	111	142	Ref upper	1.55 (1.36, 1.77)	No	First trimester
2,935	Chen, 2024	100	28,515	Low Hb	60	70	111	142	Ref upper; Exposed lower	2.60 (1.73, 4.49)	No	First trimester
2,951	Chen, 2024	1,769	28,515	Low Hb	70	101	111	142	Ref upper	1.55 (1.36, 1.77)	No	First trimester
2,952	Chen, 2024	3,703	28,515	Low Hb	100	111	111	142	Ref upper	1.37 (1.24, 1.51)	Yes	First trimester
2,953	Chen, 2024	100	28,515	Low Hb	61	71	111	142	Ref upper; Exposed lower	2.60 (1.73, 4.49)	No	First trimester
2,878	Chhabra, 2016	1,248	808	Low Hb	90	111	112	140	Ref upper	1.63 (1.36, 1.95)	Yes	Third trimester
2,879	Chhabra, 2016	87	808	Low Hb	68	71	112	140	Ref upper; Exposed lower	3.05 (1.92, 4.86)	No	Third trimester
2,880	Chhabra, 2016	857	808	Low Hb	70	91	112	140	Ref upper	2.31 (1.89, 2.81)	Yes	Third trimester
2,795	Chu, 2020	628	12,398	Low Hb	97	99	99	141	Ref upper; Exposed lower	0.56 (0.35, 0.89)	No	Third trimester
2,882	Col, 2019	320	3,100	Low Hb	70	103	113	144	Ref upper	2.49	Yes	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
										(1.78, 3.47)		trimester
2,883	Col, 2019	1,300	3,100	Low Hb	100	112	113	144	Ref upper	1.10 (0.83, 1.45)	No	Third trimester
2,884	Col, 2019	80	3,100	Low Hb	62	73	113	144	Ref upper; Exposed lower	3.82 (2.36, 6.18)	No	Third trimester
2,881	Delpisheh, 2008			Low Hb	98	110	110	140	Ref upper; Exposed lower	1.92 (1.35, 3.42)	No	Prenatal
2,783	Detlefs, 2022	3,402	13,274	Low Hb	96	110	111	142	Ref upper; Exposed lower	0.71 (0.63, 0.80)	Yes	Prenatal
2,885	Dos Santos, 2022	78	646	Low Hb	92	107	107	143	Ref upper; Exposed lower	1.68 (1.07, 2.62)	No	Second trimester
2,792	Drukker, 2015	7,977	67,683	Low Hb	95	110	111	142	Ref upper; Exposed lower	0.78 (0.70, 0.87)	Yes	Third trimester
2,808	Finkelstein, 2020	73	169	Low Hb	65	113	113	140	Ref upper; Exposed lower	1.25 (0.87, 1.81)	No	First trimester
2,774	Gonzales, 2009	396	13,130	Low Hb	83	94	114	129	Exposed lower	1.40 (1.10, 1.90)	No	Prenatal
2,775	Gonzales, 2009	3,564	13,130	Low Hb	90	114	114	129		0.90 (0.80, 1.10)	No	Prenatal
2,776	Gonzales, 2009	18,359	13,130	High Hb	134	144	110	133	Exposed upper	1.30 (1.20, 1.40)	Yes	Prenatal
2,796	Gonzales, 2012	3,635	222,958	Low Hb	80	96	117	144		0.94 (0.84, 1.05)	Yes	Prenatal
2,797	Gonzales, 2012	1,143	222,958	Low Hb	70	86	117	144		1.35 (1.14, 1.59)	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
2,798	Gonzales, 2012	45,590	222,958	Low Hb	100	116	117	144		0.85 (0.82, 0.89)	Yes	Prenatal
2,799	Gonzales, 2012	14,604	222,958	Low Hb	90	106	117	144		0.87 (0.82, 0.92)	Yes	Prenatal
2,800	Gonzales, 2012	484	222,958	Low Hb	65	76	117	144	Exposed lower	1.57 (1.23, 2.00)	No	Prenatal
2,801	Gonzales, 2012	7,237	222,958	High Hb	152	160	110	151	Exposed upper	1.33 (1.23, 1.43)	No	Prenatal
2,926	Habe, 2024	110	56	Low Hb	90	110	110	141	Ref upper; Exposed lower	0.09 (0.01, 0.69)	No	Prenatal
2,856	Hameed, 2011			Low Hb	77	111	111	142	Ref upper; Exposed lower	5.53 (2.69, 11.38)	Yes	Prenatal
2,876	Harding, 1997	134	944	Low Hb	98	108	109	134	Exposed lower	1.13 (0.66, 1.60)	No	First and second trimester
2,877	Harding, 1997	149	944	High Hb	135	137	109	134	Exposed upper	0.95 (0.70, 1.29)	No	First and second trimester
2,811	Hwang, 2010	377	3,183	Low Hb	91	100	100	141	Ref upper; Exposed lower	1.50 (1.40, 1.70)	Yes	Third trimester
2,809	Hämäläinen, 2003	256	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	0.75 (0.46, 1.21)	No	Third trimester
2,810	Hämäläinen, 2003	69	22,202	Low Hb	88	100	100	141	Ref upper; Exposed lower	0.94 (0.41, 2.17)	No	First trimester
2,857	Jessani, 2021		1,671	Low Hb	70	97	117	129		1.48 (0.84, 2.60)	No	First trimester
2,858	Jessani, 2021		1,671	Low Hb	66	76	117	129	Exposed	0.68	No	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(0.22, 2.15)		trimester
2,859	Jessani, 2021		1,671	Low Hb	70	97	117	129		1.08 (0.76, 1.53)	No	Third trimester
2,860	Jessani, 2021		4,696	Low Hb	90	117	117	129	Exposed upper	1.04 (0.74, 1.44)	No	Third trimester
2,861	Jessani, 2021		1,671	Low Hb	90	117	117	129		0.84 (0.60, 1.19)	No	First trimester
2,862	Jessani, 2021		4,696	Low Hb	70	91	111	129		1.07 (0.99, 1.15)	No	First trimester
2,863	Jessani, 2021		4,696	Low Hb	90	111	111	129		0.94 (0.85, 1.03)	No	Third trimester
2,864	Jessani, 2021		4,696	Low Hb	90	111	111	129		1.07 (0.99, 1.15)	No	First trimester
2,865	Jessani, 2021		4,696	Low Hb	69	70	111	129	Exposed lower	1.20 (0.30, 4.81)	No	Third trimester
2,866	Jessani, 2021		4,696	Low Hb	70	91	111	129		1.12 (0.96, 1.30)	No	First trimester
2,867	Jessani, 2021		1,533	Low Hb	70	92	112	129		1.16 (0.91, 1.47)	No	First trimester
2,868	Jessani, 2021		4,696	Low Hb	90	112	112	129		1.12 (0.96, 1.30)	No	First trimester
2,869	Jessani, 2021		1,671	High Hb	137	160	110	136	Exposed upper	0.71 (0.36, 1.40)	No	Third trimester
2,870	Jessani, 2021		1,671	High Hb	137	160	110	136	Exposed upper	0.98 (0.81, 1.19)	No	First trimester
2,871	Jessani, 2021		4,696	High Hb	131	138	110	130	Exposed upper	1.02 (0.90, 1.16)	No	First trimester
2,872	Jessani, 2021		4,696	High Hb	131	138	110	130	Exposed upper	1.04 (0.74, 1.44)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
2,873	Jessani, 2021		1,533	High Hb	132	146	110	131	Exposed upper	1.36 (0.87, 2.14)	No	First trimester
2,875	Koh, 1997	259	751	Low Hb	84	100	100	141	Ref upper; Exposed lower	0.40 (0.20, 0.70)	No	Third trimester
2,812	Liu, 2022	427	2,039	Low Hb	70	101	112	129		0.94 (0.77, 1.16)	No	Second trimester
2,813	Liu, 2022	421	1,883	Low Hb	100	111	112	129		0.89 (0.75, 1.06)	No	First trimester
2,814	Liu, 2022	203	1,883	Low Hb	70	101	112	129		0.97 (0.68, 1.39)	No	First trimester
2,815	Liu, 2022	989	1,720	Low Hb	100	111	112	129		0.72 (0.61, 0.84)	No	Third trimester
2,816	Liu, 2022	421	1,883	Low Hb	100	111	112	129		0.89 (0.75, 1.06)	No	First trimester
2,817	Liu, 2022	719	1,720	Low Hb	70	101	112	129		0.86 (0.70, 1.05)	No	Third trimester
2,818	Liu, 2022	12	1,720	Low Hb	61	71	112	129	Exposed lower	1.12 (0.31, 4.11)	No	Third trimester
2,819	Liu, 2022	1,241	1,883	High Hb	132	151	110	131	Exposed upper	0.99 (0.82, 1.20)	No	First trimester
2,820	Liu, 2022	308	1,720	High Hb	132	151	110	131	Exposed upper	1.16 (0.88, 1.53)	No	Third trimester
2,821	Liu, 2022	1,241	1,883	High Hb	132	151	110	131	Exposed upper	0.99 (0.82, 1.20)	No	First trimester
2,928	Liu, 2022	27,619	36,114	Low Hb	80	111	122	129		1.23 (1.15, 1.32)	No	Prenatal
2,929	Liu, 2022	45,570	36,114	Low Hb	110	121	122	129		1.17 (1.10, 1.25)	No	Prenatal
2,930	Liu, 2022	164	36,114	Low Hb	71	81	122	129	Exposed	1.46	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(0.81, 2.63)		
2,931	Liu, 2022	4,062	36,114	High Hb	142	145	120	131	Exposed upper	1.13 (0.98, 1.30)	No	Prenatal
2,932	Liu, 2022	11,196	36,114	High Hb	132	139	120	131		1.00 (0.91, 1.11)	No	Prenatal
2,777	Lone, 2004	338	286	Low Hb	63	110	110	141	Ref upper; Exposed lower	1.90 (1.10, 3.30)	No	Second and third trimester
2,846	Lu, 1991			Low Hb	88	101	124	130	Exposed lower	1.19 (0.57, 2.65)	No	First and second trimester
2,847	Lu, 1991			Low Hb	110	121	124	130		1.01 (0.82, 1.17)	No	First and second trimester
2,848	Lu, 1991			Low Hb	88	101	124	130	Exposed lower	0.62 (0.38, 1.12)	No	Third trimester
2,849	Lu, 1991			Low Hb	100	107	124	130		0.94 (0.74, 1.27)	No	Third trimester
2,850	Lu, 1991			Low Hb	100	107	124	130		1.08 (0.76, 1.52)	No	First and second trimester
2,851	Lu, 1991			Low Hb	110	121	124	130		0.99 (0.78, 1.25)	No	Third trimester
2,852	Lu, 1991			High Hb	134	140	123	131		1.42 (1.19, 1.76)	No	First and second trimester
2,853	Lu, 1991			High Hb	144	145	123	131	Exposed upper	1.33 (0.99, 1.76)	No	First and second trimester
2,854	Lu, 1991			High Hb	144	145	123	131	Exposed upper	2.51 (1.29, 2.94)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
2,855	Lu, 1991			High Hb	134	140	123	131		1.72 (1.22, 2.42)	No	Third trimester
2,927	Mamidi, 2022	298	285	Low Hb	65	112	112	141	Ref upper; Exposed lower	1.02 (0.87, 1.19)	No	First trimester
2,874	Masukume, 2015	125	5,484	Low Hb	93	109	110	141	Ref upper; Exposed lower	0.85 (0.50, 1.46)	No	First trimester
2,788	Nair, 2016	574	863	Low Hb	70	99	100	137	Ref upper	1.25 (0.90, 1.73)	No	Second and third trimester
2,789	Nair, 2016	574	592	Low Hb	68	69	100	137	Ref upper; Exposed lower	8.72 (1.66, 45.67)	No	Second and third trimester
2,906	Ohuma, 2023			Low Hb	60	61	110	111		1.06 (0.59, 1.91)	No	Third trimester
2,907	Ohuma, 2023			Low Hb	65	66	110	111		1.07 (0.76, 1.49)	No	Third trimester
2,908	Ohuma, 2023			Low Hb	70	71	110	111		1.07 (0.76, 1.49)	No	Third trimester
2,909	Ohuma, 2023			Low Hb	75	76	110	111		1.08 (1.01, 1.16)	No	Second trimester
2,910	Ohuma, 2023			Low Hb	80	81	110	111		1.09 (0.69, 1.71)	No	Prenatal
2,911	Ohuma, 2023			Low Hb	85	86	110	111		1.09 (0.69, 1.71)	No	Prenatal
2,912	Ohuma, 2023			Low Hb	90	91	110	111		1.10 (0.81, 1.50)	No	Third trimester
2,913	Ohuma, 2023			Low Hb	95	96	110	111		1.11 (0.93, 1.32)	No	Prenatal
2,914	Ohuma, 2023			Low Hb	100	101	110	111		1.11	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
										(0.93, 1.32)		
2,915	Ohuma, 2023			Low Hb	105	106	110	111		1.08 (1.01, 1.16)	No	Second trimester
2,916	Ohuma, 2023			High Hb	140	141	110	111		0.98 (0.78, 1.22)	No	Prenatal
2,917	Ohuma, 2023			High Hb	145	146	110	111		0.93 (0.72, 1.20)	No	Prenatal
2,918	Ohuma, 2023			High Hb	150	151	110	111		0.88 (0.78, 1.00)	No	Second trimester
2,919	Ohuma, 2023			High Hb	155	156	110	111		0.83 (0.68, 1.02)	No	Prenatal
2,920	Ohuma, 2023			High Hb	160	160	110	111		0.78 (0.56, 1.08)	No	Second trimester
2,924	Ohuma, 2023			High Hb	130	131	110	111		0.99 (0.80, 1.22)	No	Prenatal
2,925	Ohuma, 2023			High Hb	135	136	110	111		1.01 (0.81, 1.26)	No	Prenatal
2,921	Ohuma, 2023			Low Hb	110	111	115	116		1.14 (0.97, 1.33)	No	Second trimester
2,922	Ohuma, 2023			Low Hb	110	111	120	121		1.21 (0.67, 2.16)	No	Third trimester
2,923	Ohuma, 2023			Low Hb	110	111	125	126		1.11 (0.93, 1.32)	No	Prenatal
2,923	Ohuma, 2023			Low Hb	110	111	125	126		1.11 (0.99, 1.23)	No	Prenatal
2,938	Olga, 2024	314	2,257	Low Hb	99	105	105	141	Ref upper; Exposed lower	0.52 (0.29, 0.85)	No	Third trimester
2,822	Phaloprakarn, 2008	426	448	Low Hb*	110	124	125	145	Exposed upper	0.91 (2.50, 0.37)	No	First trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
2,937	Prioreschi, 2025	175	173	Low Hb	79	115	115	146	Ref upper; Exposed lower	0.56 (0.36, 0.88)	No	First and second trimester
2,823	Puerto, 2021			Low Hb	79	116	117	148	Ref upper; Exposed lower	0.52 (0.33, 0.80)	No	Third trimester
2,793	Randall, 2019	1,282	27,356	Low Hb	95	110	111	139	Exposed lower	1.28 (1.10, 1.49)	No	First and second trimester
2,794	Randall, 2019	3,628	27,356	High Hb	141	153	110	140	Exposed upper	0.86 (0.76, 0.96)	Yes	First and second trimester
2,778	Ren, 2007	19,329	68,820	Low Hb	80	111	112	143	Ref upper; Exposed lower	1.11 (1.03, 1.20)	No	First trimester
2,779	Ren, 2007	3,828	44,028	Low Hb	80	101	112	119		1.13 (0.98, 1.31)	No	First trimester
2,780	Ren, 2007	110	44,028	Low Hb	72	82	112	119	Exposed lower	1.49 (0.69, 3.23)	No	First trimester
2,782	Ren, 2007	4,299	44,028	High Hb	142	159	110	121		0.99 (0.84, 1.16)	No	First trimester
2,781	Ren, 2007	35,687	44,028	Low Hb*	110	121	122	139		1.02 (1.10, 0.95)	No	First trimester
2,765	Rondó, 1995	201	140	Low Hb	63	107	133	140	Ref upper; Exposed lower	0.65 (0.45, 0.93)	No	Third trimester
2,766	Rondó, 1995	335	377	Low Hb	63	113	114	140	Ref upper; Exposed lower	0.74 (0.54, 1.00)	No	Third trimester
2,764	Rondó, 1995	371	140	High Hb*	133	140	107	130	Ref upper	1.25 (1.89, 0.83)	No	Third trimester
2,840	Rondó, 1997	299	337	Low Hb	85	112	113	137	Ref upper;	0.74	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(0.54, 1.00)		
2,841	Rondó, 1997	331	125	Low Hb	107	129	132	137	Ref upper	0.80 (0.53, 1.20)	No	Prenatal
2,842	Rondó, 1997	180	125	Low Hb	85	105	132	137	Ref upper; Exposed lower	0.65 (0.45, 0.93)	No	Prenatal
2,824	Rondó, 1999	335	377	Low Hb	63	113	113	140	Ref upper; Exposed lower	0.74 (0.55, 0.99)	No	Third trimester
2,825	Salman, 2020	94	110	Low Hb	70	90	111	142	Ref upper	1.75 (0.51, 6.03)	No	Second and third trimester
2,826	Salman, 2020	65	110	Low Hb	90	110	111	142	Ref upper	1.27 (0.29, 5.49)	No	Second and third trimester
2,827	Salman, 2020	64	110	Low Hb	60	70	111	142	Ref upper; Exposed lower	3.87 (1.24, 12.05)	No	Second and third trimester
2,828	Scholl, 1992	217	562	Low Hb	91	109	110	141	Ref upper; Exposed lower	1.66 (0.90, 3.04)	No	First and second trimester
2,843	Sebastian, 2015	725	35,950	Low Hb	65	111	111	141	Ref upper; Exposed lower	1.29 (1.01, 1.65)	No	Prenatal
2,829	Shah, 2022	206	194	Low Hb	72	112	112	143	Ref upper; Exposed lower	4.04 (1.81, 8.97)	No	Prenatal
2,936	Shrivastava, 2024	26	76	Low Hb	32	42	42	138	Ref upper; Exposed lower	1.99 (1.30, 3.04)	No	Prenatal
2,784	Smith, 2019			Low Hb	90	111	111	142	Ref upper; Exposed	0.98 (0.85, 1.14)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower			
2,785	Smith, 2019			Low Hb	70	90	111	142	Ref upper	1.13 (0.97, 1.33)	No	Third trimester
2,786	Smith, 2019			Low Hb	90	110	111	142	Ref upper	0.83 (0.80, 0.86)	Yes	Third trimester
2,787	Smith, 2019			Low Hb	61	71	111	142	Ref upper; Exposed lower	2.33 (1.44, 3.76)	No	Third trimester
2,844	Spinillo, 1994	42	1,355	Low Hb	71	81	82	142	Ref upper; Exposed lower	5.05 (2.09, 12.21)	No	Prenatal
2,939	Tang, 2024	20,105	82,722	Low Hb	100	114	114	120		1.09 (1.03, 1.16)	No	First trimester
2,940	Tang, 2024	6,285	82,722	Low Hb	93	104	114	120	Exposed lower	1.43 (1.31, 1.57)	Yes	First trimester
2,942	Tang, 2024	131,205	82,722	High Hb	134	140	110	124		0.99 (0.96, 1.03)	No	First trimester
2,943	Tang, 2024	20,105	82,722	High Hb	144	150	110	124		1.09 (1.03, 1.16)	No	First trimester
2,941	Tang, 2024	174,261	82,722	Low Hb*	110	124	124	130		1.03 (1.06, 1.00)	No	First trimester
2,888	Toshimitsu, 2023			Low Hb	95	105	115	125		1.04 (0.31, 3.46)	No	First trimester
2,889	Toshimitsu, 2023			Low Hb	90	95	115	125	Exposed lower	1.18 (0.46, 3.00)	No	Second trimester
2,890	Toshimitsu, 2023			Low Hb	90	95	115	125	Exposed lower	3.76 (0.77, 18.50)	No	First trimester
2,891	Toshimitsu, 2023			Low Hb	105	115	115	125		1.38 (1.10, 1.73)	No	Third trimester
2,892	Toshimitsu,			Low Hb	95	105	115	125		1.35	No	Second

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
	2023									(0.91, 2.02)		trimester
2,893	Toshimitsu, 2023			Low Hb	95	105	115	125		0.66 (0.47, 0.93)	No	Third trimester
2,894	Toshimitsu, 2023			Low Hb	105	115	115	125		1.15 (0.86, 1.53)	No	Second trimester
2,895	Toshimitsu, 2023			Low Hb	105	115	115	125		1.27 (0.79, 2.06)	No	First trimester
2,896	Toshimitsu, 2023			Low Hb	95	105	115	125		0.68 (0.42, 1.10)	No	Third trimester
2,897	Toshimitsu, 2023			Low Hb	90	95	115	125	Exposed lower	0.60 (0.21, 1.71)	No	Third trimester
2,898	Toshimitsu, 2023			Low Hb	105	115	115	125		1.35 (0.91, 2.02)	No	Second trimester
2,899	Toshimitsu, 2023			Low Hb	90	95	115	125	Exposed lower	0.83 (0.44, 1.55)	No	Third trimester
2,904	Toshimitsu, 2023			High Hb	135	152	115	125	Exposed upper	1.06 (0.70, 1.61)	No	First trimester
2,900	Toshimitsu, 2023			Low Hb*	115	125	125	135		0.62 (1.49, 0.26)	No	First trimester
2,901	Toshimitsu, 2023			Low Hb*	115	125	125	135		0.51 (0.83, 0.31)	No	Third trimester
2,902	Toshimitsu, 2023			Low Hb*	115	125	125	135		0.55 (0.72, 0.42)	No	Third trimester
2,903	Toshimitsu, 2023			Low Hb*	115	125	125	135		1.10 (1.56, 0.78)	No	First trimester
2,830	Turner, 2012	244	441	Low Hb	93	112	112	143	Ref upper; Exposed lower	0.54 (0.15, 1.95)	No	Prenatal
2,950	Villamonte, 2024	224	483	High Hb	152	160	88	152	Ref lower; Exposed	0.69 (0.38, 1.27)	No	Third trimester

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									upper			
2,831	Wu, 2022	392	698	Low Hb	93	111	111	119	Exposed lower	1.11 (0.61, 2.03)	No	Third trimester
2,832	Wu, 2022	405	779	Low Hb	93	111	111	119	Exposed lower	1.37 (0.78, 2.39)	No	Second trimester
2,833	Wu, 2022	144	779	High Hb	131	151	110	120	Exposed upper	1.45 (0.62, 3.40)	No	Second trimester
2,835	Wu, 2022	212	698	High Hb	131	151	110	120	Exposed upper	2.00 (1.05, 3.80)	No	Third trimester
2,834	Wu, 2022	583	779	Low Hb*	110	120	121	129		0.93 (1.59, 0.29)	No	Second trimester
2,836	Wu, 2022	609	698	Low Hb*	110	120	121	129		1.06 (1.89, 0.61)	No	Third trimester
2,767	Xiong, 2003	3,001	12,942	Low Hb	86	100	100	141	Ref upper; Exposed lower	0.93 (0.79, 1.10)	No	Third trimester
2,768	Xiong, 2003	1,487	13,023	Low Hb	86	100	100	141	Ref upper; Exposed lower	0.78 (0.61, 1.01)	No	First trimester
2,837	Xu, 2022	895	1,100	Low Hb	93	111	111	119	Exposed lower	0.70 (0.48, 1.03)	No	Second and third trimester
2,839	Xu, 2022	396	1,100	High Hb	131	151	110	120	Exposed upper	2.16 (1.49, 3.13)	Yes	Second and third trimester
2,838	Xu, 2022	842	1,100	Low Hb*	110	120	121	129		0.84 (1.18, 0.60)	No	Second and third trimester
2,886	Young, 2023	313	1,142	Low Hb	89	120	120	141	Ref upper; Exposed lower	1.24 (0.88, 1.74)	No	Prenatal
2,887	Young, 2023	313	1,142	Low Hb	89	109	109	141	Ref upper;	1.83	No	Prenatal

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									Exposed lower	(1.05, 3.21)		
2,845	Yousaf, 2011	407	411	Low Hb	62	110	110	141	Ref upper; Exposed lower	2.20 (1.30, 3.50)	No	Prenatal
2,769	Zhou, 1998	109	239	Low Hb	90	99	110	119		1.02 (0.55, 1.89)	No	First trimester
2,770	Zhou, 1998	263	239	Low Hb	100	109	110	119		1.01 (0.62, 1.63)	No	First trimester
2,771	Zhou, 1998	32	239	Low Hb	85	90	110	119	Exposed lower	0.80 (0.26, 2.48)	No	First trimester
2,772	Zhou, 1998	57	239	High Hb	130	144	110	119	Exposed upper	0.75 (0.30, 1.85)	No	First trimester
2,773	Zhou, 1998	263	239	Low Hb	110	119	120	129		1.01 (0.62, 1.63)	No	First trimester

Supplemental Table 23. Observation-level effect sizes- Large-for-gestational-age

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
82	Adjei, 2024	25	129	Low Hb	68	111	111	132	Exposed lower	1.27 (0.57, 2.82)	No	First trimester
83	Adjei, 2024	15	106	Low Hb	68	111	111	132	Exposed lower	0.54 (0.25, 1.15)	No	Second trimester
84	Adjei, 2024	7	224	Low Hb	68	111	111	132	Exposed lower	0.75 (0.34, 1.67)	No	Third trimester
85	Adjei, 2024	25	129	High Hb	133	150	110	133	Exposed upper	2.90 (0.73, 11.60)	No	First trimester
86	Adjei, 2024	15	106	High Hb	133	150	110	133	Exposed upper	1.33 (0.18, 9.79)	No	Second trimester
87	Adjei, 2024	7	224	High Hb	133	150	110	133	Exposed upper	1.84 (0.15, 22.80)	No	Third trimester
77	Chu, 2020	628	12,398	Low Hb	97	99	99	141	Ref upper; Exposed lower	1.12 (0.83, 1.53)	No	Third trimester
75	Detlefs, 2022	3,402	13,274	Low Hb	96	110	111	142	Ref upper; Exposed lower	1.42 (1.24, 1.63)	No	Prenatal
76	Drukker, 2015	7,977	67,683	Low Hb	95	110	111	142	Ref upper; Exposed lower	1.29 (1.20, 1.39)	No	Third trimester
80	Hong, 2022	212	788	Low Hb	80	110	110	141	Ref upper	1.74 (1.09, 2.78)	No	Prenatal
79	Koh, 1997	259	751	Low Hb	84	100	100	141	Ref upper; Exposed lower	1.70 (1.20, 2.60)	No	Third trimester
81	Prioreschi, 2025	175	173	Low Hb	79	115	115	146	Ref upper; Exposed lower	0.66 (0.29, 1.50)	No	First and second trimester
78	de Sa, 2015	26	24	Low Hb	91	111	111	140	Ref upper; Exposed	1.85	No	Third

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
									lower	(0.18, 19.08)		trimester

Supplemental Table 24. Observation-level effect sizes - Neonatal sepis

Study observation index	Author/Year	Exposed Sample Size	Unexposed Sample Size	Exposure	Exposed Hb Lower (g/L)	Exposed Hb Upper (g/L)	Reference Hb Lower (g/L)	Reference Hb Upper (g/L)	Imputed Hb Bound	Relative Risk (95% CI)	Trimmed	Exposure timepoint
41	Bener, 2013	246	1,186	Low Hb	86	110	110	141	Ref upper; Exposed lower	1.41 (0.75, 2.65)	No	Third trimester
43	Bora, 2014	421	49	Low Hb	63	110	110	138	Ref upper; Exposed lower	2.44 (0.34, 17.78)	Yes	Third trimester
42	Lokeshwari, 2018	44	156	Low Hb	18	53	53	80	Exposed lower	2.13 (0.59, 7.63)	No	Prenatal

Section 3. Other results and sensitivity analyses

To supplement our main analyses—which evaluated maternal hemoglobin concentrations measured at any point during pregnancy while accounting for hemoglobin dynamics—we conducted sensitivity analyses to examine whether the relative risks of maternal and neonatal outcomes varied by the timing of hemoglobin measurement across the first, second, and third trimesters. Additional sensitivity analyses assessed the robustness of the modeled associations under different analytical assumptions, including the use of alternative outcome definitions and severities, a uniform reference hemoglobin concentration, and adjustment for socioeconomic confounders. We also estimated effect sizes based on conventional anemia and high hemoglobin thresholds to ensure comparability with commonly used risk definitions.

Section 3.1. Main results with and without between study heterogeneity

Supplemental Table 25. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes with and without between-study heterogeneity

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Severe anemia (Hb < 70 g/L)		Moderate anemia (Hb 70-100 g/L)		Mild anemia (Hb 100-110 g/L)		Hb 110-120 g/L		Over 140 g/L		Over 160 g/L	
			Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)
Maternal disorders														
All-cause maternal mortality	5 (5, 2)	109	2.54 (1.82 - 3.55)	2.54 (1.14 - 5.68)	1.76 (1.44 - 2.15)	1.76 (1.08 - 2.86)	1.05 (1.03 - 1.06)	1.05 (1.01 - 1.09)	1.07 (1.04 - 1.10)	1.07 (1.01 - 1.14)	NA#	NA#	NA#	NA#
Postpartum hemorrhage	71 (71, 4)	135	6.70 (5.07 - 8.86)	6.70 (2.13 - 21.08)	2.88 (2.47 - 3.37)	2.88 (1.52 - 5.46)	1.44 (1.36 - 1.51)	1.44 (1.16 - 1.79)	1.10 (1.09 - 1.12)	1.10 (1.04 - 1.17)	1.06 (1.05 - 1.06)	1.06 (1.02 - 1.09)	1.11 (1.10 - 1.13)	1.11 (1.04 - 1.19)
Antepartum hemorrhage	3 (3, 1)	126	1.21 (0.87 - 1.69)	1.21 (0.66 - 2.22)	1.21 (0.87 - 1.68)	1.21 (0.67 - 2.20)	1.16 (0.90 - 1.48)	1.16 (0.73 - 1.82)	1.06 (0.96 - 1.16)	1.06 (0.89 - 1.26)	NA#	NA#	NA#	NA#
Preeclampsia	13 (12, 5)	123	1.54 (1.30 - 1.82)	1.54 (0.16 - 14.48)	1.45 (1.26 - 1.68)	1.45 (0.21 - 9.95)	1.30 (1.18 - 1.45)	1.30 (0.33 - 5.17)	1.13 (1.08 - 1.18)	1.13 (0.61 - 2.10)	1.90 (1.75 - 2.07)	1.90 (0.60 - 6.06)	2.33 (2.31 - 2.35)	2.33 (2.09 - 2.61)
Maternal sepsis and other infections	16 (16, 0)	132	5.36 (3.21 - 8.95)	5.36 (1.09 - 26.36)	3.32 (2.30 - 4.79)	3.32 (1.06 - 10.37)	1.84 (1.53 - 2.22)	1.84 (1.03 - 3.29)	1.25 (1.17 - 1.34)	1.25 (1.01 - 1.55)	NA#	NA#	NA#	NA#
Peripartum depression	13 (13, 0)	128	1.59 (1.30 - 1.95)	1.59 (0.79 - 3.22)	1.50 (1.26 - 1.79)	1.50 (0.81 - 2.78)	1.25 (1.13 - 1.37)	1.25 (0.89 - 1.75)	1.06 (1.04 - 1.09)	1.06 (0.97 - 1.16)	NA#	NA#	NA#	NA#
Neonatal disorders														
All-cause neonatal mortality	46 (46, 5)	124	2.73 (2.26 - 3.29)	2.73 (1.72 - 4.33)	1.47 (1.37 - 1.58)	1.47 (1.23 - 1.76)	1.09 (1.07 - 1.11)	1.09 (1.05 - 1.13)	1.02 (1.02 - 1.02)	1.02 (1.01 - 1.03)	1.03 (1.02 - 1.03)	1.03 (1.01 - 1.04)	1.04 (1.03 - 1.04)	1.04 (1.02 - 1.05)

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Severe anemia (Hb < 70 g/L)		Moderate anemia (Hb 70-100 g/L)		Mild anemia (Hb 100-110 g/L)		Hb 110-120 g/L		Over 140 g/L		Over 160 g/L	
			Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)
Stillbirth	6 (6, 3)	95	2.20 (1.21 - 3.98)	2.20 (0.18 - 27.29)	1.23 (1.05 - 1.45)	1.23 (0.63 - 2.43)	1.15 (1.03 - 1.28)	1.15 (0.74 - 1.79)	1.33 (1.07 - 1.65)	1.33 (0.53 - 3.32)	1.35 (1.08 - 1.70)	1.35 (0.51 - 3.58)	1.33 (1.07 - 1.64)	1.33 (0.54 - 3.29)
Preterm birth	148 (146, 30)	124	2.66 (2.33 - 3.03)	2.66 (1.16 - 6.11)	1.52 (1.43 - 1.61)	1.52 (1.06 - 2.17)	1.09 (1.07 - 1.10)	1.09 (1.01 - 1.17)	1.05 (1.05 - 1.06)	1.05 (1.01 - 1.10)	1.16 (1.14 - 1.19)	1.16 (1.02 - 1.33)	1.20 (1.17 - 1.23)	1.20 (1.03 - 1.40)
Low birth weight	212 (207, 29)	124	2.83 (2.43 - 3.31)	2.83 (1.00 - 7.99)	1.57 (1.47 - 1.68)	1.57 (1.00 - 2.46)	1.14 (1.11 - 1.16)	1.14 (1.00 - 1.29)	1.04 (1.03 - 1.05)	1.04 (1.00 - 1.08)	1.32 (1.27 - 1.38)	1.32 (1.00 - 1.74)	1.56 (1.46 - 1.67)	1.56 (1.00 - 2.43)
Small-for-gestational-age	61 (60, 19)	130	1.62 (1.40 - 1.88)	1.62 (1.14 - 2.30)	1.21 (1.14 - 1.28)	1.21 (1.05 - 1.38)	1.05 (1.03 - 1.06)	1.05 (1.01 - 1.08)	1.03 (1.02 - 1.04)	1.03 (1.01 - 1.05)	1.15 (1.10 - 1.19)	1.15 (1.04 - 1.26)	1.31 (1.20 - 1.42)	1.31 (1.08 - 1.59)
Large-for-gestational-age	8 (8, 1)	131	1.49 (1.36 - 1.63)	1.49 (0.76 - 2.91)	1.46 (1.34 - 1.59)	1.46 (0.77 - 2.78)	1.35 (1.26 - 1.45)	1.35 (0.81 - 2.26)	1.16 (1.12 - 1.20)	1.16 (0.90 - 1.50)	NA#	NA#	NA#	NA#
Neonatal sepsis	3 (3, 0)	129	3.43 (0.57 - 20.73)	3.43 (0.34 - 34.17)	2.09 (0.71 - 6.11)	2.09 (0.53 - 8.23)	1.29 (0.89 - 1.89)	1.29 (0.80 - 2.10)	1.08 (0.97 - 1.21)	1.08 (0.94 - 1.25)	NA#	NA#	NA#	NA#

Section 3.2. By timing of hemoglobin measurement

Supplemental Table 26. Strength of the evidence for the relationship between first-trimester maternal hemoglobin and maternal and neonatal outcomes

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
Maternal disorders															
Antepartum hemorrhage	1 (1, 0)	70	NA#	NA#	NA#	NA#	NA#	NA#	90 - 127	NA#	NA#	NA#	NA#	No	NA
Preeclampsia	5 (5, 1)	102	1.53 (0.93 - 2.51)	1.21 (0.97 - 1.53)	1.02 (1.00 - 1.05)	1.21 (0.97 - 1.51)	NA#	NA#	87 - 138	1 (0)	2 (0.05)	NA#	NA#	Yes	multiple exposure levels
Peripartum depression	2 (2, 0)	141	NA#	NA#	NA#	NA#	NA#	NA#	71 - 120	NA#	NA#	NA#	NA#	No	NA
Neonatal disorders															
All-cause neonatal mortality	7 (7, 2)	147	1.44 (0.55 - 3.78)	1.43 (0.55 - 3.68)	1.33 (0.62 - 2.88)	1.17 (0.77 - 1.76)	NA#	NA#	84 - 135	0.78 (-0.25)	1 (NA)	NA#	NA#	No	NA
Stillbirth	2 (2, 2)	136	NA#	NA#	NA#	NA#	NA#	NA#	83 - 139	NA#	NA#	NA#	NA#	No	NA
Preterm birth	35 (35, 10)	121	1.92 (1.54 - 2.38)	1.44 (1.27 - 1.62)	1.08 (1.05 - 1.11)	1.01 (1.01 - 1.02)	1.21 (1.14 - 1.29)	1.30 (1.19 - 1.42)	90 - 137	1.08 (0.07)	2 (7.55)	1.02 (0.02)	2 (2.12)	Yes	blood sample type, adjustment for demographic factors, selection bias, representativeness
Low birth weight	37 (37, 10)	120	1.81 (1.00 - 3.27)	1.44 (1.00 - 2.08)	1.14 (1.00 - 1.30)	1.02 (1.00 - 1.04)	1.23 (1.00 - 1.51)	1.31 (1.00 - 1.71)	86 - 137	1.03 (0.03)	2 (2.75)	1.01 (0.01)	2 (0.8)	No	adjustment for socioeconomic factors, timing of outcome
Small-for-gestational-age	16 (16, 7)	130	1.55 (1.17 - 2.04)	1.27 (1.09 - 1.47)	1.06 (1.02 - 1.10)	1.02 (1.01 - 1.04)	1.11 (1.04 - 1.19)	1.24 (1.08 - 1.42)	85 - 137	1.03 (0.03)	2 (3.38)	1 (0)	2 (0.22)	No	adjustment for demographic factors
Large-for-gestational-age	1 (1, 1)	107	NA#	NA#	NA#	NA#	NA#	NA#	94 - 139	NA#	NA#	NA#	NA#	No	NA

Note: Hb: hemoglobin; Ref. Hb: reference hemoglobin; RR: relative risk; UI: uncertainty intervals; BPRF: burden of proof risk function; ROS: risk-outcome score; Min. % excess risk: minimum excess risk, in percent; Pub. bias: publication bias; NA: not applicable. The number of unique studies listed includes the total number of studies in the meta-regression, as well as those in which the hemoglobin levels of the exposed group were either lower than those of the non-exposed/reference group (i.e., low hemoglobin) or higher (i.e., high hemoglobin). Reference hemoglobin

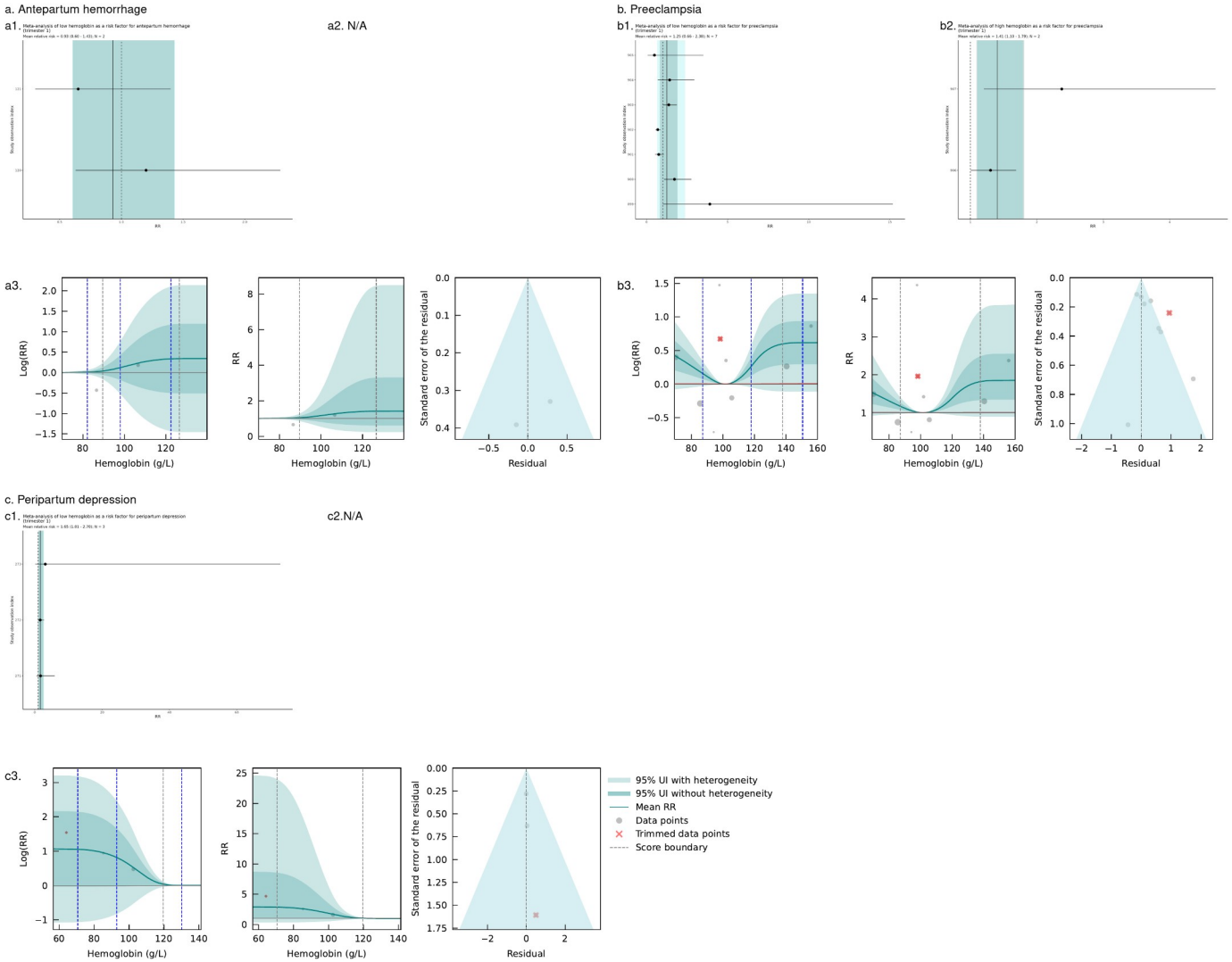
Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		

value represents the exposure level that corresponds to the lowest risk value determined by the risk function. Relative risk of the outcome is averaged across exposure ranges (including conventional anemia cutoffs), with uncertainties adjusted using a gamma method to account for between-study heterogeneity. The mean BPRF represents the weakest association consistent with available data (defined as the 5th quantile risk curve closest to the null or an RR of 1) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, after accounting for between-study heterogeneity. The data-dense exposure range below the reference hemoglobin is defined as the range from the 15th percentile of the hemoglobin distribution up to the reference hemoglobin value, or between the 15th and 85th percentiles if the entire distribution falls below the reference value. The data-dense exposure range above the reference hemoglobin is defined as the range from the reference hemoglobin value to the 85th percentile of the hemoglobin distribution. The ROS represents the signed value of the log(BPRF) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, directly comparable across outcomes. Minimum excess risk reflects the most conservative estimate of increased risk associated with hemoglobin levels that is consistent with the available data. For ease of interpretation, we have transformed the ROS and BPRF into a star rating (1–5), with a higher rating representing a larger effect and stronger evidence. The potential publication bias, which affects the validity of the results, was tested using Egger's regression. Observations were bias-adjusted to better reflect the gold standard values of selected bias covariates, identified through an algorithm that systematically detects covariates associated with significant bias across included studies. 'NA#' indicates that mean RR estimates and evidence scores are not reported because they were derived from fewer than three studies. 'NA*' indicates that mean RR estimates and evidence scores are not reported because the entire data-dense exposure range (i.e., the 15th–85th percentile of exposure) fell below the reference hemoglobin value. For outcomes with a zero-star rating, BPRF, ROS and minimum excess risk are not reported; for one-star ratings, only minimum excess risk is not reported.

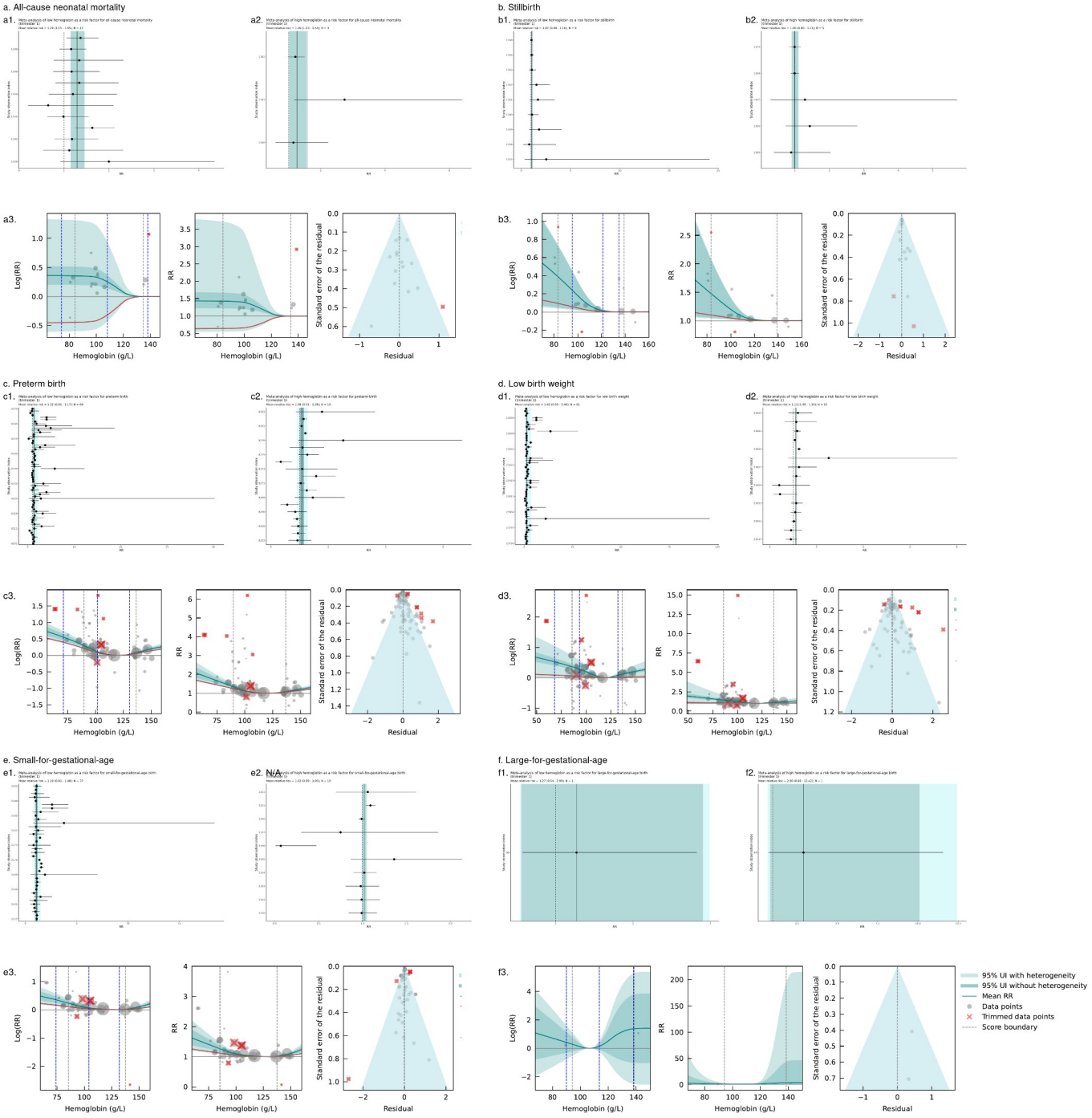
Supplemental Table 27. Strength of the evidence for the relationship between first-trimester maternal hemoglobin and maternal and neonatal outcomes with and without between-study heterogeneity

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Severe anemia (Hb < 70 g/L)		Moderate anemia (Hb 70-100 g/L)		Mild anemia (Hb 100-110 g/L)		Hb 110-120 g/L		Over 140 g/L		Over 160 g/L	
			Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)
Maternal disorders														
Antepartum hemorrhage	1 (1, 0)	70	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#
Preeclampsia	5 (5, 1)	102	1.53 (1.22 - 1.90)	1.53 (0.93 - 2.51)	1.21 (1.10 - 1.34)	1.21 (0.97 - 1.53)	1.02 (1.01 - 1.03)	1.02 (1.00 - 1.05)	1.21 (1.10 - 1.33)	1.21 (0.97 - 1.51)	NA#	NA#	NA#	NA#
Peripartum depression	2 (2, 0)	141	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#
Neonatal disorders														
All-cause neonatal mortality	7 (7, 2)	147	1.44 (1.22 - 1.69)	1.44 (0.55 - 3.78)	1.43 (1.22 - 1.67)	1.43 (0.55 - 3.68)	1.33 (1.17 - 1.51)	1.33 (0.62 - 2.88)	1.17 (1.09 - 1.25)	1.17 (0.77 - 1.76)	NA#	NA#	NA#	NA#
Stillbirth	2 (2, 2)	136	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#
Preterm birth	35 (35, 10)	121	1.92 (1.70 - 2.16)	1.92 (1.54 - 2.38)	1.44 (1.34 - 1.53)	1.44 (1.27 - 1.62)	1.08 (1.07 - 1.10)	1.08 (1.05 - 1.11)	1.01 (1.01 - 1.02)	1.01 (1.01 - 1.02)	1.21 (1.17 - 1.26)	1.21 (1.14 - 1.29)	1.30 (1.24 - 1.36)	1.30 (1.19 - 1.42)
Low birth weight	37 (37, 10)	120	1.81 (1.57 - 2.08)	1.81 (1.00 - 3.27)	1.44 (1.32 - 1.58)	1.44 (1.00 - 2.08)	1.14 (1.10 - 1.17)	1.14 (1.00 - 1.30)	1.02 (1.01 - 1.02)	1.02 (1.00 - 1.04)	1.23 (1.17 - 1.29)	1.23 (1.00 - 1.51)	1.31 (1.23 - 1.39)	1.31 (1.00 - 1.71)
Small-for-gestational-age	16 (16, 7)	130	1.55 (1.34 - 1.79)	1.55 (1.17 - 2.04)	1.27 (1.17 - 1.37)	1.27 (1.09 - 1.47)	1.06 (1.04 - 1.08)	1.06 (1.02 - 1.10)	1.02 (1.02 - 1.03)	1.02 (1.01 - 1.04)	1.11 (1.07 - 1.16)	1.11 (1.04 - 1.19)	1.24 (1.15 - 1.33)	1.24 (1.08 - 1.42)
Large-for-gestational-age	1 (1, 1)	107	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#

Supplemental Figure 7. First-trimester maternal hemoglobin and maternal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



Supplemental Figure 8. First-trimester maternal hemoglobin and neonatal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



Supplemental Table 28. Strength of the evidence for the relationship between second-trimester maternal hemoglobin and maternal and neonatal outcomes

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
Maternal disorders															
Postpartum hemorrhage	2 (2, 0)	145	NA#	NA#	NA#	NA#	NA#	NA#	99 - 128	NA#	NA#	NA#	NA#	No	NA
Preeclampsia	4 (3, 2)	118	1.20 (0.32 - 4.51)	1.14 (0.44 - 2.93)	1.04 (0.77 - 1.42)	1.00 (0.97 - 1.03)	NA#	NA#	100 - 138		0 (NA)		NA#	Yes	NA
Peripartum depression	1 (1, 0)	130	NA#	NA#	NA#	NA#	NA#	NA#	98 - 127	NA#	NA#	NA#	NA#	No	NA
Neonatal disorders															
All-cause neonatal mortality	2 (2, 2)	102	NA#	NA#	NA#	NA#	NA#	NA#	100 - 140	NA#	NA#	NA#	NA#	No	NA
Preterm birth	18 (18, 7)	123	1.72 (1.46 - 2.02)	1.49 (1.32 - 1.67)	1.24 (1.16 - 1.33)	1.09 (1.06 - 1.11)	1.45 (1.30 - 1.62)	1.66 (1.43 - 1.94)	88 - 141	1.16 (0.14)	3 (15.56)	1.08 (0.07)	2 (7.76)	No	NA
Low birth weight	17 (17, 4)	128	1.24 (0.10 - 15.60)	1.17 (0.18 - 7.54)	1.10 (0.37 - 3.24)	1.04 (0.66 - 1.63)	1.01 (0.91 - 1.12)	1.01 (0.87 - 1.18)	87 - 134		0 (NA)		0 (NA)	No	adjustment for demographic factors, representativeness, timing of outcome, study design
Small-for-gestational-age	6 (6, 4)	160	1.74 (1.38 - 2.19)	1.62 (1.32 - 1.97)	1.38 (1.21 - 1.59)	1.17 (1.09 - 1.25)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	84 - 141	1.15 (0.14)	2 (14.67)	NA*	NA*	No	NA
Large-for-gestational-age	1 (1, 1)	68	NA#	NA#	NA#	NA#	NA#	NA#	94 - 139	NA#	NA#	NA#	NA#	No	NA

Note: Hb: hemoglobin; Ref. Hb: reference hemoglobin; RR: relative risk; UI: uncertainty intervals; BPRF: burden of proof risk function; ROS: risk-outcome score; Min. % excess risk: minimum excess risk, in percent; Pub. bias: publication bias; NA: not applicable. The number of unique studies listed includes the total number of studies in the meta-regression, as well as those in which the hemoglobin levels of the exposed group were either lower than those of the non-exposed/reference group (i.e., low hemoglobin) or higher (i.e., high hemoglobin). Reference hemoglobin value represents the exposure level that corresponds to the lowest risk value determined by the risk function. Relative risk of the outcome is averaged across exposure ranges (including conventional anemia cutoffs), with uncertainties adjusted using a gamma method to account for between-study heterogeneity. The mean BPRF represents the weakest association consistent with available data (defined as the 5th quantile risk curve closest to the null or an RR of 1) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, after accounting for between-study heterogeneity. The data-dense exposure range below the reference hemoglobin is defined as the range from the 15th percentile of the hemoglobin distribution up to the reference hemoglobin value, or between the 15th and 85th percentiles if the entire distribution falls below the reference value. The data-dense exposure range above the reference hemoglobin is defined as the range from the reference hemoglobin value to the 85th percentile of the hemoglobin distribution. The ROS represents the signed value of the log(BPRF) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, directly comparable across outcomes. Minimum excess risk reflects the most conservative estimate of increased risk associated with hemoglobin levels that is consistent with the available data. For ease of interpretation, we have transformed the ROS and BPRF into a star rating (1–5), with a higher rating representing a larger effect and stronger evidence. The potential publication bias, which affects the validity of the results, was tested using Egger's regression. Observations were bias-adjusted

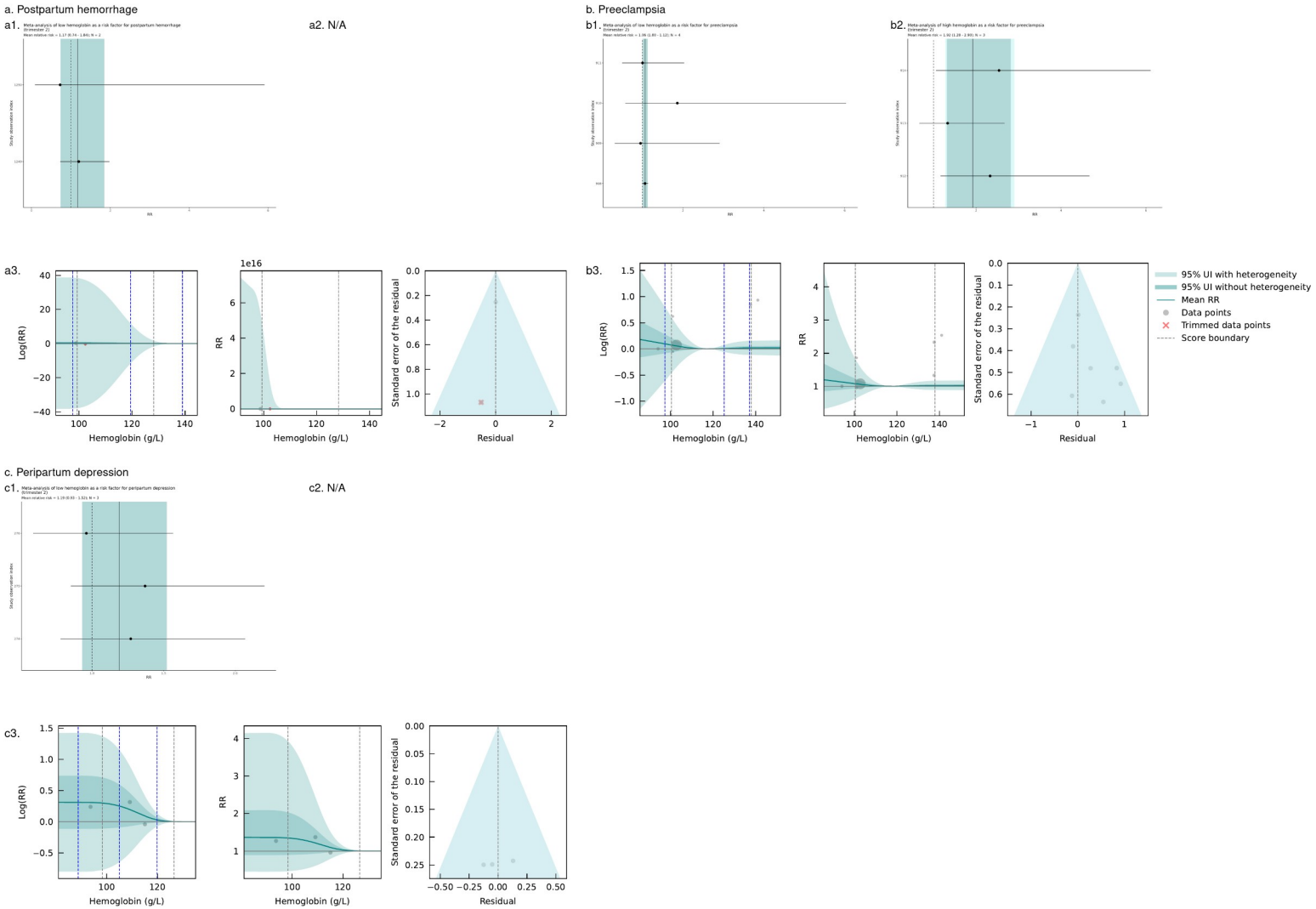
Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		

to better reflect the gold standard values of selected bias covariates, identified through an algorithm that systematically detects covariates associated with significant bias across included studies. 'NA#' indicates that mean RR estimates and evidence scores are not reported because they were derived from fewer than three studies. 'NA*' indicates that mean RR estimates and evidence scores are not reported because the entire data-dense exposure range (i.e., the 15th–85th percentile of exposure) fell below the reference hemoglobin value. For outcomes with a zero-star rating, BPRF, ROS and minimum excess risk are not reported; for one-star ratings, only minimum excess risk is not reported.

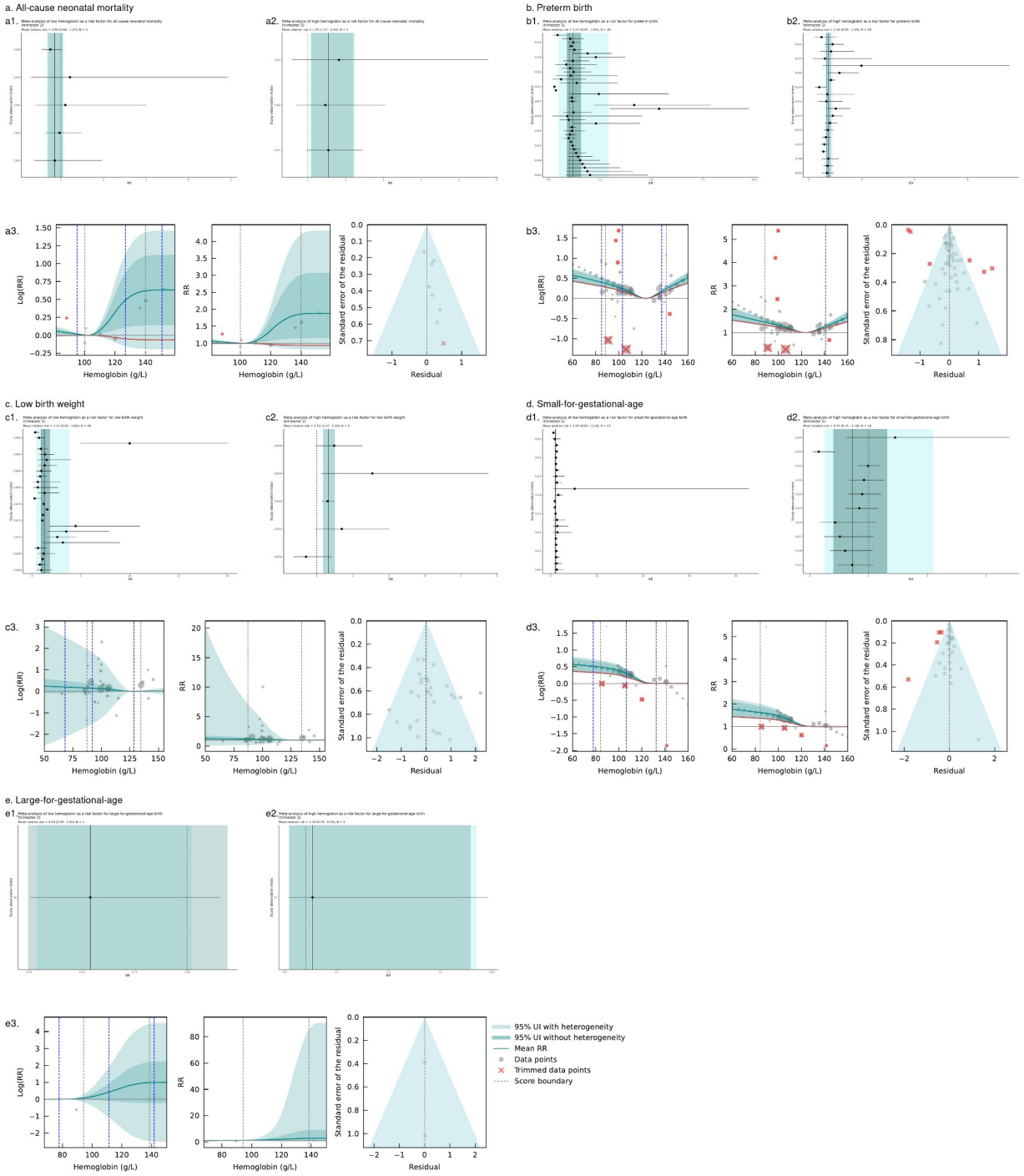
Supplemental Table 29. Strength of the evidence for the relationship between second-trimester maternal hemoglobin and maternal and neonatal outcomes with and without between-study heterogeneity

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Severe anemia (Hb < 70 g/L)		Moderate anemia (Hb 70-100 g/L)		Mild anemia (Hb 100-110 g/L)		Hb 110-120 g/L		Over 140 g/L		Over 160 g/L	
			Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)
Maternal disorders														
Postpartum hemorrhage	2 (2, 0)	145	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#
Preeclampsia	4 (3, 2)	118	1.20 (0.85 - 1.68)	1.20 (0.32 - 4.51)	1.14 (0.89 - 1.45)	1.14 (0.44 - 2.93)	1.04 (0.96 - 1.13)	1.04 (0.77 - 1.42)	1.00 (1.00 - 1.01)	1.00 (0.97 - 1.03)	NA#	NA#	NA#	NA#
Peripartum depression	1 (1, 0)	130	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#
Neonatal disorders														
All-cause neonatal mortality	2 (2, 2)	102	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#
Preterm birth	18 (18, 7)	123	1.72 (1.51 - 1.95)	1.72 (1.46 - 2.02)	1.49 (1.35 - 1.63)	1.49 (1.32 - 1.67)	1.24 (1.18 - 1.31)	1.24 (1.16 - 1.33)	1.09 (1.06 - 1.11)	1.09 (1.06 - 1.11)	1.45 (1.33 - 1.58)	1.45 (1.30 - 1.62)	1.66 (1.47 - 1.88)	1.66 (1.43 - 1.94)
Low birth weight	17 (17, 4)	128	1.24 (0.91 - 1.70)	1.24 (0.10 - 15.60)	1.17 (0.93 - 1.48)	1.17 (0.18 - 7.54)	1.10 (0.96 - 1.26)	1.10 (0.37 - 3.24)	1.04 (0.98 - 1.10)	1.04 (0.66 - 1.63)	1.01 (1.00 - 1.02)	1.01 (0.91 - 1.12)	1.01 (0.99 - 1.03)	1.01 (0.87 - 1.18)
Small-for-gestational-age	6 (6, 4)	160	1.74 (1.46 - 2.08)	1.74 (1.38 - 2.19)	1.62 (1.39 - 1.88)	1.62 (1.32 - 1.97)	1.38 (1.25 - 1.54)	1.38 (1.21 - 1.59)	1.17 (1.11 - 1.23)	1.17 (1.09 - 1.25)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)
Large-for-gestational-age	1 (1, 1)	68	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#

Supplemental Figure 9. Second-trimester maternal hemoglobin and maternal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



Supplemental Figure 10. Second-trimester maternal hemoglobin and neonatal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



Supplemental Table 30. Strength of the evidence for the relationship between third-trimester maternal hemoglobin and maternal and neonatal outcomes

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
Maternal disorders															
Postpartum hemorrhage	29 (29, 1)	160	4.96 (1.71 - 14.37)	3.06 (1.46 - 6.43)	1.89 (1.24 - 2.89)	1.32 (1.10 - 1.59)	NA#	NA#	84 - 129	1.29 (0.25)	3 (28.07)	NA#	NA#	No	NA
Antepartum hemorrhage	1 (1, 0)	138	NA#	NA#	NA#	NA#	NA#	NA#	91 - 124	NA#	NA#	NA#	NA#	No	NA
Maternal sepsis and other infections	9 (9, 0)	154	3.09 (0.12 - 80.35)	2.53 (0.17 - 36.80)	1.81 (0.33 - 10.08)	1.35 (0.57 - 3.21)	NA#	NA#	77 - 136	0.48 (-0.76)	1 (NA)	NA#	NA#	No	NA
Peripartum depression	7 (7, 0)	147	1.49 (0.58 - 3.84)	1.48 (0.58 - 3.78)	1.31 (0.69 - 2.52)	1.11 (0.87 - 1.40)	NA#	NA#	90 - 129	0.82 (-0.19)	1 (NA)	NA#	NA#	No	NA
Neonatal disorders															
All-cause neonatal mortality	19 (19, 1)	100	5.69 (2.92 - 11.08)	1.51 (1.29 - 1.77)	1.00 (1.00 - 1.00)	1.01 (1.01 - 1.01)	NA#	NA#	66 - 127	1.41 (0.34)	3 (40.9)	NA#	NA#	Yes	method of outcome diagnoses, study design, adjustment for socioeconomic factors, adjustment for obstetric factors, representativeness, blood sample type, adjustment for maternal comorbidities
Preterm birth	44 (44, 7)	125	2.56 (1.00 - 6.56)	1.46 (1.00 - 2.12)	1.07 (1.00 - 1.13)	1.02 (1.00 - 1.04)	1.39 (1.00 - 1.93)	1.75 (1.00 - 3.06)	83 - 135	1.02 (0.02)	2 (1.89)	1 (0)	2 (0.27)	Yes	multiple exposure levels, adjustment for health behaviors, adjustment for obstetric factors, adjustment for demographic factors, study design
Low birth weight	68 (67, 9)	126	2.33 (1.52 - 3.57)	1.40 (1.18 - 1.66)	1.05 (1.03 - 1.08)	1.02 (1.01 - 1.02)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	85 - 133	1.06 (0.05)	2 (5.56)	1 (0)	2 (0.02)	Yes	representativeness, study design,

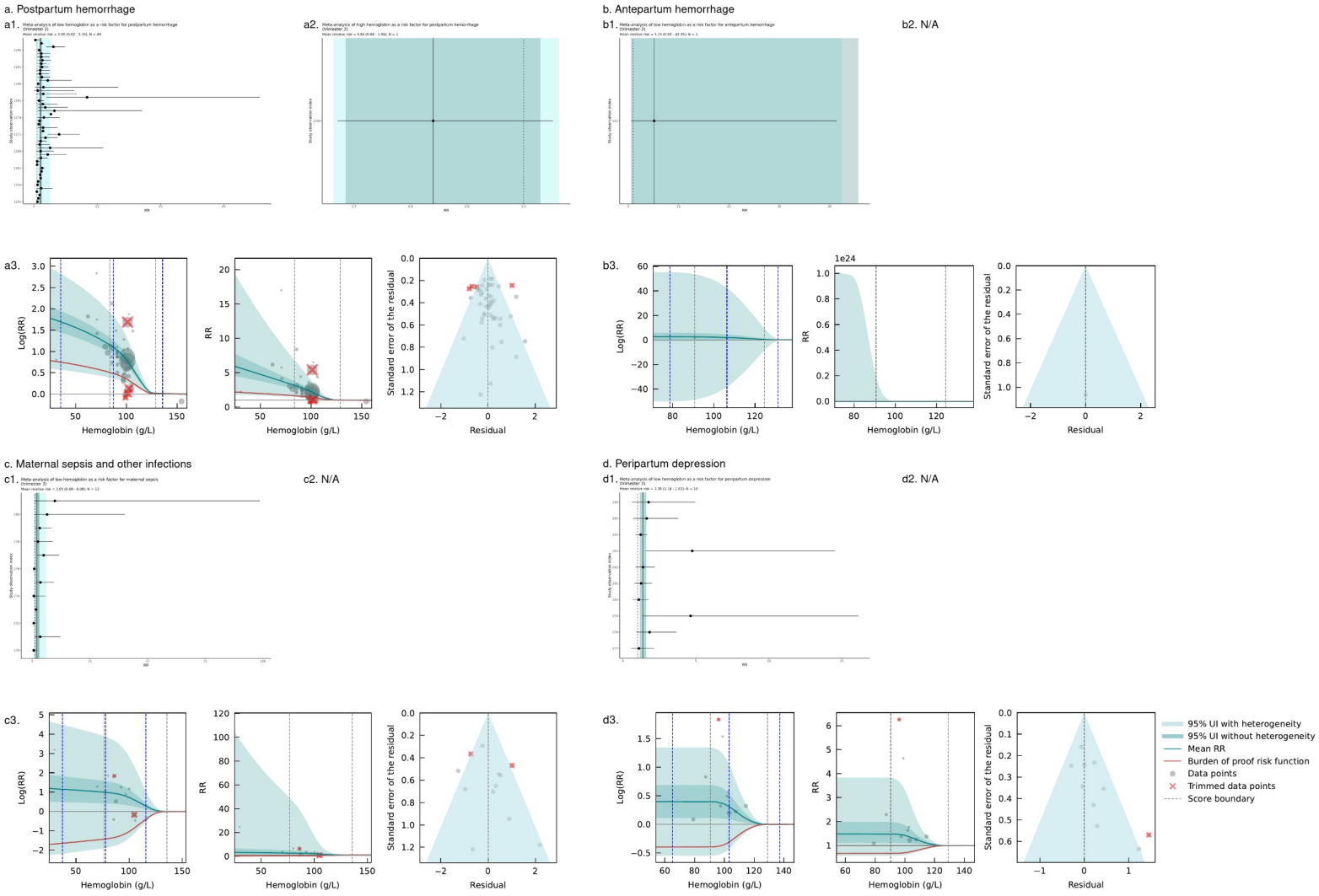
Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
															adjustment for health behaviors, adjustment for demographic factors, adjustment for obstetric factors, multiple exposure levels
Small-for-gestational-age	22 (21, 8)	99	2.14 (1.13 - 4.05)	1.22 (1.03 - 1.44)	1.03 (1.01 - 1.06)	1.15 (1.02 - 1.30)	1.31 (1.04 - 1.65)	1.32 (1.04 - 1.67)	76 - 137	1.04 (0.04)	2 (4.41)	1.05 (0.05)	2 (4.76)	No	representativeness, adjustment for health behaviors, adjustment for maternal comorbidities, study design
Large-for-gestational-age	5 (5, 1)	150	1.49 (0.83 - 2.67)	1.45 (0.84 - 2.49)	1.35 (0.87 - 2.07)	1.18 (0.93 - 1.52)	NA#	NA#	91 - 130	0.96 (-0.05)	1 (NA)	NA#	NA#	No	NA
Neonatal sepsis	2 (2, 0)	141	NA#	NA#	NA#	NA#	NA#	NA#	89 - 125	NA#	NA#	NA#	NA#	No	NA

Note: Hb: hemoglobin; Ref. Hb: reference hemoglobin; RR: relative risk; UI: uncertainty intervals; BPRF: burden of proof risk function; ROS: risk-outcome score; Min. % excess risk: minimum excess risk, in percent; Pub. bias: publication bias; NA: not applicable. The number of unique studies listed includes the total number of studies in the meta-regression, as well as those in which the hemoglobin levels of the exposed group were either lower than those of the non-exposed/reference group (i.e., low hemoglobin) or higher (i.e., high hemoglobin). Reference hemoglobin value represents the exposure level that corresponds to the lowest risk value determined by the risk function. Relative risk of the outcome is averaged across exposure ranges (including conventional anemia cutoffs), with uncertainties adjusted using a gamma method to account for between-study heterogeneity. The mean BPRF represents the weakest association consistent with available data (defined as the 5th quantile risk curve closest to the null or an RR of 1) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, after accounting for between-study heterogeneity. The data-dense exposure range below the reference hemoglobin is defined as the range from the 15th percentile of the hemoglobin distribution up to the reference hemoglobin value, or between the 15th and 85th percentiles if the entire distribution falls below the reference value. The data-dense exposure range above the reference hemoglobin is defined as the range from the reference hemoglobin value to the 85th percentile of the hemoglobin distribution. The ROS represents the signed value of the log(BPRF) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, directly comparable across outcomes. Minimum excess risk reflects the most conservative estimate of increased risk associated with hemoglobin levels that is consistent with the available data. For ease of interpretation, we have transformed the ROS and BPRF into a star rating (1–5), with a higher rating representing a larger effect and stronger evidence. The potential publication bias, which affects the validity of the results, was tested using Egger's regression. Observations were bias-adjusted to better reflect the gold standard values of selected bias covariates, identified through an algorithm that systematically detects covariates associated with significant bias across included studies. 'NA#' indicates that mean RR estimates and evidence scores are not reported because they were derived from fewer than three studies. 'NA*' indicates that mean RR estimates and evidence scores are not reported because the entire data-dense exposure range (i.e., the 15th–85th percentile of exposure) fell below the reference hemoglobin value. For outcomes with a zero-star rating, BPRF, ROS and minimum excess risk are not reported; for one-star ratings, only minimum excess risk is not reported.

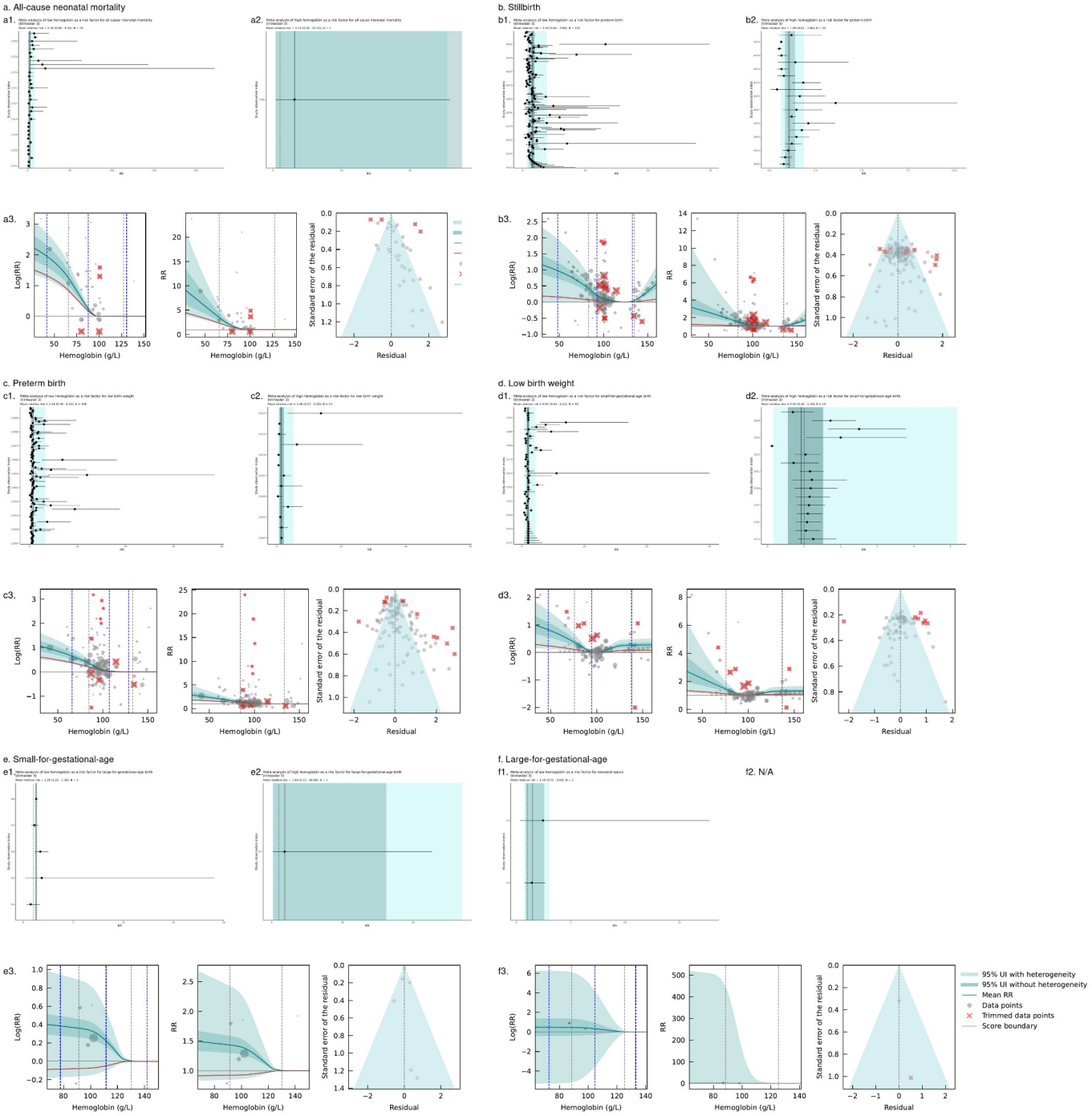
Supplemental Table 31. Strength of the evidence for the relationship between third-trimester maternal hemoglobin and maternal and neonatal outcomes with and without between-study heterogeneity

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Severe anemia (Hb < 70 g/L)		Moderate anemia (Hb 70-100 g/L)		Mild anemia (Hb 100-110 g/L)		Hb 110-120 g/L		Over 140 g/L		Over 160 g/L	
			Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)
Maternal disorders														
Postpartum hemorrhage	29 (29, 1)	160	4.96 (3.91 - 6.29)	4.96 (1.71 - 14.37)	3.06 (2.59 - 3.61)	3.06 (1.46 - 6.43)	1.89 (1.72 - 2.08)	1.89 (1.24 - 2.89)	1.32 (1.27 - 1.37)	1.32 (1.10 - 1.59)	NA#	NA#	NA#	NA#
Antepartum hemorrhage	1 (1, 0)	138	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#
Maternal sepsis and other infections	9 (9, 0)	154	3.09 (1.61 - 5.92)	3.09 (0.12 - 80.35)	2.53 (1.48 - 4.31)	2.53 (0.17 - 36.80)	1.81 (1.29 - 2.55)	1.81 (0.33 - 10.08)	1.35 (1.14 - 1.61)	1.35 (0.57 - 3.21)	NA#	NA#	NA#	NA#
Peripartum depression	7 (7, 0)	147	1.49 (1.12 - 1.99)	1.49 (0.58 - 3.84)	1.48 (1.11 - 1.97)	1.48 (0.58 - 3.78)	1.31 (1.08 - 1.60)	1.31 (0.69 - 2.52)	1.11 (1.03 - 1.19)	1.11 (0.87 - 1.40)	NA#	NA#	NA#	NA#
Neonatal disorders														
All-cause neonatal mortality	19 (19, 1)	100	5.69 (4.15 - 7.79)	5.69 (2.92 - 11.08)	1.51 (1.40 - 1.63)	1.51 (1.29 - 1.77)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.01 (1.01 - 1.01)	1.01 (1.01 - 1.01)	NA#	NA#	NA#	NA#
Preterm birth	44 (44, 7)	125	2.56 (2.01 - 3.27)	2.56 (1.00 - 6.56)	1.46 (1.32 - 1.61)	1.46 (1.00 - 2.12)	1.07 (1.05 - 1.08)	1.07 (1.00 - 1.13)	1.02 (1.01 - 1.02)	1.02 (1.00 - 1.04)	1.39 (1.28 - 1.52)	1.39 (1.00 - 1.93)	1.75 (1.51 - 2.02)	1.75 (1.00 - 3.06)
Low birth weight	68 (67, 9)	126	2.33 (1.96 - 2.76)	2.33 (1.52 - 3.57)	1.40 (1.31 - 1.50)	1.40 (1.18 - 1.66)	1.05 (1.04 - 1.06)	1.05 (1.03 - 1.08)	1.02 (1.01 - 1.02)	1.02 (1.01 - 1.02)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)
Small-for-gestational-age	22 (21, 8)	99	2.14 (1.67 - 2.74)	2.14 (1.13 - 4.05)	1.22 (1.14 - 1.30)	1.22 (1.03 - 1.44)	1.03 (1.02 - 1.05)	1.03 (1.01 - 1.06)	1.15 (1.10 - 1.21)	1.15 (1.02 - 1.30)	1.31 (1.20 - 1.43)	1.31 (1.04 - 1.65)	1.32 (1.21 - 1.44)	1.32 (1.04 - 1.67)
Large-for-gestational-age	5 (5, 1)	150	1.49 (1.34 - 1.67)	1.49 (0.83 - 2.67)	1.45 (1.31 - 1.61)	1.45 (0.84 - 2.49)	1.35 (1.24 - 1.46)	1.35 (0.87 - 2.07)	1.18 (1.13 - 1.24)	1.18 (0.93 - 1.52)	NA#	NA#	NA#	NA#
Neonatal sepsis	2 (2, 0)	141	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#

Supplemental Figure 11. Third-trimester maternal hemoglobin and maternal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



Supplemental Figure 12. Third-trimester maternal hemoglobin and neonatal outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



Section 3.3 . By study design and outcome definitions

Supplemental Table 32. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes, including observations with socioeconomic factors adjustment, unclear temporality between exposure and otucome, undefined outcomes and low birtweight and preterm birth severities

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
Subset to observations that adjusted for socioeconomic factors															
Low birth weight	38 (38, 10)	121	3.60 (1.13 - 11.48)	1.98 (1.07 - 3.68)	1.18 (1.02 - 1.36)	1.03 (1.00 - 1.06)	1.33 (1.03 - 1.73)	1.52 (1.04 - 2.21)	85 - 137	1.06 (0.06)	2 (6.06)	1.01 (0.01)	2 (1)	No	adjustment for health behaviors, adjustment for demographic factors, timing of outcome, multiple exposure levels
Include observations with unclear temporal relationship between exposure and outcome															
Antepartum hemorrhage	4 (4, 1)	68	1.00 (0.98 - 1.03)	1.00 (0.69 - 1.44)	1.00 (0.52 - 1.91)	1.00 (0.51 - 1.95)	NA#	NA#	89 - 132		0 (NA)	NA#	NA#	No	NA
Preeclampsia	38 (35, 8)	119	3.16 (1.47 - 6.78)	2.00 (1.26 - 3.16)	1.32 (1.10 - 1.58)	1.04 (1.01 - 1.07)	2.06 (1.27 - 3.34)	2.11 (1.28 - 3.46)	80 - 138	1.19 (0.18)	3 (19.24)	1.12 (0.11)	2 (11.69)	No	adjustment for obstetric factors, adjustment for maternal comorbidities, adjustment for demographic factors, em_excl_chr_hyp, multiple exposure levels, adjustment for chronic hypertension, adjustment for health behaviors, representativeness
Include observations with undefined outcomes															
Stillbirth	57 (56, 14)	101	3.46 (1.71 - 7.01)	1.43 (1.17 - 1.76)	1.02 (1.01 - 1.03)	1.04 (1.02 - 1.06)	1.11 (1.05 - 1.19)	1.14 (1.06 - 1.23)	78 - 135	1.13 (0.12)	2 (12.91)	1.02 (0.02)	2 (2.04)	Yes	stillbirth occurring >20 weeks of gestation, blood sample type, adjustment for obstetric factors, study design
Preterm birth	173	115	2.43	1.41	1.04	1.00	1.13	1.11	85 - 137	1.05	2	1.02	2	Yes	selection bias,

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
	(169, 34)		(1.30 - 4.54)	(1.11 - 1.80)	(1.01 - 1.06)	(1.00 - 1.00)	(1.04 - 1.23)	(1.03 - 1.19)		(0.05)	(4.8)	(0.02)	(1.63)		adjustment for socioeconomic factors, adjustment for health behaviors, adjustment for obstetric factors, study design, adjustment for demographic factors, multiple exposure levels
Low birth weight	231 (225, 31)	122	2.70 (1.04 - 6.99)	1.67 (1.02 - 2.71)	1.21 (1.01 - 1.45)	1.05 (1.00 - 1.09)	1.26 (1.01 - 1.58)	1.35 (1.01 - 1.80)	83 - 136	1.05 (0.05)	2 (4.85)	1.01 (0.01)	2 (0.87)	Yes	multiple exposure levels, adjustment for socioeconomic factors, adjustment for demographic factors, adjustment for obstetric factors, study design, selection bias
Small-for-gestational-age	65 (64, 20)	130	1.61 (0.96 - 2.70)	1.22 (0.98 - 1.51)	1.05 (1.00 - 1.11)	1.02 (1.00 - 1.05)	1.16 (0.99 - 1.37)	1.35 (0.98 - 1.86)	81 - 137	1.01 (0.01)	2 (0.72)	1 (0)	2 (0.06)	No	adjustment for socioeconomic factors, adjustment for obstetric factors, representativeness
Large-for-gestational-age	10 (10, 1)	131	1.45 (0.64 - 3.26)	1.45 (0.65 - 3.25)	1.33 (0.71 - 2.50)	1.14 (0.86 - 1.51)	NA#	NA#	90 - 137	0.85 (-0.16)	1 (NA)	NA#	NA#	No	NA
Include only observations that evaluated low birthweight and preterm birth severities															
Moderate preterm birth	3 (3, 1)	98	1.18 (1.11 - 1.26)	1.05 (1.03 - 1.07)	1.01 (1.01 - 1.01)	1.03 (1.02 - 1.05)	NA#	NA#	81 - 137	1.02 (0.02)	2 (1.65)	NA#	NA#	No	NA
Very preterm birth	2 (2, 0)	146	NA#	NA#	NA#	NA#	NA#	NA#	93 - 129	NA#	NA#	NA#	NA#	No	NA
Extremely preterm birth	2 (2, 0)	142	NA#	NA#	NA#	NA#	NA#	NA#	94 - 121	NA#	NA#	NA#	NA#	No	NA
Very low birthweight	10 (10, 1)	123	1.59 (1.20 - 2.11)	1.20 (1.07 - 1.33)	1.03 (1.01 - 1.05)	1.01 (1.00 - 1.01)	NA#	NA#	85 - 126	1.03 (0.03)	2 (2.7)	NA#	NA#	No	NA

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
Extremely low birthweight	3 (3, 0)	88	1.00 (1.00 - 1.00)	1.00 (0.88 - 1.14)	1.04 (0.06 - 18.64)	1.16 (0.00 - 21396.07)	NA#	NA#	94 - 127		0 (NA)	NA#	NA#	No	NA

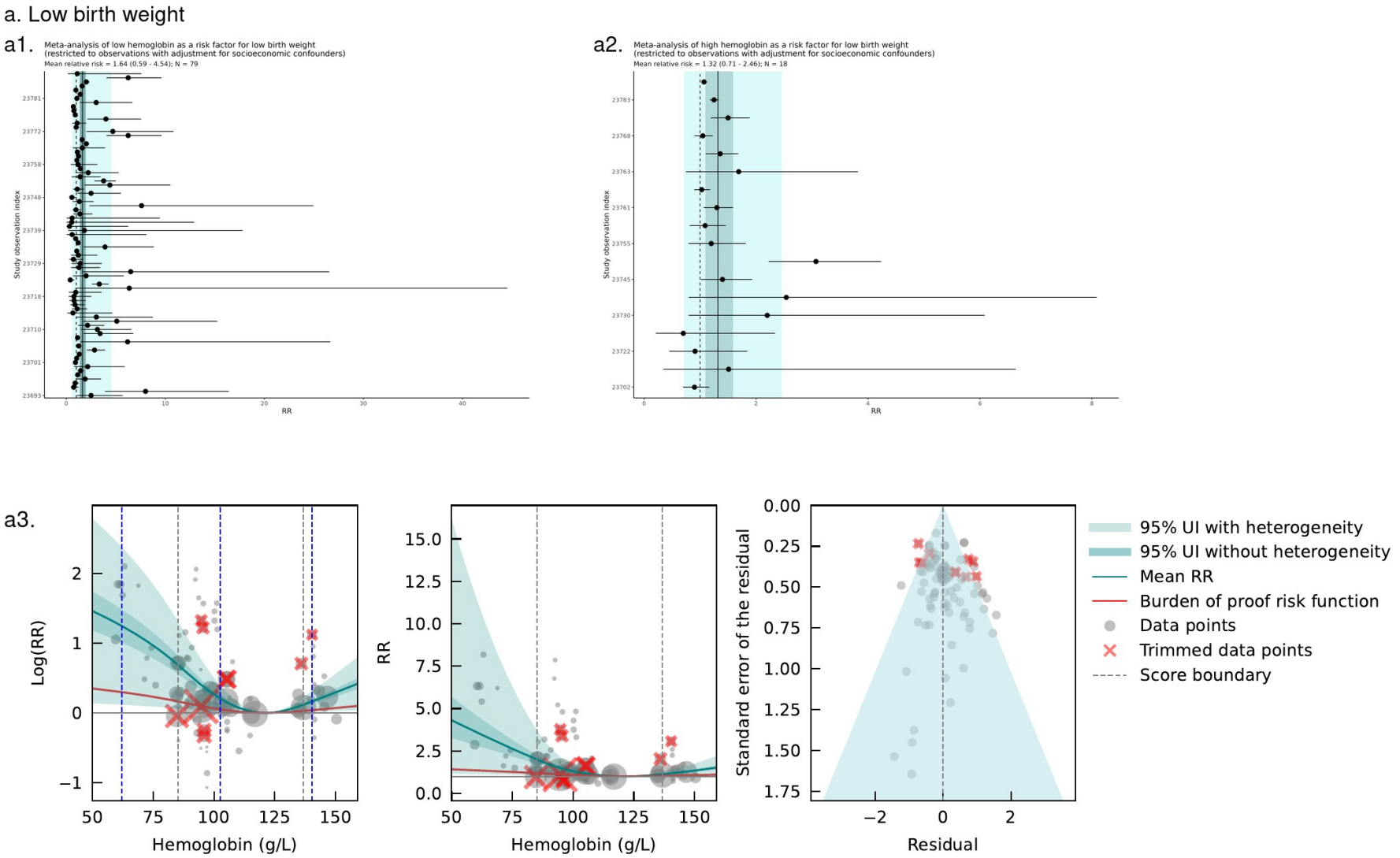
Note: Hb: hemoglobin; Ref. Hb: reference hemoglobin; RR: relative risk; UI: uncertainty intervals; BPRF: burden of proof risk function; ROS: risk-outcome score; Min. % excess risk: minimum excess risk, in percent; Pub. bias: publication bias; NA: not applicable. The number of unique studies listed includes the total number of studies in the meta-regression, as well as those in which the hemoglobin levels of the exposed group were either lower than those of the non-exposed/reference group (i.e., low hemoglobin) or higher (i.e., high hemoglobin). Reference hemoglobin value represents the exposure level that corresponds to the lowest risk value determined by the risk function. Relative risk of the outcome is averaged across exposure ranges (including conventional anemia cutoffs), with uncertainties adjusted using a gamma method to account for between-study heterogeneity. The mean BPRF represents the weakest association consistent with available data (defined as the 5th quantile risk curve closest to the null or an RR of 1) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, after accounting for between-study heterogeneity. The data-dense exposure range below the reference hemoglobin is defined as the range from the 15th percentile of the hemoglobin distribution up to the reference hemoglobin value, or between the 15th and 85th percentiles if the entire distribution falls below the reference value. The data-dense exposure range above the reference hemoglobin is defined as the range from the reference hemoglobin value to the 85th percentile of the hemoglobin distribution. The ROS represents the signed value of the log(BPRF) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, directly comparable across outcomes. Minimum excess risk reflects the most conservative estimate of increased risk associated with hemoglobin levels that is consistent with the available data. For ease of interpretation, we have transformed the ROS and BPRF into a star rating (1–5), with a higher rating representing a larger effect and stronger evidence. The potential publication bias, which affects the validity of the results, was tested using Egger's regression. Observations were bias-adjusted to better reflect the gold standard values of selected bias covariates, identified through an algorithm that systematically detects covariates associated with significant bias across included studies. 'NA#' indicates that mean RR estimates and evidence scores are not reported because they were derived from fewer than three studies. 'NA*' indicates that mean RR estimates and evidence scores are not reported because the entire data-dense exposure range (i.e., the 15th–85th percentile of exposure) fell below the reference hemoglobin value. For outcomes with a zero-star rating, BPRF, ROS and minimum excess risk are not reported; for one-star ratings, only minimum excess risk is not reported.

Supplemental Table 33. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes, including observations with socioeconomic factors adjustment, unclear temporality between exposure and otucome, undefined outcomes and low birtweight and preterm birth severities with and without between-study heterogeneity

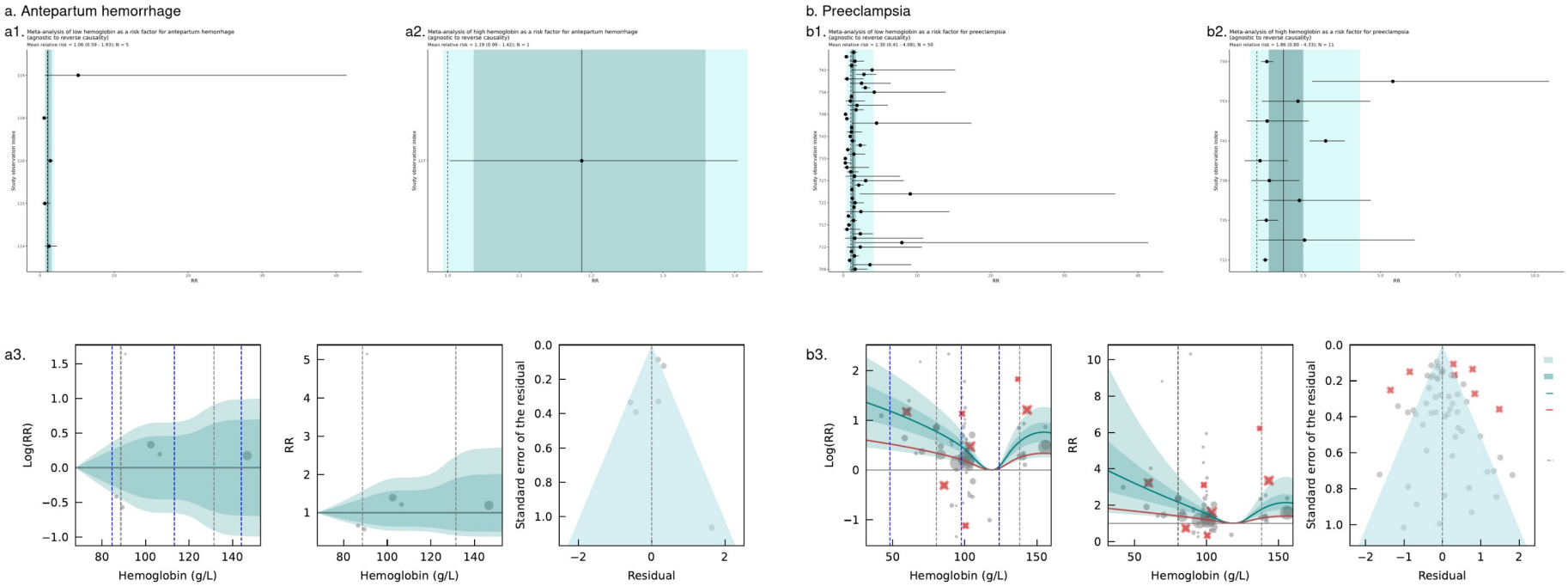
Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Severe anemia (Hb < 70 g/L)		Moderate anemia (Hb 70-100 g/L)		Mild anemia (Hb 100-110 g/L)		Hb 110-120 g/L		Over 140 g/L		Over 160 g/L	
			Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)
Subset to observations that adjusted for socioeconomic factors														
Low birth weight	38 (38, 10)	121	3.60 (2.82 - 4.59)	3.60 (1.13 - 11.48)	1.98 (1.74 - 2.26)	1.98 (1.07 - 3.68)	1.18 (1.14 - 1.21)	1.18 (1.02 - 1.36)	1.03 (1.02 - 1.03)	1.03 (1.00 - 1.06)	1.33 (1.26 - 1.41)	1.33 (1.03 - 1.73)	1.52 (1.40 - 1.64)	1.52 (1.04 - 2.21)
Include observations with unclear temporal relationship between exposure and outcome														
Antepartum hemorrhage	4 (4, 1)	68	1.00 (0.98 - 1.02)	1.00 (0.98 - 1.03)	1.00 (0.77 - 1.29)	1.00 (0.69 - 1.44)	1.00 (0.64 - 1.57)	1.00 (0.52 - 1.91)	1.00 (0.63 - 1.59)	1.00 (0.51 - 1.95)	NA#	NA#	NA#	NA#
Preeclampsia	38 (35, 8)	119	3.16 (2.35 - 4.24)	3.16 (1.47 - 6.78)	2.00 (1.67 - 2.38)	2.00 (1.26 - 3.16)	1.32 (1.23 - 1.41)	1.32 (1.10 - 1.58)	1.04 (1.03 - 1.05)	1.04 (1.01 - 1.07)	2.06 (1.71 - 2.48)	2.06 (1.27 - 3.34)	2.11 (1.74 - 2.55)	2.11 (1.28 - 3.46)
Include observations with undefined outcomes														
Stillbirth	57 (56, 14)	101	3.46 (2.85 - 4.21)	3.46 (1.71 - 7.01)	1.43 (1.35 - 1.52)	1.43 (1.17 - 1.76)	1.02 (1.01 - 1.02)	1.02 (1.01 - 1.03)	1.04 (1.03 - 1.05)	1.04 (1.02 - 1.06)	1.11 (1.10 - 1.13)	1.11 (1.05 - 1.19)	1.14 (1.12 - 1.17)	1.14 (1.06 - 1.23)
Preterm birth	173 (169, 34)	115	2.43 (2.16 - 2.73)	2.43 (1.30 - 4.54)	1.41 (1.35 - 1.48)	1.41 (1.11 - 1.80)	1.04 (1.03 - 1.04)	1.04 (1.01 - 1.06)	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.13 (1.11 - 1.15)	1.13 (1.04 - 1.23)	1.11 (1.09 - 1.12)	1.11 (1.03 - 1.19)
Low birth weight	231 (225, 31)	122	2.70 (2.36 - 3.09)	2.70 (1.04 - 6.99)	1.67 (1.56 - 1.78)	1.67 (1.02 - 2.71)	1.21 (1.18 - 1.24)	1.21 (1.01 - 1.45)	1.05 (1.04 - 1.05)	1.05 (1.00 - 1.09)	1.26 (1.22 - 1.30)	1.26 (1.01 - 1.58)	1.35 (1.30 - 1.40)	1.35 (1.01 - 1.80)
Small-for-gestational-age	65 (64, 20)	130	1.61 (1.40 - 1.86)	1.61 (0.96 - 2.70)	1.22 (1.15 - 1.29)	1.22 (0.98 - 1.51)	1.05 (1.04 - 1.07)	1.05 (1.00 - 1.11)	1.02 (1.02 - 1.03)	1.02 (1.00 - 1.05)	1.16 (1.11 - 1.22)	1.16 (0.99 - 1.37)	1.35 (1.23 - 1.47)	1.35 (0.98 - 1.86)
Large-for-gestational-age	10 (10, 1)	131	1.45 (1.33 - 1.58)	1.45 (0.64 - 3.26)	1.45 (1.33 - 1.57)	1.45 (0.65 - 3.25)	1.33 (1.25 - 1.42)	1.33 (0.71 - 2.50)	1.14 (1.10 - 1.17)	1.14 (0.86 - 1.51)	NA#	NA#	NA#	NA#
Include only observations that evaluated low birthweight and preterm birth severities														
Moderate preterm birth	3 (3, 1)	98	1.18 (1.12 - 1.25)	1.18 (1.11 - 1.26)	1.05 (1.03 - 1.07)	1.05 (1.03 - 1.07)	1.01 (1.01 - 1.01)	1.01 (1.01 - 1.01)	1.03 (1.02 - 1.05)	1.03 (1.02 - 1.05)	NA#	NA#	NA#	NA#
Very preterm birth	2 (2, 0)	146	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#
Extremely preterm birth	2 (2, 0)	142	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#	NA#
Very low birthweight	10 (10, 1)	123	1.59 (1.37 - 1.85)	1.59 (1.20 - 2.11)	1.20 (1.13 - 1.27)	1.20 (1.07 - 1.33)	1.03 (1.02 - 1.04)	1.03 (1.01 - 1.05)	1.01 (1.00 - 1.01)	1.01 (1.00 - 1.01)	NA#	NA#	NA#	NA#
Extremely low birthweight	3 (3, 0)	88	1.00 (1.00 - 1.00)	1.00 (1.00 - 1.00)	1.00 (0.99 - 1.01)	1.00 (0.88 - 1.14)	1.04 (0.80 - 1.37)	1.04 (0.06 - 18.64)	1.16 (0.46 - 2.90)	1.16 (0.00 -	NA#	NA#	NA#	NA#

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Severe anemia (Hb < 70 g/L)		Moderate anemia (Hb 70-100 g/L)		Mild anemia (Hb 100-110 g/L)		Hb 110-120 g/L		Over 140 g/L		Over 160 g/L	
			Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)
										21396.07)				

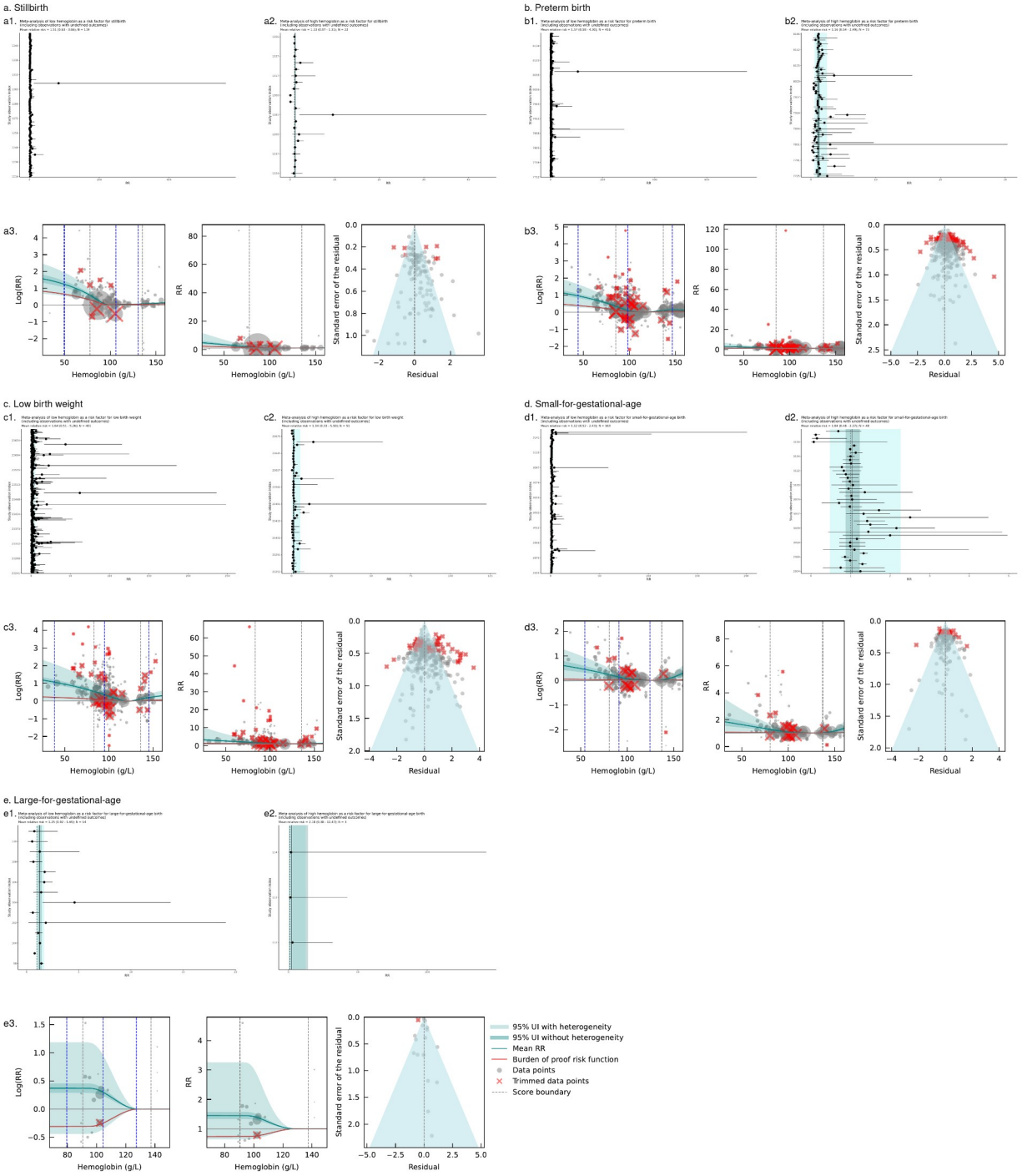
Supplemental Figure 13. Maternal hemoglobin and low birthweight, subsetting to observations that adjusted for socioeconomic factors: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



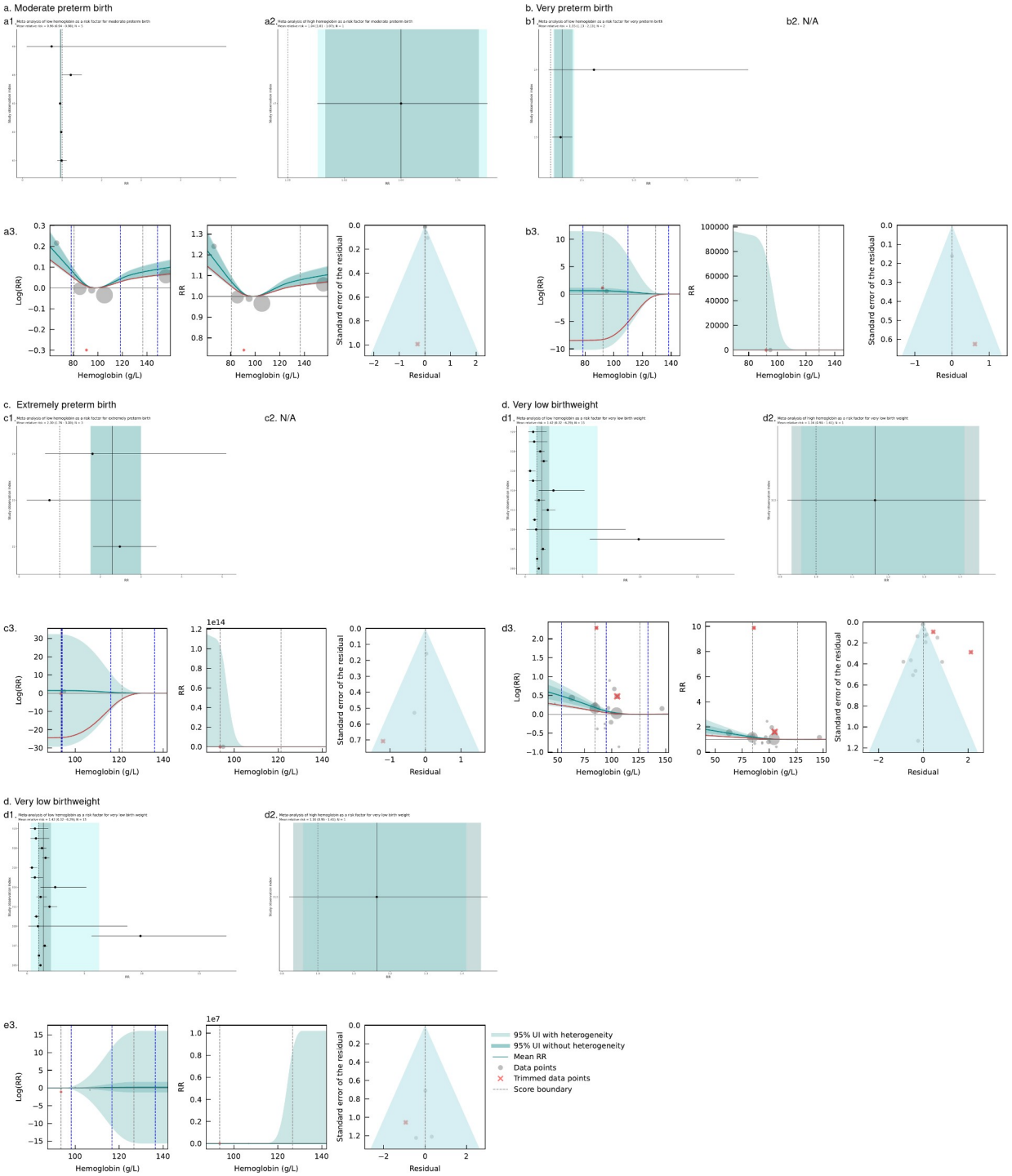
Supplemental Figure 14. Maternal hemoglobin and antepartum hemorrhage and preeclampsia, including observations with unclear temporal relationship between exposure and outcome: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



Supplemental Figure 15. Maternal hemoglobin and neonatal outcomes, including observations with undefined outcomes: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



Supplemental Figure 16. Maternal hemoglobin and low birthweight and preterm birth severities: x1, Forest plot for binary anemia. x2, Forest plot for binary high hemoglobin. x3, The log(RR) function; RR function; A modified funnel plot showing the residuals (relative to 0) on the x axis and the estimated standard deviation (SD) that includes reported SD and between-study heterogeneity on the y axis.



Section 3.4. Using a uniform reference hemoglobin level of 120 g/L

Supplemental Table 34. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes, relative to a uniform reference hemoglobin of 120 g/L

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
Maternal disorders															
All-cause maternal mortality	5 (5, 2)	120	2.11 (1.11 - 4.03)	1.46 (1.05 - 2.03)	0.87 (0.77 - 0.98)	0.89 (0.81 - 0.98)	NA#	NA#	65 - 131	1.06 (0.06)	2 (6.39)	NA#	NA#	No	NA
Postpartum hemorrhage	71 (71, 4)	120	6.47 (2.10 - 19.89)	2.78 (1.50 - 5.15)	1.39 (1.14 - 1.69)	1.06 (1.02 - 1.10)	1.02 (1.00 - 1.04)	1.07 (1.03 - 1.12)	79 - 129	1.31 (0.27)	3 (31.48)	0.99 (0.01)	2 (0.9)	Yes	study design, method of outcome diagnoses, outcome definition, adjustment for demographic factors, blood sample type, mode of delivery
Antepartum hemorrhage	3 (3, 1)	120	1.19 (0.69 - 2.07)	1.19 (0.69 - 2.06)	1.14 (0.76 - 1.70)	1.04 (0.92 - 1.18)	NA#	NA#	89 - 135	0.83 (-0.19)	1 (NA)	NA#	NA#	Yes	NA
Preeclampsia	13 (12, 5)	120	1.50 (0.19 - 12.09)	1.41 (0.24 - 8.31)	1.27 (0.37 - 4.32)	1.10 (0.68 - 1.76)	1.85 (0.68 - 5.06)	2.27 (2.36 - 2.18)	94 - 141	0.52 (-0.65)	1 (NA)	0.66 (-0.42)	1 (NA)	No	multiple exposure levels, adjustment for demographic factors
Maternal sepsis and other infections	16 (16, 0)	120	4.95 (1.08 - 22.60)	3.07 (1.06 - 8.89)	1.70 (1.03 - 2.82)	1.16 (1.01 - 1.33)	NA#	NA#	63 - 133	1.2 (0.18)	3 (19.61)	NA#	NA#	No	adjustment for maternal comorbidities, blood sample type
Peripartum depression	13 (13, 0)	120	1.57 (0.79 - 3.10)	1.48 (0.82 - 2.68)	1.23 (0.90 - 1.68)	1.05 (0.98 - 1.12)	NA#	NA#	87 - 129	0.94 (-0.06)	1 (NA)	NA#	NA#	No	NA
Neonatal disorders															
All-cause neonatal mortality	46 (46, 5)	120	2.72 (1.72 - 4.31)	1.47 (1.23 - 1.75)	1.09 (1.05 - 1.13)	1.02 (1.01 - 1.02)	1.02 (1.01 - 1.03)	1.03 (1.02 - 1.05)	69 - 131	1.17 (0.16)	3 (17.35)	1 (0)	2 (0.07)	Yes	adjustment for demographic factors, adjustment for

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
Stillbirth	6 (6, 3)	120	1.58 (0.36 - 6.91)	0.89 (0.46 - 1.73)	0.83 (0.45 - 1.51)	0.96 (0.84 - 1.10)	0.98 (0.91 - 1.05)	0.96 (0.83 - 1.10)	78 - 136	1.33 (-0.29)	1 (NA)	0.98 (-0.02)	1 (NA)	Yes	obstetric factors method of outcome diagnoses, representativeness, adjustment for maternal comorbidities
Preterm birth	148 (146, 30)	120	2.53 (1.15 - 5.59)	1.45 (1.05 - 1.99)	1.04 (1.00 - 1.07)	1.00 (1.00 - 1.01)	1.11 (1.01 - 1.21)	1.14 (1.02 - 1.28)	85 - 137	1.03 (0.03)	2 (2.84)	1 (0)	2 (0.49)	Yes	blood sample type, adjustment for maternal comorbidities, multiple exposure levels, adjustment for obstetric factors, adjustment for socioeconomic factors, selection bias, study design, adjustment for health behaviors, representativeness
Low birth weight	212 (207, 29)	120	2.81 (1.00 - 7.86)	1.56 (1.00 - 2.42)	1.13 (1.00 - 1.27)	1.03 (1.00 - 1.06)	1.31 (1.00 - 1.72)	1.55 (1.00 - 2.39)	83 - 136	1.03 (0.03)	2 (3.1)	1 (0)	2 (0.23)	Yes	study design, multiple exposure levels, adjustment for health behaviors, adjustment for socioeconomic factors, adjustment for demographic factors, timing of outcome, representativeness
Small-for-gestational-age	61 (60, 19)	120	1.59 (1.14 - 2.23)	1.18 (1.05 - 1.34)	1.03 (1.01 - 1.05)	1.01 (1.00 - 1.02)	1.12 (1.03 - 1.22)	1.28 (1.07 - 1.53)	82 - 137	1.02 (0.02)	2 (2.46)	1 (0)	2 (0.47)	No	adjustment for socioeconomic factors

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Mean RR across exposure levels (95% UI with gamma)						15th-85th %ile of exposure	Low hemoglobin		High hemoglobin		Pub. bias	Selected bias covariates
			Severe anemia (Hb < 70 g/L)	Moderate anemia (Hb 70-100 g/L)	Mild anemia (Hb 100-110 g/L)	Hb 110-120 g/L	High Hb >140 g/L	High Hb >160 g/L		Mean BPRF (ROS)	Star rating (Min. % excess risk)	Mean BPRF (ROS)	Star rating (Min. % excess risk)		
Large-for-gestational-age	8 (8, 1)	120	1.39 (0.80 - 2.44)	1.37 (0.81 - 2.33)	1.27 (0.85 - 1.89)	1.09 (0.94 - 1.26)	NA#	NA#	89 - 142	0.92 (-0.09)	1 (NA)	NA#	NA#	No	NA
Neonatal sepsis	3 (3, 0)	120	3.36 (0.35 - 32.26)	2.04 (0.54 - 7.77)	1.27 (0.81 - 1.98)	1.06 (0.95 - 1.18)	NA#	NA#	51 - 125	0.69 (-0.37)	1 (NA)	NA#	NA#	No	NA

Note: Hb: hemoglobin; Ref. Hb: reference hemoglobin; RR: relative risk; UI: uncertainty intervals; BPRF: burden of proof risk function; ROS: risk-outcome score; Min. % excess risk: minimum excess risk, in percent; Pub. bias: publication bias; NA: not applicable. The number of unique studies listed includes the total number of studies in the meta-regression, as well as those in which the hemoglobin levels of the exposed group were either lower than those of the non-exposed/reference group (i.e., low hemoglobin) or higher (i.e., high hemoglobin). Reference hemoglobin value represents the exposure level that corresponds to the lowest risk value determined by the risk function. Relative risk of the outcome is averaged across exposure ranges (including conventional anemia cutoffs), with uncertainties adjusted using a gamma method to account for between-study heterogeneity. The mean BPRF represents the weakest association consistent with available data (defined as the 5th quantile risk curve closest to the null or an RR of 1) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, after accounting for between-study heterogeneity. The data-dense exposure range below the reference hemoglobin is defined as the range from the 15th percentile of the hemoglobin distribution up to the reference hemoglobin value, or between the 15th and 85th percentiles if the entire distribution falls below the reference value. The data-dense exposure range above the reference hemoglobin is defined as the range from the reference hemoglobin value to the 85th percentile of the hemoglobin distribution. The ROS represents the signed value of the log(BPRF) averaged across the data-dense exposure ranges below and above the reference hemoglobin value, separately, directly comparable across outcomes. Minimum excess risk reflects the most conservative estimate of increased risk associated with hemoglobin levels that is consistent with the available data. For ease of interpretation, we have transformed the ROS and BPRF into a star rating (1–5), with a higher rating representing a larger effect and stronger evidence. The potential publication bias, which affects the validity of the results, was tested using Egger's regression. Observations were bias-adjusted to better reflect the gold standard values of selected bias covariates, identified through an algorithm that systematically detects covariates associated with significant bias across included studies. 'NA#' indicates that mean RR estimates and evidence scores are not reported because they were derived from fewer than three studies. 'NA*' indicates that mean RR estimates and evidence scores are not reported because the entire data-dense exposure range (i.e., the 15th–85th percentile of exposure) fell below the reference hemoglobin value. For outcomes with a zero-star rating, BPRF, ROS and minimum excess risk are not reported; for one-star ratings, only minimum excess risk is not reported.

Supplemental Table 35. Strength of the evidence for the relationship between maternal hemoglobin and maternal and neonatal outcomes, relative to a uniform reference hemoglobin of 120 g/L with and without between-study heterogeneity

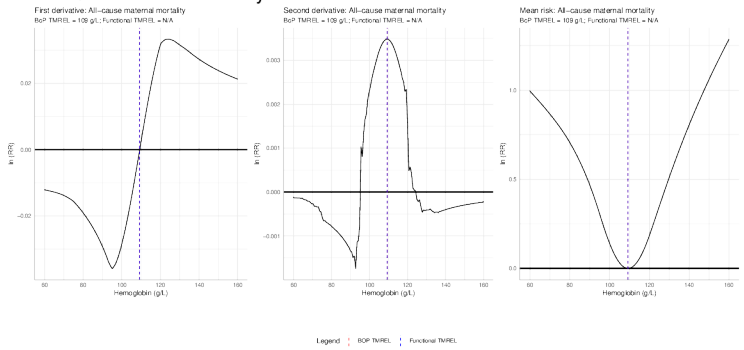
Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Severe anemia (Hb < 70 g/L)		Moderate anemia (Hb 70-100 g/L)		Mild anemia (Hb 100-110 g/L)		Hb 110-120 g/L		Over 140 g/L		Over 160 g/L	
			Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)
Maternal disorders														
All-cause maternal mortality	5 (5, 2)	120	2.11 (1.62 - 2.76)	2.11 (1.11 - 4.03)	1.46 (1.28 - 1.68)	1.46 (1.05 - 2.03)	0.87 (0.83 - 0.91)	0.87 (0.77 - 0.98)	0.89 (0.85 - 0.93)	0.89 (0.81 - 0.98)	NA#	NA#	NA#	NA#
Postpartum hemorrhage	71 (71, 4)	120	6.47 (4.92 - 8.50)	6.47 (2.10 - 19.89)	2.78 (2.39 - 3.23)	2.78 (1.50 - 5.15)	1.39 (1.32 - 1.45)	1.39 (1.14 - 1.69)	1.06 (1.05 - 1.07)	1.06 (1.02 - 1.10)	1.02 (1.01 - 1.02)	1.02 (1.00 - 1.04)	1.07 (1.06 - 1.08)	1.07 (1.03 - 1.12)
Antepartum hemorrhage	3 (3, 1)	120	1.19 (0.88 - 1.61)	1.19 (0.69 - 2.07)	1.19 (0.89 - 1.60)	1.19 (0.69 - 2.06)	1.14 (0.91 - 1.42)	1.14 (0.76 - 1.70)	1.04 (0.97 - 1.11)	1.04 (0.92 - 1.18)	NA#	NA#	NA#	NA#
Preeclampsia	13 (12, 5)	120	1.50 (1.28 - 1.75)	1.50 (0.19 - 12.09)	1.41 (1.23 - 1.61)	1.41 (0.24 - 8.31)	1.27 (1.16 - 1.39)	1.27 (0.37 - 4.32)	1.10 (1.06 - 1.13)	1.10 (0.68 - 1.76)	1.85 (1.71 - 1.99)	1.85 (0.68 - 5.06)	2.27 (2.27 - 2.26)	2.27 (2.36 - 2.18)
Maternal sepsis and other infections	16 (16, 0)	120	4.95 (3.04 - 8.07)	4.95 (1.08 - 22.60)	3.07 (2.18 - 4.32)	3.07 (1.06 - 8.89)	1.70 (1.45 - 2.00)	1.70 (1.03 - 2.82)	1.16 (1.11 - 1.21)	1.16 (1.01 - 1.33)	NA#	NA#	NA#	NA#
Peripartum depression	13 (13, 0)	120	1.57 (1.29 - 1.90)	1.57 (0.79 - 3.10)	1.48 (1.25 - 1.75)	1.48 (0.82 - 2.68)	1.23 (1.12 - 1.34)	1.23 (0.90 - 1.68)	1.05 (1.03 - 1.07)	1.05 (0.98 - 1.12)	NA#	NA#	NA#	NA#
Neonatal disorders														
All-cause neonatal mortality	46 (46, 5)	120	2.72 (2.26 - 3.28)	2.72 (1.72 - 4.31)	1.47 (1.37 - 1.58)	1.47 (1.23 - 1.75)	1.09 (1.07 - 1.10)	1.09 (1.05 - 1.13)	1.02 (1.01 - 1.02)	1.02 (1.01 - 1.02)	1.02 (1.02 - 1.03)	1.02 (1.01 - 1.03)	1.03 (1.03 - 1.04)	1.03 (1.02 - 1.05)
Stillbirth	6 (6, 3)	120	1.58 (1.12 - 2.24)	1.58 (0.36 - 6.91)	0.89 (0.76 - 1.04)	0.89 (0.46 - 1.73)	0.83 (0.72 - 0.95)	0.83 (0.45 - 1.51)	0.96 (0.93 - 0.99)	0.96 (0.84 - 1.10)	0.98 (0.96 - 0.99)	0.98 (0.91 - 1.05)	0.96 (0.93 - 0.99)	0.96 (0.83 - 1.10)
Preterm birth	148 (146, 30)	120	2.53 (2.23 - 2.87)	2.53 (1.15 - 5.59)	1.45 (1.38 - 1.52)	1.45 (1.05 - 1.99)	1.04 (1.03 - 1.04)	1.04 (1.00 - 1.07)	1.00 (1.00 - 1.01)	1.00 (1.00 - 1.01)	1.11 (1.09 - 1.13)	1.11 (1.01 - 1.21)	1.14 (1.12 - 1.16)	1.14 (1.02 - 1.28)
Low birth weight	212 (207, 29)	120	2.81 (2.41 - 3.28)	2.81 (1.00 - 7.86)	1.56 (1.46 - 1.66)	1.56 (1.00 - 2.42)	1.13 (1.11 - 1.15)	1.13 (1.00 - 1.27)	1.03 (1.03 - 1.04)	1.03 (1.00 - 1.06)	1.31 (1.26 - 1.36)	1.31 (1.00 - 1.72)	1.55 (1.45 - 1.65)	1.55 (1.00 - 2.39)
Small-for-gestational-age	61 (60, 19)	120	1.59 (1.38 - 1.84)	1.59 (1.14 - 2.23)	1.18 (1.12 - 1.24)	1.18 (1.05 - 1.34)	1.03 (1.02 - 1.04)	1.03 (1.01 - 1.05)	1.01 (1.01 - 1.01)	1.01 (1.00 - 1.02)	1.12 (1.08 - 1.16)	1.12 (1.03 - 1.22)	1.28 (1.19 - 1.38)	1.28 (1.07 - 1.53)
Large-for-gestational-age	8 (8, 1)	120	1.39 (1.29 - 1.50)	1.39 (0.80 - 2.44)	1.37 (1.28 - 1.47)	1.37 (0.81 - 2.33)	1.27 (1.20 - 1.34)	1.27 (0.85 - 1.89)	1.09 (1.07 - 1.11)	1.09 (0.94 - 1.26)	NA#	NA#	NA#	NA#

Outcome	Number of unique studies (low hemoglobin, high hemoglobin)	Reference Hemoglobin Value (g/L)	Severe anemia (Hb < 70 g/L)		Moderate anemia (Hb 70-100 g/L)		Mild anemia (Hb 100-110 g/L)		Hb 110-120 g/L		Over 140 g/L		Over 160 g/L	
			Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)	Mean RR (95% UI without gamma)	Mean RR (95% UI with gamma)
Neonatal sepsis	3 (3, 0)	120	3.36 (0.57 - 19.73)	3.36 (0.35 - 32.26)	2.04 (0.72 - 5.82)	2.04 (0.54 - 7.77)	1.27 (0.90 - 1.80)	1.27 (0.81 - 1.98)	1.06 (0.97 - 1.15)	1.06 (0.95 - 1.18)	NA#	NA#	NA#	NA#

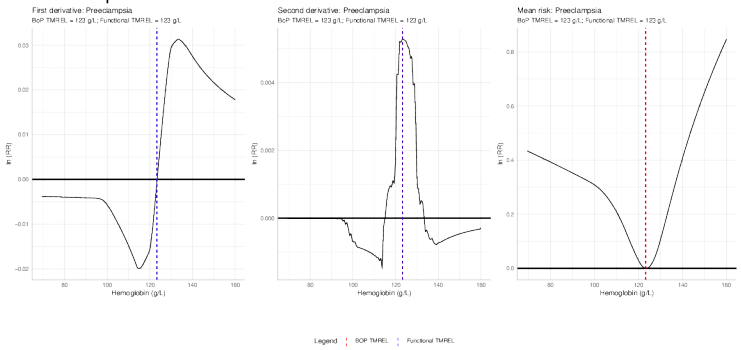
Section 3.5. Comparing model derived- vs. functional reference hemoglobin concentrations

Supplemental Figure 17. Derivatives of the log relative risk (RR) function for the relationship between maternal hemoglobin and maternal outcomes: First derivative; Second derivative; Mean log RR function

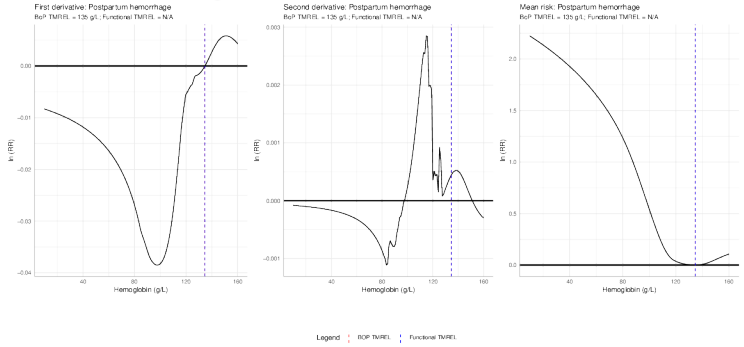
a. All-cause maternal mortality



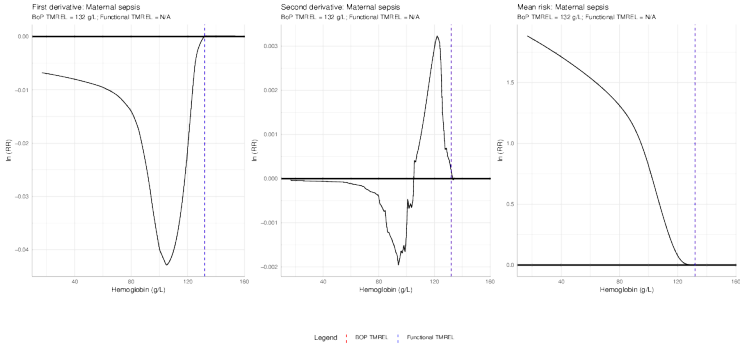
d. Preeclampsia



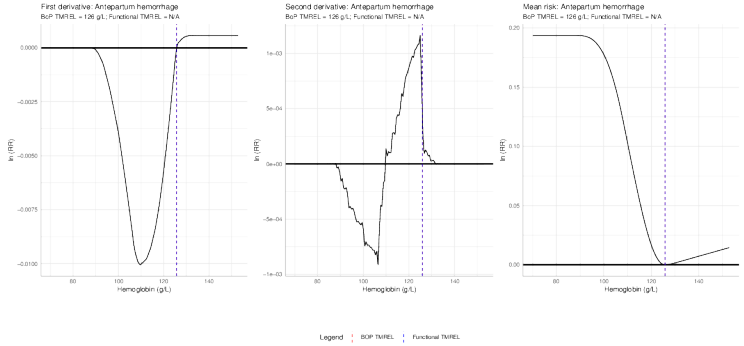
b. Postpartum hemorrhage



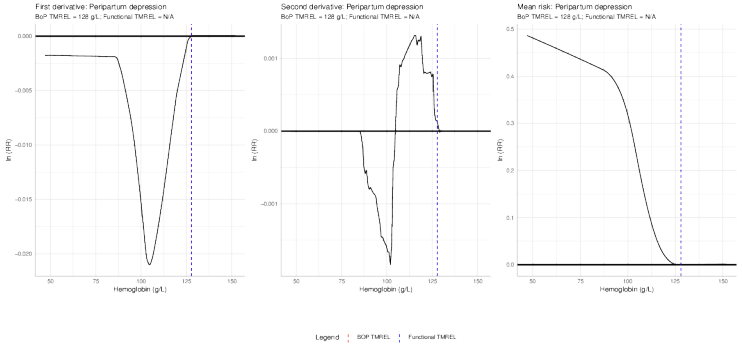
e. Maternal sepsis and other infections



c. Antepartum hemorrhage

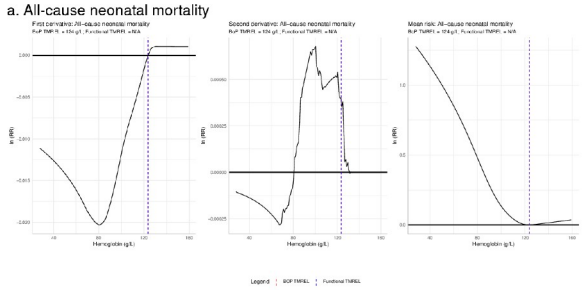


f. Peripartum depression

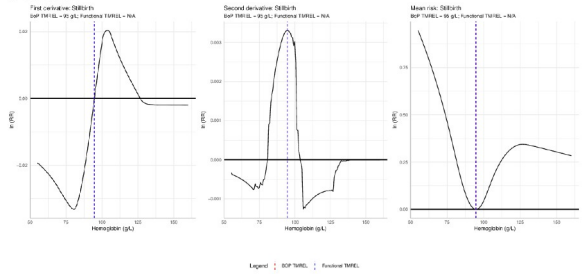


Supplemental Figure 18. Derivatives of the log relative risk (RR) function for the relationship between maternal hemoglobin and neonatal outcomes: First derivative; Second derivative; Mean log RR function

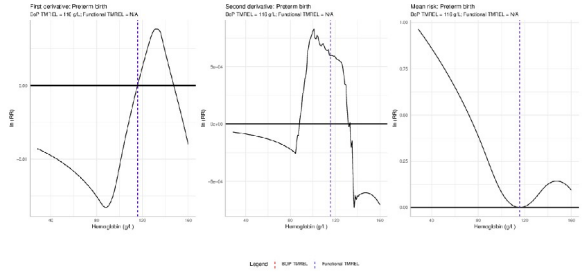
a. All-cause neonatal mortality



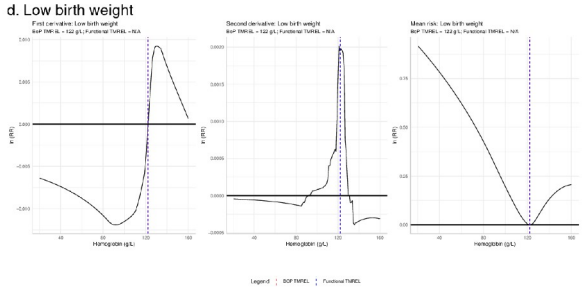
b. Stillbirth



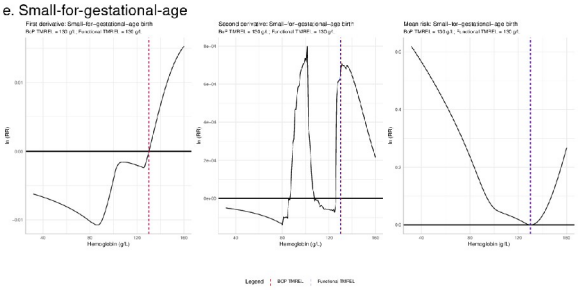
c. Preterm birth



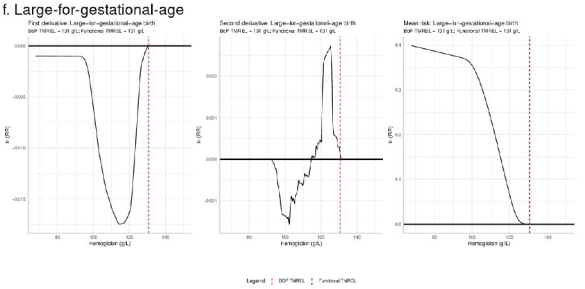
d. Low birth weight



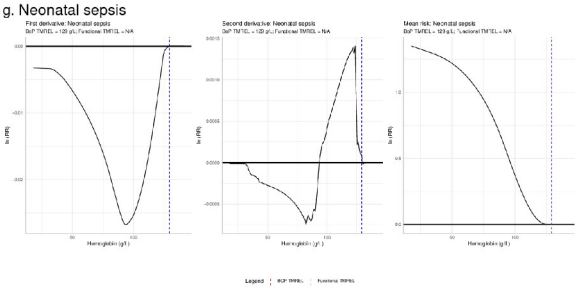
e. Small-for-gestational-age



f. Large-for-gestational-age

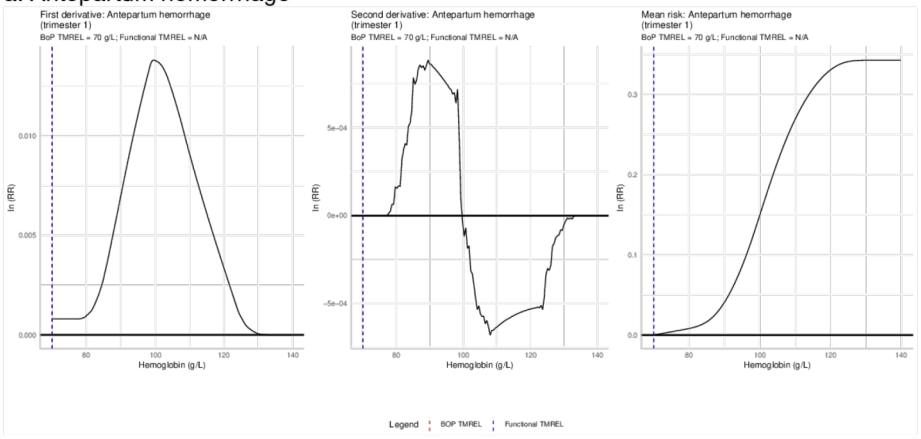


g. Neonatal sepsis

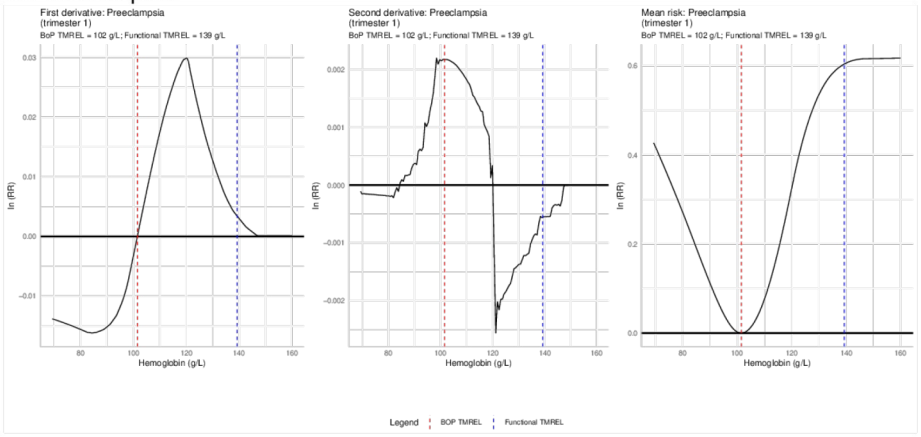


Supplemental Figure 19. Derivatives of the log relative risk (RR) function for the relationship between first trimester maternal hemoglobin and maternal outcomes: First derivative; Second derivative; Mean log RR function

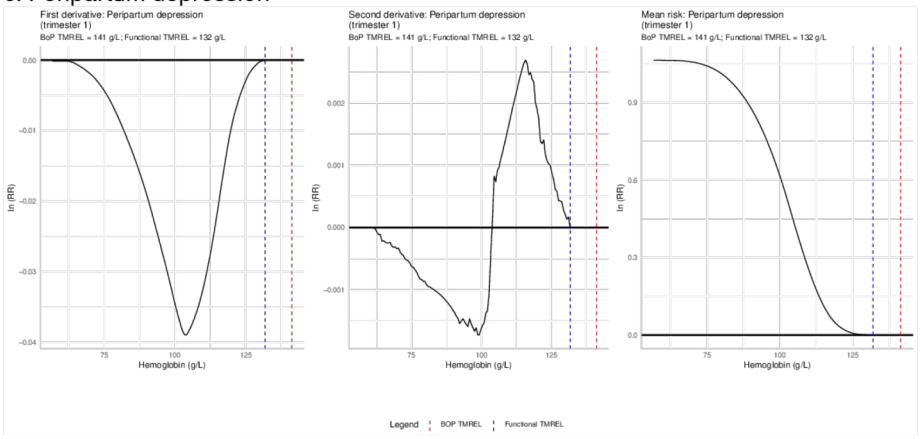
a. Antepartum hemorrhage



b. Preeclampsia

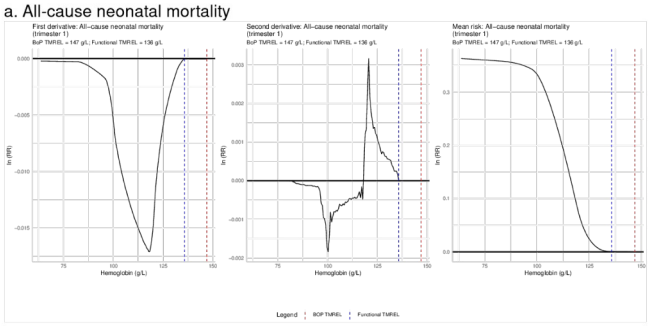


c. Peripartum depression

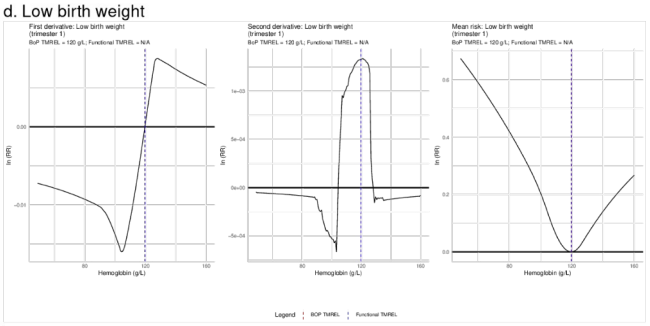


Supplemental Figure 20. Derivatives of the log relative risk (RR) function for the relationship between first trimester maternal hemoglobin and neonatal outcomes: First derivative; Second derivative; Mean log RR function

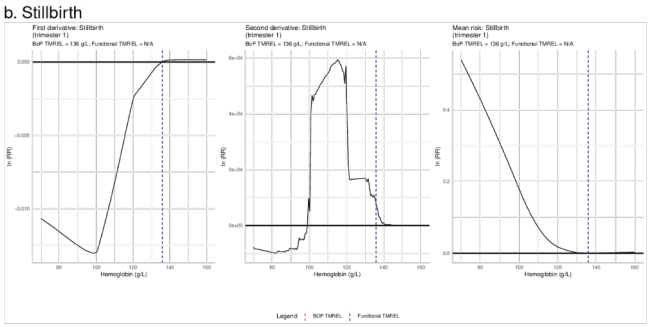
a. All-cause neonatal mortality



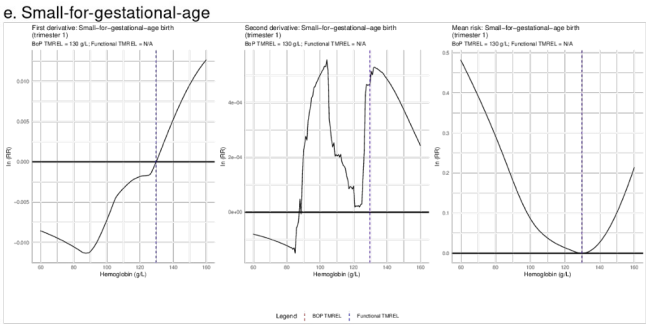
d. Low birth weight



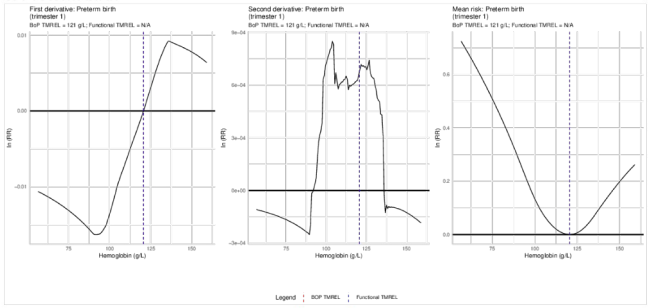
b. Stillbirth



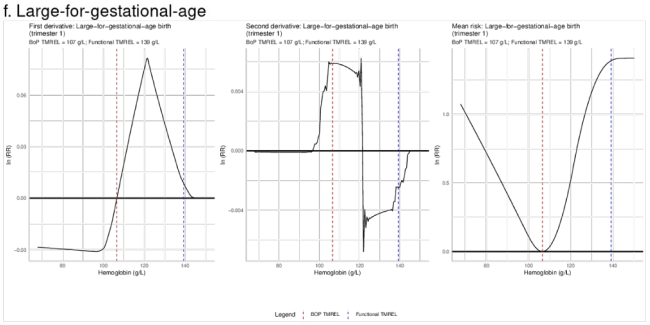
e. Small-for-gestational-age



c. Preterm birth

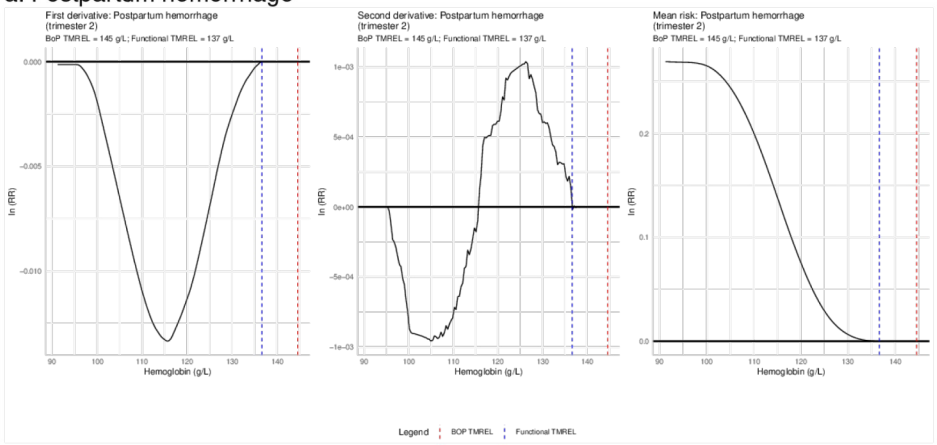


f. Large-for-gestational-age

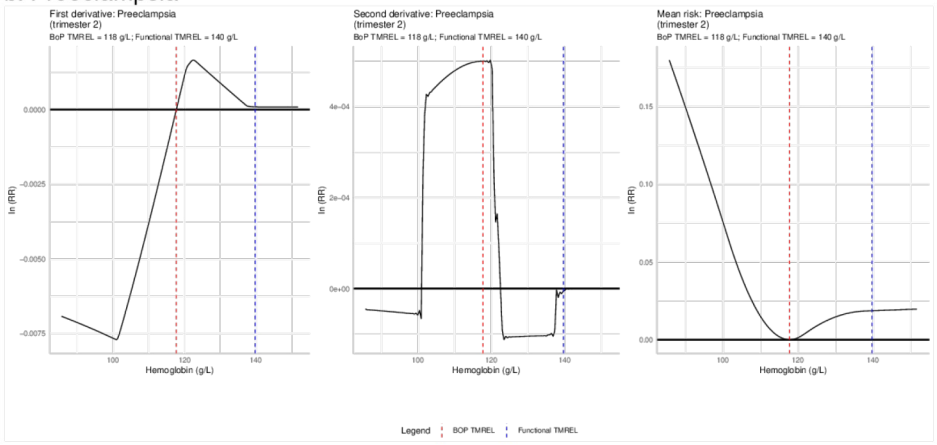


Supplemental Figure 21. Derivatives of the log relative risk (RR) function for the relationship between second trimester maternal hemoglobin and maternal outcomes: First derivative; Second derivative; Mean log RR function

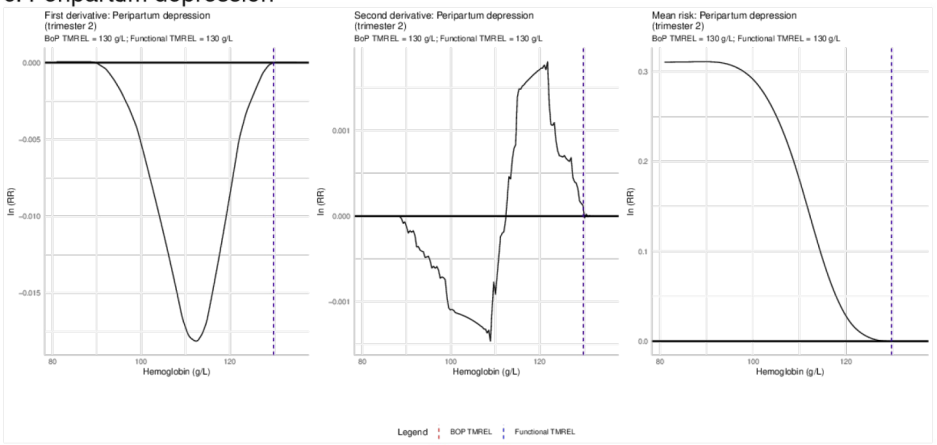
a. Postpartum hemorrhage



b. Preeclampsia

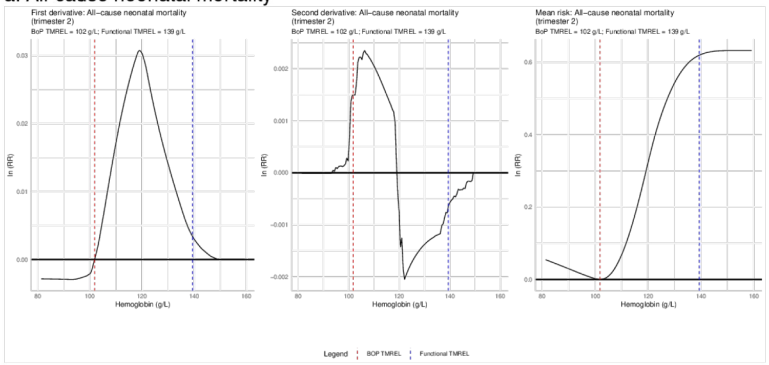


c. Peripartum depression

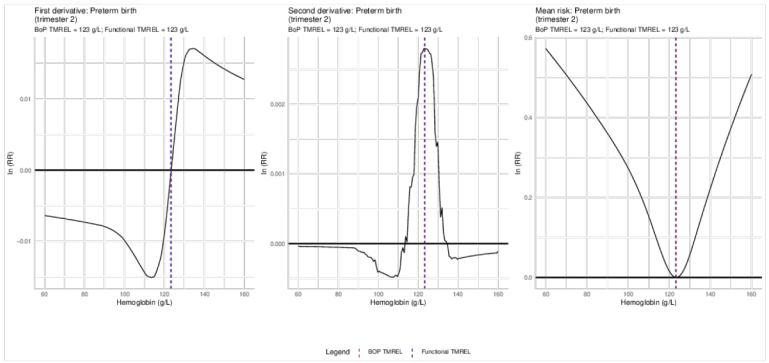


Supplemental Figure 22. Derivatives of the log relative risk (RR) function for the relationship between second trimester maternal hemoglobin and neonatal outcomes: First derivative; Second derivative; Mean log RR function

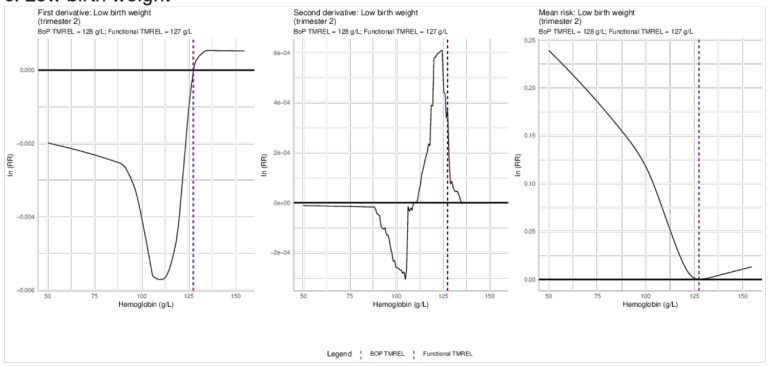
a. All-cause neonatal mortality



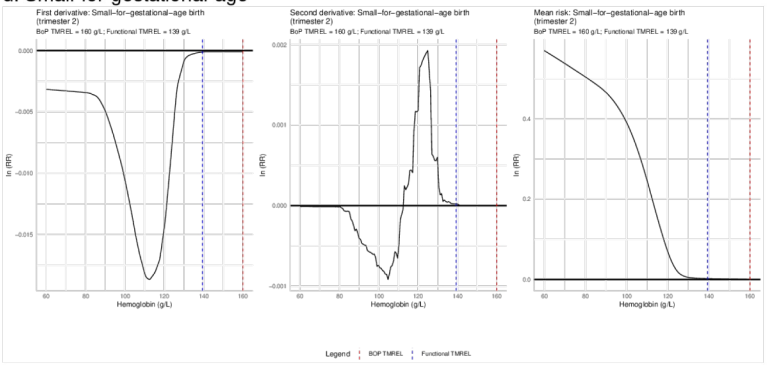
b. Preterm birth



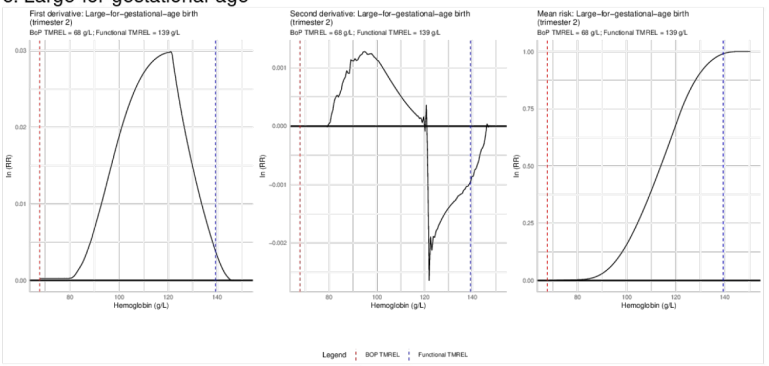
c. Low birth weight



d. Small-for-gestational-age

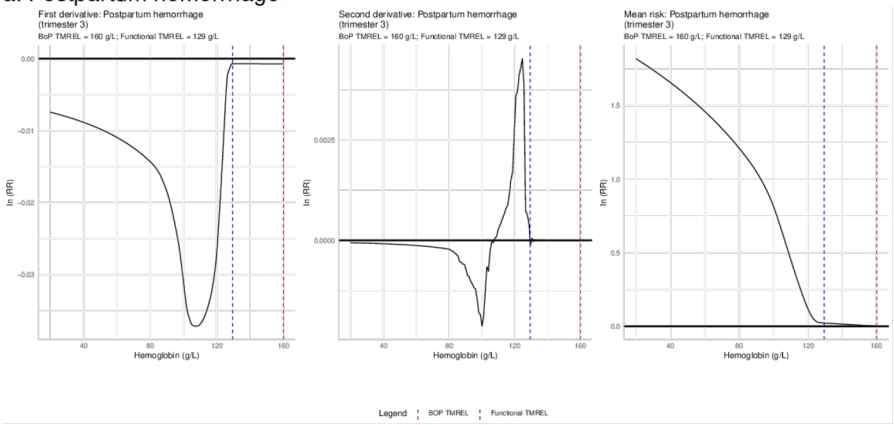


e. Large-for-gestational-age

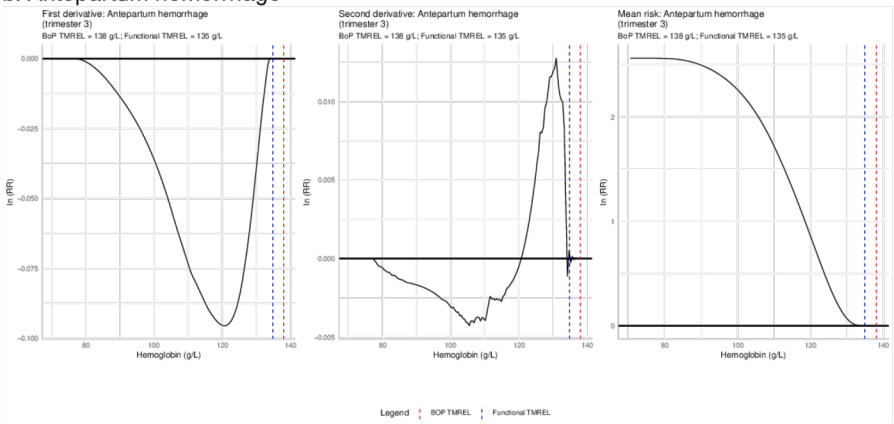


Supplemental Figure 23. Derivatives of the log relative risk (RR) function for the relationship between third trimester maternal hemoglobin and maternal outcomes: First derivative; Second derivative; Mean log RR function

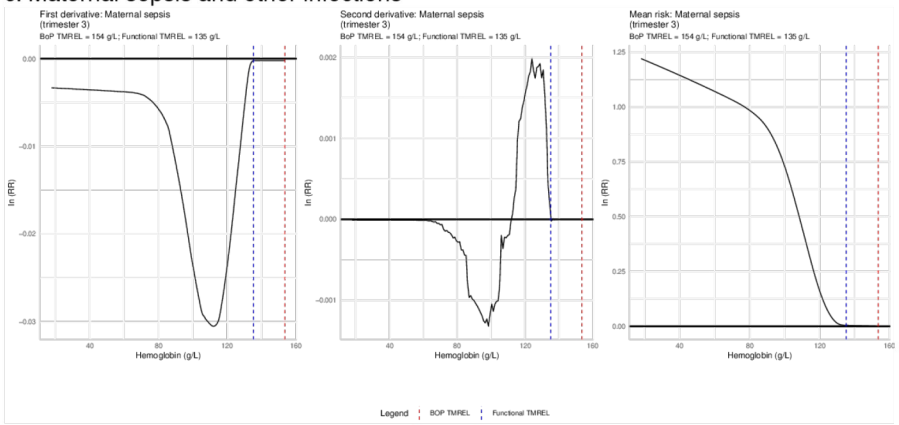
a. Postpartum hemorrhage



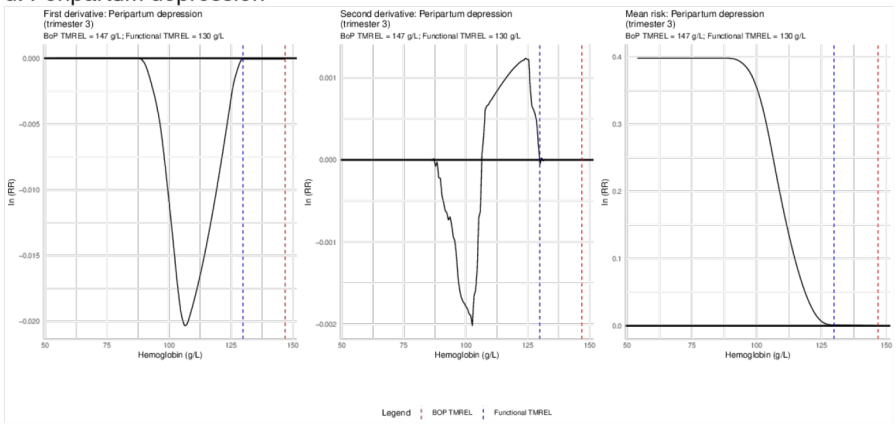
b. Antepartum hemorrhage



c. Maternal sepsis and other infections

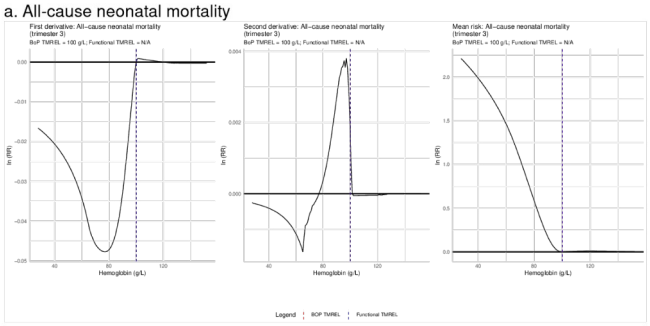


d. Peripartum depression

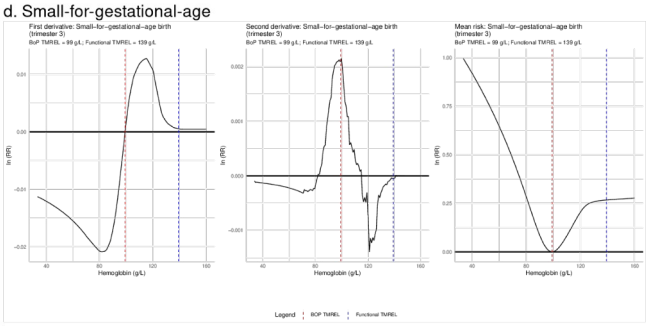


Supplemental Figure 24. Derivatives of the log relative risk (RR) function for the relationship between third trimester maternal hemoglobin and neonatal outcomes: First derivative; Second derivative; Mean log RR function

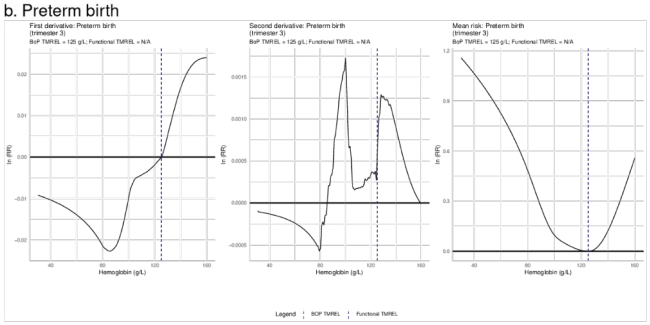
a. All-cause neonatal mortality



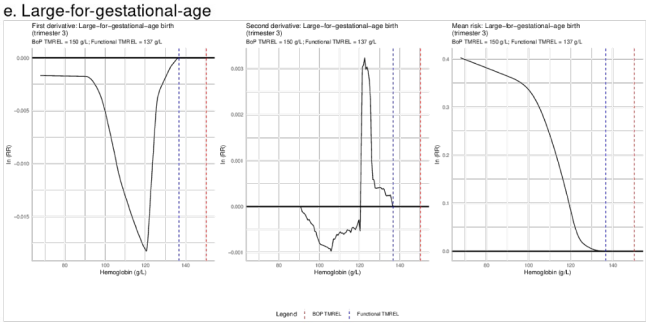
d. Small-for-gestational-age



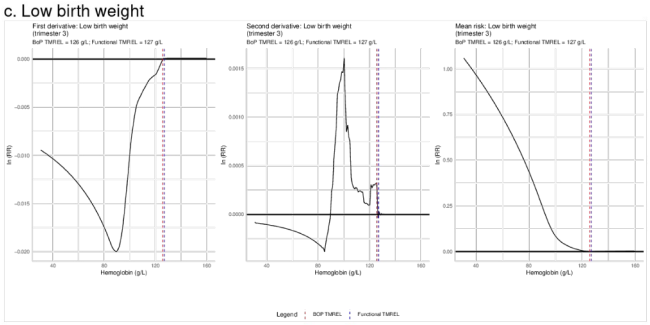
b. Preterm birth



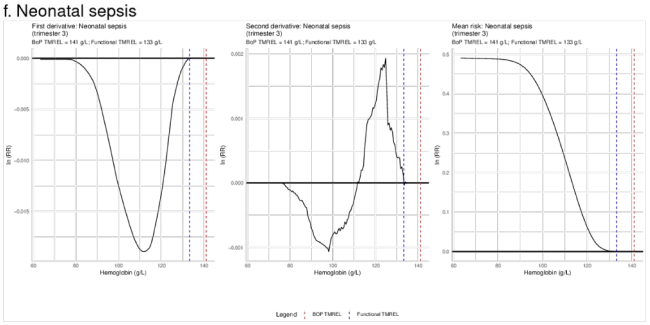
e. Large-for-gestational-age



c. Low birth weight



f. Neonatal sepsis



Section 4. PRISMA & GATHER checklist

Supplemental Table 36. PRISMA abstract cheklist



PRISMA 2020 for Abstracts Checklist

1. Section and Topic	Item #	Checklist item	Reported (Yes/No)
TITLE			
Title	1	Identify the report as a systematic review.	Yes (Burden of Proof studies)
BACKGROUND			
Objectives	2	Provide an explicit statement of the main objective(s) or question(s) the review addresses.	Yes
METHODS			
Eligibility criteria	3	Specify the inclusion and exclusion criteria for the review.	Yes
Information sources	4	Specify the information sources (e.g. databases, registers) used to identify studies and the date when each was last searched.	Yes
Risk of bias	5	Specify the methods used to assess risk of bias in the included studies.	Yes
Synthesis of results	6	Specify the methods used to present and synthesise results.	Yes
RESULTS			
Included studies	7	Give the total number of included studies and participants and summarise relevant characteristics of studies.	Yes
Synthesis of results	8	Present results for main outcomes, preferably indicating the number of included studies and participants for each. If meta-analysis was done, report the summary estimate and confidence/credible interval. If comparing groups, indicate the direction of the effect (i.e. which group is favoured).	Yes
DISCUSSION			
Limitations of evidence	9	Provide a brief summary of the limitations of the evidence included in the review (e.g. study risk of bias, inconsistency and imprecision).	Yes
Interpretation	10	Provide a general interpretation of the results and important implications.	Yes
OTHER			

Funding	11	Specify the primary source of funding for the review.	Yes
Registration	12	Provide the register name and registration number.	Yes

Supplemental Table 37. PRISMA manuscript checklist



PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Manuscript p.1 (Burden of Proof studies)
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Manuscript p. 3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Manuscript p. 6 [Main]
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Manuscript p. 6 [Main]
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Manuscript p. 22 [Methods: Systematic Review and data extraction]
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Manuscript p. 22 [Methods: Systematic Review and data extraction]
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Supplement p. 6 [Data source identification and assessment]
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Manuscript p. 22 [Methods: Systematic Review and data extraction], Supplement p. 13 [Title and abstract screening using Distiller-SR]
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Manuscript p. 22 [Methods: Systematic Review and data extraction],

			Supplement p. 20 [Data extraction]
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Manuscript [Table 2], Supplement p. 38 [Data inputs]
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Manuscript p. 23-24 [Methods: Estimating the shape of the exposure-outcome association], Supplement p. 20 [Data extraction]
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Supplement p. 170 [Data processing approaches and quality control]
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Supplement p. 173 [Observation-level effect sizes for model inputs]
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Manuscript p. 22 [Methods: Systematic Review and data extraction]
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Manuscript p. 23-25 [Methods: Estimating the shape of the exposure-outcome association] Supplement p. 170 [Data processing approaches and quality control]
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Manuscript p. 22 [Methods: Systematic Review and data extraction]
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Manuscript p. 21 [Methods]
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Manuscript p. 26 [Methods: Quantifying between-study heterogeneity and evaluating publication bias]
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Manuscript p. 27

			[Methods: Model validation and sensitivity analyses]
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Manuscript p. 26 [Methods: Quantifying between-study heterogeneity and evaluating publication bias]
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Manuscript p. 27 [Methods: Model validation and sensitivity analyses]
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Manuscript p. 7 & 10 [Results: Maternal outcomes, Neonatal outcomes], Supplement p. 15 [PRISMA diagrams]
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	
Study characteristics	17	Cite each included study and present its characteristics.	Supplement p. 41 [Study-level characteristics of extracted studies]
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Supplement p. 340 [Study quality and bias assessment]
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Manuscript p. 7-14 [Results]
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Manuscript p. 7-14 [Results]
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Manuscript p. 7-14 [Results]
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Manuscript p. 7 & 10 [Results: Maternal outcomes, Neonatal outcomes]
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Manuscript p. 14 [Results: Sensitivity and

			additional analyses]
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Manuscript p. 7-14 [Results]
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Manuscript p. 7-14 [Results]
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Manuscript p. 16-21 [Discussion]
	23b	Discuss any limitations of the evidence included in the review.	Manuscript p. 20 [Discussion]
	23c	Discuss any limitations of the review processes used.	Manuscript p. 20 [Discussion]
	23d	Discuss implications of the results for practice, policy, and future research.	Manuscript p. 19 & 20-21 [Discussion]
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Manuscript p.35 [Acknowledgements]
Competing interests	26	Declare any competing interests of review authors.	Manuscript p. 35 [Competing interests]
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Manuscript p. 28 [Data availability, Code availability]

Supplemental Table 38. GATHER checklist

Checklist of information that should be included in new reports of global health estimates

Item #	Checklist item	Reported on page #
Objectives and funding		
1	Define the indicator(s), populations (including age, sex, and geographic entities), and time period(s) for which estimates were made.	Manuscript p. 7 [Results]
2	List the funding sources for the work.	Manuscript p.35 [Acknowledgements]
Data Inputs		
For all data inputs from multiple sources that are synthesized as part of the study:		
3	Describe how the data were identified and how the data were accessed.	Manuscript p. 22 [Methods]
4	Specify the inclusion and exclusion criteria. Identify all ad hoc exclusions.	Manuscript p. 22 [Methods: Systematic Review and data extraction]
5	Provide information on all included data sources and their main characteristics. For each data source used, report reference information or contact name/institution, population represented, data collection method, year(s) of data collection, sex and age range, diagnostic criteria or measurement method, and sample size, as relevant.	Supplement p. 41 [Study-level characteristics of extracted studies]
6	Identify and describe any categories of input data that have potentially important biases (e.g., based on characteristics listed in item 5).	Manuscript p. 26 [Methods: Quantifying between-study heterogeneity and evaluating publication bias], Supplement p. 340 [Study quality and bias assessment]
For data inputs that contribute to the analysis but were not synthesized as part of the study:		
7	Describe and give sources for any other data inputs.	Supplement p. 37 [Summary of outcomes that were evaluated but not screened or screened but not modeled]
For all data inputs:		
8	Provide all data inputs in a file format from which data can be efficiently extracted (e.g., a spreadsheet rather than a PDF), including all relevant meta data listed in item 5. For any data inputs that cannot be shared because of ethical or legal reasons, such as third party ownership, provide a contact name or the name of the institution that retains the right to the data.	
Data analysis		
9	Provide a conceptual overview of the data analysis method. A diagram may be helpful.	Manuscript p. 24 [Methods:

		Estimating the shape of the exposure-outcome association]
10	Provide a detailed description of all steps of the analysis, including mathematical formulae. This description should cover, as relevant, data cleaning, data pre□processing, data adjustments and weighting of data sources, and mathematical or statistical model(s).	Manuscript p. 21-27 [Methods], Supplement p. 170 [Data processing approaches and quality control]
11	Describe how candidate models were evaluated and how the final model(s) were selected.	Manuscript p. 27 [Methods: Model validation and sensitivity analyses]
12	Provide the results of an evaluation of model performance, if done, as well as the results of any relevant sensitivity analysis.	Manuscript p. 7-14 [Results]
13	Describe methods for calculating uncertainty of the estimates. State which sources of uncertainty were, and were not, accounted for in the uncertainty analysis.	Manuscript p. 22 [Methods]
14	State how analytic or statistical source code used to generate estimates can be accessed.	Manuscript p. 28 [Data availability, Code availability]
Results and Discussion		
15	Provide published estimates in a file format from which data can be efficiently extracted.	
16	Report a quantitative measure of the uncertainty of the estimates (e.g. uncertainty intervals).	Table 3, Supplementary Tables 25-35
17	Interpret results in light of existing evidence. If updating a previous set of estimates, describe the reasons for changes in estimates.	Manuscript p. 16-21 [Discussion]
18	Discuss limitations of the estimates. Include a discussion of any modelling assumptions or data limitations that affect interpretation of the estimates.	Manuscript p. 20 [Discussion]

This checklist should be used in conjunction with the GATHER statement and Explanation and Elaboration document, found on gather□statement.org

Section 5. Study quality and bias assessment

Supplemental Table 39. General bias covariates

Bias domain	Bias Covariates	Variable Name	Definition	Values
Representativeness	Study representativeness	Cov_representative	The study participants are representative of the population of the location in which the study was conducted.	0 = Representative of general population 1 = Not representative
Exposure assessment quality	Study design	Cov_exp_des	This covariate serves as an indicator of exposure, outcome, and confounder quality to provide reliable evidence for causal inference.	0 = Cohort study 1 = Case-control or cross-sectional study
	Blood sample	Cov_exp_blood	The study reports the use of capillary or venous blood for the measurement of hemoglobin concentration. We will not apply this bias covariate for other biomarkers, such as serum ferritin and serum transferrin receptor, as the evidence supporting the variations in the measurement is limited	0 = Venous blood 1 = Capillary blood (fingerstick) 2 = Non-invasive or unspecified
	Alternative exposure category (hemoglobin)	Cov_exp_sev	The study reports multiple exposure categories (such as mild, moderate, and severe anemia).	0 = Exposure has 2 or more categories 1 = Binary exposure
Outcome assessment quality	Effect size measure	Cov_effect_size	The study reports Relative risk (RR) as the effect size.	0 = RR 1 = Odds ratio (OR), hazard ratio (HR), standardized incidence ratio (SIR), standardized mortality ratio (SMR)
Confounder control	Demographics	Cov_con_demo	The study controls for one or more demographic variables (e.g., maternal age, race).	0 = Study controls for one or more demographic variables 1 = Study does not control for any demographic variables
	Socioeconomics	Cov_con_socio	The study controls for one or more socioeconomic variables (e.g., maternal education, income).	0 = Study controls for one or more socioeconomic variables 1 = Study does not control for any socioeconomic variables
	Health behavior	Cov_con_health	The study controls for one or more lifestyle and health behavior variables (e.g., smoking exposure during pregnancy, physical activity).	0 = Study controls for one or more lifestyle & health behavior variables 1 = Study does not control for any lifestyle & health behavior variables
	Maternal comorbidity	Cov_con_maternal	The study controls for one or more maternal comorbidity variables (e.g., maternal hypertension, maternal diabetes).	0 = Study controls for one or more maternal comorbidity variables 1 = Study does not control for any maternal comorbidity variables

Bias domain	Bias Covariates	Variable Name	Definition	Values
Representativeness	Study representativeness	Cov_representative	The study participants are representative of the population of the location in which the study was conducted.	0 = Representative of general population 1 = Not representative
	Obstetric factors	Cov_con_obstetric	The study controls for one or more demographic variables (e.g., antenatal care, parity/gravidity).	0 = Study controls for one or more obstetric factors variables 1 = Study does not control for any obstetric factor variables
Reverse causation	Clear temporality between risk and outcome	Cov_rev_1	The outcome was ascertained prior to the exposure assessment.	0 = Exposure measured before outcome 1 = Unclear temporal order between exposure and outcome
Selection bias	Selection bias	Cov_sel_bias	There is evidence of attrition bias.	0 = <15% drop-out rate 1 = >15% drop-out rate or not reported

Supplemental Table 40. Outcome-specific bias covariates

Outcome	Bias domain	Bias Covariates	Variable Name	Definition	Values
Maternal mortality, obstructed labor, maternal sepsis and other infections	Outcome assessment quality	Specificity of outcome definition – maternal sepsis and other infections	Cov_out_def	Maternal sepsis or other infection (e.g., urinary tract infection, obstetrical wound infections) is defined.	0 = Sepsis or other infection is defined (not "unspecified" or "other") 1 = Sepsis or other infection is undefined ("unspecified" or "other")
		Defined timing of outcome – maternal mortality, maternal sepsis and other infections	Cov_out_timing	Outcome timepoint is clearly defined.	0 = Outcome timepoint is defined (not "unspecified" nor "postpartum, unspecified") and not "prenatal/antenatal" 1 = Outcome timepoint is undefined ("unspecified" or "postpartum, unspecified") or "prenatal/antenatal"
		Outcome method specificity – near-miss	Cov_out_method	The study reports that near-misses were identified using ICD codes, based on some established criteria, or at least in part, on laboratory results.	0 = Physician diagnosis or physical measurement, Biomarker, Administrative medical records, Imaging/scan, Disease registry 1 = Self-report, undescribed
		Outcome method specificity – maternal sepsis and other infections	Cov_out_method	The study reports that maternal sepsis cases were identified using ICD codes, based on some established criteria, or at least in part, on laboratory results.	0 = Physician diagnosis or physical measurement, Biomarker, Administrative medical records, Imaging/scan, Disease registry 1 = Self-report, undescribed
Maternal hemorrhage (postpartum and antepartum)	Outcome assessment quality	Defined timing of outcome	Cov_out_timing	Time at which hemorrhage occurs is clearly defined.	0 = Primary postpartum hemorrhage within 24 hours of delivery or other defined time 1 = Timing of postpartum hemorrhage not defined
		Specificity of outcome definition	Cov_out_def	The study reports that maternal hemorrhage cases were identified using a blood loss estimate from death record, medical record, or physician diagnosis.	0 = Blood loss estimate is defined 1 = No definition for blood loss
		Mode of delivery	Cov_out_delivery	The study reports the modes of delivery among participants.	0= Vaginal birth, Cesarian delivery, Abortion, or More than one 1 = Mode of delivery not defined

Outcome	Bias domain	Bias Covariates	Variable Name	Definition	Values
		Outcome method specificity	Cov_out_method	The study measures blood loss by weight or volume.	0 = Method to measure blood loss is defined by weight or volume/weight 1 = Method to measure blood loss is weight/volume based (e.g., gauze pad absorption, transfusions, etc.) or is not defined
	Confounder quality	Level of confounding by variables – delivery risk factors	Cov_con_delivery	The study controls for one or more delivery risk factor variables (e.g., previous maternal hemorrhage, mode of delivery).	0 = study controls for one or more delivery risk factors variables 1 = study does not control for any delivery risk factors variables
Preeclampsia	Outcome assessment quality	Gestational hypertension outcome definition	Cov_out_def_gh	The study defines gestational hypertension as blood pressure (BP) >140/90 based on multiple measurements in pregnant persons after 20 weeks of gestation who were not hypertensive prior to pregnancy, but without proteinuria, edema, or other symptoms.	0 = BP >140/90 and **no** proteinuria or signs of end-organ damage 1 = other outcome definition or N/A
		Preeclampsia outcome definition	Cov_out_def_pree	The study defines pre-eclampsia as BP >140/90 with proteinuria or signs of end-organ damage. Pre-eclampsia includes mild pre-eclampsia, severe pre-eclampsia, and HELLP.	0 = BP >140/90 and proteinuria or signs of end-organ damage 1 = other outcome definition or N/A
		Severe preeclampsia outcome definition	Cov_out_def_sev_pree	The study defines severe pre-eclampsia as severe hypertension (BP>160/100), proteinuria (>=0.3 g/l), and additional signs of end organ damage (liver: low platelets, elevated liver enzymes, coagulation issues; kidney: elevated creatinine; CNS: headaches or visual disturbances). We include here the syndrome of HELLP.	0 = BP >160/100 and proteinuria >=0.3 g/L or signs of end-organ damage or HELLP syndrome 1 = other outcome definition or N/A
		Eclampsia outcome definition	Cov_out_def_ecl	The study defines eclampsia as hypertension with seizures, with or without proteinuria.	0 = hypertension (any BP cutoffs) and seizures 1 = other outcome definition or N/A
		General outcome definition	Cov_out_bp	The study clearly defines the outcome using a threshold for BP and/or proteinuria.	0 = any BP cutoffs provided 1 = no BP cutoffs or N/A
		Outcome method	Cov_out_method	The study reports the method used to identify cases of the outcome.	0 = ascertainment of diagnosis described 1 = ascertainment of diagnosis not described
		Outcome timepoint definition	Cov_out_timing	The hypertensive event occurs within the study's defined time frame to ensure outcome is a complication of current pregnancy.	0 = Outcome occurs during pregnancy or within six weeks after birth 1 = Outcome timepoint not described or

Outcome	Bias domain	Bias Covariates	Variable Name	Definition	Values
					outside of primary window
		Chronic hypertension	Cov_excl_chr_hyp	The study excludes participants with chronic hypertension.	0 = Excluded from the study 1 = Included in the study or not described
	Confounder quality	Previous preeclampsia as a risk factor	Cov_con_prev_pree	The study controls for previous pre-eclampsia.	0 = study controls for previous preeclampsia 1 = study does not control for previous preeclampsia
		Chronic hypertension as a risk factor	Cov_con_chr_hyp	The study controls for chronic hypertension.	0 = study controls for chronic hypertension 1 = study does not control for chronic hypertension
Peripartum depression	Exposure quality	Trimester-specific measurements	Cov_exp_timing	The study reports more than one instance of exposure assessment.	0 = Trimester-specific measurement 1 = Measurement not trimester-specific
	Outcome quality	Clear definition provided	Cov_out_def	The outcome was assessed using a standardized tool.	0 = EDPS or other standardized survey 1 = Non standardized survey
		Self-reported	Cov_out_method	The outcome was measured through a survey administered by a health care worker.	0 = Administered by health care worker 1 = Self-report
		Validated instrument use	Cov_out_instrument	The outcome assessment tool was validated for the study setting.	0 = Validated for setting/language or standardized survey 1 =Not validated or described as being validated
Low birthweight, preterm birth, birthweight for gestational age, stillbirth and neonatal mortality, and neonatal sepsis	Outcome quality	Clear measurement of outcome – preterm birth	Cov_out_method	Gestational age was determined using the best obstetric estimate in the study.	0 = Obstetric estimate (e.g., ultrasound) 1 = Dubowitz, LMP and other methods
		Clear measurement of outcome – SGA and LGA	Cov_out_method	The study defines SGA and LGA using percentiles.	0 = Percentile or % 1 = Weeks or SD
		Clear measurement of outcome – low birthweight	Cov_out_method	The study obtained birthweights through physical measurements.	0 = Physical measurements 1 = Medical records and self-report
		Clear measurement of outcome – low birthweight; timing	Cov_out_timing	The study reports that birthweight is measured at or within 48 hours of birth.	0 = At birth or within 48 hours 1 = After 48 hours or unspecified
		Clear measurement of outcome – neonatal sepsis	Cov_out_method	The study identified neonatal sepsis cases through medical records, physician diagnoses, biomarkers, or death certificates.	0 = Medical records or physician diagnosis/biomarker or death certificates 1 = Self-report and other methods
		Clear definition of	Cov_out_def	The study reports a clear case definition of neonatal	0 = Clearly defined

Outcome	Bias domain	Bias Covariates	Variable Name	Definition	Values
		outcome – neonatal sepsis		sepsis.	1 = Unspecified
		Clear measurement of outcome – stillbirth, perinatal deaths, and neonatal deaths	Cov_out_method	The study identified stillbirths, perinatal deaths, and neonatal deaths through medical records, physician diagnosis, or vital registries/death certificates.	0 = Medical records, physician diagnosis, or vital registries/death certificates 1 = Self-report and other methods
		Clear measurement of outcome – stillbirth; timing	Cov_sb_timing	The study defines stillbirth using a minimum gestational age (in weeks).	0 = Timing of stillbirth is defined 1 = Timing of stillbirth is not defined
			Cov_sb_timing_20	The study defines stillbirth using a minimum of 20 weeks of gestation.	0 = Stillbirth occurs at 20 weeks of gestation 1 = Stillbirth does not occur at 20 weeks of gestation or timing is undefined
			Cov_sb_timing_22	The study defines stillbirth using a minimum of 22 weeks of gestation.	0 = Stillbirth occurs at 22 weeks of gestation 1 = Stillbirth does not occur at 22 weeks of gestation or timing is undefined
			Cov_sb_timing_24	The study defines stillbirth using a minimum of 24 weeks of gestation.	0 = Stillbirth occurs at 24 weeks of gestation 1 = Stillbirth does not occur at 24 weeks of gestation or timing is undefined
			Cov_sb_timing_28	The study defines stillbirth using a minimum of 28 weeks of gestation.	0 = Stillbirth occurs at 28 weeks of gestation 1 = Stillbirth does not occur at 28 weeks of gestation or timing is undefined

Supplemental Table 41. Distribution of study-level bias covariates - Maternal mortality

Author	Country	Study representativeness*	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality			Confounder control				
							Multiple exposure category*	Blood sample*	Clear definition of outcome*	Clear measurement of outcome timing	Clear measurement of outcome*	Demographics	Socioeconomics*	Health behavior	Maternal comorbidity	Obstetric factors*
Ali, 2020	India	0	1	0	0	0	0	1	1	0	1	1	1	1	1	1
Ali, 2020	Pakistan	0	1	0	0	0	0	1	1	0	1	1	1	1	1	1
Daru, 2018	Global	0	1	0	0	1	0	1	1	1	1	1	1	1	0	1
Daru, 2018	Global	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1
Gonzales, 2012	Peru	0	1	0	0	0	0	1	1	1	1	0	0	0	0	0
Parks, NA	South Asia	0	1	0	0	0	0	1	1	0	1	0	0	1	1	0
Rukuni, 2016	United Kingdom	0	1	0	0	0	0	1	1	1	1	0	0	0	1	0

*The covariate was not included in BoP analysis.

Supplemental Table 42. Distribution of study-level bias covariates - Postpartum hemorrhage

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality				Confounder control					
							Multiple exposure category	Blood sample	Clear definition of outcome	Clear measurement of outcome timing	Mode of delivery	Clear measurement of outcome	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors	Delivery risk factors
Al-Zirqi, 2008	Norway	0	1	0	0	0	1	1	0	0	0	0	0	1	0	1	0	0
Ashwini, 2018	India	0	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1
Atukunda, 2014	Uganda	0	1	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1
Awan, 2022	Pakistan	1	1	0	0	1	0	1	0	1	1	0	1	1	1	1	1	1
Bachou, 2006	India	0	1	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1
Banavathu, 2025	India	0	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Barut, 2023	Somalia	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Barut, 2023	Somalia	1	1	0	0	0	1	1	1	0	0	1	1	1	1	1	1	1
Bazirete, 2022	Rwanda	1	1	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1
Bestman, 2024	China	1	1	0	0	0	1	1	0	1	0	0	0	0	1	1	0	1
Biradar, 2023	India	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Bone, 2022	India	0	1	0	0	1	0	1	1	1	0	1	0	0	0	1	0	1
Borovac-Pinheiro, 2021	Brazil	1	1	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1
Bukhari, 2022	Saudi Arabia	0	1	0	0	1	0	1	1	0	0	1	1	1	1	1	1	1
Buzaglo, 2015	Israel	1	1	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1
Çakmak, 2018	Türkiye	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Cheng, 2025	India	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality				Confounder control					
							Multiple exposure category	Blood sample	Clear definition of outcome	Clear measurement of outcome timing	Mode of delivery	Clear measurement of outcome	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors	Delivery risk factors
Chu, 2020	Taiwan (Province of China)	0	1	0	0	0	1	1	0	1	0	1	1	1	0	1	0	1
Detlefs, 2022	United States of America	0	1	0	0	0	1	0	1	1	0	1	0	0	0	0	0	1
Dewi, 2018	Indonesia	0	1	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1
Drukker, 2015	Israel	0	1	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0
Dutta, 2018	India	0	1	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1
Ernawati, 2018	Indonesia	0	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1
Feng, 2023	China	0	1	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1
Flores, 2020	Australia	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Geelhoed, 2006	Ghana	1	1	0	0	0	1	1	0	1	0	0	1	1	1	1	1	1
Gimono, 2024	Oman	0	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Gonzales, 2012	Peru	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1
Guignard, 2020	France	0	1	0	0	1	0	1	1	1	0	1	0	0	0	0	0	1
Hews-Girard, 2023	Canada	1	1	0	0	0	1	1	0	1	0	0	0	0	1	1	1	1
Jaleel, 2010	Pakistan	0	1	0	0	1	1	1	0	1	0	1	0	1	1	1	1	0
Kaul, 2017	India	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Keren, 2019	China	1	1	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality				Confounder control					
							Multiple exposure category	Blood sample	Clear definition of outcome	Clear measurement of outcome timing	Mode of delivery	Clear measurement of outcome	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors	Delivery risk factors
Labib, 2021	Egypt	1	1	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1
Lao, 1996	China	1	1	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1
Liu, 2021	China	0	1	0	0	1	1	1	0	0	0	0	0	1	1	0	0	0
Luik, 2021	Estonia	0	1	0	0	0	0	1	0	0	1	1	0	1	0	1	0	1
Luis, 2016	United Kingdom	1	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1
Lumbanraja, 2019	India	0	1	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1
Mahmood, 2019	Pakistan	0	1	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1
Mehrnoush, 2023	Iran (Islamic Republic of)	0	1	0	0	1	0	1	1	1	0	1	1	1	1	1	1	1
Moges, 2025	Ethiopia	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Movva, 2023	United States of America	0	1	0	0	0	1	1	1	1	0	0	1	1	1	1	1	1
Nair, 2016	India	1	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Nair, 2021	India	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Negesa, 2024	Ethiopia	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1
Nur, 2021	Indonesia	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Nyfløt, 2017	Norway	1	1	0	0	1	1	1	0	1	0	0	0	1	0	0	1	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality				Confounder control					
							Multiple exposure category	Blood sample	Clear definition of outcome	Clear measurement of outcome timing	Mode of delivery	Clear measurement of outcome	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors	Delivery risk factors
Okunade, 2024	Nigeria	1	1	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1
Okunade, 2024	Nigeria	0	1	0	0	0	1	1	0	0	0	0	0	1	1	1	0	0
Okunade, 2024	Nigeria	1	1	0	0	0	1	1	0	0	0	0	1	1	1	1	1	1
Owiredu, 2016	Ghana	1	1	0	0	0	1	0	0	0	0	0	1	1	1	1	1	1
Parks, NA	South Asia	0	1	0	0	0	0	1	1	1	0	0	1	1	1	1	1	1
Prata, 2011	Egypt	0	1	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0
Randall, 2019	Australia	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
Randall, 2019	Australia	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
Rukuni, 2016	United Kingdom	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1
Safarzadeh, 2023	Iran (Islamic Republic of)	1	1	0	0	0	1	1	1	1	0	1	0	0	0	1	0	0
Salomon, 2021	France	1	1	0	0	0	1	1	0	1	0	0	1	1	1	1	1	1
Shi, 2022	China	0	1	0	0	0	0	1	1	1	0	1	0	0	1	0	0	0
Shrivastava, 2024	India	0	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Singal, 2018	India	0	1	0	0	1	1	1	1	0	0	1	1	1	1	1	1	1
Singh, 1998	Singapore	0	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1
Skjeldestad,	Norway	1	1	0	0	0	0	1	0	0	0	1	0	1	1	1	0	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality				Confounder control					
							Multiple exposure category	Blood sample	Clear definition of outcome	Clear measurement of outcome timing	Mode of delivery	Clear measurement of outcome	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors	Delivery risk factors
2012																		
Soltan, 2007	Egypt	1	1	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1
Suryanarayana, 2017	India	0	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Tian, 2024	China	0	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Tsu, 1993	Zimbabwe	0	1	0	0	1	0	1	0	0	0	0	0	1	1	1	0	1
Tzur, 2012	Israel	0	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Wang, 2021	China	1	1	0	0	1	1	1	0	0	0	0	1	1	1	1	1	1
Wetta, 2013	United States of America	1	1	0	0	1	1	1	1	0	0	0	0	1	0	0	0	0
Yang, 2016	China	1	1	0	0	0	0	0	1	1	1	1	0	1	1	1	0	0
Yuliati, 2018	Indonesia	0	1	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1

*The covariate was not included in BoP analysis.

Supplemental Table 43. Distribution of study-level bias covariates - Antepartum hemorrhage

Author	Country	Study representativeness*	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality				Confounder control					
							Multiple exposure category*	Blood sample*	Clear definition of outcome*	Clear measurement of outcome timing*	Mode of delivery	Clear measurement of outcome*	Demographics*	Socioeconomics*	Health behavior*	Maternal comorbidity*	Obstetric factors*	Delivery risk factors*
Biradar, 2023	India	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1	1
Bone, 2022	India	0	1	0	0	1	0	1	1	1	0	1	0	0	0	1	0	1
Randall , 2019	Australia	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1

*The covariate was not included in BoP analysis.

Supplemental Table 44. Distribution of study-level bias covariates - Preeclampsia

								Exposure assessment quality			Outcome assessment quality							Confounder control					
Author	Country	Study representativeness	Chronic hypertension excluded	Effect size measure *	Reverse causation *	Selection bias*	Study design	Multiple exposure category	Blood sample	Gestational hypertension defined*	Preeclampsia defined	Severe preeclampsia defined*	Eclampsia defined*	General BP threshold defined	Clear measurement of outcome	Clear measurement of outcome timing	Demographics	Socioeconomics*	Health behavior *	Maternal comorbidity	Obstetric factors*	Previous preeclampsia *	Chronic hypertension *
Bone, 2022	India	1	1	1	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	1	0	1	1
Bone, 2022	India	1	1	1	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	1	0	1	1
Bone, 2022	India	1	1	1	0	0	0	0	1	1	0	1	1	0	0	1	0	0	0	1	0	1	1
Cevher, 2022	Türkiye	1	0	1	0	0	0	1	1	1	0	1	1	0	0	0	1	1	1	1	1	1	1
Gaillard, 2014	Netherlands	1	1	1	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	0	1	1
Gonzales, 2012	Peru	0	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	1
Gonzales, 2012	Peru	0	1	1	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	1
Hämäläinen, 2003	Finland	0	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hämäläinen, 2003	Finland	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Larsen, 2016	Norway	0	1	1	0	0	0	0	1	1	0	1	1	0	0	0	1	1	1	1	1	1	1
Mogaddam, 2019	Iran (Islamic Republic of)	1	0	1	0	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
Mogaddam, 2019	Iran (Islamic Republic of)	1	0	1	0	0	0	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1
Nordenvall, 1990	Sweden	0	1	1	0	0	0	0	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1
Nordenvall, 1990	Sweden	0	1	1	0	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1
Phaloprakarn, 2008	Thailand	1	0	1	0	0	0	1	1	1	0	1	1	0	0	0	1	1	1	0	1	1	1
Prasetya, 2020	Indonesia	0	0	1	0	0	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1
Ulfah, 2015	Indonesia	0	1	1	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1

								Exposure assessment quality			Outcome assessment quality							Confounder control					
Author	Country	Study representativeness	Chronic hypertension excluded	Effect size measure*	Reverse causation*	Selection bias*	Study design	Multiple exposure category	Blood sample	Gestational hypertension defined*	Preeclampsia defined	Severe preeclampsia defined*	Eclampsia defined*	General BP threshold defined	Clear measurement of outcome	Clear measurement of outcome timing	Demographics	Socioeconomics*	Health behavior*	Maternal comorbidity	Obstetric factors*	Previous preeclampsia*	Chronic hypertension*
Wang, 2018	China	1	0	1	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	1	0	1	1
Zhang, 2009	China	1	1	1	0	0	0	0	1	1	1	1	1	0	0	1	0	0	0	1	0	1	1

*The covariate was not included in BoP analysis.

Supplemental Table 45. Distribution of study-level bias covariates - Maternal sepsis and other infections

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality			Confounder control				
							Multiple exposure category	Blood sample	Clear definition of outcome*	Clear measurement of outcome timing	Clear measurement of outcome*	Demographics	Socioeconomics*	Health behavior*	Maternal comorbidity	Obstetric factors
Ambedkar, 2021	India	0	1	0	0	1	0	1	1	0	0	1	1	1	1	1
Bizuayew, 2021	Ethiopia	1	1	0	0	0	1	1	1	0	0	1	1	1	1	1
Daru, 2018	Global	0	1	0	0	1	0	1	1	1	0	1	1	1	1	1
Flores-Venegas, 2019	Mexico	0	1	0	0	0	1	0	1	0	0	1	1	1	1	1
Gelaw, 2017	Ethiopia	1	1	0	0	1	1	1	1	0	0	1	1	1	1	1
Kajeguka, 2020	United Republic of Tanzania	0	1	0	0	1	0	1	1	1	0	1	1	1	1	1
Malhotra, 2002	India	1	1	0	0	0	0	1	1	1	0	1	1	1	1	1
Mamo, 2017	Ethiopia	0	1	0	0	0	1	1	1	0	0	1	1	1	1	1
Ojiyi, 2013	Nigeria	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1
Parveen, 2025	India	0	1	0	0	0	1	1	1	0	0	1	1	1	0	0
Rukuni, 2016	United Kingdom	0	1	0	0	0	0	1	1	1	0	0	0	0	1	0
Sehgal, 2016	India	1	1	0	0	0	0	1	1	1	0	1	1	1	1	1
Shanbhag, 2021	India	1	1	0	0	0	0	1	1	0	0	1	1	1	1	1
Shen, 2024	China	1	1	0	0	0	1	1	1	0	0	0	0	1	0	0
Shrivastava, 2024	India	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1
Tandu-Umba,	Democratic Republic of the	0	1	0	0	1	1	0	1	0	0	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality			Confounder control				
							Multiple exposure category	Blood sample	Clear definition of outcome*	Clear measurement of outcome timing	Clear measurement of outcome*	Demographics	Socioeconomics*	Health behavior*	Maternal comorbidity	Obstetric factors
2015	Congo															

*The covariate was not included in BoP analysis.

Supplemental Table 46. Distribution of study-level bias covariates - Peripartum depresstion

Author	Country	Study representativeness	Effect size measure	Reverse causation*	Selection bias*	Study design	Exposure assessment quality			Outcome assessment quality			Confounder control				
							Granular timepoint assessment	Multiple exposure category	Blood sample	Clear definition of outcome*	Validated instrument used*	Clear measurement of outcome	Demographics	Socioeconomics*	Health behavior	Maternal comorbidity	Obstetric factors
Alharbi, 2014	Saudi Arabia	1	1	0	0	1	0	1	1	0	0	0	1	1	1	1	1
Alharbi, 2014	Saudi Arabia	1	1	0	0	1	1	1	1	0	0	0	1	1	1	1	1
Alharbi, 2014	Saudi Arabia	1	1	0	0	1	1	1	1	0	0	0	1	1	1	1	0
Babah, 2025	Nigeria	1	1	0	0	0	1	0	1	0	0	0	1	1	1	1	1
Babah, 2025	Nigeria	1	1	1	0	0	1	0	1	0	0	0	1	1	1	1	1
Eckerdal, 2016	Sweden	1	1	0	0	1	0	1	1	0	0	1	1	1	1	1	1
Goshtasebi, 2013	Iran (Islamic Republic of)	1	1	0	0	0	0	1	0	0	0	0	0	0	1	1	0
Kariman, 2008	Iran (Islamic Republic of)	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Kemppinen, 2022	Finland	1	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0
Kemppinen, 2025	Finland	1	1	0	0	0	0	1	1	0	0	0	1	1	1	1	1
Kwak, 2022	Republic of Korea	1	1	0	0	1	0	1	1	0	1	0	1	1	1	1	1
Kwak, 2022	Republic of Korea	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0
Kwak, 2025	Republic of Korea	1	0	0	0	0	0	1	1	0	0	0	1	1	1	1	1
La, 2024	Israel	1	1	0	0	0	0	1	0	0	0	1	0	0	1	0	1
Maeda, 2020	Japan	0	1	0	1	0	0	0	1	0	0	0	0	0	1	1	0
Maeda, 2020	Japan	0	1	0	0	0	0	0	1	0	0	0	0	0	1	1	0
Tian, 2022	China	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1

Author	Country	Study representativeness	Effect size measure	Reverse causation*	Selection bias*	Study design	Exposure assessment quality			Outcome assessment quality			Confounder control				
							Granular timepoint assessment	Multiple exposure category	Blood sample	Clear definition of outcome*	Validated instrument used*	Clear measurement of outcome	Demographics	Socioeconomics*	Health behavior	Maternal comorbidity	Obstetric factors
Tian, 2022	China	1	1	0	0	0	0	1	1	0	0	0	1	1	1	1	1
Woldetensay, 2018	Ethiopia	0	1	0	0	0	0	1	1	0	0	1	0	0	0	1	1

*The covariate was not included in BoP analysis.

Supplemental Table 47. Distribution of study-level bias covariates - All-cause neonatal mortality

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Abdullah, 2012	Indonesia	0	1	0	0	1	1	1	1	1	1	1	1	1
Abioye, 2023	United Republic of Tanzania	1	1	0	0	1	0	1	0	0	1	0	1	0
Abioye, 2023	United Republic of Tanzania	1	1	0	0	1	0	1	0	0	1	0	1	0
Agrawal, 2017	India	0	1	0	0	0	0	1	1	1	1	1	1	1
Ali, 2020	South Asia	1	1	0	0	0	0	1	0	0	0	1	1	0
Ashley, 1994	Jamaica	0	1	0	0	1	0	1	0	0	1	1	0	1
Badi, 2021	Sudan	0	1	0	0	1	0	0	1	1	1	1	1	1
Bakhtiar, 2011	Pakistan	1	1	0	0	0	1	0	1	1	1	1	1	1
Chasekwa, 2021	Zimbabwe	0	1	0	1	0	0	1	1	0	0	1	1	0
Chu, 2020	Taiwan (Province of China)	1	1	0	0	0	0	1	1	0	1	0	1	0
Cozzi, 2023	United States of America	0	1	0	0	0	1	1	0	0	1	0	0	0
Detlefs, 2022	United States of America	0	1	0	0	0	0	0	0	0	0	0	0	0
Dolan, 1993	Thailand	0	1	0	0	1	1	1	1	1	1	1	1	1
Dutta, 2018	India	1	1	0	0	1	1	1	1	1	1	1	1	1
Edelson, 2023	Uganda	1	1	0	0	0	1	1	0	1	1	1	1	1
Essen, 2000	Sweden	0	1	0	0	0	1	1	0	0	0	0	0	0
Geda, 2021	Ethiopia	0	1	0	0	1	1	1	1	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Geelhoed, 2006	Ghana	1	1	0	0	0	0	1	0	0	1	1	1	1
Heydarpour, 2019	Iran (Islamic Republic of)	0	1	0	0	0	0	1	0	1	1	1	1	1
Jessani, 2021	India	1	1	0	0	0	0	1	0	0	1	0	0	1
Jessani, 2021	India	1	1	0	0	0	0	1	0	0	1	0	0	1
Jessani, 2021	Pakistan	1	1	0	0	0	0	1	0	0	1	0	0	1
Jessani, 2021	Pakistan	1	1	0	0	0	0	1	0	0	1	0	0	1
Khan, 2023	Malaysia	1	1	0	0	0	0	1	0	1	1	1	1	1
Khan, 2023	Malaysia	1	1	0	0	0	0	1	0	1	1	1	1	1
Khatana, 2020	India	1	1	0	0	0	0	1	0	1	1	1	1	1
Kidanto, 2009	United Republic of Tanzania	0	1	0	0	1	0	0	0	1	1	1	1	1
Kulmala, 2000	Malawi	1	1	0	0	0	1	1	1	1	1	1	1	1
Kumar, 2020	India	0	1	0	0	0	0	1	0	1	1	1	1	1
Kumar, 2020	India	0	1	0	0	0	0	1	0	1	1	1	1	1
Lao, 1996	China	0	1	0	0	0	0	0	0	1	1	1	1	1
Lokeshwari, 2018	India	0	1	0	0	1	1	1	1	1	1	1	1	1
Mahmood, 2019	Pakistan	1	1	0	0	0	0	1	0	1	1	1	1	1
Moges, 2025	Ethiopia	0	1	0	0	0	0	1	0	1	0	1	0	0
Murphy, 1986	United Kingdom	0	1	0	0	0	0	1	0	1	1	1	1	1
NA, NA	United Kingdom	0	1	0	0	0	0	1	0	1	1	1	1	1
Nair, 2017	United Kingdom	0	1	0	0	0	0	1	0	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Nair, 2017	United Kingdom	0	1	0	0	0	0	1	0	0	1	0	0	0
Nair, 2017	United Kingdom	0	1	0	0	0	0	1	0	1	1	1	1	1
Nair, 2017	United Kingdom	0	1	0	0	0	0	1	0	0	1	0	0	0
Parks, NA	South Asia	0	1	0	0	0	0	1	0	0	0	1	1	0
Patel, 2018	India	0	1	0	0	0	0	1	0	1	1	1	1	1
Prema, 1981	India	0	1	0	0	1	0	1	1	1	1	1	1	1
Räisänen, 2014	Finland	0	1	0	0	0	1	1	0	0	1	0	0	1
Räisänen, 2014	Finland	0	1	0	0	0	1	1	0	0	1	0	0	0
Rawat, 2025	India	0	1	0	0	0	0	1	0	1	1	1	1	1
Rukuni, 2016	United Kingdom	1	1	0	0	0	0	1	1	1	1	1	1	1
Rukuni, 2016	United Kingdom	1	1	0	0	0	0	1	1	0	1	0	1	0
Smith, 2019	Canada	0	1	0	0	0	0	1	0	0	1	0	0	0
Smith, 2019	Canada	0	1	0	0	0	0	1	0	1	1	1	1	1
Tiwari, 2021	India	0	1	0	0	0	1	1	1	1	1	1	1	1
Tunkyi, 2018	South Africa	0	1	0	0	0	0	0	1	1	1	1	1	1
Tzur, 2012	Israel	0	1	0	0	0	1	1	0	1	1	1	1	1
Viplava, 2022	India	0	1	0	0	1	0	1	1	1	1	1	1	1
Vogel, 2014	Global	1	1	0	0	1	0	1	0	0	0	1	1	0
Xiong, 2003	China	1	1	0	0	0	0	1	1	0	0	0	0	0
Yousaf, 2011	Pakistan	1	1	0	0	0	0	1	1	1	1	1	1	1
Zhang, 1993	China	0	1	0	0	1	0	1	0	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors

*The covariate was not included in BoP analysis.

Supplemental Table 48. Distribution of study-level bias covariates - Stillbirth

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design*	Exposure assessment quality		Outcome assessment quality						Confounder control				
							Multiple exposure category*	Blood sample	Clear measurement of outcome	Clear timepoint of stillbirth*	Stillbirth >20 weeks gestation*	>22 weeks gestation*	>24 weeks gestation*	>28 weeks gestation*	Demographics	Socioeconomics*	Health behavior *	Maternal comorbidity	Obstetric factors*
Barut, 2023	Somalia	1	1	0	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1
Gonzales, 2012	Peru	0	1	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0
Gonzales, 2014	Peru	0	1	0	0	0	0	1	1	0	0	1	1	1	0	0	1	0	0
Jessani, 2021	Guatemala	1	1	0	0	0	0	1	0	0	0	1	1	1	0	1	0	0	1
Jessani, 2021	Guatemala	1	1	0	0	0	0	1	0	1	1	1	1	1	0	1	0	0	1
Jessani, 2021	India	1	1	0	0	0	0	1	0	0	0	1	1	1	0	1	0	0	1
Jessani, 2021	India	1	1	0	0	0	0	1	0	1	1	1	1	1	0	1	0	0	1
Jessani, 2021	Pakistan	1	1	0	0	0	0	1	0	0	0	1	1	1	0	1	0	0	1
Jessani, 2021	Pakistan	1	1	0	0	0	0	1	0	1	1	1	1	1	0	1	0	0	1
Shi, 2022	China	1	1	0	0	0	0	1	1	0	0	1	1	1	0	1	1	1	1
Shi, 2022	China	1	1	0	0	0	0	1	1	0	0	1	1	1	0	1	1	0	1
Tang, 2024	China	0	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0

*The covariate was not included in BoP analysis.

Supplemental Table 49. Distribution of study-level bias covariates - Preterm birth

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Aballo, 2025	Ghana	0	1	0	0	0	0	1	1	1	1	1	1	1
Abeysena, 2010	Sri Lanka	1	1	0	0	0	0	0	1	1	1	1	1	1
Abioye, 2023	United Republic of Tanzania	1	1	0	0	1	0	1	1	0	1	0	1	0
Ahankari, 2017	India	1	1	0	0	0	1	1	1	0	1	1	1	1
Ahmad, 2022	Pakistan	1	1	0	0	0	0	1	1	1	1	1	1	1
Ali, 2011	Sudan	0	1	0	0	0	0	1	1	0	0	1	1	0
Alwan, 2015	United Kingdom	1	1	0	0	0	0	0	1	0	1	0	0	0
Alwan, 2015	United Kingdom	1	1	0	0	0	0	1	1	0	1	0	0	0
Arafa, 1998	Egypt	0	1	0	0	0	0	0	1	1	1	0	0	0
Arafa, 1998	Egypt	0	1	0	0	0	0	0	1	1	1	1	1	1
Arbedili, 2024	Iran (Islamic Republic of)	0	1	0	0	0	0	1	1	1	1	1	1	1
Ardic, 2019	Türkiye	1	1	0	0	0	0	1	1	0	0	0	1	0
Ashwini, 2018	India	1	1	0	0	1	0	1	1	1	1	1	1	1
Badi, 2021	Sudan	0	1	0	0	1	1	0	1	1	1	1	1	1
Bakhtiar, 2011	Pakistan	1	1	0	0	0	1	0	1	1	1	1	1	1
Bánhidy, 2011	Hungary	1	1	0	0	0	0	1	1	1	1	1	1	1
Bánhidy, 2011	Hungary	1	1	0	0	0	0	1	1	0	1	1	1	1
Bener, 2013	Qatar	1	1	0	1	0	1	1	1	1	1	1	1	1
Bhalerao, 2011	India	0	1	0	0	0	0	1	1	1	1	1	1	1
Biradar, 2023	India	1	1	0	0	0	0	1	1	1	1	1	1	1
Bondevik, 2001	Nepal	0	1	0	0	1	0	1	1	0	1	0	1	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Carboo, 2024	South Africa	0	1	0	0	0	0	1	1	0	1	0	1	1
Chang, 2003	United States of America	1	1	0	0	0	0	1	1	0	1	0	1	0
Chasekwa, 2021	Zimbabwe	0	1	0	1	0	1	1	1	0	0	1	0	0
Chen, 2024	China	1	1	0	0	0	0	1	1	0	0	0	0	0
Chen, 2024	China	0	1	0	0	0	0	0	1	0	0	0	0	0
Chu, 2020	Taiwan (Province of China)	1	1	0	0	0	0	1	1	0	1	0	1	0
Chumak, 2010	Russian Federation	0	1	0	0	0	1	1	1	1	1	1	1	0
Damanhuri, 2024	Malaysia	1	1	0	0	0	0	1	1	0	1	0	0	0
Damanhuri, 2024	Malaysia	0	1	0	0	0	0	1	1	1	1	1	1	1
Detlefs, 2022	United States of America	0	1	0	0	0	1	0	1	0	0	0	0	0
Díaz-Granda, 2019	Ecuador	1	1	0	0	0	0	0	1	1	1	1	1	1
Dos, 2022	Brazil	1	1	0	0	0	0	0	1	1	1	1	1	1
Drukker, 2015	Israel	0	1	0	0	0	1	0	1	0	0	1	1	0
Dündar, 2010	Türkiye	0	1	0	0	0	1	1	1	1	1	1	1	1
Elmugabil, 2022	Sudan	1	1	0	0	1	0	1	1	1	1	1	1	1
Finkelstein, 2020	India	1	1	0	0	0	0	0	1	1	1	1	1	0
Finkelstein, 2020	India	1	1	0	0	0	0	0	1	1	0	0	1	0
Fukushima, 1991	Japan	1	1	0	0	0	0	1	1	1	1	1	1	1
Gaillard, 2014	Netherlands	1	1	0	0	0	0	0	1	0	0	0	1	0
Gamini, 2021	India	1	1	0	0	0	1	1	1	1	1	1	1	1
Gann, 1989	United States of America	1	1	0	0	0	1	1	1	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Gerety, 2024	Bangladesh	1	1	0	0	0	1	1	1	0	0	0	0	0
Gimono, 2024	Oman	0	1	0	0	0	0	1	1	1	1	1	1	1
Go, 2022	Japan	0	1	0	0	0	0	1	1	0	0	0	0	0
Gonzales, 2009	Peru	0	1	0	0	0	0	1	1	1	1	1	1	1
Gonzales, 2012	Peru	0	1	0	0	0	0	1	1	0	0	0	0	0
Gonzales, 2014	Peru	0	1	0	0	0	0	1	1	0	0	1	0	0
Gyimah, 2021	Ghana	1	1	0	1	0	0	0	1	0	1	1	1	1
Habe, 2024	Japan	1	1	0	0	0	0	1	1	1	1	1	1	1
Hämäläinen, 2003	Finland	1	1	0	0	0	0	1	1	1	1	1	1	1
Harding, 1997	United Kingdom	0	1	0	0	0	0	1	1	0	0	0	1	0
Heilmann, 1993	Germany	1	1	0	0	0	1	1	1	1	1	1	1	1
Heydarpour, 2019	Iran (Islamic Republic of)	0	1	0	0	0	0	1	1	1	1	1	1	1
Hsu, 2013	Taiwan (Province of China)	1	1	0	1	1	0	1	1	1	1	1	1	1
Hwang, 2010	Republic of Korea	1	1	0	0	0	1	1	1	1	1	1	1	1
Iqbal, 2020	Pakistan	1	1	0	0	1	0	0	1	1	1	1	1	1
Jahedbozorgan, 2020	Iran (Islamic Republic of)	0	1	0	0	1	1	0	1	1	1	1	1	1
Jessani, 2021	Guatemala	1	1	0	0	0	0	1	1	0	1	0	0	1
Jessani, 2021	India	1	1	0	0	0	0	1	1	0	1	0	0	1
Jessani, 2021	Pakistan	1	1	0	0	0	0	1	1	0	1	0	0	1
Kaur, 2015	India	0	1	0	0	1	0	1	1	1	1	1	1	1
Kelkay, 2019	Ethiopia	0	1	0	0	0	1	1	1	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Kemppinen, 2020	Finland	0	1	0	0	0	0	1	1	1	1	1	1	1
Khan, 2023	Malaysia	1	1	0	0	0	1	1	1	1	1	1	1	1
Khezri, 2023	Iran (Islamic Republic of)	1	1	0	0	1	1	0	1	0	0	0	0	0
Khezri, 2025	Iran (Islamic Republic of)	0	1	0	0	1	0	1	1	0	0	1	0	0
Khezri, 2025	Iran (Islamic Republic of)	0	1	0	0	1	0	1	1	1	1	1	1	1
Kibret, 2024	Ethiopia	1	1	0	0	1	1	1	1	1	1	1	1	1
Kidanto, 2009	United Republic of Tanzania	0	1	0	0	1	0	0	1	1	1	1	1	1
Kim, 1998	Republic of Korea	1	1	0	0	0	0	1	1	1	1	1	1	1
Klebanoff, 1989	United States of America	0	1	0	0	0	0	1	1	1	1	1	1	1
Knottnerus, 1990	Netherlands	0	1	0	0	0	0	0	1	1	1	1	1	1
Koura, 2012	Benin	1	1	0	0	0	1	1	1	1	1	1	1	1
Kumar, 2020	India	0	1	0	0	0	0	1	1	1	1	1	1	1
Kumari, 2019	India	0	1	0	0	1	0	1	1	0	0	0	1	0
Lao, 1996	China	0	1	0	0	0	0	0	1	1	1	1	1	1
Lao, 2022	China	0	1	0	0	1	1	0	1	1	1	1	1	1
Lee, 2006	Republic of Korea	0	1	0	0	0	0	1	1	1	1	1	1	1
Levy, 2005	Israel	1	1	0	1	0	0	1	1	0	1	1	1	1
Lieberman, 1988	United States of America	0	1	0	0	0	0	1	1	1	1	1	1	1
Lin, 2018	China	0	1	0	0	0	1	1	1	1	1	1	1	1
Lone, 2004	Pakistan	1	1	0	0	0	1	1	1	0	0	0	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Lumbanraja, 2019	India	1	1	0	0	0	1	1	1	1	1	1	1	1
Mahmood, 2019	Pakistan	1	1	0	0	0	1	1	1	1	1	1	1	1
Masukume, 2015	High-income	0	1	0	0	0	0	1	1	1	1	1	1	1
Masukume, 2015	High-income	0	1	0	0	0	0	1	1	0	0	1	1	1
Mayorga, 2012	Honduras	0	1	0	0	1	1	1	1	1	1	1	1	1
Meda, 1999	Burkina Faso	1	1	0	0	0	0	1	1	0	0	0	0	0
Mekonen, 2019	Ethiopia	0	1	0	0	1	1	1	1	1	1	1	0	0
Mekuriyaw, 2020	Ethiopia	1	1	0	0	1	1	1	1	1	0	1	1	0
Menon, 2016	India	1	1	0	0	0	0	0	1	1	1	1	1	1
Moakhar, 2019	Iran (Islamic Republic of)	1	1	0	0	1	0	0	1	1	1	1	1	1
Moges, 2025	Ethiopia	0	1	0	0	0	0	1	1	1	1	1	1	1
Mohamed, 2012	United States of America	1	1	0	0	0	0	1	1	0	1	0	0	0
Morgan-Ortiz, 2010	Mexico	0	1	0	0	1	1	1	1	1	1	1	1	1
Murphy, 1986	United Kingdom	0	1	0	0	0	0	1	1	1	1	1	1	1
Nasiri-Amiri, 2007	Iran (Islamic Republic of)	1	1	0	0	0	0	1	1	1	1	1	1	1
Nsereko, 2020	Rwanda	1	1	0	0	0	0	0	1	0	1	1	1	0
Nsereko, 2020	Rwanda	1	1	0	0	0	0	0	1	1	1	1	1	1
Ohuma, 2023	Global	1	1	0	0	0	0	0	1	0	1	0	0	0
Omar, 2022	Somalia	1	1	0	0	1	0	1	1	1	1	1	1	1
Özgen, 2020	Türkiye	0	1	0	0	0	0	1	1	1	1	1	1	1
Parks, NA	South Asia	0	1	0	0	0	0	1	1	0	0	1	1	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Phaloprakarn, 2008	Thailand	1	1	0	0	0	0	1	1	1	1	1	1	1
Phaloprakarn, 2008	Thailand	1	1	0	0	0	0	1	1	0	1	0	1	0
Pinho-Pompeu, 2017	Brazil	0	1	0	0	0	1	1	1	1	1	1	1	1
Prioreschi, 2025	South Africa	0	1	0	0	0	0	1	1	1	1	1	1	1
Radoń-Pokracka, 2016	Poland	0	1	0	0	0	1	0	1	1	1	1	1	1
Räisänen, 2014	Finland	0	1	0	0	0	1	1	1	0	0	0	1	0
Ramya, 2019	India	0	1	0	0	0	0	1	1	1	1	1	1	1
Randall, 2019	Australia	0	1	0	0	0	0	1	1	1	1	1	1	1
Rao, 2018	India	1	1	0	0	0	0	1	1	1	1	1	1	1
Rasmussen, 1993	Norway	0	1	0	0	0	0	1	1	1	1	1	1	1
Rawat, 2025	India	0	1	0	0	0	0	1	1	1	1	1	1	1
Razmy, 2016	Sri Lanka	1	1	0	0	0	0	1	1	1	1	1	1	1
Ren, 2007	China	1	1	0	0	0	0	1	1	0	0	0	1	0
Ribot, 2014	Spain	1	1	0	0	0	0	1	1	0	0	0	1	0
Ronnenberg, 2004	China	1	1	0	0	0	0	0	1	0	0	0	1	0
Rukuni, 2016	United Kingdom	1	1	0	0	0	0	1	1	1	1	1	1	1
Rukuni, 2016	United Kingdom	1	1	0	0	0	0	1	1	0	1	0	1	0
Salman, 2020	Iraq	1	1	0	0	0	0	0	1	1	1	1	1	1
Salunkhe, 2021	India	1	1	0	0	0	0	1	1	1	1	1	1	1
Scholl, 1992	United States of	0	1	0	0	0	0	0	1	0	1	0	1	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
	America													
Seifi, 2015	Iran (Islamic Republic of)	1	1	0	0	1	0	1	1	1	1	1	1	1
Seifi, 2015	Iran (Islamic Republic of)	1	1	0	0	1	0	1	1	0	0	0	1	0
Shah, 2022	Pakistan	0	1	0	0	1	1	1	1	1	1	1	1	1
Shrivastava, 2024	India	1	1	0	0	0	1	1	1	1	1	1	1	1
Siega-Riz, 1998	United States of America	0	1	0	0	0	0	0	1	1	1	1	1	1
Siega-Riz, 1998	United States of America	1	1	0	0	0	0	0	1	1	1	1	1	1
Skhvitaridze, 2025	Georgia	0	1	0	0	0	0	0	1	0	0	0	1	1
Smith, 2019	Canada	0	1	0	0	0	0	1	1	0	1	0	0	0
Smith, 2019	Canada	0	1	0	0	0	0	1	1	1	1	1	1	1
Steer, 1995	United Kingdom	0	1	0	0	0	0	1	1	0	1	0	1	0
Sun, 2021	China	0	1	0	0	1	1	1	1	0	0	0	1	1
Sureshbabu, 2021	India	0	1	0	0	1	1	1	1	1	1	1	0	1
Symington, 2019	South Africa	1	1	0	0	0	0	1	1	0	0	0	0	0
Symington, 2019	South Africa	1	1	0	0	0	0	1	1	0	1	1	1	0
Symington, 2019	South Africa	1	1	0	0	0	0	1	1	0	0	0	1	0
Tabrizi, 2019	Iran (Islamic Republic of)	1	1	0	0	0	1	0	1	0	0	0	1	0
Tabussum, 1994	Pakistan	0	1	0	0	1	1	1	1	1	1	1	1	1
Tang, 2024	China	0	1	0	0	0	0	0	1	0	0	0	1	0
Turner, 2012	United States of	1	1	0	0	0	0	1	1	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
	America													
Tzur, 2012	Israel	0	1	0	0	0	0	1	1	0	1	1	1	1
Ulaganeethi, 2024	India	0	1	0	0	0	0	1	1	1	1	1	1	1
Vakili, 2018	Iran (Islamic Republic of)	1	1	0	0	0	1	1	1	1	1	1	1	1
Verhoeff, 2001	Malawi	1	1	0	0	0	0	0	1	1	1	1	1	1
Vural, 2016	Türkiye	0	1	0	0	0	0	0	1	1	1	1	1	1
Wagura, 2018	Kenya	0	1	0	0	0	1	1	1	1	1	1	1	1
Wahabi, 2022	Saudi Arabia	0	1	0	0	0	0	1	1	0	1	1	1	0
Wang, 2007	China	1	1	0	0	0	0	1	1	0	0	1	0	0
Wang, 2018	China	0	1	0	0	0	0	1	1	1	1	1	1	1
Wassie, 2020	Ethiopia	0	1	0	0	1	0	1	1	1	1	1	1	0
Watson-Jones, 2007	United Republic of Tanzania	0	1	0	0	1	1	1	1	0	1	1	0	0
Wu, 2022	China	0	1	0	0	0	0	0	1	1	1	1	1	1
Wu, 2022	China	0	1	0	0	0	0	0	1	0	0	0	0	0
Xiong, 2003	China	1	1	0	0	0	0	1	1	0	0	0	0	0
Yahia, 2020	Yemen	1	1	0	0	0	0	1	1	1	1	1	1	1
Yazdani, 2004	Iran (Islamic Republic of)	0	1	0	0	0	1	1	1	1	1	1	1	1
Young, 2023	Viet Nam	1	1	0	0	0	0	1	1	0	0	1	1	1
Yousaf, 2011	Pakistan	1	1	0	0	0	1	1	1	1	1	1	1	1
Zewde, 2020	Ethiopia	1	1	0	0	1	1	1	1	0	1	1	0	0
Zhang, 2009	China	0	1	0	0	0	0	1	1	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Zhang, 2018	China	1	1	0	0	0	0	1	1	0	1	1	1	1
Zhang, 2018	China	1	1	0	0	0	0	1	1	0	0	0	0	0
Zhang, 2018	China	1	1	0	0	0	0	1	1	0	0	0	1	0
Zhou, 1998	China	0	1	0	0	0	0	1	1	0	1	0	0	0

*The covariate was not included in BoP analysis.

Supplemental Table 50. Distribution of study-level bias covariates - Low birthweight

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Aballo, 2025	Ghana	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Abdelmoneim, 2004	Saudi Arabia	1	1	0	0	1	1	1	1	0	0	1	1	1	0
Abera, 2019	Ethiopia	1	1	0	0	1	1	0	1	0	1	0	1	1	0
Abeysena, 2010	Sri Lanka	1	1	0	0	0	0	0	1	0	1	1	1	1	1
Abioye, 2023	United Republic of Tanzania	1	1	0	0	1	0	1	1	0	0	1	0	1	0
Adam, 2019	Ghana	1	1	0	0	1	1	1	1	0	1	0	1	1	0
Adane, 2018	Ethiopia	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Adjei-Gyamfi, 2023	Ghana	1	1	0	0	1	0	1	1	1	1	1	1	1	1
Ahankari, 2017	India	1	1	0	0	0	1	1	1	0	0	1	1	1	1
Ahankari, 2017	India	1	1	0	0	0	1	0	1	0	1	1	1	1	1
Ahmad, 1997	Malaysia	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Ahmad, 2017	Pakistan	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Ahmad, 2022	Pakistan	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Ahmed, 2018	Ethiopia	0	1	0	0	1	1	1	1	0	1	1	1	1	1
Al-Sibai, 1987	Saudi Arabia	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Alemu, 2020	Ethiopia	0	1	0	0	0	0	0	1	0	1	1	1	1	1
Ali, 2011	Sudan	0	1	0	0	0	0	1	1	1	0	0	1	1	0
Alvarez, 2019	Cuba	1	1	0	0	1	1	1	1	1	1	1	1	1	1
Anchang-Kimbi, 2020	Cameroon	0	1	0	0	1	1	1	1	1	0	1	1	1	0
Aynie, 2020	Ethiopia	0	1	0	0	1	1	1	1	1	1	1	1	1	0
Badi, 2021	Sudan	0	1	0	0	1	1	0	1	1	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Bakacak, 2015	Türkiye	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Bánhidy, 2011	Hungary	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Bánhidy, 2011	Hungary	1	1	0	0	0	0	1	1	1	0	1	1	1	0
Barut, 2023	Somalia	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Becerra, 1998	Peru	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Bener, 2013	Qatar	1	1	0	1	0	0	1	1	0	1	1	1	1	1
Bhalerao, 2011	India	0	1	0	0	0	0	1	1	0	1	1	1	1	1
Bian, 2013	China	1	1	0	0	0	1	1	1	0	0	1	1	1	0
Biradar, 2023	India	1	1	0	0	0	1	1	1	1	1	1	1	1	1
Bondevik, 2001	Nepal	0	1	0	0	1	0	1	1	0	0	1	0	1	0
Brabin, 1990	Papua New Guinea	0	1	0	0	0	0	0	1	1	1	1	1	1	1
Brabin, 1997	Papua New Guinea	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Briand, 2016	Lao People's Democratic Republic	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Bukhari, 2022	Saudi Arabia	1	1	0	0	1	0	1	1	1	1	1	1	1	1
Carboo, 2024	South Africa	0	1	0	0	0	0	1	1	1	0	1	0	1	1
Carpenter, 2021	Bangladesh	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Casanueva, 2006	Mexico	1	1	0	0	0	1	0	1	0	1	1	1	1	1
Chang, 2003	United States of America	1	1	0	0	0	0	1	1	0	0	1	0	1	0
Chanie, 2017	Ethiopia	1	1	0	0	1	1	1	1	0	1	1	0	1	0
Chen, 2024	China	1	1	0	0	0	0	1	1	0	0	0	0	0	0
Chen, 2024	China	0	1	0	0	0	0	0	1	1	0	0	0	0	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Chu, 2020	Taiwan (Province of China)	1	1	0	0	0	0	1	1	0	0	1	0	1	0
Dane, 2013	Türkiye	1	1	0	0	0	0	0	1	0	1	1	1	1	1
Deriba, 2021	Ethiopia	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Devaguru, 2023	India	1	1	0	0	1	0	1	1	0	1	1	1	1	1
Dhar, 2003	Bangladesh	0	1	0	0	1	0	0	1	0	1	1	1	1	1
Díaz-Granda, 2019	Ecuador	1	1	0	0	0	0	0	1	0	1	1	1	1	1
Dos, 2022	Brazil	1	1	0	0	0	0	0	1	0	1	1	1	1	1
Drukker, 2015	Israel	0	1	0	0	0	1	0	1	0	0	0	1	1	0
Dutta, 2018	India	1	1	0	0	1	0	1	1	0	1	1	1	1	1
Ekubagewargies, 2019	Ethiopia	0	1	0	0	0	0	1	1	1	1	1	1	1	1
El-Moselhy, 2012	Egypt	0	1	0	0	1	1	0	1	1	1	1	1	1	1
Elhassan, 2010	Sudan	0	1	0	0	1	0	1	1	0	1	1	1	1	1
Elhassan, 2010	Sudan	1	1	0	0	1	1	1	1	0	1	1	0	1	0
Elmugabil, 2023	Sudan	1	1	0	0	1	1	0	1	0	0	0	0	1	0
Engidaw, 2022	Ethiopia	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Essome, 2024	Cameroon	0	1	0	0	0	1	1	1	1	0	1	1	0	0
Fajriana, 2018	Indonesia	0	1	0	0	1	1	1	1	1	1	1	1	1	1
Finkelstein, 2020	India	1	1	0	0	0	0	0	1	0	1	1	1	1	0
Finkelstein, 2020	India	1	1	0	0	0	0	0	1	0	1	0	0	1	0
Gaillard, 2014	Netherlands	1	1	0	0	0	0	0	1	1	0	0	0	1	0
Ganesh, 2010	India	1	1	0	0	1	1	1	1	0	0	1	0	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Gann, 1989	United States of America	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Gazali, 1987	Indonesia	0	1	0	0	0	1	0	1	0	1	1	1	1	1
Gebrehawerya, 2018	Ethiopia	1	1	0	0	1	1	1	1	0	1	0	1	0	0
Geelhoed, 2006	Ghana	1	1	0	0	0	0	1	1	1	0	1	1	1	1
Gnanasekaran, 2019	India	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Go, 2022	Japan	0	1	0	0	0	0	1	1	1	0	0	0	0	0
Govil, 2018	India	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Guevara, 2009	Cuba	0	1	0	0	1	1	1	1	1	1	1	1	1	1
Gyimah, 2021	Ghana	1	1	0	1	0	0	0	1	0	0	1	1	1	1
Habe, 2024	Japan	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Habib, 2017	Pakistan	0	1	0	0	1	1	1	1	0	1	1	1	1	1
Haggaz, 2010	Sudan	1	1	0	0	1	1	1	1	0	0	0	0	1	0
Hämäläinen, 2003	Finland	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Heilmann, 1993	Germany	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Heydarpour, 2019	Iran (Islamic Republic of)	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Hirve, 1994	India	0	1	0	0	0	0	1	1	0	1	1	1	1	1
Hosain, 2006	Bangladesh	0	1	0	0	0	1	1	1	0	1	1	1	1	1
Hosain, 2006	Bangladesh	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Howard, 2015	Afghanistan	0	1	0	0	1	1	1	1	1	0	1	1	1	0
Ilunga, 2016	Democratic Republic	1	1	0	0	1	1	1	1	1	0	0	0	0	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
	of the Congo														
Javadi, 2023	Iran (Islamic Republic of)	1	1	0	0	1	0	1	1	1	0	0	1	1	0
Jember, 2020	Ethiopia	0	1	0	0	0	0	1	1	0	0	1	1	1	0
Jessani, 2021	Guatemala	1	1	0	0	0	0	1	1	0	0	1	0	0	1
Jessani, 2021	India	1	1	0	0	0	0	1	1	0	0	1	0	0	1
Jessani, 2021	Pakistan	1	1	0	0	0	0	1	1	0	0	1	0	0	1
Kant, 2018	India	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Kargbo, 2021	Sierra Leone	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Kashyap, 2019	India	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Kasuga, 2021	Japan	1	1	0	0	0	1	1	1	1	1	1	0	0	0
Khan, 2016	Pakistan	1	1	0	0	1	1	1	1	0	1	0	0	1	1
Khan, 2023	Malaysia	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Kidanto, 2009	United Republic of Tanzania	0	1	0	0	1	0	0	1	0	1	1	1	1	1
Kim, 1998	Republic of Korea	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Knottnerus, 1990	Netherlands	0	1	0	0	0	0	0	1	0	1	1	1	1	1
Koh, 1997	Republic of Korea	1	1	0	0	1	0	1	1	0	0	1	0	1	1
Komicha, 2021	Ethiopia	0	1	0	0	0	1	1	1	0	1	1	1	1	0
Koura, 2012	Benin	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Kumar, 2010	India	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Kumar, 2017	India	0	1	0	0	0	0	1	1	0	1	1	1	1	1
Kumari, 2019	India	0	1	0	0	1	0	1	1	0	0	0	0	1	0
Lake, 2019		0	1	0	0	0	1	1	1	1	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Lao, 1996	China	0	1	0	0	0	0	0	1	1	1	1	1	1	1
Lee, 2006	Republic of Korea	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Lemlem, 2021	Ethiopia	0	1	0	0	0	0	1	1	0	1	1	1	1	1
Levy, 2005	Israel	1	1	0	1	0	0	1	1	0	0	1	1	1	1
Lin, 2018	China	0	1	0	0	0	1	1	1	1	1	1	1	1	1
Liu, 2022	China	0	1	0	0	0	0	0	1	1	0	0	0	1	0
Liu, 2022	China	1	1	0	0	0	0	1	1	0	0	0	0	1	0
Lone, 2004	Pakistan	1	1	0	0	0	1	1	1	0	0	0	0	1	1
Luik, 2021	Estonia	1	1	0	0	0	1	1	1	0	0	1	0	1	1
Lumbanraja, 2019	India	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Magahed, 1986	United Arab Emirates	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Mahmood, 2019	Pakistan	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Malhotra, 2002	India	0	1	0	0	0	0	1	1	1	0	1	1	1	0
Mamidi, 2022	India	1	1	0	0	0	1	0	1	1	1	1	1	1	1
Masukume, 2015	High-income	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Masukume, 2015	High-income	0	1	0	0	0	0	1	1	1	0	0	1	1	1
McFarlane, 1996	United States of America	0	1	0	0	0	1	1	1	1	1	1	1	1	1
Mekie, 2019	Ethiopia	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Meng, 1984	Republic of Korea	1	1	0	0	1	0	1	1	1	1	1	1	1	1
Mezen, 2022	Ethiopia	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Mingude, 2020	Ethiopia	1	1	0	0	1	1	1	1	0	1	0	0	1	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Moakhar, 2019	Iran (Islamic Republic of)	1	1	0	0	1	0	0	1	0	1	1	1	1	1
Moges, 2025	Ethiopia	0	1	0	0	0	0	1	1	1	1	0	1	0	0
Mohamed, 2012	United States of America	1	1	0	0	0	0	1	1	0	0	1	0	0	0
Mohamed, 2012	Egypt	0	1	0	0	0	1	1	1	1	1	1	1	1	1
Mohammed, 2019	Ghana	0	1	0	0	0	1	1	1	1	1	1	1	1	0
Murphy, 1986	United Kingdom	0	1	0	0	0	0	1	1	0	1	1	1	1	1
Mwanyumba, 2001	Kenya	1	1	0	0	0	1	0	1	0	0	1	1	0	0
Nair, 2016	India	0	1	0	0	0	1	1	1	0	1	1	1	1	1
Nair, 2016	India	0	1	0	0	0	0	1	1	0	0	0	0	1	0
Nair, 2016	India	0	1	0	0	0	0	1	1	0	1	1	1	1	1
Nasiri-Amiri, 2007	Iran (Islamic Republic of)	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Novikova, 2018	Indonesia	0	1	0	0	1	1	1	1	1	1	1	1	1	1
Oladeinde, 2015	Nigeria	1	1	0	0	1	1	0	1	0	1	1	1	1	1
Onadeko, 1996	Nigeria	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Özgen, 2020	Türkiye	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Pal, 2020	India	1	1	0	0	0	1	1	1	0	0	0	0	0	0
Pardilawati, 2017	Indonesia	1	1	0	0	1	1	1	1	1	1	1	1	1	1
Parks, NA	South Asia	0	1	0	0	0	0	1	1	1	0	0	1	1	0
Patel, 2018	India	0	1	0	0	0	0	1	1	0	1	1	1	1	1
Patel, 2021	India	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Pattanapisalsak,	Thailand	1	1	0	0	0	1	1	1	0	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
2011															
Peters, 2001	Papua New Guinea	0	1	0	0	1	0	1	1	0	1	1	1	1	1
Phaloprakarn, 2008	Thailand	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Phaloprakarn, 2008	Thailand	1	1	0	0	0	0	1	1	1	0	1	0	1	0
Pinho-Pompeu, 2017	Brazil	0	1	0	0	0	1	1	1	1	1	1	1	1	1
Prema, 1981	India	0	1	0	0	1	0	1	1	0	1	1	1	1	1
Prioreschi, 2025	South Africa	0	1	0	0	0	0	1	1	0	1	1	1	1	1
Puerto, 2021	Colombia	1	1	0	0	0	0	0	1	0	1	1	1	1	1
Puerto, 2021	Colombia	1	1	0	0	0	0	0	1	0	0	0	1	1	0
Radoń-Pokracka, 2016	Poland	0	1	0	0	0	1	0	1	1	1	1	1	1	1
Rahfiludin, 2018	Indonesia	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Ramazanali, 2006	Iran (Islamic Republic of)	1	1	0	0	0	0	1	1	1	0	1	1	1	0
Ramya, 2019	India	0	1	0	0	0	0	1	1	0	1	1	1	1	1
Ranaei, 2013	Iran (Islamic Republic of)	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Rashid, 2020	Pakistan	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Rawat, 2025	India	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Razmy, 2016	Sri Lanka	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Ren, 2007	China	1	1	0	0	0	0	1	1	0	0	0	0	1	0
Riu, 2020	Indonesia	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Rogerson, 2000	Malawi	0	1	0	0	1	1	1	1	1	1	1	1	1	1
Ronnenberg,	China	1	1	0	0	0	0	0	1	0	0	0	0	1	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
2004															
Roopnarine, 2017	Trinidad and Tobago	0	1	0	0	1	1	1	1	1	1	1	1	1	1
Rukuni, 2016	United Kingdom	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Rukuni, 2016	United Kingdom	1	1	0	0	0	0	1	1	1	0	1	0	1	0
Sah, 2022	Nepal	1	1	0	0	1	0	0	1	0	0	0	0	1	0
Saleh, 2019	Indonesia	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Salunkhe, 2019	India	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Salunkhe, 2021	India	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Saragih, 2020	Indonesia	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Saraswati, 1998	Indonesia	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Scaria, 2022	India	0	1	0	0	0	0	1	1	1	0	0	0	1	0
Scholl, 1992	United States of America	0	1	0	0	0	0	0	1	1	0	1	0	1	0
Seedidhi, 2017	India	0	1	0	0	0	1	1	1	0	1	1	1	1	1
Seid, 2022	Ethiopia	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Sekhavat, 2013	Iran (Islamic Republic of)	1	1	0	0	1	0	1	1	0	1	1	1	1	1
Shah, 2020	India	0	1	0	0	1	0	0	1	0	1	1	1	1	1
Shah, 2022	Pakistan	0	1	0	0	1	1	1	1	0	1	1	1	1	1
Shams, 2012	Pakistan	0	1	0	0	0	1	1	1	1	1	1	1	1	1
Shankar, 2019	India	1	1	0	0	0	0	0	1	1	1	1	1	1	1
Sharma, 2015	Nepal	0	1	0	0	1	1	1	1	1	1	1	1	1	1
Shrivastava, 2024	India	1	1	0	0	0	1	1	1	1	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Singh, 1997	India	1	1	0	0	0	1	1	1	1	1	1	1	1	1
Singh, 2014	India	0	1	0	0	1	1	1	1	0	1	1	1	1	1
Srikrishna, 2003	India	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Steer, 1995	United Kingdom	0	1	0	0	0	0	1	1	0	0	1	0	1	0
Suryanarayana, 2017	India	1	1	0	0	0	1	1	1	1	1	1	1	1	1
Swain, 1994	India	0	1	0	0	0	1	1	1	0	1	1	1	1	1
Symington, 2019	South Africa	1	1	0	0	0	0	1	1	0	0	1	1	1	0
Symington, 2019	South Africa	1	1	0	0	0	0	1	1	0	0	0	1	1	0
Symington, 2019	South Africa	1	1	0	0	0	0	1	1	0	0	0	0	0	0
Tabrizi, 2019	Iran (Islamic Republic of)	1	1	0	0	0	1	0	1	0	0	0	0	1	0
Tadese, 2021	Ethiopia	0	1	0	0	1	0	1	1	1	0	0	1	0	0
Tadesse, 2023	Ethiopia	1	1	0	0	1	1	1	1	1	1	1	1	1	1
Tagbor, 2010	Ghana	1	1	0	0	0	1	1	1	1	0	1	1	0	0
Tang, 2024	China	0	1	0	0	0	0	0	1	1	0	0	0	1	0
Thakre, 2018	India	0	1	0	0	1	1	1	1	0	1	1	1	1	1
Tilahun, 2021		0	1	0	0	1	0	1	1	1	1	1	1	1	1
Turner, 2012	United States of America	1	1	0	0	0	1	1	1	1	1	1	1	1	1
Tzur, 2012	Israel	0	1	0	0	0	0	1	1	1	1	1	1	0	1
Ulaganeethi, 2024	India	0	1	0	0	0	0	1	1	1	1	1	1	1	1
Uneke, 2007	Nigeria	1	1	0	0	0	0	1	1	0	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Urdaneta, 2015	Venezuela (Bolivarian Republic of)	1	1	0	0	1	1	1	1	0	1	1	1	1	1
Uzunov, 2022	Romania	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Vakili, 2018	Iran (Islamic Republic of)	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Vilchez, 2013	Cuba	0	1	0	0	1	1	1	1	1	1	1	1	1	1
Villalva-Luna, 2020	Peru	1	1	0	0	1	0	1	1	0	1	1	1	1	1
Viplava, 2022	India	0	1	0	0	1	1	1	1	1	1	1	1	1	1
Vural, 2016	Türkiye	0	1	0	0	0	0	0	1	1	1	1	1	1	1
Wahabi, 2022	Saudi Arabia	0	1	0	0	0	0	1	1	0	0	1	1	1	0
Walker, 2003	Jamaica	0	1	0	0	0	1	1	1	1	1	1	1	1	1
Wang, 2007	China	1	1	0	0	0	0	1	1	1	0	0	1	0	0
Watson-Jones, 2007	United Republic of Tanzania	0	1	0	0	1	1	1	1	0	0	1	1	0	0
Wu, 2022	China	0	1	0	0	0	0	0	1	0	1	1	1	1	1
Wu, 2022	China	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Xiong, 2003	China	1	1	0	0	0	0	1	1	1	0	0	0	0	0
Yahia, 2020	Yemen	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Yazdani, 2004	Iran (Islamic Republic of)	0	1	0	0	0	1	1	1	1	1	1	1	1	1
Yousaf, 2011	Pakistan	1	1	0	0	0	1	1	1	0	1	1	1	1	1
Yovera-Aldana, 2022	Peru	1	1	0	0	0	0	1	1	0	1	1	1	1	1
Yovera-Aldana, 2022	Peru	1	1	0	0	0	0	1	1	0	0	1	0	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias	Study design	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Clear measurement of outcome timing	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Yovera-Aldana, 2022	Peru	1	1	0	0	0	0	1	1	0	0	1	0	1	0
Zagre, 2002	Burkina Faso	0	1	0	0	0	1	1	1	0	1	1	1	1	1
Zaveri, 2020	India	0	1	0	0	1	1	1	1	0	0	0	0	1	0
Zhou, 1998	China	0	1	0	0	0	0	1	1	1	0	1	0	0	0

*The covariate was not included in BoP analysis.

Supplemental Table 51. Distribution of study-level bias covariates - Small-for-gestational-age

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Abeysena, 2010	Sri Lanka	1	1	0	0	0	0	0	0	1	1	1	1	1
Abioye, 2023	United Republic of Tanzania	1	1	0	0	1	0	1	0	0	1	0	1	0
Abioye, 2023	United Republic of Tanzania	1	1	0	0	1	0	1	1	0	1	0	1	0
Adjei-Gyamfi, 2024	Ghana	0	1	0	0	0	0	0	0	0	0	1	1	0
Alwan, 2015	United Kingdom	1	1	0	0	0	1	1	0	0	1	0	0	1
Ashwini, 2018	India	1	1	0	0	1	0	1	0	1	1	1	1	1
Bhalerao, 2011	India	0	1	0	0	0	0	1	0	1	1	1	1	1
Brummaier, 2020	Thailand	0	1	0	0	0	0	1	0	1	1	1	1	1
Chasekwa, 2021	Zimbabwe	0	1	0	1	0	1	1	0	0	0	1	0	0
Chen, 2024	China	1	1	0	0	0	0	1	0	0	0	0	0	0
Chen, 2024	China	0	1	0	0	0	0	0	0	0	0	0	0	0
Chhabra, 2016	India	0	1	0	0	1	0	1	0	1	1	1	1	1
Chu, 2020	Taiwan (Province of China)	1	1	0	0	0	0	1	0	0	1	0	1	0
Col, 2019	Türkiye	1	1	0	0	0	0	1	0	1	1	1	1	1
Delpisheh, 2008	United Kingdom	0	1	0	0	1	0	1	0	1	1	1	1	1
Delpisheh, 2008	United Kingdom	0	1	0	0	1	0	1	0	1	1	0	1	0
Detlefs, 2022	United States of America	0	1	0	0	0	0	0	0	0	0	0	0	0
Dos, 2022	Brazil	1	1	0	0	0	0	0	0	1	1	1	1	1
Drukker, 2015	Israel	0	1	0	0	0	0	0	0	0	0	1	1	0
Finkelstein, 2020	India	1	1	0	0	0	0	0	0	1	1	1	1	0
Finkelstein, 2020	India	1	1	0	0	0	0	0	0	1	0	0	1	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Gonzales, 2009	Peru	0	1	0	0	0	0	1	0	1	1	1	1	1
Gonzales, 2012	Peru	0	1	0	0	0	0	1	0	0	0	0	0	0
Habe, 2024	Japan	1	1	0	0	0	0	1	0	1	1	1	1	1
Hämäläinen, 2003	Finland	1	1	0	0	0	0	1	0	1	1	1	1	1
Hameed, 2011	Iraq	1	1	0	0	1	1	1	0	1	1	1	1	1
Harding, 1997	United Kingdom	0	1	0	0	0	0	1	0	0	0	0	1	0
Hwang, 2010	Republic of Korea	1	1	0	0	0	1	1	0	1	1	1	1	1
Jessani, 2021	Guatemala	1	1	0	0	0	0	1	0	0	1	0	0	1
Jessani, 2021	India	1	1	0	0	0	0	1	0	0	1	0	0	1
Jessani, 2021	Pakistan	1	1	0	0	0	0	1	0	0	1	0	0	1
Koh, 1997	Republic of Korea	1	1	0	0	1	0	1	0	0	1	0	1	1
Liu, 2022	China	0	1	0	0	0	0	0	0	0	0	0	1	0
Liu, 2022	China	1	1	0	0	0	0	1	0	0	0	0	1	0
Lone, 2004	Pakistan	1	1	0	0	0	1	1	0	1	1	0	1	1
Lu, 1991	United States of America	0	1	0	0	0	0	1	0	1	1	1	1	1
Mamidi, 2022	India	1	1	0	0	0	1	0	0	1	1	1	1	1
Masukume, 2015	High-income	0	1	0	0	0	0	1	0	1	1	1	1	1
Masukume, 2015	High-income	0	1	0	0	0	0	1	0	0	0	1	1	1
Nair, 2016	India	0	1	0	0	0	0	1	0	1	1	1	1	1
Nair, 2016	India	0	1	0	0	0	0	1	0	0	0	0	1	0
Ohuma, 2023	Global	1	1	0	0	0	0	0	0	0	1	0	0	0
Olga, 2024	United Kingdom	0	1	0	0	0	0	1	0	0	1	0	1	0

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Phaloprakarn, 2008	Thailand	1	1	0	0	0	0	1	0	1	1	1	1	1
Phaloprakarn, 2008	Thailand	1	1	0	0	0	0	1	0	0	1	0	1	0
Prioreschi, 2025	South Africa	0	1	0	0	0	0	1	0	1	1	1	1	1
Puerto, 2021	Colombia	1	1	0	0	0	0	0	0	1	1	1	1	1
Puerto, 2021	Colombia	1	1	0	0	0	0	0	0	0	0	1	1	1
Randall, 2019	Australia	0	1	0	0	0	0	1	0	1	1	1	1	1
Ren, 2007	China	1	1	0	0	0	0	1	0	1	0	0	1	0
Rondo, 1995	Brazil	0	1	0	0	1	0	0	0	1	1	1	1	1
Rondo, 1997	Brazil	0	1	0	0	1	0	1	0	1	1	1	1	1
Rondó, 1999	Brazil	1	1	0	0	1	1	0	0	1	1	1	1	1
Salman, 2020	Iraq	1	1	0	0	0	0	0	0	1	1	1	1	1
Scholl, 1992	United States of America	0	1	0	0	0	0	0	0	0	1	0	1	0
Sebastian, 2015	India	1	1	0	0	0	1	1	0	0	0	0	0	0
Shah, 2022	Pakistan	0	1	0	0	1	1	1	0	1	1	1	1	1
Shrivastava, 2024	India	1	1	0	0	0	1	1	0	1	1	1	1	1
Smith, 2019	Canada	0	1	0	0	0	0	1	0	0	1	0	0	0
Smith, 2019	Canada	0	1	0	0	0	0	1	0	1	1	1	1	1
Spinillo, 1994	Italy	1	1	0	0	1	1	1	0	0	0	0	0	0
Tang, 2024	China	0	1	0	0	0	0	0	0	0	0	0	1	0
Toshimitsu, 2023	Japan	1	1	0	0	1	0	0	0	1	1	1	1	1
Turner, 2012	United States of America	1	1	0	0	0	1	1	0	1	1	1	1	1

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control			
							Multiple exposure category	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity	Obstetric factors
Villamonte-Calanche, 2024	Peru	1	1	0	0	0	1	0	0	0	1	1	1	1
Wu, 2022	China	0	1	0	0	0	0	0	0	1	1	1	1	1
Wu, 2022	China	0	1	0	0	0	0	0	0	0	0	0	0	0
Xiong, 2003	China	1	1	0	0	0	0	1	0	0	0	0	0	0
Xu, 2022	China	1	1	0	0	0	0	1	0	0	0	0	1	0
Xu, 2022	China	1	1	0	0	0	0	1	0	0	0	0	0	0
Young, 2023	Viet Nam	1	1	0	0	0	0	1	0	0	0	1	1	1
Yousaf, 2011	Pakistan	1	1	0	0	0	1	1	0	1	1	1	1	1
Zhou, 1998	China	0	1	0	0	0	0	1	0	0	1	0	0	0

*The covariate was not included in BoP analysis.

Supplemental Table 52. Distribution of study-level bias covariates - Large-for-gestational-age

Author	Country	Study representativeness	Effect size measure*	Reverse causation*	Selection bias*	Study design	Exposure assessment quality		Outcome assessment quality	Confounder control				
							Multiple exposure category*	Blood sample	Clear measurement of outcome*	Demographics	Socioeconomics	Health behavior	Maternal comorbidity*	Obstetric factors
Adjei-Gyamfi, 2024	Ghana	0	1	0	0	0	0	0	0	0	0	1	1	0
Chu, 2020	Taiwan (Province of China)	1	1	0	0	0	0	1	0	0	1	0	1	0
De Sa, 2015	Brazil	1	1	0	0	1	0	0	0	1	1	1	1	1
Detlefs, 2022	United States of America	0	1	0	0	0	0	0	0	0	0	0	0	0
Drukker, 2015	Israel	0	1	0	0	0	0	0	0	0	0	1	1	0
Hong, 2022	Malaysia	1	1	0	0	1	1	0	0	1	1	1	1	1
Koh, 1997	Republic of Korea	1	1	0	0	1	0	1	0	0	1	0	1	1
Prioreschi, 2025	South Africa	0	1	0	0	0	0	1	0	1	1	1	1	1

*The covariate was not included in BoP analysis.

Supplemental Table 53. Distribution of study-level bias covariates - Neonatal sepsis

Author	Country	Study representativeness*	Effect size measure*	Reverse causation*	Selection bias*	Study design*	Exposure assessment quality		Outcome assessment quality		Confounder control				
							Multiple exposure category*	Blood sample*	Clear measurement of outcome*	Clear definition of outcome*	Demographics*	Socioeconomics*	Health behavior*	Maternal comorbidity*	Obstetric factors*
Bener, 2013	Qatar	1	1	0	1	0	1	1	0	1	1	1	1	1	1
Bora, 2014	India	1	1	0	0	1	1	1	1	1	1	1	1	1	1
Lokeshwari, 2018	India	0	1	0	0	1	1	1	0	1	1	1	1	1	1

*The covariate was not included in BoP analysis.