Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Autism Spectrum Disorder in Nigeria: A Systematic Review and Meta-analysis of Prevalence and Clinical Characteristics

Godswill Uzoechina
godswill.uzoechina.243750@unn.edu.ng
University of Nigeria Teaching Hospital
Treasure Osajiuba
University of Nigeria Teaching Hospital
Marvellous Elochukwu
University of Nigeria Teaching Hospital

Systematic Review

Keywords:

Posted Date: March 8th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-8933754/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder with a significant global health burden, but epidemiologic data from low- and middle-income countries are limited. Evidence in Nigeria is fragmented, largely clinic-based, and has not been previously reviewed systematically. This review sought to provide an estimate of the prevalence of ASD in various Nigerian communities and to highlight common demographic and clinical features.

Methods

A PRISMA 2020 compliant systematic review with meta-analysis was performed. PubMed, Google Scholar, and grey literature were searched from inception to December 2025. We included studies that reported the prevalence or percentages of ASD among children (0–18 years) in Nigeria, using established diagnostic criteria or validated screening instruments. RoB was evaluated with the JBI tool for prevalence studies. Studies that reported similar clinic-based denominators were included in a random-effects meta-analysis; other studies were narratively synthesized.

Results

Eight studies were included following qualification for the criteria of inclusion. Three clinic-based neurology/psychiatry studies (n=5,393) yielded a clinic-based ASD pooled prevalence of 1.79% (95% CI: 1.29–2.47%; I^2=60%). Adding one study from a private clinic with a limited neurological denominator raised the pooled estimate to 3.48%, but resulted in extremely high heterogeneity (I^2=98.6%) and was therefore considered in the sensitivity analysis only. A single school-based study reported a prevalence of 2.9%, whereas screened high-risk and special-population samples showed significantly higher proportions (11–34%). Delay in diagnosis, male predominance, and frequent neurological comorbidities were consistent findings. The overall risk of bias was low to high, predominantly due to sampling limitations and methodological diagnosis variability.

Conclusion

Estimates of ASD prevalence for Nigeria differ greatly by setting, with evidence largely driven by clinic-based studies and marked by significant diagnostic delay. Accurate, population-based studies using a standardized two-stage ascertainment format are urgently required to guide early detection methods and national child health policy.

Introduction

Autism Spectrum Disorder (ASD) is a group of chronic neurodevelopmental conditions characterized by persistent impairments in social communication and social interaction as well as restricted, repetitive patterns of behaviour or interests. These patterns are evident early in development and frequently lead to significant life-long impairment (DSM-5) (1). The global impact of ASD is large, with current evidence suggesting that 61.8 million individuals (one in every 127 people) lived with autism in 2021, thus signalling ASD as a major cause of non-fatal health burden, especially among youth under 20 years of age, as ASD ranks within the top ten leading causes of such burden. The age-standardized prevalence is 788.3 per 100,000 people globally, with males having a higher rate than females, and a high burden of disability-adjusted life-years (DALYs) across ages (2).

Despite these global data, the majority of the epidemiological evidence comes from high-income countries where surveillance systems are well established, and estimates of the prevalence of ASD vary widely, depending on diagnostic approaches and study designs. Systematic reviews suggest that the global child prevalence is around ~ 0.6–0.77%, with regional differences across continents and higher rates reported in some high-income countries. This variation highlights the influence of diagnostic criteria, measurement tools, and the capacity of health systems on the reported ASD estimate (3).

The evidence base from low- and middle-income countries (LMICs), especially sub-Saharan Africa (SSA), is much smaller (4). Although LMICs bear the brunt of the global ASD burden, there are critical gaps in epidemiological data resulting from limited access to diagnostics, a shortage of trained professionals, non-uniform screening practices, and under-resourced health care systems. Together, these challenges result in late diagnosis, under-recognition of ASD, and a lack of standardized information on prevalence and clinical features, further complicating attempts to truly map and estimate the prevalence of ASD, beyond high-income countries (5).

In Nigeria, the largest country in Africa by population, there remains a poor characterization of ASD at the population level. Clinical information is almost entirely drawn from tertiary neurology or pediatric clinics, and school-based screening studies are extremely limited (6). Attempts to estimate the prevalence of ASD have resulted in widely differing figures (e.g., clinic prevalence about 1.4–2.3% of pediatric neurology cases, 2.9% of school samples, and as high as 34.5% among screened high-risk community samples) (5). These figures reflect differences in sampling strategies, diagnostic criteria (including DSM-IV, DSM-5, ICD-10, or unstandardized screening instruments), and denominators, but no previous systematic synthesis has quantitatively summarized or critically reviewed this evidence. Cultural beliefs, stigma attached to developmental conditions, and the commonality of late help-seeking behaviours further complicate the situation in Nigeria, contributing to increased diagnostic delay and decreased case ascertainment in community samples (7).

Nigeria's ASD literature is therefore characterized by predominance of clinic-based studies, small sample size, inconsistent denominators across studies, varying application of diagnostic criteria and screening tools, and no risk-of-bias evaluation. These constraints limit meaningful synthesis and fuel uncertainties on the actual epidemiology of ASD among Nigerian children, particularly at community or population levels (5).

In view of these gaps, a systematic review and possibly, meta-analysis is therefore warranted. The primary objective of this review is to synthesize the existing evidence on the burden of ASD in Nigeria across different settings. Secondary include: (i) describe the demographic and clinical characteristics (e.g., age at diagnosis, sex ratios), (ii) provide an overview of comorbidity profiles (e.g., epilepsy, ID, ADHD), and (iii) evaluate methodological quality and risk of

bias based on the Joanna Briggs Institute (JBI) prevalence checklist. This study aims to provide the best possible evidence on the epidemiology of ASD in Nigeria, highlight gaps in the evidence, and guide future research and health policy formulation.

Methods

Protocol and reporting standards

This systematic review and meta-analysis was performed and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement (8). The methods of this review were specified in advance, including eligibility criteria, search strategy, data extraction framework, and risk-of-bias assessment. Due to institutional limitations, the review protocol was not registered in PROSPERO; however, all decisions regarding methodology were made a priori and were consistently applied to the included studies.

Eligibility criteria

The criteria for eligibility were defined using a Population–Outcome–Study design (POS) framework.

- **Population**: Studies were considered eligible if they included children or adolescents aged 0–18 years living in Nigeria, regardless of sex, tribe, or health status. Both community and clinical populations were eligible as long as the denominator population was well defined.
- **Outcome**: The primary outcome was the prevalence or proportion of ASD, defined as the proportion of individuals fulfilling ASD diagnostic or screening criteria in a given population. Studies were required to provide a numerator (number of ASD cases) and a denominator (the total population assessed). Studies reporting on ASD as a subgroup outcome were included only if data specific to ASD could be extracted.
- **Case definition**: ASD had to be ascertained based on established diagnostic criteria or validated screening tools, such as Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV, DSM-IV-TR, DSM-5, International Classification of Diseases (ICD)-10, or validated screening instruments, such as Modified Checklist for Autism in Toddlers (M-CHAT), and Checklist for Autism in Toddlers (CAST), with or without subsequent clinical confirmation.
- **Study designs**: Eligible study designs were: cross-sectional studies, school-based surveys, retrospective or prospective observational studies, and clinic-based descriptive studies describing the proportion or prevalence of ASD.

Studies were excluded if they were:

- Intervention trials
- Qualitative studies
- Studies without a clear ASD case definition
- Studies conducted outside Nigeria or not disaggregated for Nigerian participants

Information sources and search strategy

A comprehensive literature search was performed across several bibliographic databases and grey literature sources to capture the scarce and diverse ASD research in Nigeria. Searches were conducted in PubMed (MEDLINE), Google Scholar, and institutional repositories (e.g., HAL). The search covered all records from database inception to December 2025. Language was restricted to English. The search terms included a combination of controlled vocabulary and free-text terms relating to autism and Nigeria, such as:

autism” OR “autism spectrum disorder” OR “ASD” OR “pervasive developmental disorder” AND “Nigeria

Standard keyword combinations were used for Google Scholar and grey literature; the first several hundred results were screened to ensure feasibility. Reference lists of included studies were hand searched for any further eligible papers not identified through database searches. A comprehensive search strategy for PubMed and Google Scholar is described in Table 1.

Table 1

Comprehensive Search Strategy for Identification of Primary Studies on Autism in Nigeria A. PubMed (MEDLINE) Search Strategy

Concept	Search terms
Autism (MeSH terms)	"Autism Spectrum Disorder"[Mesh] OR "Autistic Disorder"[Mesh]
Autism (free-text)	autism OR autistic OR "autism spectrum disorder" OR ASD OR "pervasive developmental disorder" OR PDD
Nigeria (MeSH term)	"Nigeria"[Mesh]
Nigeria (free-text)	Nigeria OR Nigerian*
Population (optional, not mandatory)	child* OR adolescent* OR pediatric* OR paediatric*
Combined PubMed Search String	("Autism Spectrum Disorder"[Mesh] OR "Autistic Disorder"[Mesh] OR autism OR autistic OR "autism spectrum disorder" OR ASD OR "pervasive developmental disorder" OR PDD) AND ("Nigeria"[Mesh] OR Nigeria OR Nigerian*)
Filters applied	Language: English
PubMed syntax:	

(("Autism Spectrum Disorder"[Mesh] OR "Autistic Disorder"[Mesh] OR autism OR autistic OR "autism spectrum disorder" OR ASD OR "pervasive developmental disorder" OR PDD)

AND

("Nigeria"[Mesh] OR Nigeria OR Nigerian*))

Filters: English

B. Google Scholar Search Strategy

Concept	Search terms
Autism terms	autism OR autistic OR "autism spectrum disorder" OR ASD
Nigeria terms	Nigeria OR Nigerian
Setting (optional refinement)	hospital OR clinic OR school OR community
Combined Google Scholar Search String	("autism" OR "autism spectrum disorder" OR ASD OR autistic) AND (Nigeria OR Nigerian)
Filters applied	Language: English
Google Scholar syntax:	

("autism" OR "autism spectrum disorder" OR ASD OR autistic)

AND

(Nigeria OR Nigerian)

Study selection

All obtained records were imported into Rayaan, and duplicates were removed before screening. Two reviewers independently screened titles and abstracts for potential inclusion. Full texts of potentially eligible studies were independently reviewed according to the inclusion criteria. Disputes at any stage were resolved by discussion and consensus. The study selection process is summarized in Fig. 1; a PRISMA 2020 flow diagram indicating the number of records identified, screened, excluded, and included.

Data extraction

Data extraction was performed using a pre-specified and standardized extraction framework designed specifically for this review and applied consistently to all the included studies. The extraction parameters captured were:

- Study identification (author, year, region/geopolitical zone)
- Study design and setting
- Sample size and population denominator
- Age range and mean age
- Sampling method

- ASD diagnostic criteria and/or screening tools
- Case definition
- ASD prevalence or proportion
- Age at symptom onset and age at diagnosis
- Sex distribution
- Comorbidities (e.g., epilepsy, intellectual disability, ADHD)
- Caregiver concerns, stigma, or help-seeking notes
- Study-reported limitations
- Risk-of-bias tool and judgment

Two reviewers independently extracted data; after which the extracted parameters were cross-checked for consistency and accuracy. When information was not reported in the source study, this was noted as 'not reported (NR)' rather than inferred.

Risk of bias assessment

Two reviewers independently assessed risk of bias using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Prevalence Studies (9). For clinic-based descriptive studies without the aim of estimating population prevalence, the nearest relevant JBI checklist was used, taking into account the context.

The JBI instrument allows for assessment of domains such as sampling adequacy, reliability of measurement, validity of case definition, and appropriateness of statistical analysis. Each domain was assessed as "Yes," "No," "Unclear," or "Not applicable." A judgement on overall risk-of-bias (RoB) (Low, Moderate, or High) was made based on the collective domain assessments, and a specific rationale for this judgement was recorded. Rob-visualizations were produced with the generic template of the web application RobVis (10).

Data synthesis and statistical analysis

Due to considerable diversity in the design of the included studies, settings, diagnostic criteria, and denominators, all included studies were narratively synthesized. Narrative synthesis focused on patterns in ASD prevalence, age at diagnosis, sex distribution, comorbidity profiles, and diagnostic delay across settings (clinic-based, school-based, and community screening studies). Quantitative meta-analysis was undertaken only for studies with compatible denominators, particularly clinic-based prevalence studies reporting ASD as a proportion of pediatric neurology or outpatient populations. Studies reporting proportions within screened or high-risk populations were not pooled to avoid biased overestimation.

Estimates of the pooled prevalence were obtained using a random-effect model because of the anticipated heterogeneity among included studies. Prevalence data were transformed usinga logit transformation for proportion, which involved computing logit-transformed effect sizes and variances, estimating fixed effect weight to calculate the Q statistic, deriving between-study variance (τ^2) via the DerSimonian-Laird estimator, applying random-effects weights to obtain the pooled logit mean and its standard error, back-transforming to pooled proportions with 95% CIs, and using a t-distribution for predicted intervals (PI), if if degrees of freedom ($df = k - 2$) > 0: PI variance = $\tau^2 + se^2$, with t-value at 97.5% quantile. (11, 12).

Where data permitted, subgroup analyses were conducted by:

- Clinic type (Public, Private)
- Decade
- Geographic region within Nigeria

Sensitivity analyses were conducted by removing studies that were considered to be at high risk of bias, and by investigating the influence of the individual studies on the pooled estimate (13). Due to the variability in reporting, age at symptom onset, age at diagnosis, sex ratios, and frequencies of comorbidities were summarized descriptively and not meta-analyzed. All analyses were carried out using R (meta and metafor packages). Statistical significance was set at $p < 0.05$ (14).

Results

Study selection

A total of eight studies were included in this systematic review and meta-analysis to assess the prevalence of ASD in Nigeria. Following the screening of 5,215 titles and abstracts, 421 articles in full text were assessed. Eight studies were retained, all reporting primary prevalence data on ASD in Nigerian cohorts with numerical denominators, using clear diagnostic or screening procedures. Reasons for exclusion at full-text evaluation were non-Nigerian subjects, case reports, reviews, and studies not reporting primary prevalence data. The included studies were divided into (i) clinic based neurology/paediatric settings (Pool A), (ii) population/school based prevalence (Pool B), (iii) screened/high-risk community samples (Pool C), (iv) special populations with intellectual disability (ID) (Pool D), and descriptive case series without prevalence denominators (narrative only). The study selection process is summarized in Fig. 1: PRISMA flow diagram.

Figure 1: PRISMA Flow Diagram

Characteristics of included studies

The eight included studies were conducted across various geopolitical zones of Nigeria. Clinic-based studies were conducted in tertiary pediatric neurology or child psychiatric clinics in Calabar (South-South), Ibadan (South-West), and Sokoto (North-West) (15, 16, 17). Chínawa et al. presented population-based school-attending child prevalence data in Southeast Nigeria; Enugu and Ebonyi (18), while Oshodi et al. conducted a community-based sampling at a neurodevelopmental screening event in Lagos (South-West) (19). Bakare et al. reported on ASD prevalence in children with ID in a special school context in Enugu, South-East Nigeria (20). West & Aitafo (2025) reviewed clinic-wide outpatient denominator data from a private hospital neurology clinic in Rivers State to produce a contrasting prevalence figure due to a restricted neurological denominator (21). A final study (Mojeed et al., 2017) presented descriptive case series data without estimation of prevalence in Lagos, South-South Nigeria (22). Table 2 summarises the characteristics of the included studies.

Table 2
Summary of Characteristics of Included Studies

Study (Author, Year)	Region	Design	Setting	Sample Size (N)	Age (years)	Diagnostic Criteria / Tool	ASD Cases / Total (%)	Male: Female Ratio	Key Comorbidities	Ro
Torty et al (2024)	Calabar/SS	Retrospective clinical records	Tertiary hospital pediatrics clinic	1,806	2–10; mean diagnosis: 3.8 ± 1.4	DSM-5; no screening tool	28/1,806 (1.6%)	3:1	Hyperactivity: 53.5%; Seizures: 7%; ID (not quantified)	Mc
Oshodi et al (2017)	Lagos/SW	Cross-sectional	Community	85	3–17; mean: 7.53 ± 4.35	DSM-5 after M-CHAT/CAST screening	29/85 (34.5%)	~ 4:1	ADHD: 13.1%; ID: 8.3%; Language disorder: 19.0%; Learning disability: 9.5%; Down syndrome: 8.3%	Hig
Chinawa et al (2016)	Enugu and Ebonyi/SE	Cross-sectional	School	721	3–18; mean: 12.71 ± 3.03	DSM-IV-TR adapted questionnaire	21/721 (2.9%)	~ 1:1	NR	Mc
Mojeed et al (2017)	Lagos/SW	Clinic-based descriptive	Clinic	60	2–17; mean: 9.45 ± 4.33	DSM-IV/ICD-10/DSM-V; symptom checklist	60/60 (NA)	7:3	NR	Hig
Bakare et al (2012)	Enugu/SE	Cross-sectional	Child & Adolescent Unit	44	NR	ICD-10 (F84.0)	5/44 (11.4%)	4:1	All had ID	Hig
Lagunju et al (2014)	Oyo/SW	Descriptive prospective cohort	Pediatric neurology & child psychiatry clinics	2,320	NR	DSM-IV	54/2,320 (2.3%)	~ 5:1	Neurological: 75.5% (epilepsy/ADHD not specified)	Mc
Ahmad et al (2019)	Sokoto/NW	Descriptive observational (retrospective)	Pediatrics Neurology Unit	1,267	2–13; mean diagnosis: 5.6 ± 2.5	DSM-5	18/1,267 (1.4%)	~ 1:1.6	Hyperactivity: 55.6%; Seizures: 33.3%; Motor delays: 27.8%	Mc
West et al (2025)	Rivers/SS	Retrospective observational	Private pediatric hospital neurology clinic	203 (neurological); 22,965 (outpatient)	0–17; mean: 5.90 ± 4.19	Clinical assessment	48/203 (24.3%); 48/22,965 (0.21%)	~ 1:1.1	Seizures: 54.6%; ADHD: 11.3% (overall neurological)	Mc

Across the studies, sample size varied considerably: the sample size with the lowest number of participants was 44 in the ID special school sample, and that with the highest number of participants was 22,965 in the private neurology clinic among outpatient visits. The diagnostic criteria were mainly clinical (DSM-5 or DSM-IV when stated); some studies used clinical diagnosis in conjunction with screening tools. A summary of key features is provided in Table 2.

Risk of bias across studies

RoB was evaluated with the JBI Critical Appraisal Checklist for Prevalence Studies with domains relevant to representativeness of the sample, adequacy of sample size, validity of ASD measurement, and clarity of statistical analysis. Most clinic-based studies had a low to moderate risk of bias, with clearly defined denominators and diagnostic criteria. However, West & Aitafo (2025) were rated as high risk due to the application of a restricted clinical denominator (children with neurological disorders only), thereby limiting generalizability to other clinical subgroups (21). The population and school-based groups were at moderate risk due to voluntary participation or the use of screening tools without universal clinical confirmation. A traffic light plot and a summary plot summarizing study-level JBI ratings are provided in Figs. 2 and 3, respectively.

Figure 2: Traffic Light Plot

Figure 3: Summary Plot

Studies qualifying for the main pooled prevalence analysis were those that had similar denominators and clinical ascertainment, while studies deemed high-risk or methodologically inconsistent were considered for sensitivity analyses or narrative synthesis. Table 3 summarizes the JBI domain-level RoB assessment.

Table 3: JBI Domain-level RoB Assessment

Prevalence of ASD

Three clinic-based neuropsychiatry investigations utilized similar denominators of new cases presenting to pediatric neurology/psychiatry clinics and consistent diagnostic mechanisms:

- Torty et al. (2024): 28 ASD cases among 1,806 clinic attenders (1.55% prevalence; 95%CI (1.07–2.23%)) in Calabar applying DSM-5 criteria (15).
- Lagunju et al. (2014): 54 of 2,320 new patients met the criteria for a diagnosis of ASD in Ibadan, Lagos (2.3% prevalence; 95%CI (1.79–3.02%), using the DSM-IV (16).
- Ahmad et al. (2019): 18 ASD cases among 1,267 pediatric neurology clinic attenders (1.42% prevalence; 95%CI (0.90–2.23%) in Sokoto, according to DSM-5 clinical records (17).

Adding the results of these three studies, the pooled clinic-based prevalence is 1.79% (100 ASD cases in 5,393 children) with a 95% CI of approximately 1.29–2.47%; 95% PI: 0.05–39.63%), calculated using Wilson methods for proportion CIs. Heterogeneity was moderate (I^2 = 60.0%, τ^2 = 0.051). Study weights were 35.4% for Torty, 44.2% for Lagunju, and 28.8% for Ahmad. This pooled estimate reflects moderate homogeneity of public neurology/ psychiatry clinic-based cohorts (15).

Sensitivity analysis, which includes the addition of West & Aitafo's (2025) (23.65%; 95% CI: 17.46–31.38%), outpatient neurology sample, where 48 of 203 children with neurological disorders were diagnosed with ASD, swells the pooled estimate to 3.48% (148/5,596; 95% CI: 0.84–13.33%; 95% PI: 0.003–97.70%). There was very high heterogeneity (I^2 = 98.6%, τ^2 = 2.154), with roughly equal weights (~ 25% each) due to increased variance. However, this figure is highly skewed by the restricted nature of the denominator (only neurological diagnosis) and a private rather than a public setting, which differs in diagnostic pathways, and the potential for referral biases from the public tertiary clinics; hence, it is presented here as a sensitivity analysis rather than as the primary indicator of prevalence. These are highlighted in the forest plots illustrating Pool A, sensitivity analysis in, and leave one out in Figs. 4, 5, and 6, respectively.

Figure 4: Forest plot for Clinic-based Neurology Studies

Figure 5: Forest plot for Sensitivity Analysis

Figure 6: Forest plot for Leave one out

The overall model was robust under exclusions: removing Torty resulted in 1.89% (95% CI: 1.17–3.04%; I^2 = 70.2%, τ^2 = 0.089); removing Lagunju: 1.50% (95% CI: 1.12–2.00%; I^2 = 0%, τ^2 = 0); removing Ahmad: 1.94% (95% CI: 1.30–2.88%; I^2 = 67.8%, τ^2 = 0.058).

For pool B: school- and population-based prevalence, only one study reported a population/school-based prevalence estimate:

- Chínawa et al. (2016): 21 ASD among 721 children attending school, resulting in a prevalence of 2.91% (95% CI: 1.92–4.40) in Southeastern Nigeria. Although this gives an important insight into wider community prevalence outside of clinical populations, differing sampling frames and confirmations based on only screening, prohibit direct pooling with the clinic-based estimates (18).

Methodological limitations, such as the reliance on screening tools without universal clinical standardization, necessitate cautious interpretation and separate pooling from clinical-based studies.

For pool C: special clinical population:

- Oshodi et al. (2017): 34.5% (n = 29) of 85 children who took part in a community screening and outreach in Lagos were diagnosed with ASD following evaluation. This overrepresentation and elevated prevalence indicate a high-risk subpopulation setting and should not be compared to general prevalence estimates (19).

These extremely high rates highlight the importance of selection context; therefore, this sample is most meaningfully considered for understanding high-risk groups rather than population prevalence.

For pool D: special clinical population:

- Bakare et al. (2012): 5 (11.36%) out of 44 children with ID in a special school in Southeast Nigeria were found to fulfill criteria for ASD. This high prevalence should be interpreted in the context of a subpopulation at high risk and thus is not directly comparable to general population estimates.

Subgroup analyses were also performed:

- By Region (and West included): The south-south (SS) group (Torty, West) yielded a pooled prevalence of 6.54% (95% CI = 0.38–56.44%; I^2 = 99.3%, τ^2 = 4.405). South-west (SW) (Lagunju) and north-west (NW) (Ahmad) were both single studies (2.33% and 1.42%, respectively). Overall pooled: 3.48% (I^2 = 98.6%, τ^2 = 2.154).

- By Decade: 2010s group (Lagunju, Ahmad) pooled at 1.89% (95% CI: 1.17–3.04%; I^2 = 70.2%, τ^2 = 0.089). The 2020s pooled at 6.54% (Torty and West) (95% CI: 0.38–56.44%; I^2 = 99.3%, τ^2 = 4.405). Overall: 3.48%.
- By Clinic Type: The Public (Torty, Lagunju, Ahmad) pooled at 1.79% (95% CI 1.29–2.47%; I^2 = 60.0%, τ^2 = 0.051). Private (West) was 23.65%. Overall: 3.48%. These subgroup analyses are visualized in Figs. 7, 8, and 9.

Figure 7: Forest plot for Subgroup Analyses by Region

Figure 8: Forest plot for Subgroup Analyses by Decade

Figure 9: Forest plot for Subgroup Analyses by Clinic type

Also, there were consistent demographic trends across clinic-based and outreach studies:

- Age at diagnosis: The Mean age at diagnosis was generally in early childhood (approximately 3.8–5.6 years in clinical settings), with a considerable number of children diagnosed after age 3, suggesting late identification in routine care (15, 17)
- Sex distribution: The majority of clinical cohorts reported male predominance consistent with worldwide ASD prevalence.
- Diagnostic delay: The studies highlighted a significant delay from initial parents' concerns to specialist assessment, highlighting systemic obstacles to early detection.

Reported comorbidities were hyperactivity, seizures, and developmental delays, common in ASD cohorts, but inconsistently reported. Caregivers often noted language and social communication impairments as their greatest concern, and multiple studies highlighted limited public awareness and delayed help-seeking as barriers to early diagnosis. These themes resonate with broader insights on poor ASD awareness and resource limitation in Nigeria (6).

Discussion

Principal findings

In our clinic-based neurology/pediatric cohorts in Nigeria, the prevalence of ASD was pooled, with an overall pooled estimate of 1.79% (100/5,393) in tertiary clinical settings, with a single population study yielding a school-based point estimate of ≈ 2.9% and significantly higher rates in screened or special-needs samples (11–34%).

Overall, the data reveal three consistent themes. First, estimates of prevalence differ by sampling frame: clinical samples produce a pronounced signal of ASD in referred children, but population data are limited. Second, delay in diagnosis is frequently reported; all clinical reports describe late presentation and diagnosis in children older than preschool age, suggesting missed opportunities for early identification. Third, the evidence base is heavily clinic-based, with most primary prevalence data coming from tertiary neurology or psychiatry clinics rather than community sampling, which limits generalizability and risk sampling bias. The patterns seen in these studies reflect recent synthesis, noting that ASD in sub-Saharan Africa is the subject of growing description, though not yet fully quantified beyond specialist settings (23, 24, 25).

Comparison with other regions

Global monitoring programs and recent reviews show elevated reported ASD prevalence in high-income countries where systematic screening and record-based surveillance are standard practice. For instance, the US ADDM Network estimated 1 in 31 (≈ 3.2%) eight-year-olds in its latest report, reflecting both broader case ascertainment and evolving diagnostic practices (24).

In the same vein, recent reviews and narrative synthesis of ASD research from Africa indicate that the actual prevalence of ASD in Africa may be similar to that found globally as case ascertainment improves, although the current body of work is methodologically heterogeneous and largely clinic-based, and thus produces widely varying estimates reflective of methodological differences rather than actual population differences (23, 25).

Potential reasons for such differences are that (a) case ascertainment and measurement routine, repeat surveillance and linkages to administrative records lead to inflation of detected prevalence in higher income countries, (b) diagnostic frameworks transitions from DSM-IV to DSM-5 and the local use of diagnostic instruments influence case numbers and (c) health-system and socio-cultural factors, which include reduced awareness, stigmatisation and limited access to specialist care in many African countries result in under-recognition and late referrals. These differences necessitate a cautious interpretation when directly comparing figures; methodological and system drivers explain a great deal of the variation between Nigeria and the better-surveyed areas (25, 26).

Methodological considerations

Study design and denominator definition were key drivers of observed prevalence in our review. Clinic-based studies (our Pool A) represent samples of care-seeking populations who have already crossed thresholds for referral, meaning that the denominators are bounded and represent the pipeline into specialist care, rather than the community (15, 16, 17). The addition of an outlier study with a limited neurological denominator (West & Aitafo) demonstrates the extent to which the definition of the denominator can inflate pooled proportions and why sensitivity analyses are crucial (21).

Screening-only studies are deserving of a cautious interpretation. Community-based or school-based screening programs using brief instruments increase sensitivity and identify many children who may not receive clinical confirmation; in the absence of diagnostic confirmation, such figures are likely to overestimate "true" clinical ASD prevalence, but at least identify unmet need. On the other hand, very strict clinic-based clinical ascertainment may be overly

specific, potentially excluding mild cases or cases that are unrecognized and do not present to specialist services. Thus, approaches therefore have limitations, with the best epidemiologic approach being a two-staged (screening followed by clinical confirmation) with representative sampling.

Our risk-of-bias assessment applied the JBI Critical Appraisal Checklist for Prevalence Studies to evaluate the sample frame, recruitment method, case definition, and clarity of the denominator; frequent limitations were non-representative sample frames, small sample sizes, response rates not reported, and varying diagnostic verification within and between the studies. Consideration and compliance with JBI domains enhances certainty of the findings: when sample frames are appropriate and diagnostic ascertainment robust, pooled prevalence estimates are more reliable. We advocate that future prevalence work in Nigeria adhere to JBI recommendations for design, reporting, and the transparent management of missing data to minimize bias and allow for meta-analytical synthesis (9).

Public health and clinical implications

The predominance of reliable data from clinics, together with the uniform diagnostic delays, suggests obvious public-health implications. In the first place, early screening in primary healthcare and in the early-childhood education context ought to be expanded: routine developmental surveillance and focused ASD screening instruments (followed by referral pathways for confirmation) can lessen age at diagnosis and open windows for early interventions. Second, training is needed to enhance the identification capacity of primary care providers, community health workers, and school personnel, so as to recognize early red flags for ASD in order to expand detection beyond tertiary centers. Third, as a policy recommendation, ASD needs to be integrated within child-health and disability policies; developing national surveillance, gathering standardized prevalence data, and investing in early-intervention services will align Nigeria with global best practice and improve outcomes.

Importantly, these public-health actions need to be culturally tailored and resource sensitive: awareness programmes must tackle stigma and encourage help-seeking in culturally appropriate language, and screening instruments need to be validated locally to avoid over-identification and to direct limited diagnostic resources efficiently. Recent regional publications highlight that raising awareness and diagnostic infrastructures in Africa significantly increases case identification and service utilization, endorsing the proposed policy actions (23, 25).

Strengths and limitations of the review

A particular strength of this review is the systematic grouping of studies according to similar denominators and a clear illustration of the conservative and sensitivity pooled estimates, as well as a stringent quality assessment using the JBI tool. This stratification prevents distorted pooled estimates produced by systematic heterogeneity and highlights the influence of denominator selection

Limitations are mainly those of the underlying evidence base. There was little homogeneity in sampling frames and diagnostic procedures to allow for a single estimate of general population prevalence. The small number of true population-based studies (only one school-based prevalence study) and the predominance of data drawn from clinic-derived samples limit external validity. Several included studies had small denominators and did not sufficiently describe methods, which decreases precision and increases the risk of residual bias despite JBI evaluation. We therefore recommend cautious interpretation and suggest that pooled clinic prevalence should be described as an estimate of ASD among children presenting to tertiary neurology/psychiatry services rather than a national population prevalence.

Future research directions

High-priority research includes well-designed community-based epidemiologic studies utilizing representative sampling and two-stage case ascertainment (screen + clinical confirmation) to derive reliable and robust national estimates. Consistent application of validated screening instruments adapted to Nigerian languages and cultures, with explicit reporting on response rates and case ascertainment procedures (as outlined in JBI), will enhance comparability. Longitudinal cohorts are required to delineate developmental trajectories, interventions, and outcomes in Nigerian children with ASD. In addition, studies should examine regional differences and socio-cultural factors related to help-seeking and diagnosis, to guide region-specific service provision and public health messaging. Current genetic and epidemiologic studies in African populations also propose opportunities to study etiologic heterogeneity and to generate locally relevant intervention strategies (27, 28).

Conclusion

This systematic review demonstrates that clinic tertiary services in Nigeria diagnose ASD in approximately 1.8–2.6% of children referred to them (depending on the choice of denominator), while very limited population-based data indicate a possible prevalence of ~ 3% among school-attenders, with high-risk and special-needs samples demonstrating much higher proportions. Diagnostic delay and clinic-based evidence are recurrent themes. Major deficiencies include: a minority of surveys are population-representative, diagnostic procedures vary widely, and few early-detection systems. Filling these gaps will require national investment in screening, standardized two-stage prevalence studies, primary care capacity building, and integration of ASD into child-health policy. These will allow Nigeria to advance from clinic-based signals to strong, policy-relevant prevalence figures and earlier, more equitable care.

Abbreviations

- **ASD**

Autism Spectrum Disorder

- **CI**

Confidence Interval

- **DSM**

IV—Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
- **DSM**
5—Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
- **GLMM**
Generalized Linear Mixed Model
- **ID**
Intellectual Disability
- **I^2**
I—squared statistic (measure of heterogeneity)
- **JBI**
Joanna Briggs Institute
- **LMICs**
Low—and Middle—Income Countries
- **PRISMA**
Preferred Reporting Items for Systematic Reviews and Meta—Analyses
- **RoB**
Risk of Bias
- **SR**
Systematic Review

Declarations

Ethics approval and consent to participate

Not applicable. This study did not involve human participants, human data, or tissue.

Consent for publication

Not applicable. No person's data in any form is presented in this manuscript.

Competing interests

The authors declare that they have no competing interests. All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria, educational grants, participation in speakers' bureaus, membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' contributions

GU conceived and designed the study, served as the guarantor of the review, performed the meta-analysis, drafted the Introduction and Results sections, and coordinated the overall manuscript development. **GU** and **ME** independently screened titles, abstracts, and full texts for eligibility and resolved discrepancies through discussion. **TO** developed and wrote the Methods section, led the Discussion, and contributed to interpretation of findings. **ME** drafted the Abstract and Conclusion sections and assisted with data extraction. All authors critically reviewed the manuscript for intellectual content, approved the final version, and agree to be accountable for all aspects of the work.

Acknowledgements

Not applicable.

Clinical trial number

Not applicable

References

1. Hodis B, Mughal S, Saadabadi A. Autism Spectrum Disorder. [Updated 2025 Jan 17]. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK525976/

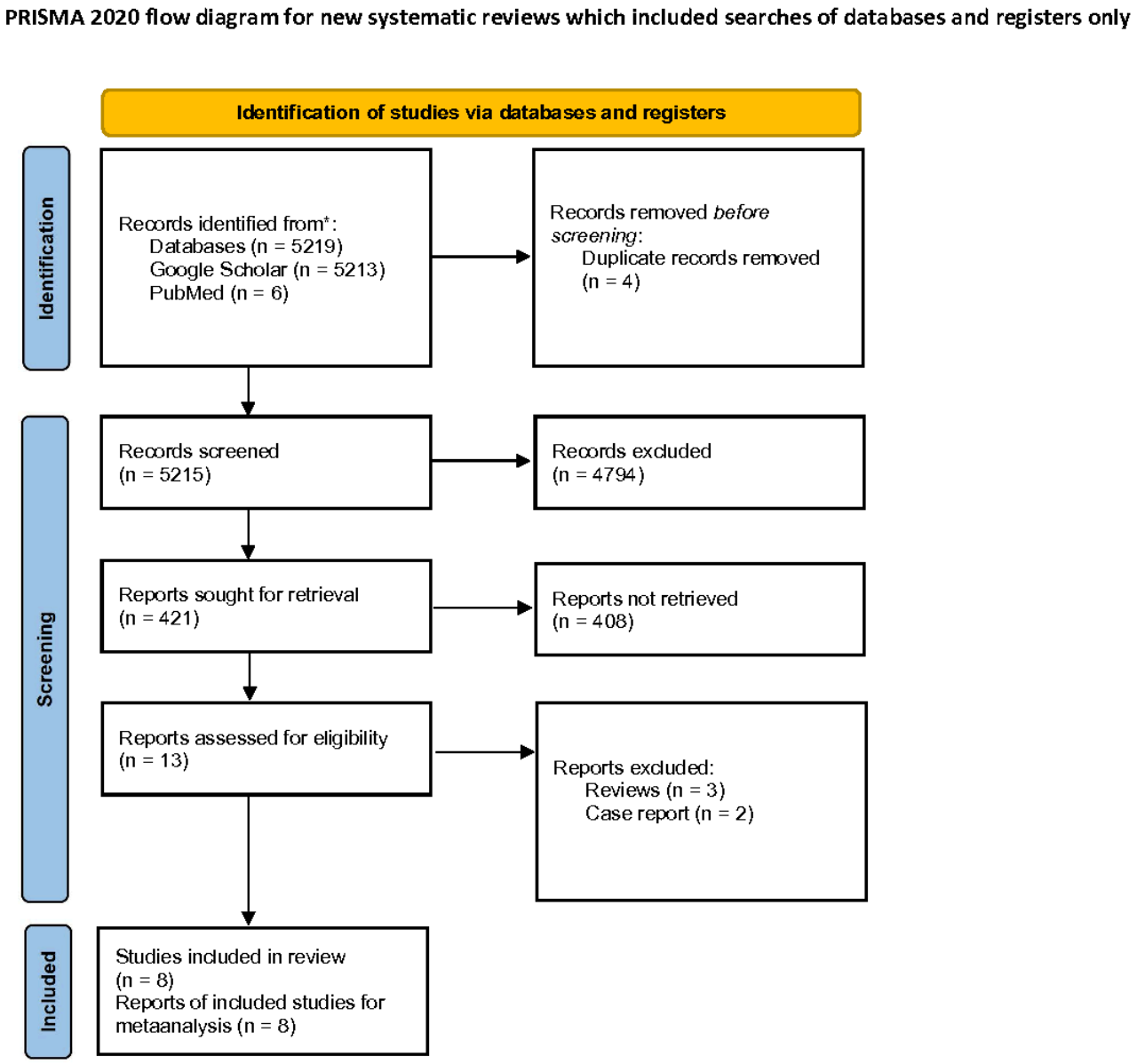
2. Global Burden of Disease Study 2021 Autism Spectrum Collaborators. The global epidemiology and health burden of the autism spectrum: findings from the Global Burden of Disease Study 2021. Lancet Psychiatry. 2025 Feb;12(2):111-121. doi: 10.1016/S2215-0366(24)00363-8. Epub 2024 Dec 19. PMID: 39709974; PMCID: PMC11750762
3. Issac A, Halemani K, Shetty A, Thimmappa L, Vijay VR, Koni K, et al. The global prevalence of autism spectrum disorder in children: a systematic review and meta-analysis. Osong Public Health Res Perspect. 2025 Feb;16(1):3-27. doi: 10.24171/j.phrp.2024.0286. Epub 2025 Feb 10. PMID: 39933560; PMCID: PMC11917377.
4. Abubakar A, Ssewanyana D, Newton CR. A Systematic Review of Research on Autism Spectrum Disorders in Sub-Saharan Africa. Behavioural Neurology. 2016;2016:1–14. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5107214/
5. Autism spectrum disorders. Available from: https://www.who.int/en/news-room/fact-sheets/detail/autism-spectrum-disorders
6. Bakare MO, Taiwo OG, Bello-Mojeed MA, Munir KM. Autism Spectrum Disorders in Nigeria: A Scoping Review of Literature and Opinion on Future Research and Social Policy Directions. J Health Care Poor Underserved. 2019;30(3):899-909. doi: 10.1353/hpu.2019.0063. PMID: 31422978; PMCID: PMC6815667.
7. Akinbobola O. Stigma on Mental Illness and Help-Seeking among Nigerians in Stigma on Mental Illness and Help-Seeking among Nigerians in the United States the United States. 2024. Available from: https://scholarworks.waldenu.edu/cgi/viewcontent.cgi
8. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021 Mar 29;372:n71. doi: 10.1136/bmj.n71. PMID: 33782057; PMCID: PMC8005924.
9. CHECKLIST FOR PREVALENCE STUDIES Critical Appraisal tools for use in JBI Systematic Reviews. Available from: https://jbi.global/sites/default/files/2020-08/Checklist_for_Prevalence_Studies.pdf
10. McGuinness LA, Higgins JPT. Risk-of-bias VISualization (robvis): An R package and Shiny web app for visualizing risk-of-bias assessments. Res Synth Methods. 2021 Jan;12(1):55-61. doi: 10.1002/jrsm.1411. Epub 2020 May 6. PMID: 32336025.
11. Hartung J, Knapp G. On tests of the overall treatment effect in meta-analysis with normally distributed responses. Stat Med. 2001 Jun 30;20(12):1771-82. doi: 10.1002/sim.791. PMID: 11406840.
12. StatsDirect. Heterogeneity in Meta-analysis (Q, I-square) - StatsDirect. Statsdirect.com. 2019. Available from: https://www.statsdirect.com/help/meta_analysis/heterogeneity.htm
13. Patsopoulos NA, Evangelou E, Ioannidis JP. Sensitivity of between-study heterogeneity in meta-analysis: proposed metrics and empirical evaluation. Int J Epidemiol. 2008 Oct;37(5):1148-57. doi: 10.1093/ije/dyn065. Epub 2008 Apr 18. PMID: 18424475; PMCID: PMC6281381.
14. Polanin JR, Hennessy EA, TannerSmith EE. A Review of MetaAnalysis Packages in R. Journal of Educational and Behavioral Statistics. 2017;42(2):206–42. Available from: https://www.jstor.org/stable/26447660
15. Torty C, Eyong K, Asindi A A, Usun E. Autism Spectrum Disorders in Calabar, Nigeria. Iran J Child Neurol. 2024 Summer;18(3):75-81. doi: 10.22037/ijcn.v18i3.41744. Epub 2024 Jun 22. PMID: 38988844; PMCID: PMC11231682.
16. Lagunju IA, Bella-Awusah TT, Omigbodun OO. Autistic disorder in Nigeria: profile and challenges to management. Epilepsy Behav. 2014 Oct;39:126-9. doi: 10.1016/j.yebeh.2014.08.020. Epub 2014 Sep 18. PMID: 25240124.
17. Ahmad M, Helal Uddin Ahmed, Baba J, JN Legbo, Aliyu Mamman Na'uzo, Omar M, et al. Autism Spectrum Disorder in North-Western Nigeria. International Neuropsychiatric Disease Journal. 2019 Jan 21;12(2):1–5.
18. Chinawa JM, Manyike PC, Aniwada EC, Chinawa AT, Obu HA, Odetunde OI, et al. Prevalence and socioeconomic correlates of autism among children attending primary and secondary schools in south east Nigeria. Afr Health Sci. 2016 Dec;16(4):936-942. doi: 10.4314/ahs.v16i4.8. PMID: 28479884; PMCID: PMC5398438.
19. Oshodi YO, Olagunju AT, Oyelohunnu MA, Campbell EA, Umeh CS, Aina OF, et al. Autism Spectrum Disorder in a Community-based Sample with Neurodevelopmental Problems in Lagos, Nigeria. J Public Health Afr. 2017 Jan 17;7(2):559. doi: 10.4081/jphia.2016.559. PMID: 28299159; PMCID: PMC5345404.
20. Bakare MO, Ebigbo PO, Ubochi VN. Prevalence of autism spectrum disorder among Nigerian children with intellectual disability: a stopgap assessment. J Health Care Poor Underserved. 2012 May;23(2):513-8. doi: 10.1353/hpu.2012.0056. PMID: 22643602.
21. West BA, Aitafo JE. Prevalence and Pattern of Neurological Disorders amongst Children Attending the Neurology Clinic of a Private Paediatric Hospital in Southern Nigeria. Archives of Current Research International. 2025 Jan 16;25(1):71–81. Available from: https://hal.science/hal-05043740/
22. Bello-Mojeed MA, Omigbodun OO, Bakare MO, Adewuya AO. Pattern of impairments and late diagnosis of autism spectrum disorder among a sub-Saharan African clinical population of children in Nigeria. Glob Ment Health (Camb). 2017 Mar 21;4:e5. doi: 10.1017/gmh.2016.30. PMID: 28596906; PMCID: PMC5454767.
23. Adams SN. The Unmasking of Autism in South Africa and Nigeria. Neuropsychiatr Dis Treat. 2024 May 8;20:947-955. doi: 10.2147/NDT.S461650. PMID: 38737770; PMCID: PMC11088825.
24. CDC. Data and Statistics on Autism Spectrum Disorder. Autism Spectrum Disorder (ASD). CDC; 2025. Available from: https://www.cdc.gov/autism/data-research/index.html
25. Aderinto N, Olatunji D, Idowu O. Autism in Africa: prevalence, diagnosis, treatment and the impact of social and cultural factors on families and caregivers: a review. Ann Med Surg (Lond). 2023 Jul 24;85(9):4410-4416. doi: 10.1097/MS9.0000000000001107. PMID: 37663716; PMCID: PMC10473371.
26. Akomolafe AF, Abdallah BM, Mahmood FR, Elshoeibi AM, Al-Khulaifi AA, Mahmoud E, et al. Estimates of the prevalence of autism spectrum disorder in the Middle East and North Africa region: A systematic review and Meta-Analysis. BMC Public Health. 2025 Jul 21;25(1):2519. doi: 10.1186/s12889-025-

23651-x. PMID: 40691829; PMCID: PMC12278510.
27. Hakizimana O, Hitayezu J, Uyisenga JP, Onohuean H, Palmeira L, Bours V, et al. Genetic etiology of autism spectrum disorder in the African population: a scoping review. Front Genet. 2024 Sep 26;15:1431093. doi: 10.3389/fgene.2024.1431093. PMID: 39391062; PMCID: PMC11464363.
28. Adeola Dorcas Folorunso. Autism Spectrum Disorder Among Nigerian Children Ages 2-17: Prevalence, Awareness, Advocacy and Legislative Action Scoping Review. Research Square (Research Square). 2025 May 29;

Table

Table 3 is available in the supplementary files section

Figures



Source: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

This work is licensed under CC BY 4.0. To view a copy of this license, visit https://creativecommons.org/licenses/by/4.0/

Figure 1

PRISMA Flow Diagram

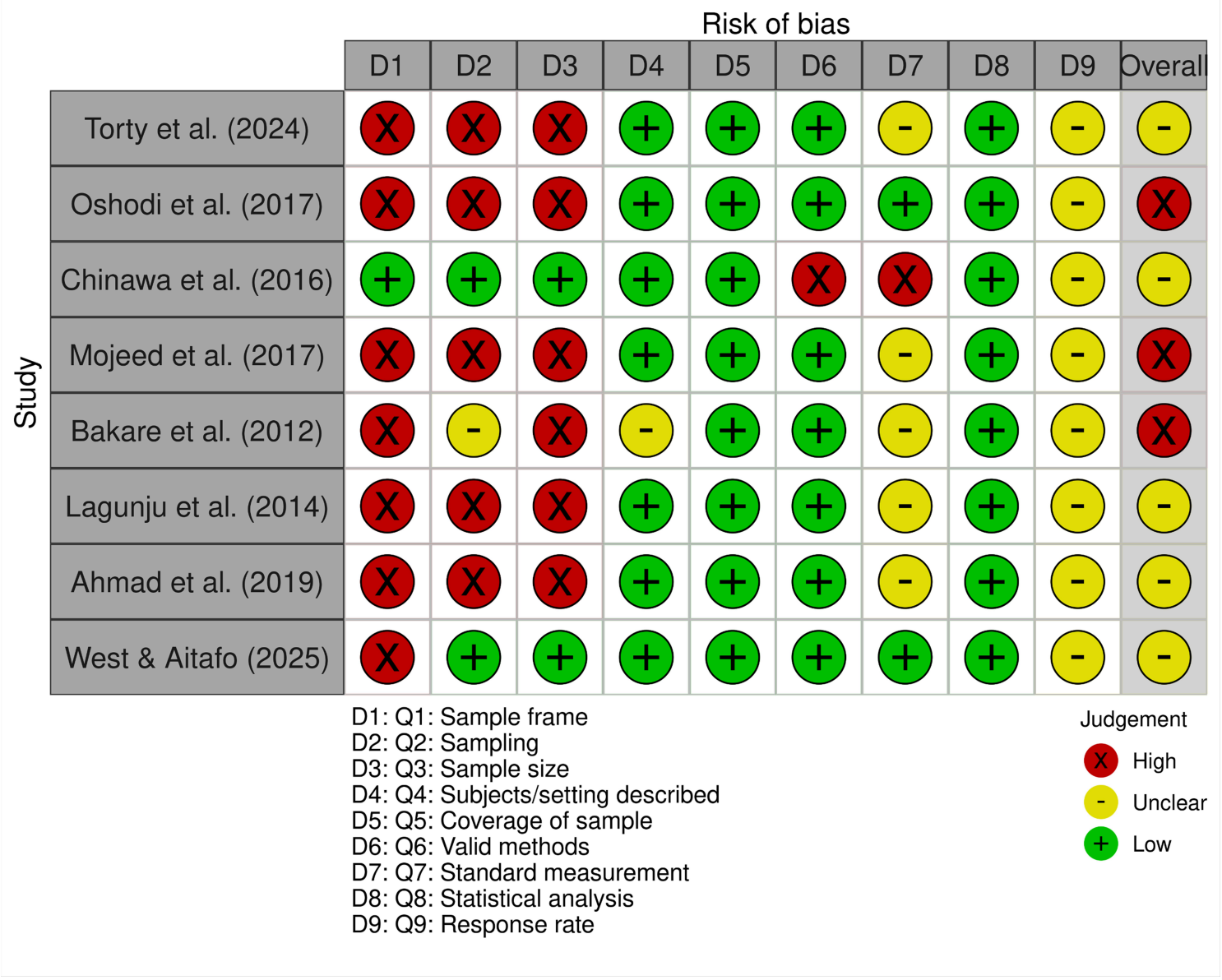


Figure 2

Traffic Light Plot

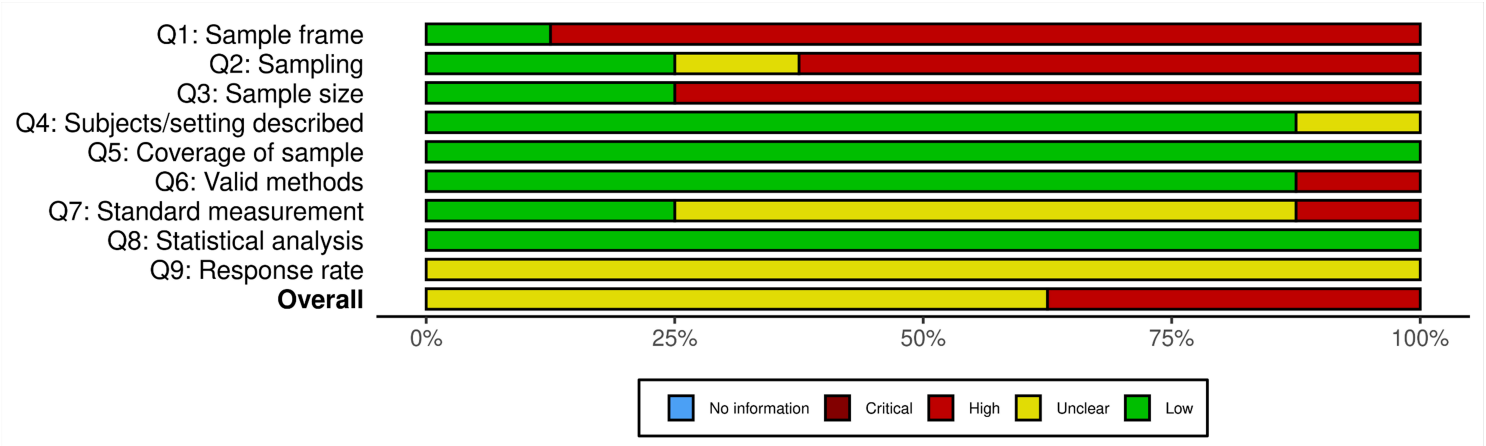


Figure 3

Summary Plot

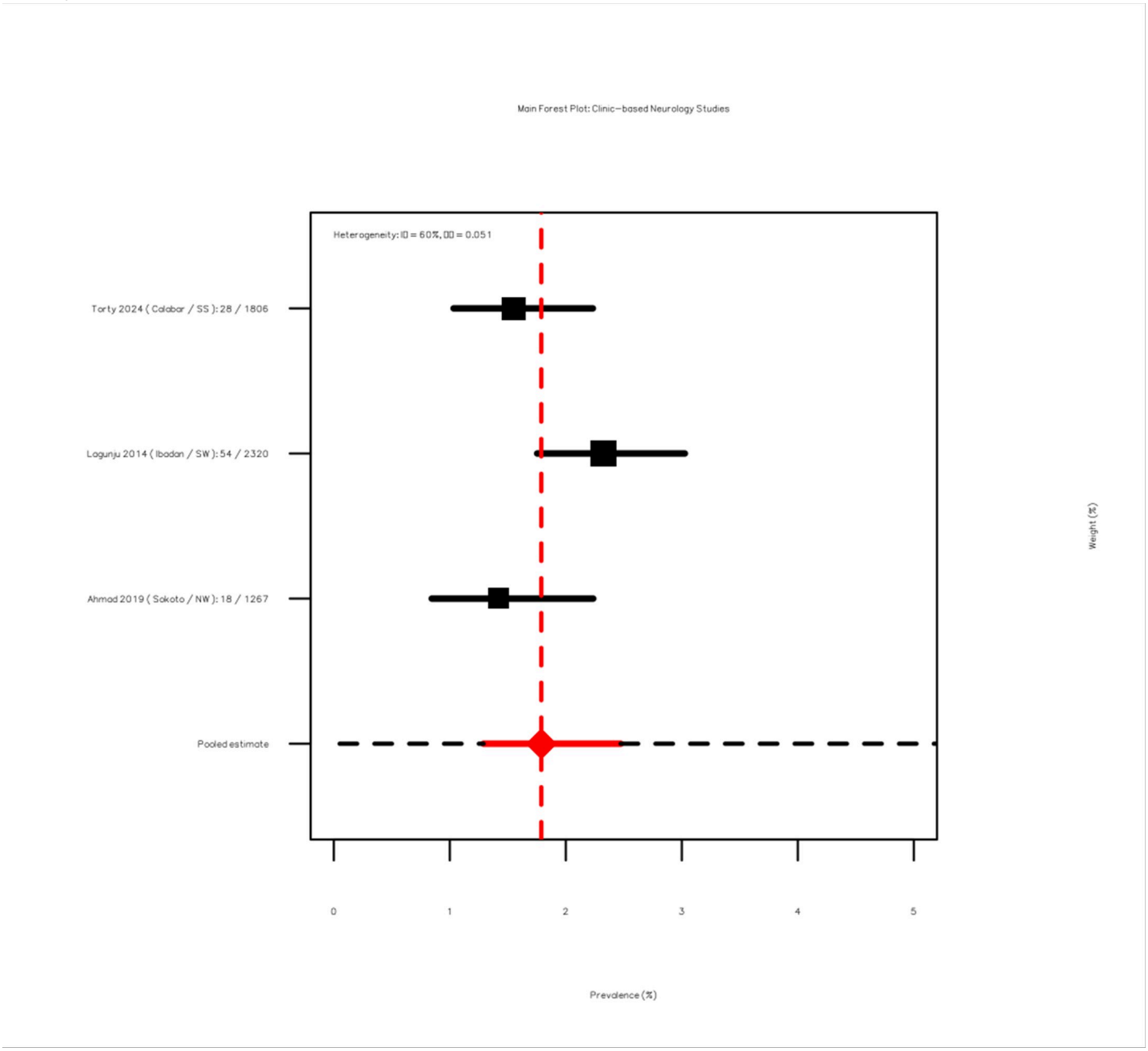


Figure 4

Forest plot for Clinic-based Neurology Studies

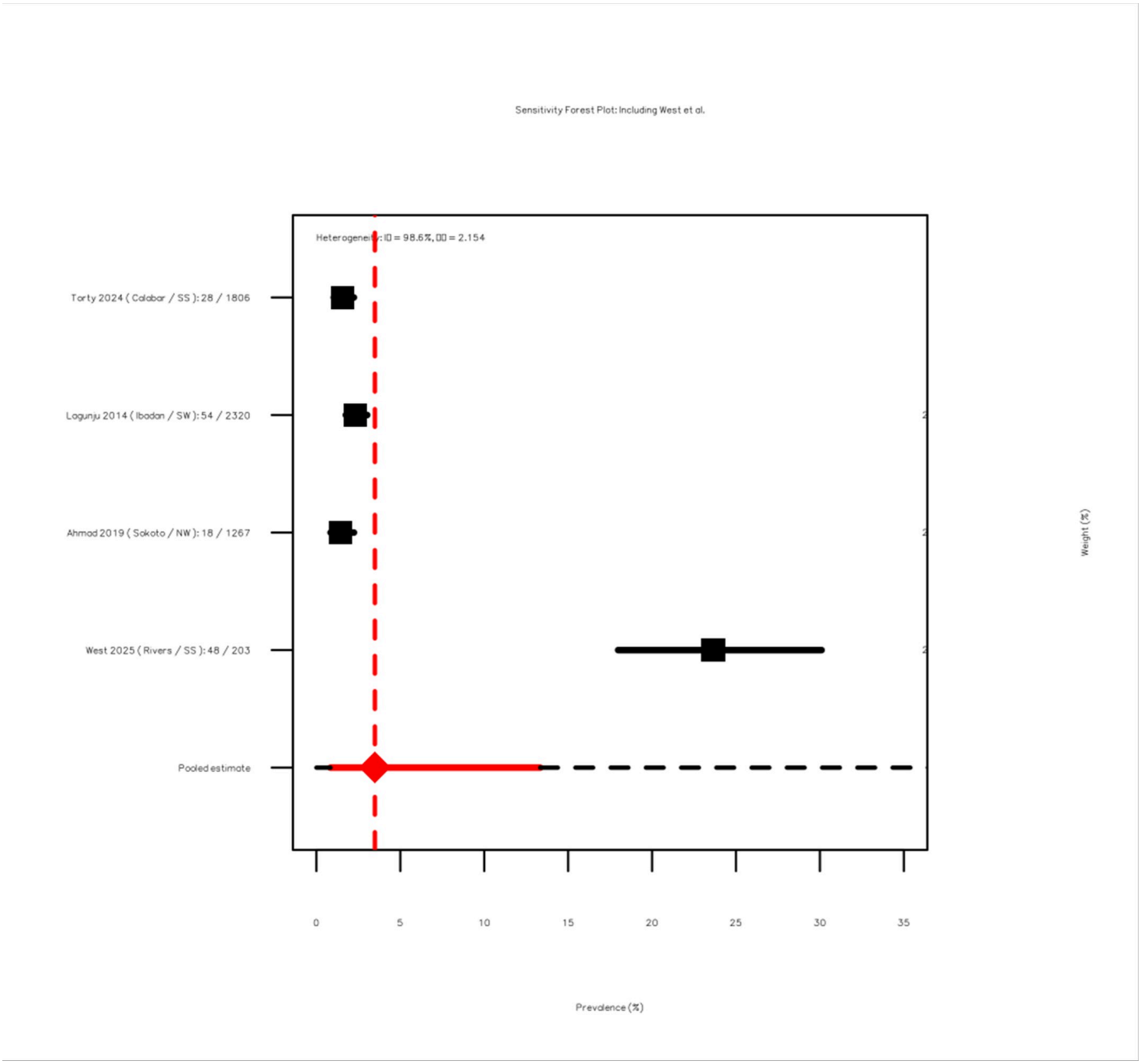


Figure 5

Forest plot for Sensitivity Analysis

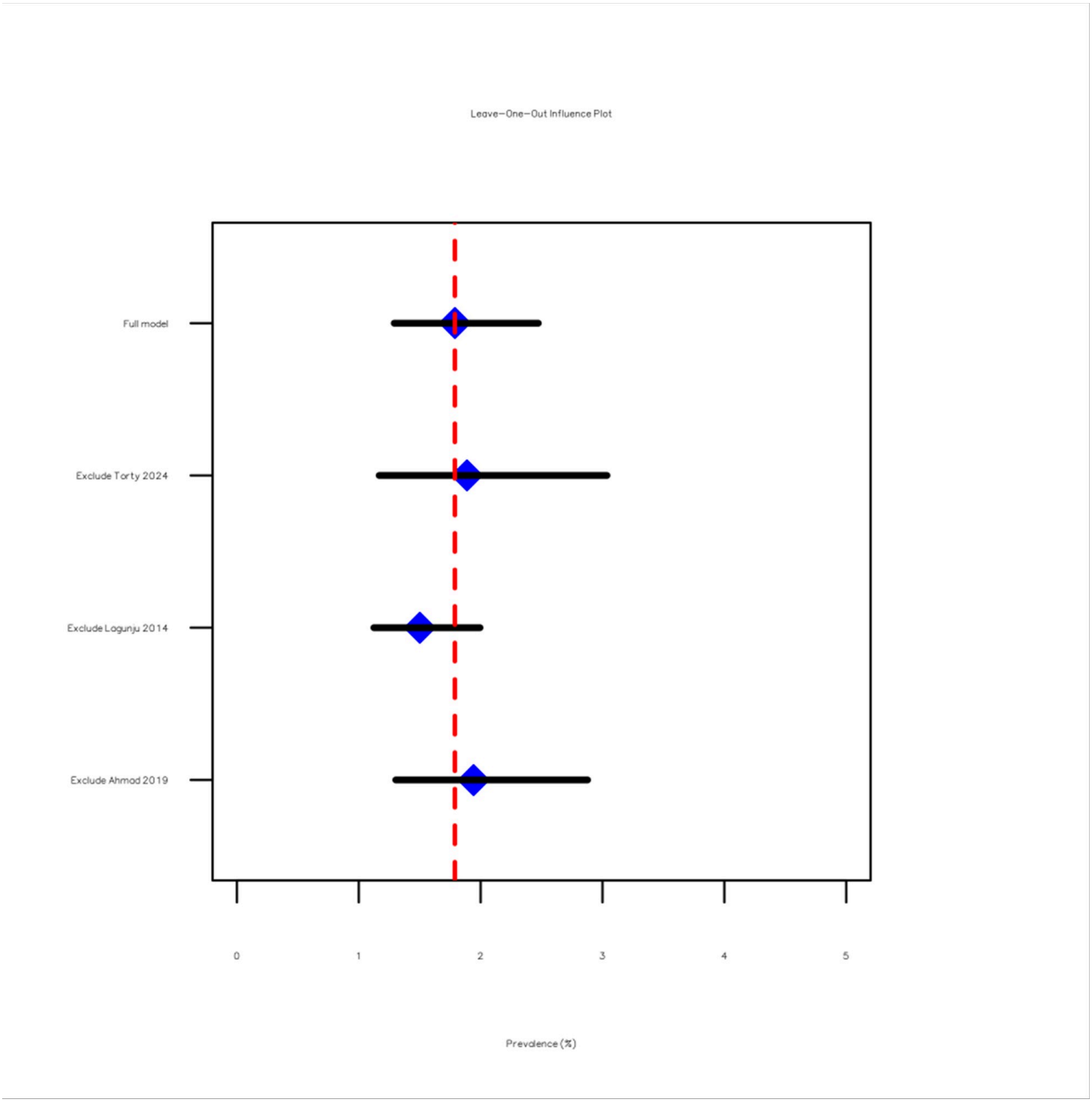


Figure 6

Forest plot for Leave one out

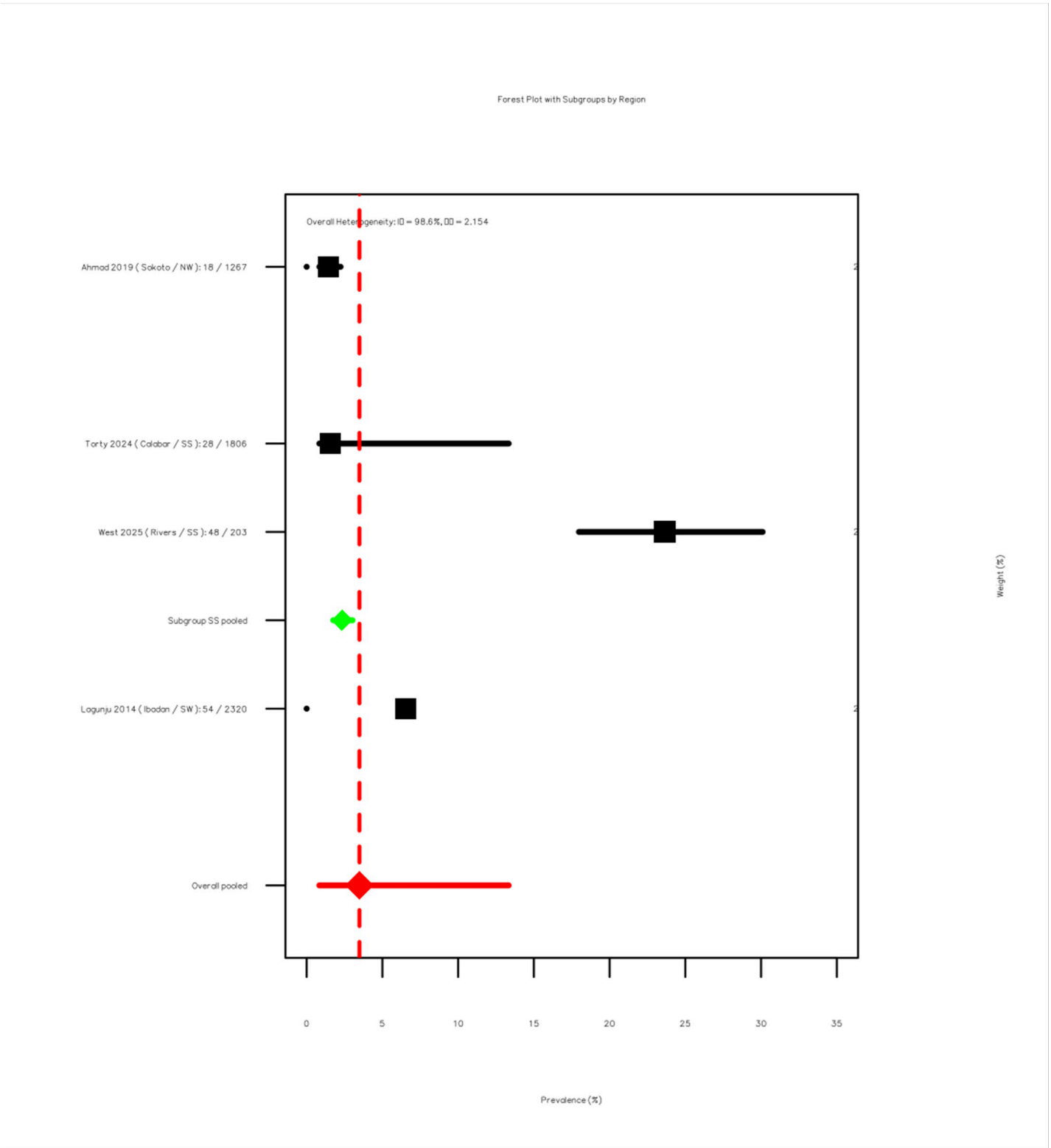


Figure 7

Forest plot for Subgroup Analyses by Region

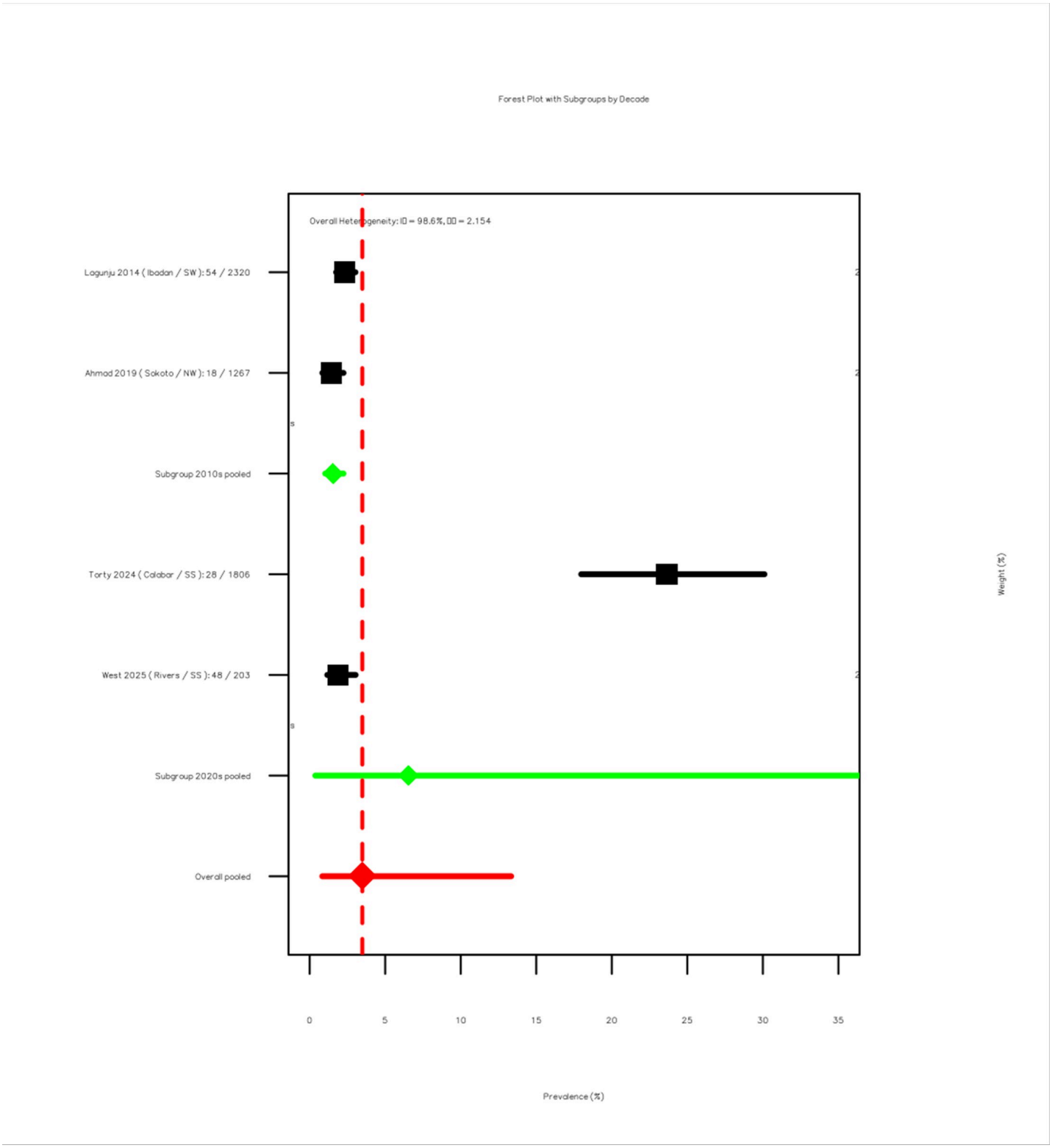


Figure 8

Forest plot for Subgroup Analyses by Decade

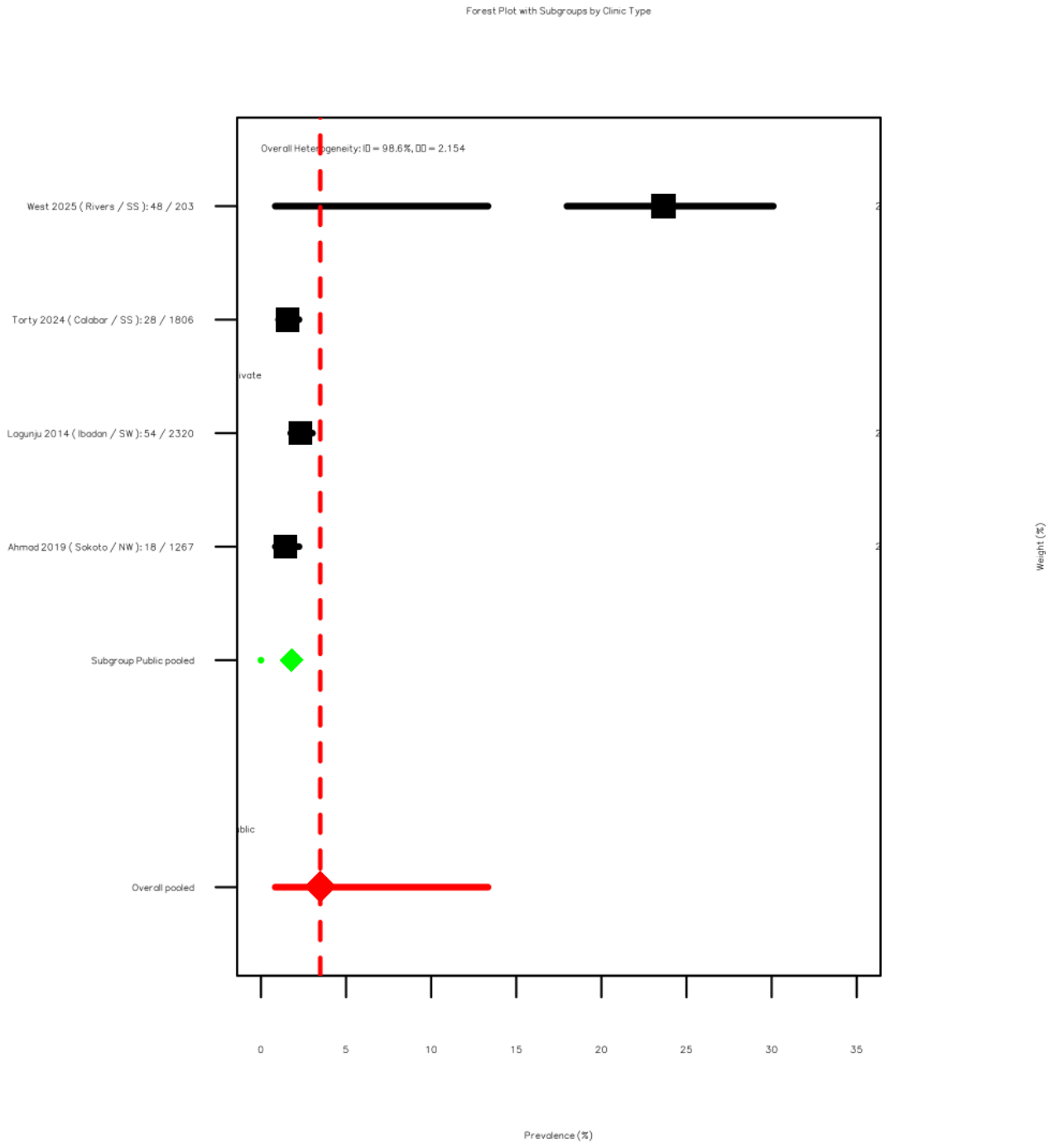


Figure 9

Forest plot for Subgroup Analyses by Clinic type

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Table3JBIDomainlevelRoBAssessment.xlsx