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Trends and Inequalities in Severe Wasting among Children Under Five in Ghana Based on a Secondary Analysis of National Surveys 1988 to 2022

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Abstract

Background

Severe wasting, defined as weight-for-height z-score below − 3 standard deviations according to the WHO Child Growth Standards, reflects acute undernutrition and is associated with a substantially elevated risk of mortality among children under five years. In Ghana, most studies of child undernutrition focus on stunting and single survey rounds. Evidence on long-term trends and inequalities in severe wasting remains limited.

Methods

This is a secondary data analysis of harmonised Joint Child Malnutrition Estimates from nine nationally representative Demographic and Health Surveys (1988, 1998, 2003, 2008, 2014, 2022) and Multiple Indicator Cluster Surveys (2006, 2011, 2017) in Ghana (n = 1,980–8,776 children aged 0–59 months per round). Weighted prevalence estimates with 95% CIs were generated using standardised anthropometric definitions and design-based methods accounting for clustering and stratification. Trends and inequalities were descriptively assessed by sex, age group, residence, household wealth quintile, maternal education, and subnational region.

Results

National severe wasting prevalence declined overall from 2.1% (1988) to 1.2% (2022), with variation across survey rounds (range 0.7% (2014)–2.8% (2003)). Across most surveys, persistent inequalities were observed by sex, residence, age, household wealth, maternal education, and region. Prevalence was generally higher among male compared with female children, rural compared with urban populations, and infants aged 6–11 months, and among children from poorer households and those whose mothers had no formal education, with northern regions consistently showing higher prevalence than southern regions. Illustrative differences include males vs females in 2022 (1.4% vs 0.9%), rural vs urban in 2022 (1.5% vs 0.8%), poorest vs richest households in 2017 (1.9% vs 0.4%), and non-educated vs educated mothers in 2008 (3.9% vs 2.2%), with higher prevalence among infants aged 6–11 months (up to 6.7% in 2003) and in Upper East (6.6% in 2003).

Conclusions

Despite an overall national decline, persistent socioeconomic and geographic inequalities in severe wasting remain in Ghana. Strengthening harmonised and disaggregated nutrition surveillance is essential to guide equity-focused interventions and accelerate progress towards World Health Organization and Sustainable Development Goal nutrition targets.

Introduction

Severe wasting is a major public health concern as it represents a life-threatening form of acute undernutrition in which children become dangerously thin for their height due to recent and rapid weight loss, often resulting from inadequate food intake or recurrent illness such as diarrhoea (UNICEF, 2023). It reflects acute nutritional deprivation and serves as a key indicator of child survival and health system performance globally [2]. Current estimates indicate that 42.8 million children under five years are wasted, including 12.2 million who are severely wasted [3]. Severe wasting is the most extreme form of acute undernutrition and is commonly associated with chronic poverty, food insecurity, poor diets, inadequate water and sanitation, a high infectious disease burden, and constrained caregiving environments [1, 4, 5]. It is

strongly linked to increased risks of morbidity and mortality in early childhood [1, 6] and is defined as a weight-for-height z-score below − 3 standard deviations from the median of the WHO Child Growth Standards among children aged 0–59 months [7].

Globally, child undernutrition has declined over the past three decades, with key indicators such as stunting decreasing from approximately 40% in 1990 to around 22% in 2022 [3], driven by coordinated nutrition policies, expanded primary healthcare, improved maternal education, and targeted child survival interventions [8–10]. However, progress in reducing wasting has been uneven and less clearly sustained than for stunting, reflecting its episodic nature and challenges in trend measurement, with many countries remaining off track to meet global nutrition targets [11–14]. Recent global assessments, including the 2021 Global Nutrition Report, indicate that the world is not on track to meet global wasting targets [12]. Progress towards the 2025 World Health Assembly (WHA) target of reducing and maintaining wasting prevalence to below 5%, and the 2030 Sustainable Development Goal 2 (SDG-2) nutrition targets, is further constrained by gaps in data availability and comparability across countries [11, 12, 15].

Sub-Saharan Africa continues to bear a disproportionate burden of child wasting. Recent pooled estimates indicate that approximately 7% of children aged 6–59 months in the region are wasted, with more than 2% severely wasted, representing a persistent public health concern [15]. Progress remains constrained by food system instability, poverty, conflict, climate shocks, and unequal access to essential health and nutrition services [12, 15–18].

In Ghana, important improvements in child health indicators have been recorded over recent decades, as reflected in national surveys and global health reports [19, 20]. However, acute malnutrition, including wasting, remains a persistent challenge, suggesting that national averages may mask subpopulations at elevated risk of severe wasting.

Although Ghana has conducted repeated nationally representative household surveys over more than three decades, including Demographic and Health Surveys and Multiple Indicator Cluster Surveys, analyses of child undernutrition have largely prioritised stunting and underweight, with wasting often treated descriptively rather than as a primary analytical outcome [21, 24–29]. Furthermore, cross-year comparisons frequently rely on round-specific estimates rather than harmonised reanalysed series [27, 28, 30], limiting comparability across survey waves. Consequently, equity-focused assessments of long-term trends in severe wasting remain limited.

This study provides a harmonised long-term assessment of severe wasting among children aged 0–59 months in Ghana using nationally representative survey data spanning 1988 to 2022, with standardised estimates produced through the Joint Malnutrition Estimates framework (JME) [15]. It examines trends and inequalities in severe wasting over time, generating uncertainty-aware, design-based prevalence estimates that are comparable across survey rounds. It further assesses disparities across key subgroup characteristics, including child sex, age, and place of residence. By integrating long-term trend analysis with subgroup inequality assessment using standardised estimation procedures, the study provides policy-relevant evidence on whether progress has been consistent and equitable, or whether vulnerable groups remain disproportionately affected.

Methods

Study design and data sources

This study analysed nationally representative household survey data from Ghana spanning 1988 to 2022 to examine long-term trends and inequalities in severe wasting among children aged 0–59 months. The analysis used harmonised country-level estimates from the JME Working Group, a collaboration between UNICEF, the World Health Organization, and the World Bank Group [3, 31, 32].

These harmonised estimates are derived from re-analysed nationally representative survey datasets, including Demographic and Health Surveys conducted in 1988, 1998, 2003, 2008, 2014, and 2022 [33, 34], and Multiple Indicator Cluster Surveys conducted in 2006, 2011, and 2017 [35]. The harmonisation process applies standardised anthropometric definitions, data cleaning rules, and analytical procedures to improve comparability across survey rounds and over time [31]. Surveys were implemented by national statistical authorities in collaboration with international partners (e.g., ICF for DHS, UNICEF for MICS), using standard questionnaires and measurement protocols [31, 34, 35].

Study setting and population

The study population comprised children aged 0–59 months living in sampled households in Ghana. All surveys used multistage, stratified cluster sampling designs, described in detail elsewhere [31] and summarised briefly here. The sampling frame for each survey round was derived from the most recent national population census and consisted of enumeration areas stratified by region and urban or rural residence [34]. Enumeration areas were selected using probability proportional to size, followed by systematic sampling of households within clusters. Sample sizes for each round were determined by DHS and MICS programme designers to produce nationally representative estimates, as shown in Fig. 1 [33–35]. Eligible children under five years in selected households were measured using standardised anthropometric procedures and equipment across survey rounds [3, 36].

Measures

Anthropometric measurements in DHS and MICS

Child height or length and age were measured according to standard DHS and MICS anthropometric protocols [36]. Recumbent length was measured for younger children and standing height for older children using calibrated measuring boards [36]. Age was determined from birth certificates, health records, or caregiver report where documentation was unavailable. Anthropometric indices were calculated using the WHO Child Growth Standards [36]. Standard data quality checks were applied, including plausibility assessment and exclusion of biologically implausible values in line with WHO recommendations [36, 37, 38].

Study outcome measures

The primary outcome was severe wasting among children aged 0–59 months. Severe wasting was defined as weight for height z score (WHZ) less than < − 3 SD from the median of the WHO Child Growth Standards [7, 2]. For each survey round, the numerator included children classified as severely wasted and the denominator included children with valid anthropometric measurements [37, 38]. Prevalence was expressed as a weighted percentage with corresponding 95% confidence intervals.

Explanatory variables

To assess inequality patterns, prevalence estimates were examined across consistently defined subgroup characteristics available across survey rounds. These included child sex (male, female), child age in months, place of residence (urban, rural), and survey year [39, 40]. Where definitions were comparable across surveys, additional subgroup stratification by region and household wealth was considered for interpretation. The primary explanatory dimension for trend assessment was survey year [29].

Statistical analysis

Estimation procedures

All prevalence estimates were derived using survey sampling weights to account for unequal probabilities of selection and non-response. Design-based estimation methods incorporating clustering and stratification were used for variance estimation. Point estimates were presented with 95% confidence intervals (CI) to reflect statistical uncertainty. Differences across survey rounds and subgroups were assessed using the magnitude and overlap of confidence intervals, with consideration of potential residual methodological differences between surveys.

Harmonised prevalence estimates and associated sample sizes were compiled across survey rounds to support longitudinal comparison. Temporal patterns were assessed using descriptive comparison of point estimates and uncertainty intervals across time. Figures were produced in R using ggplot2 and related visualisation packages.

Results

Across survey rounds, sample sizes varied across survey rounds but increased overall over time. The full range was from 1,980 children in 1988 to 8,776 in 2017, with a median sample size of 3,240 children (interquartile range 2,657–5,835).

Severe wasting prevalence, reported with 95% confidence intervals, showed an overall declining pattern across survey rounds, albeit with fluctuations (Fig. 1). Prevalence ranged from 2.8% in 2003 to 0.7% in 2014, with a modest decline to 1.2% in 2022.

Analysis of regional severe wasting prevalence among children under five in Ghana between 1988 and 2022 indicates persistent geographical disparities (Fig. 2). In 1988, the Northern and Upper West regions had the highest prevalence (4.2%), while Greater Accra and Central regions recorded lower levels (approximately 1.0–1.5%). Across subsequent survey years (2006–2017), most regions showed reductions in prevalence; however, Northern, Volta, and Upper East regions consistently reported higher prevalence compared with other regions across multiple time points. By 2022, Ashanti region recorded the highest prevalence (3.2%), followed by Upper West (1.9%) and Northern (1.2%), while Central, Eastern, Greater Accra, and Upper East remained below 1%.

Trends and Inequalities in Severe Wasting by Sex, Age, Residence, Wealth, and Maternal Education (1988–2022)

Across survey rounds from 1988 to 2022, severe wasting prevalence varied across subgroups, with persistent differences between demographic and socioeconomic categories and changing patterns over time.

By sex, males generally recorded higher prevalence than females across most survey rounds. In 1988, severe wasting among males was 2.8% (95% CI 1.9–4.1) compared with 1.4% (95% CI 0.8–2.4) among females. By 2022, prevalence was 1.4% (95% CI 0.9–2.2) in males and 0.9% (95% CI 0.5–1.8) in females, with overlapping confidence intervals. Both sexes showed reductions over time, although declines appeared earlier and more pronounced among females between 2008 and 2014.

Urban–rural differences were consistent throughout the study period. Rural prevalence exceeded urban estimates in most survey years, including in 1988 (2.5% in rural areas vs 1.1% in urban areas) and in 2022 (1.5% vs 0.8%). An exception was observed in 2003, when urban prevalence (3.3%) exceeded rural levels (2.6%). Both settings experienced declines after 2008, with urban areas showing relatively smaller fluctuations in later survey rounds.

Age-specific inequalities were marked. Infants aged 6–11 months consistently showed the highest prevalence across several surveys, rising from 4.1% in 1988 to 6.7% in both 2003 and 2008 before declining to 2.3% in 2022. Children aged 0–5 months also showed high levels during earlier years, increasing from 1.2% in 1988 to 6.2% in 2003 and remaining

elevated in 2008 (5.8%) before declining after 2011. In contrast, older age groups, particularly 24–35 months and above, consistently recorded lower prevalence. Children aged 36–47 months had near-zero levels in later surveys (0.1%–0.3% after 2014), while children aged 48–59 months maintained low prevalence throughout the period.

Socioeconomic gradients were evident across wealth quintiles. Children in the lowest quintile generally had higher prevalence than those in higher quintiles, particularly in earlier survey rounds. In 1998, the lowest quintile recorded 3.9%, compared with 1.4% in the highest quintile. By 2022, differences between quintiles had narrowed, with prevalence of 1.5% in the lowest quintile and 0.7% in the highest quintile, although variation remained across middle and upper groups.

Differences by maternal education were observed across survey rounds, although patterns varied over time. Children of mothers with no formal education generally had higher prevalence compared with those whose mothers had some level of education. For example, in 1998, prevalence was 3.8% among children of mothers with no education compared with 2.0% among those with primary education, with similar patterns observed in 2003 and 2008. Prevalence declined across all education categories after 2008. Estimates among children of mothers with higher education were consistently low across survey rounds (Table 1).

Table 1
Severe Wasting Prevalence (%, 95% CI) among Children Under Five in Ghana by Sex, Age, Residence, Wealth Quintile, and Maternal Education, 1988–2022

Year	1988 (DHS) (95% CI)	1998 (DHS) (95% CI)	2003 (DHS) (95% CI)	2006 (MICS) (95% CI)	2008 (DHS) (95% CI)	2011 (MICS) (95% CI)	2014 (DHS) (95% CI)	2017 (MICS) (95% CI)	2022 (DHS) (95% CI)
Sex									
Male	2.8(1.9–4.1)	3.3(2.5–4.3)	3.0(2.2-4.0)	2.0(1.4–2.9)	2.5(1.7–3.6)	1.9(1.2–2.8)	0.8(0.4–1.5)	1.3(0.9–1.8)	1.4(0.9–2.2)
Female	1.4(0.8–2.4)	1.7(1.1–2.5)	2.6(1.9–3.7)	1.5(1.0-2.4)	2.4(1.7–3.4)	0.9(0.6–1.5)	0.6(0.2–1.5)	1.0(0.7–1.5)	0.9(0.5–1.8)
Place of residence									
Urban	1.1(0.5–2.3)	1.6(0.8–3.2)	3.3(2.2–4.8)	1.4(0.8–2.3)	1.6(1.0-2.7)	1.5(0.9–2.5)	0.6(0.2–1.3)	0.8(0.5–1.3)	0.8(0.4–1.5)
Rural	2.5(1.8–3.6)	2.8(2.2–3.4)	2.6(1.8–3.6)	2.0(1.5–2.8)	2.9(2.2–3.9)	1.4(1.0-1.9)	0.8(0.4–1.6)	1.4(0.9–2.1)	1.5(0.9–2.6)
Age of Child									
0 to 5 months	1.2(0.3–4.6)	5.0(3.0-8.3)	6.2(3.8–9.9)	3.0(1.7–5.3)	5.8(3.4–9.7)	3.6(2.2-6.0)	1.6(0.6–4.4)	4.4(2.7–7.1)	2.6(0.7–8.6)
6 to 11 months	4.1(2.3–7.1)	5.7(3.5–9.3)	6.7(4.5–9.9)	4.0(1.9–8.5)	6.7(4.2–10.5)	1.9(1.1–3.4)	1.9(0.8–4.7)	2.7(1.7–4.2)	2.3(1.1-5.0)
12 to 23 months	2.7(1.7–4.1)	3.6(2.3–5.4)	2.5(1.5–4.3)	2.0(1.1–3.5)	3.6(2.3–5.7)	1.9(0.9–3.7)	1.1(0.5–2.4)	1.7(1.0-2.9)	1.7(0.8–3.5)
24 to 35 months	0.5(0.2–1.6)	1.3(0.6-3.0)	1.8(1.0-3.1)	1.7(0.9–3.3)	0.9(0.4–2.1)	1.0(0.5–1.7)	0.5(0.1–1.8)	0.3(0.1–0.8)	0.8(0.4–1.6)
36 to 47 months	0.0(0.0–0.0)	0.9(0.3–2.1)	2.4(1.2–4.7)	1.0(0.4–2.2)	0.6(0.2–1.9)	0.4(0.1–1.1)	0.1(0.0-0.4)	0.1(0.1–0.3)	0.3(0.1–0.9)
48 to 59 months	(-)	0.6(0.2–2.1)	0.9(0.3–2.1)	0.6(0.2-2.0)	0.9(0.3–2.2)	1.0(0.3–3.8)	0.1(0.0-0.8)	0.2(0.1–0.5)	0.6(0.1–2.3)
Economic status									
Wealth Quintile 1	(-)	3.9(2.9–5.3)	3.4(2.3–4.9)	2.6(1.6–4.2)	3.2(2.1–4.8)	1.3(0.9–1.9)	1.1(0.6–2.1)	1.9(1.2–3.1)	1.5(0.9–2.5)
Wealth Quintile 2	(-)	1.7(0.9–3.2)	2.5(1.4–4.2)	2.1(1.3–3.4)	2.8(1.8–4.4)	1.8(1.0-3.2)	1.2(0.4–3.3)	1.0(0.6–1.7)	1.7(0.7–4.4)
Wealth Quintile 3	(-)	3.0(1.9–4.7)	2.5(1.4–4.5)	1.2(0.5-3.0)	2.7(1.5–4.8)	2.1(1.0-4.2)	0.5(0.1–1.7)	1.4(0.7–2.7)	0.1(0.0-0.3)
Wealth Quintile 4	(-)	1.5(0.7–3.3)	3.0(1.8–5.2)	1.5(0.7-3.0)	1.7(0.9–3.3)	0.9(0.5–1.8)	0.3(0.1–1.2)	0.8(0.4–1.5)	1.6(0.6-4.0)
Wealth Quintile 5	(-)	1.4(0.5–3.5)	2.4(1.2–4.6)	1.1(0.4–2.9)	1.3(0.5–3.4)	0.8(0.3–2.2)	0.4(0.1–2.5)	0.4(0.2–0.9)	0.7(0.2–2.2)
Mother's Education									
No Education	2.5(1.5-4.0)	3.8(2.9–5.1)	3.3(2.4–4.5)	2.6(1.8–3.8)	3.9(2.7–5.5)	1.8(1.1–2.8)	1.0(0.6–1.9)	2.0(1.1–3.6)	1.0(0.6–1.7)

Year	1988 (DHS) (95% CI)	1998 (DHS) (95% CI)	2003 (DHS) (95% CI)	2006 (MICS) (95% CI)	2008 (DHS) (95% CI)	2011 (MICS) (95% CI)	2014 (DHS) (95% CI)	2017 (MICS) (95% CI)	2022 (DHS) (95% CI)
Sex									
Primary Education	1.9(1.2-3.0)	2.0(1.1–3.7)	2.4(1.5–3.8)	2.2(1.3–3.8)	2.2(1.3–3.6)	1.1(0.6–1.9)	1.3(0.6–2.9)	1.3(0.8–2.1)	1.6(0.6–4.1)
Higher Education	(-)	1.9(0.2–14.1)	0.0(0.0–0.0)	(-)	0.0(0.0–0.0)	(-)	0.0(0.0–0.0)	0.0(0.0–0.0)	0.3(0.0–2.0)

Discussion

This study examined long-term trends and inequalities in severe wasting among children under five years in Ghana, using harmonised nationally representative survey estimates spanning 1988 to 2022 inclusive. Severe wasting prevalence declined overall across the study period, although the pattern was not uniformly downward and included short term fluctuations. Prevalence increased during earlier survey rounds, peaked in the early 2000s, and declined more clearly after 2008, remaining relatively low in recent years. Despite overall improvement, substantial and persistent inequalities were observed. Severe wasting burden remained consistently higher among rural children, males, younger age groups, children from poorer households, and children of mothers with no formal education. Regions in northern Ghana often recorded higher prevalence than southern and more urbanised regions. These findings indicate that national reductions have not translated into uniform risk reduction across population subgroups, consistent with similar studies in Ghana [21, 29].

The overall decline with intermittent increases aligns with broader evidence that acute malnutrition indicators are more variable over time than chronic indicators [41]. Wasting prevalence fluctuates more than stunting due to its sensitivity to short term shocks in food access, disease burden, insecurity, and household vulnerability [41–45]. Increases observed in the early 2000s, and mid period survey rounds may reflect episodic food system stress, infectious disease exposure, or measurement variation [38, 42, 46]. The decline observed after 2008 coincided with increased attention to integrated child health and nutrition interventions in Ghana, including district-level delivery of combined nutrition-specific and nutrition-sensitive programmes [47, 48]. However, these interventions had variable subnational coverage and are unlikely to fully explain national trends observed in DHS data, particularly as DHS surveys are not designed to evaluate programme impact. Rather, the decline likely reflects broader improvements in health systems, nutrition services, and socioeconomic conditions over time.

The higher prevalence observed among male children is consistent with prior research, suggesting greater biological vulnerability among boys, potentially related to differences in immune function and increased susceptibility to infections compared with girls [49, 50]. The higher prevalence among infants aged 6–11 months corresponds with the recognised complementary feeding transition period, when infection exposure increases, maternally derived immunity declines, and dietary adequacy may be reduced [21, 27, 41].

Inequality patterns across wealth, maternal education, and residence are consistent with conceptual frameworks that position acute child undernutrition within broader socioeconomic and environmental constraints [51]. These associations align with pathways linking poverty, food insecurity, limited health service access, and constrained caregiving resources to acute malnutrition risk [22, 29]. Rural disadvantage persisted across most survey rounds, likely reflecting differences in service availability, infrastructure, market access, and exposure to livelihood shocks [24, 26]. As most rural populations in Ghana rely on agriculture, climate change and increasing variability in extreme weather events pose significant challenges to food security, particularly in northern Ghana [16, 52]

By geography, regions in northern Ghana consistently showed higher prevalence across decades, indicating that national averages mask subnational inequalities, consistent with similar studies [26, 29]. Although subgroup gaps narrowed in later survey rounds, disparities persisted, suggesting that progress has not been evenly shared and reflecting pro-rich and urban patterns of improvement reported elsewhere [22, 28].

Building on these findings, this study highlights several key implications for policy and practice. Nutrition and child health strategies could be further strengthened by complementing national approaches with more targeted interventions focused on high burden regions, poorer households, and rural communities [40]. Given resource constraints, the consistently higher prevalence among infants in the complementary feeding age range provides a rationale for prioritising interventions at these specific ages [12, 13, 53]. Monitoring systems could also benefit from routinely reporting disaggregated wasting indicators and applying harmonised estimation approaches to improve comparability over time [31, 54]. Planning and resource allocation informed by equity-stratified data, rather than national averages alone, may enhance targeting efficiency and support progress towards global nutrition targets, including reducing wasting prevalence to below 5% by 2030 [55].

Strengths and limitations

This study uses harmonised nationally representative survey estimates spanning more than three decades, enabling extended assessment of trends and inequalities in severe wasting among children under five in Ghana. The use of reanalysed Demographic and Health Surveys and Multiple Indicator Cluster Surveys supports cross-round comparability through standardised anthropometric definitions, processing, and estimation procedures. Survey weights and design-based variance estimation were applied, and confidence intervals were reported for all prevalence estimates to support uncertainty-aware interpretation. An explicit equity framework guided disaggregated analyses by region, residence, wealth, maternal education, child age, and sex.

The study has some limitations. It is based on repeated cross-sectional surveys and does not permit causal inference. Although harmonisation improves comparability, residual differences in measurement conditions, sampling variation, and field procedures may affect estimates [38]. The use of harmonised country-level estimates rather than microdata limited multivariable and decomposition analyses. Nevertheless, this analysis provides the longest harmonised assessment to date of severe wasting trends and inequalities in Ghana and highlights the need for continued equity-focused surveillance and targeted intervention.

Conclusion

This study of severe wasting among children under five in Ghana from 1988 to 2022 shows overall long-term improvement, alongside persistent and patterned inequalities. Although declining prevalence suggests progress in child nutrition and health responses, fluctuations across survey rounds indicate ongoing vulnerability to shocks and instability in acute nutrition outcomes. Inequalities across household wealth, maternal education, place of residence, child age, sex, and region highlight the multidimensional nature of severe wasting risk and suggest that gains have been unevenly distributed.

Financial constraints, including reductions in international development funding, may limit short-term capacity to sustain nutrition and child health interventions in Ghana and across the African continent [56]. In this context, addressing severe wasting more effectively will require doing more with limited resources, with targeted, equity-informed approaches becoming increasingly important. Strengthening complementary feeding support, early childhood infection prevention, and access to basic health and nutrition services remains particularly important for younger children. Improving routine monitoring through harmonised and disaggregated wasting indicators may enable more precise targeting and better

tracking of subgroup risk. Region-specific and vulnerability-focused strategies, alongside national nutrition policies, are likely to be critical for reducing persistent disparities and sustaining progress towards global child nutrition targets.

Declarations

Competing interests

The authors declare no competing interests.

Authors' contributions

Abdul-Wahab Inusah led the study, conceptualized it, and coordinated the field investigation.

Moses Nwuzoh, Victor Mogre, Michael G. Head and Shamsu-Deen Ziblim contributed to the study's conceptualization, design, and data collection. Abdul-Wahab Inusah, Victor Mogre, Michael G. Head and Shamsu-Deen Ziblim conducted the data analysis and interpretation. Victor Mogre provided technical guidance, academic supervision, and critical review of the manuscript.

Abdul-Wahab Inusah and Moses Nwuzoh drafted the initial manuscript, while Victor Mogre, Michael G. Head and Shamsu-Deen Ziblim provided substantive revisions and editorial inputs. All authors read and approved the final manuscript.

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Declarations

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Ethics approval

This study involved secondary analysis of publicly available, anonymised Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) data for Ghana (1988–2022). Ethical approval for the original surveys was obtained from the Ghana Health Service Ethical Review Committee and the ICF Institutional Review Board. No additional ethical approval was required for this secondary analysis of de-identified data.

Consent to participate

Informed consent was obtained from all participants by the original survey implementers prior to data collection. For participants under the age of 18 years, informed consent was obtained from a parent or legal guardian, in accordance with procedures approved by the Ghana Health Service Ethical Review Committee and the ICF Institutional Review Board. Further details on DHS ethical procedures are available at: https://dhsprogram.com/methodology/Protecting-the-Privacy-of-DHS-Survey-Respondents.cfm

Consent for publication

Not applicable.

Clinical trial number

Not applicable.

Competing interests

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References

1. UNICEF. Severe wasting: An urgent threat to child survival. UNICEF. https://www.unicef.org/child-alert/severe-wasting (accessed 18 Mar 2026.
2. World Health Organization. *Severe wasting among children under 5 years of age (Indicator-Metadata-Registry: IMR Code 3410)*. World Health Organization; accessed 15 Feb 2026. https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3410 (accessed 15 Feb 2026).
3. World Health Organization. Joint child malnutrition estimates (UNICEF-WHO-World Bank). World Health Organization; updated 2026. https://www.who.int/data/gho/data/themes/topics/joint-child-malnutrition-estimates-unicef-who-wb. (accessed 15 Feb 2026).
4. Global Nutrition Cluster. *Joint statement on child wasting crisis*. https://www.nutritioncluster.net/news-and-events/news/joint-statement-child-wasting-crisis (accessed 15 Feb 2026).
5. Sulistyaningsih E, Wulandari ESP, Marchianti ACN. Determinant factors of under five years severely wasted children in rural and sub urban areas of Indonesia. J Educ Health Promot. 2024;13:242. https://pmc.ncbi.nlm.nih.gov/articles/PMC11410288/. (accessed 15 Feb 2026). doi:10.4103/jehp.jehp_108_24.
6. United Nations. *Child deaths from wasting are predictable and preventable: WHO chief*. UN News; 20 Nov 2023. https://news.un.org/en/story/2023/11/1143787 (accessed 15 Feb 2026).
7. UNICEF USA. *What is child wasting?* UNICEF USA. https://www.unicefusa.org/stories/what-child-wasting (accessed 15 Feb 2026).
8. World Bank. *Nutrition overview*. World Bank; https://www.worldbank.org/en/topic/nutrition/overview (accessed 15 Feb 2026).
9. Pike V, Bradley B, Rappaport AI, Zlotkin S, Perumal N. A scoping review of research on policies to address child undernutrition in the Millennium Development Goals era. Public Health Nutr. 2021;24:4346–57. https://pmc.ncbi.nlm.nih.gov/articles/PMC10195300/. (accessed 15 Feb 2026). doi:10.1017/S1368980021001890.
10. Huicho L, Vidal-Cárdenas E, Akseer S, Brar S, Conway K, Islam M, et al. Drivers of stunting reduction in Peru: a country case study. Am J Clin Nutr. 2020;112(Suppl 2):S816–29. 10.1093/ajcn/nqaa164. https://pmc.ncbi.nlm.nih.gov/articles/PMC7487430/. (accessed 15 Feb 2026).
11. Pan American Health Organization. *Global child malnutrition estimates dashboard*. Pan American Health Organization/World Health Organization. https://www.paho.org/en/enlace/global-child-malnutrition-estimates-dashboard (accessed 15 Feb 2026).
12. *Global Nutrition Report* 2021: Assessing progress towards the global nutrition targets. Global Nutrition Report 2021. https://globalnutritionreport.org/reports/2021-global-nutrition-report/assessing-progress-towards-the-global-nutrition-targets/ (accessed 15 Feb 2026).
13. *Global Nutrition Report* 2020: Inequalities in the global burden of malnutrition. Global Nutrition Report 2020. https://globalnutritionreport.org/reports/2020-global-nutrition-report/inequalities-global-burden-malnutrition/ (accessed 15 Feb 2026).

14. UNICEF. *Malnutrition: data and trends*. UNICEF; https://data.unicef.org/topic/nutrition/malnutrition/ (accessed 16 Feb 2026).
15. World Health Organization, United Nations Children's Fund, World Bank. *Levels and trends in child malnutrition: UNICEF/WHO/World Bank Group joint child malnutrition estimates: key findings of the 2023 edition*. World Health Organization; 23 May 2023. https://www.who.int/publications/i/item/9789240073791 (accessed 15 Feb 2026).
16. Asebe HA, Asmare ZA, Mare KU, Kase BF, Tebeje TM, Asgedom YS, Shibeshi AH, Lombebo AA, Sabo KG, Fente BM, Bezie MM, Seifu BL. The level of wasting and associated factors among children aged 6–59 months in sub-Saharan African countries: multilevel ordinal logistic regression analysis. Front Nutr. 2024;11:1336864. 10.3389/fnut.2024.1336864. . (accessed 15 Feb 2026).
17. Food and Agriculture Organization of the United Nations. The State of Food Security and Nutrition in the World 2023: Towards food security and improved nutrition for all. FAO. 2023. https://openknowledge.fao.org/items/ea9cebff-306c-49b7-8865-2aef3bfd25e2 (accessed 15 Feb 2026).
18. WHO. (2025). *Global nutrition targets 2025: Wasting policy brief* (service coverage and system gaps sections). https://www.who.int/publications/i/item/WHO-NMH-NHD-14.8
19. Budu E, Armah-Ansah EK, Gyawu NO, Tweneboah R, Sekyi-Dickson K, Oga-Omenka C, Otchi EH. Factors associated with inequalities in malnutrition among children in Ghana using the 2022 GDHS and WHO HEAT framework. BMC Public Health. 2025;25:2954. 10.1186/s12889-025-24356-X. https://pmc.ncbi.nlm.nih.gov/articles/PMC12382195/. (accessed 15 Feb 2026).
20. Ghana Statistical Service (GSS). Ghana Health Service & ICF. (2023). *Ghana Demographic and Health Survey 2022* (child nutrition indicators section). https://dhsprogram.com/publications/
21. Addae HY, Sulemana M, Yakubu T, Atosona A, Tahiru R, et al. Low birth weight, household socio-economic status, water and sanitation are associated with stunting and wasting among children aged 6–23 months: results from a national survey in Ghana. PLoS ONE. 2024;19(3):e0297698. 10.1371/journal.pone.0297698. https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0297698. (accessed 15 Feb 2026).
22. Novignon J, Aboagye E, Agyemang OS, Aryeetey G. Socioeconomic-related inequalities in child malnutrition: evidence from the Ghana Multiple Indicator Cluster Survey. Health Econ Rev. 2015;5:34. 10.1186/s13561-015-0072-4. https://pmc.ncbi.nlm.nih.gov/articles/PMC4658346/. (accessed 15 Feb 2026).
23. Darteh EKM, Acquah E, Darteh F. Why are our children wasting? Determinants of wasting among under-5s in Ghana. Nutr Health. 2017;23(3):159–66. https://journals.sagepub.com/doi/10.1177/0260106017722924. accessed 16 Feb 2026). doi:10.1177/0260106017722924.
24. Addae HY, Tahiru R, Alhassan A, Fuseini AG, Iddrisu M, Mensah W, et al. Trends and determinants of the triple burden of malnutrition in Ghana: analyses of two decades of demographic and health survey datasets. PLOS Glob Public Health. 2025;5(9):e0005078. 10.1371/journal.pgph.0005078. https://journals.plos.org/globalpublichealth/article?id=10.1371/journal.pgph.0005078. (accessed 15 Feb 2026).
25. Anku EK, Duah HO. Predicting and identifying factors associated with undernutrition among children under five years in Ghana using machine learning algorithms. PLoS ONE. 2024;19(2):e0296625. 10.1371/journal.pone.0296625. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0296625. (accessed 15 Feb 2026).
26. Osborne A, Bangura C, Sesay U, Ahinkorah BO, et al. Trends and inequalities in stunting and underweight among children aged 0–59 months in Ghana, 1993–2022. Int J Equity Health. 2025;24:168. 10.1186/s12939. https://pmc.ncbi.nlm.nih.gov/articles/PMC12153175/. (accessed 15 Feb 2026). -025-02519-X.
27. Boah M, Azupogo F, Amporfro DA, Abada LA. The epidemiology of undernutrition and its determinants in children under five years in Ghana. PLoS ONE. 2019;14(7):e0219665. 10.1371/journal.pone.0219665. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0219665. (accessed 16 Feb 2026).

28. Sewor C, Jayalakshmi R. Trends of risk factors associated with childhood stunting and anaemia in Ghana: evidence from the Demographic Health Survey and Multiple Indicator Cluster Survey (2003–2017). Public Health Nutr. 2024;27(1):e29. 10.1017/S1368980023002951.
29. Budu E, Armah-Ansah E, Gyawu N, Tweneboah R, Dickson K, Omenka C, Otchi E. Factors associated with inequalities in malnutrition among children in Ghana using the 2022 GDHS and WHO HEAT framework. BMC Public Health. 2025;25:24356. 10.1186/s12889-025-24356-X.
30. Kuwornu JP, Amoyaw J, Manyanga T, Cooper EJ, Donkoh E, Nkrumah A. Measuring the overall burden of early childhood malnutrition in Ghana: a comparison of estimates from multiple data sources. Int J Health Policy Manag. 2020;11(7):1035–46. 10.34172/ijhpm.2020.253. https://pmc.ncbi.nlm.nih.gov/articles/PMC9808187/. (accessed 16 Feb 2026).
31. World Health Organization. *Joint Child Malnutrition Estimates (JME).* WHO Nutrition and Food Safety; https://www.who.int/teams/nutrition-and-food-safety/monitoring-nutritional-status-and-food-safety-and-events/joint-child-malnutrition-estimates (accessed 16 Feb 2026).
32. World Bank. Child malnutrition: data and trends. World Bank.https://datatopics.worldbank.org/child-malnutrition/ (accessed 16 Feb 2026).
33. The DHS, Program. *Survey search: Ghana* [methodology]. ICF; https://dhsprogram.com/methodology/survey-search.cfm?SrvyTp=country&ctry_id=14&pgtype=main (accessed 16 Feb 2026).
34. World Bank. *Microdata: Ghana 2022 Demographic and Health Survey (DHS)* [dataset]. World Bank Microdata Library. https://microdata.worldbank.org/index.php/catalog/6122 (accessed 16 Feb 2026).
35. UNICEF. *Ghana Multiple Indicator Cluster Survey (MICS) reports.* UNICEF Ghana; https://www.unicef.org/ghana/reports/ghana-multiple-cluster-indicator-survey (accessed 16 Feb 2026).
36. The DHS, Program. *DHS Analytical Studies No. 77: A guide to DHS statistics and demographic methods.* ICF; 2024. https://dhsprogram.com/pubs/pdf/OD77/OD77.pdf (accessed 16 Feb 2026).
37. Centers for Disease Control and Prevention. *CDC SAS programs for WHO growth charts.* CDC; https://www.cdc.gov/growth-chart-training/hcp/computer-programs/sas-who.html (accessed 16 Feb 2026).
38. Corsi DJ, Perkins JM, Subramanian SV. Child anthropometry data quality from Demographic and Health Surveys, Multiple Indicator Cluster Surveys, and National Nutrition Surveys in the West Central Africa region: are we comparing apples and oranges? Glob Health Action. 2017;10(1):1328185. 10.1080/16549716.2017.1328185. https://pmc.ncbi.nlm.nih.gov/articles/PMC5496063/. (accessed 16 Feb 2026).
39. UNICEF. Collecting data on early childhood development in household surveys. UNICEF. Feb 2024. https://data.unicef.org/wp-content/uploads/2024/02/Collecting-data-on-ECD-in-Household-Surveys_Feb-2024.pdf (accessed 16 Feb 2026).
40. World Health Organization. State of inequality: reproductive, maternal, newborn and child health. WHO. 2015. https://www.who.int/docs/default-source/gho-documents/health-equity/state-of-inequality/state-of-inequality-reproductive-maternal-new-born-and-child-health.pdf (accessed 16 Feb 2026).
41. The Lancet. Maternal and child nutrition series. London: The Lancet. 2013. Available: https://www.thelancet.com/series-do/maternal-and-child-nutrition
42. UNICEF, World Health Organization, World Bank Group., *Joint child malnutrition estimates: standard methodology 2024*. New York: UNICEF; 2024. Available: https://data.unicef.org/wp-content/uploads/2024/09/JME-Standard-methodology-2024.pdf
43. Kohlmann K, Sudfeld CR, Garba S, Guindo O, Grais RF, Isanaka S. Exploring the relationships between wasting and stunting among a cohort of children under two years of age in Niger. BMC Public Health. 2021;21(1):1713. 10.1186/s12889-021-11689-6.

44. Akombi BJ, Agho KE, Hall JJ, Wali N, Renzaho AMN, Merom D. Stunting, wasting and underweight in sub-Saharan Africa: a systematic review. Int J Environ Res Public Health. 2017;14(8):863. 10.3390/ijerph14080863. Available:https://pmc.ncbi.nlm.nih.gov/articles/PMC5580567/
45. Global Nutrition Report. Africa nutrition profile – Country nutrition profiles. Bristol, UK: Global Nutrition Report. 2024. Available: https://globalnutritionreport.org/resources/nutrition-profiles/africa/
46. Kuwornu JP, Amoyaw J, Manyanga T, Cooper EJ, Donkoh E, Nkrumah A. Measuring the overall burden of early childhood malnutrition in Ghana: a comparison of estimates from multiple data sources. Int J Health Policy Manag. 2022;11(7):1035–1046. 10.34172/ijhpm.2020.253. Available:https://pmc.ncbi.nlm.nih.gov/articles/PMC9808187/
47. O'Leary M, Owusu R, Mildon A. Integrated delivery of nutrition-specific and nutrition-sensitive interventions in Ghana to address child malnutrition. Eur J Nutr Food Saf. 2015;5(5):701–702. 10.9734/EJNFS/2015/21038. Available: https://journalejnfs.com/index.php/EJNFS/article/view/974
48. Gongwer CR, Aryeetey R. Implementing nutrition interventions in Ghana at district level: gaps and opportunities. Afr J Food, Agric Nutr Dev. 2014;14(2): [unpaginated]. Available: https://ugspace.ug.edu.gh/server/api/core/bitstreams/0123b577-2c79-41c1-915c-59a011d5bf13/content
49. Thurstans S, Sessions N, Dolan C, Sadler K, Cichon B, Isanaka S, Roberfroid D, Stobaugh H, Webb P, Khara T. The relationship between wasting and stunting in young children: a systematic review. Matern Child Nutr. 2021;18(1):e13246. Available:https://pmc.ncbi.nlm.nih.gov/articles/PMC8710094/
50. Thurstans S, Opondo C, Seal A, Wells JC, Khara T, Dolan C, Briend A, Myatt M, Garenne M, Mertens A, Sear R, Kerac M. *Understanding sex differences in childhood undernutrition: A narrative review*. Nutrients. 2022;14(5):948. 10.3390/nu14050948. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC8912557/
51. UNICEF. The conceptual framework of malnutrition. New York: United Nations Children's Fund. 2020. Available: https://www.unicef.org/documents/conceptual-framework-nutrition
52. Boxall J, Bird A, Brown A, Head M, Abdulai MM, Shani AK, Mogre V, Gaa PK. Exploring women's perspectives on food insecurity and the impacts of climate change in the Karaga district of Northern Ghana: a community-based mixed-methods study. Research Square [Preprint]. 2026 [cited 2026 Mar 25]. Available from: https://doi.org/10.21203/rs.3.rs-8444462/v1
53. World Health Organization. Complementary feeding. Geneva: WHO. 2021. Available: https://www.who.int/health-topics/complementary-feeding#tab=tab_1
54. World Health Organization. WHO Health Equity Monitor. Geneva: World Health Organization. 2024. Available: https://www.who.int/data/inequality-monitor
55. World Health Organization. Global targets 2030: Wasting. Geneva: World Health Organization. 2020. Available: https://www.who.int/teams/nutrition-and-food-safety/global-targets-2030
56. Gutema EA, Ousman SK, Tamirat A, Tesemma M, Alemu ZA. Fund contraction challenges for supplies for maternal and newborn health services in low- and middle-income countries: a scoping review. BMC Public Health. 2025;25:4351. 10.1186/s12889-025-25721-6. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC12751249/

Figures

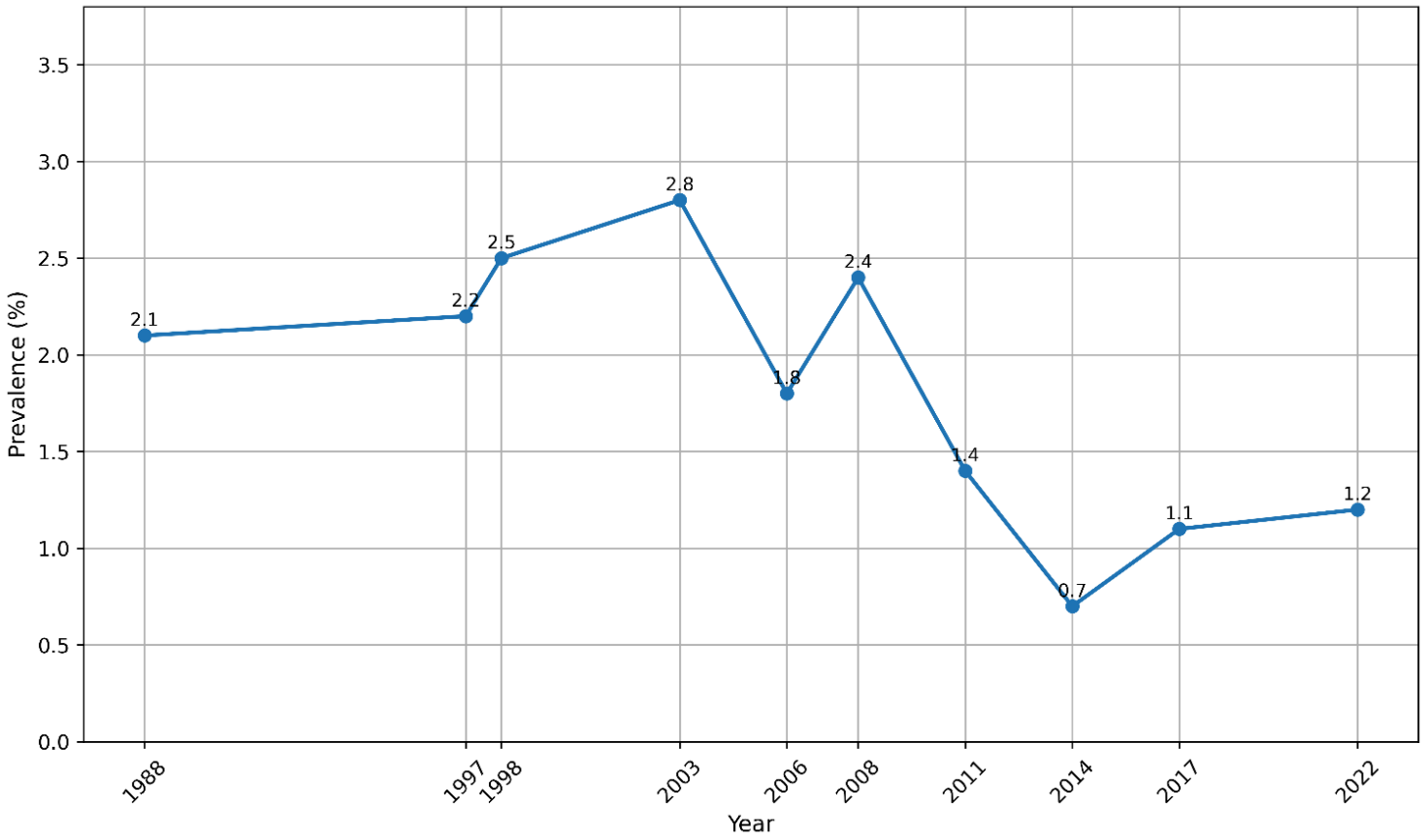
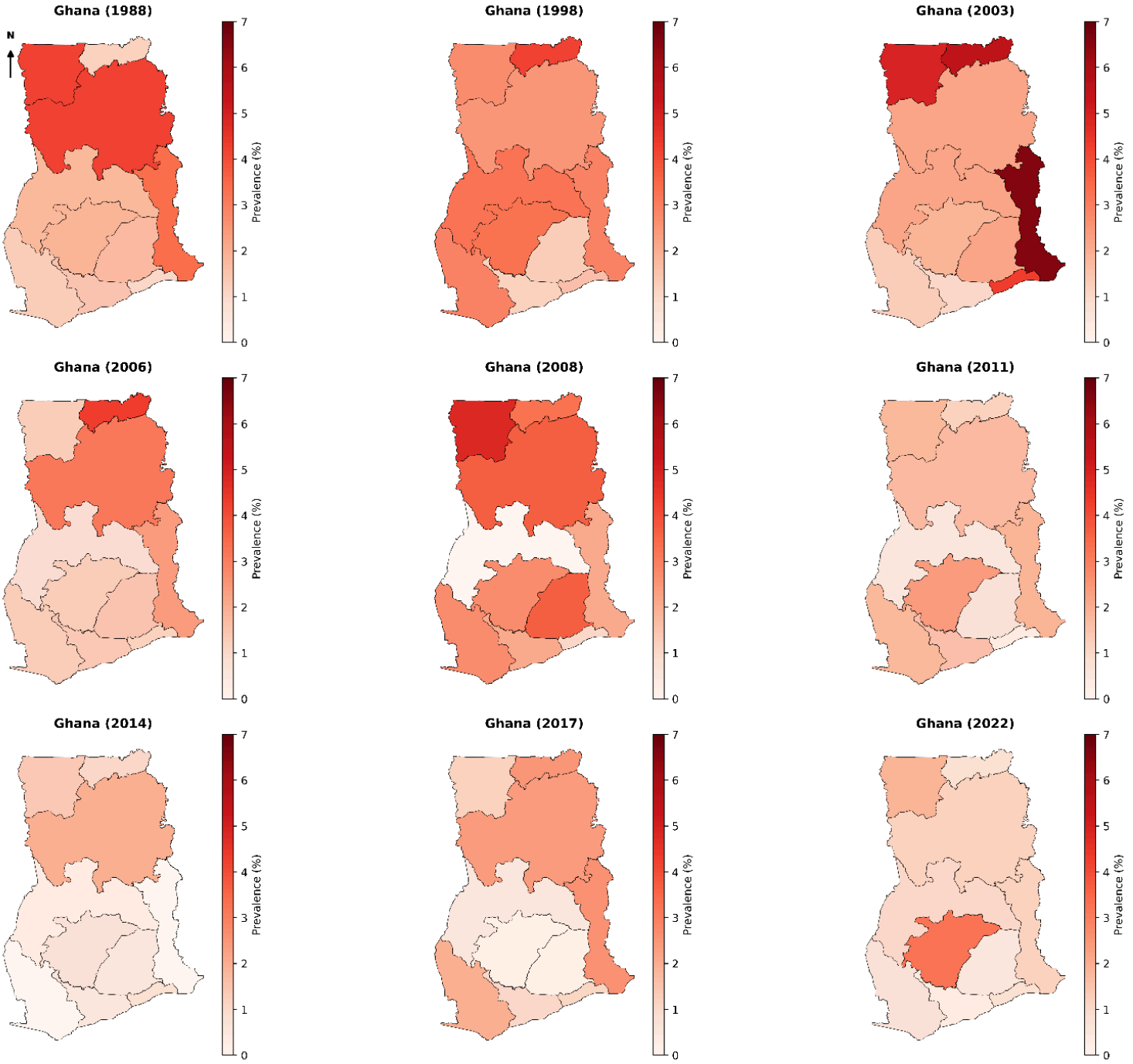


Figure 1

Trends in Severe Wasting Prevalence and Survey Sample Sizes among Children Under Five in Ghana, 1988–2022



Data Source: The Joint Malnutrition Estimates Working Group (UNICEF, World Health Organization, and World Bank Group), Country-Level National Survey Estimates, 1988–2022.

Figure 2

Regional Inequalities of Severe Wasting Prevalence (%, 95% CI) among Children Under Five in Ghana, 1988–2022