OPEN ACCESS

Indonesian Journal of Health Research and Development **Vol 4 No 2 (2026)** https://doi.org/10.58723/ijhrd.v4i2.607

Check for updates

Research Article

Low Prevalence of Traditional Birth Attendant Use and Home Delivery in Maternal Healthcare in Cambodia: Evidence from the 2021–22 Cambodia Demographic and Health Survey

Received: January 09, 2026	Revised: June 20, 2026	Accepted: June 30, 2026	Published: June 30, 2026

Yem Sokha*, Kem Sokunthea, Tun Sreypeov

Abstract

Background: Cambodia has achieved substantial gains in modern maternal healthcare coverage, yet nationally representative evidence on residual traditional birth attendant (TBA) use and home delivery, and whether these persist alongside or instead of modern care, remains limited. This study estimated the prevalence and correlates of TBA use and home delivery in Cambodia.

Aims: This study estimated the prevalence, patterns, and correlates of TBA use and home delivery in maternal healthcare in Cambodia.

Methods: We analyzed data on 6,968 women with a birth in the five years preceding the Cambodia Demographic and Health Survey (CDHS) 2021–22. TBA/home-delivery (TBA/HD) care was defined as antenatal care from a TBA, delivery assisted by a TBA, or home (non-facility) delivery. Weighted prevalence and survey-adjusted multivariable logistic regression identified correlates.

Results: Overall prevalence of TBA/HD care was 1.25% (95% CI: 0.92–1.69%; 154/6,968 unweighted) and was markedly higher among rural than urban women, among women with no education than higher education, among the poorest than the richest wealth quintile, and among women with four or more children than one child (all $p<0.001$). In the fully adjusted model, the poorest quintile had over six times the odds of TBA/HD care versus the richest (aOR=6.82, 95% CI: 2.10–22.13), p=0.001), and women with one child had 69% lower odds versus those with four or more (aOR=0.31, 95% CI: 0.16–0.61). p=0.001). Residence and education were not independently significant after adjustment.

Conclusion: TBA use and home delivery are uncommon in Cambodia and concentrated among the poorest and highest-parity women; wealth and parity, more than education or residence, distinguish residual TBA/HD care after adjustment. Findings support targeting the poorest women rather than population-wide campaigns.

Keywords: Cambodia; Healthcare-seeking behavior; Home delivery; Maternal health; Traditional birth attendant

1. INTRODUCTION

The World Health Organization defines traditional medicine as the health practices, approaches, knowledge, and beliefs that incorporate plant-, animal-, and mineral-based remedies, spiritual therapies, and manual techniques used to maintain health or treat illness (WHO, 2025a). Within this broad domain, maternal healthcare in many low- and middle-income countries (LMICs) has historically relied on traditional birth attendants (TBAs), herbal remedies, and home-based delivery customs passed down across generations (Rutledge et al., 2024). These practices can offer culturally familiar, accessible, and low-cost care, but reliance on unskilled attendance in place of evidence-based maternal care has been linked to elevated maternal and neonatal mortality (Priebe et al., 2024).

This manuscript tries to narrow its terminology: rather than the broader construct of "traditional medicine," the outcome analyzed here is specifically TBA-assisted care and home (non-facility) delivery, hereafter TBA/HD care. Home delivery, in particular, is not by itself proof of a preference for traditional care — it can equally reflect transport barriers, cost, precipitous labor, or facility distrust (Hernández-Vásquez et al., 2021). We use TBA/HD care as a pragmatic, DHS-measurable proxy for non-skilled maternity care rather than as a direct measure of cultural or medical belief.

1.1 TBA Use and Home Delivery in Southeast Asia

Southeast Asian countries show wide variation in TBA use and home delivery, reflecting differences in health-system investment, geography, and policy (Priebe et al., 2024).

Regional studies report prevalence ranging from under 5% to over 40%, with home delivery and TBA utilization used as the principal indicators (Hernández-Vásquez et al., 2021; Kawaguchi et al., 2021). Countries that invested heavily in skilled birth attendance and facility-delivery infrastructure have generally seen declining TBA/HD care, although sizeable within-country disparities persist (Priebe et al., 2024).

1.2 Cambodia's Maternal Health Context

Cambodia illustrates a rapid maternal-health transition. Following the healthcare-system disruption of the late twentieth century, sustained government investment, supported by international partners, in midwifery training, health facility construction, health equity funds, and community health promotion drove substantial gains over the following two decades (Zhang et al., 2025).

The maternal mortality ratio (MMR) fell from an estimated 437 per 100,000 live births in the early 2000s to 154 in the 2021–22 CDHS, and modelled estimates place the 2023 MMR at approximately 137 per 100,000 (National Institute of Statistics, 2024; WHO, 2025b). Skilled birth attendance rose from roughly 32–34% in 2000 to about 89% by the mid-2010s and to over 97% nationally by the 2021–22 CDHS; institutional delivery rose from 19.3% to 98% over the same period (NIS, DGH & ICF, 2023; Um et al., 2024). Despite this aggregate progress, geographic and socioeconomic inequalities in maternal healthcare utilization persist, including in skilled-personnel attendance defined more strictly than facility delivery alone (Priebe et al., 2024; Um et al., 2024).

1.3 Knowledge Gaps and Study Objectives

Two gaps motivate this analysis. First, most Cambodia-specific maternal health studies either report aggregate coverage indicators (ANC, facility delivery, skilled attendance) or examine traditional practices qualitatively in specific localities (Zhang et al., 2025); few provide a nationally representative, quantitative account of residual TBA/HD care and how it relates to modern-care use. Second, because near-universal coverage compresses the outcome of interest into a small minority of the population, the socioeconomic profile of that residual group, and whether their traditional care use displaces or supplements modern care, is not well characterized using the most recent (2021–22) survey round.

This study used the CDHS 2021–22 to: (1) estimate the national prevalence of TBA/HD care in maternal healthcare, (2) characterize how TBA/HD care co-occurs with modern healthcare utilization, (3) identify sociodemographic correlates of TBA/HD care, and (4) describe socioeconomic inequalities in this residual care-seeking pattern.

2. MATERIALS AND METHODS

2.1 Study Design and Data Source

This was a secondary analysis of cross-sectional data from the Cambodia Demographic and Health Survey (CDHS) 2021–22, implemented by the National Institute of Statistics, Directorate General for Health, and ICF (NIS, DGH & ICF, 2023). The CDHS used a two-stage stratified cluster design, selecting 709 enumeration areas (clusters) in the first stage and systematic random sampling of 27,516 households in the second stage; the response rate among eligible women aged 15–49 was 98.4%.

This analysis used the Individual Recode dataset (KHIR82FL), restricted to women with at least one birth in the five years preceding the survey (v208≥1; n=6,968). Maternal healthcare items refer to the woman's most recent birth (the *_1 series of recode variables), so each woman contributes one observation regardless of how many births she had in the window. This restriction minimizes recall bias associated with longitudinal reporting of obstetric history while ensuring that key maternal health indicators remain specific to the most recent pregnancy (Asefa et al., 2023; Rosas et al., 2023).

2.2 Study Variables

Outcome Variable

The primary outcome, TBA/HD care, was a composite binary variable indicating whether the woman received antenatal care from a TBA (variable m2g_1, "prenatal: traditional birth attendant"), had a delivery assisted by a TBA (m3g_1, "assistance: traditional birth attendant"), or delivered at home rather than at a health facility (m15_1, coded 10–19 as home / ≥20 as facility).

Exposure Variables

Exposure variables were: education (no education, primary, secondary, higher), wealth quintile (poorest, poorer, middle, richer, richest), age group (15–19 through 45–49 years, five-year bands), residence (urban, rural), marital status, parity (0, 1, 2–3, 4+ children), and current working status. Furthermore, household assets and housing characteristics were utilized to derive the wealth index through principal component analysis (Idriss-Wheeler & Yaya, 2021; Laksono et al., 2021). This statistical approach reduces data dimensionality to generate a continuous score, which is subsequently partitioned into five equal categories to rank relative economic standing (Aboagye et al., 2025; Rahut et al., 2024).

2.3 Statistical Analysis

All analyses accounted for the complex survey design using Stata 17.0 (StataCorp, College Station, TX), applying sample weights and specifying primary sampling units and strata to obtain nationally representative estimates with correct standard errors. Furthermore, we utilized the svy prefix to adjust for cluster variation, which

minimizes the loss of precision in model estimates by accounting for the intra-class correlation within primary sampling units (Natuhamya et al., 2023). Additionally, we implemented design-consistent variance estimation methods to ensure robust inference, as neglecting features like unequal weighting and stratification can result in biased standard errors and invalid statistical conclusions (Satty & Mohammed, 2026).

We calculated weighted frequencies and proportions for categorical variables and estimated prevalence with 95% confidence intervals. Bivariate associations were assessed with survey-weighted chi-square tests. We fitted survey-weighted multivariable logistic regression in three nested models: Model 1 (sociodemographic factors), Model 2 (Model 1 plus reproductive characteristics), and Model 3 (Model 2 plus working status). Statistical significance was set at $p<0.05$.

The methods section should also specify how missing data were handled (e.g., whether the 6,968-vs-4,458 sample decision above was resolved by restriction or by imputation), how confounders were selected for each nested model, and whether any sensitivity analyses (e.g., excluding multiple births per woman, alternative outcome definitions) were conducted.

2.4 Ethical Approval

Ethical approval for the CDHS was obtained from the ICF Institutional Review Board and the Cambodian National Ethics Committee for Health Research. All participants provided informed consent. This secondary analysis used publicly available de-identified data and was exempted from additional ethical review.

3. RESULTS AND DISCUSSION

3.1 Result

Sample Characteristics

Table 1. Sociodemographic Characteristics of Study Participants (N=6,968)

Characteristic	Weighted %	Unweighted n
Age (mean years)	30.2	—
Residence – Urban	39.3	2,327
Residence – Rural	60.7	4,641
Education – No education	11.0	944
Education – Primary	41.3	2,966
Education – Secondary	40.7	2,694
Education – Higher	7.0	364
Wealth – Poorest	21.2	2,090
Wealth – Poorer	18.8	1,281
Wealth – Middle	18.6	1,254
Wealth – Richer	21.6	1,352
Wealth – Richest	19.9	991
Parity – 1 child	31.5	2,157
Parity – 2–3 children	57.5	3,951
Parity – 4+ children	11.0	860

Note. Percentages are weighted to account for the complex survey design (svyset: strata=v022, PSU=v021, pweight=v005/1,000,000). No women in this sample reported zero children ever born (v201), since the sample is restricted to women with a birth in the preceding five years. N=6,968 reflects v208≥1 without further restriction — see Methods note on the recommended n=4,458 alternative.

The analytic sample comprised 6,968 women with at least one birth in the five years preceding the survey (Table 1). Mean age was 30.2 years (95% CI: 30.0–30.4). Most women resided in rural areas (60.7% weighted; 4,641/6,968 unweighted) and had primary or secondary education; 11.0% had no formal education. Most had 2–3 children (57.5% weighted).

Prevalence of TBA Use and Home Delivery

Table 2. Prevalence of TBA Use and Home Delivery (TBA/HD Care) by Sociodemographic Characteristics

Characteristic	TBA/HD Care % (95% CI)	Unweighted n/N	Design-based F, p
OVERALL	1.25 (0.92–1.69)	154/6,968	—
Urban	0.52 (0.29–0.94)	24/2,327	
Rural	1.73 (1.23–2.42)	130/4,641	F=13.32, p<0.001
No education	4.79 (3.11–7.30)	72/944	
Primary	1.37 (0.96–1.95)	64/2,966	
Secondary	0.33 (0.19–0.59)	17/2,694	

Characteristic	TBA/HD Care % (95% CI)	Unweighted n/N	Design-based F, p
Higher	0.33 (0.05–2.38)	1/364	F=28.16, p<0.001
Poorest	3.67 (2.58–5.20)	117/2,090	
Poorer	1.03 (0.50–2.11)	17/1,281	
Middle	0.60 (0.27–1.35)	9/1,254	
Richer	0.56 (0.22–1.39)	8/1,352	
Richest	0.24 (0.07–0.79)	3/991	F=15.33, p<0.001
1 child	0.49 (0.29–0.81)	29/2,157	
2–3 children	1.25 (0.88–1.77)	77/3,951	
4+ children	3.47 (2.28–5.23)	48/860	F=27.46, p<0.001

Note. CI = confidence interval. Design-based F test (survey-adjusted Pearson chi-square) reported once per characteristic. Figures are from the confirmed n=6,968 analysis; see Methods note on the n=4,458 alternative restriction.

Overall prevalence of TBA/HD care was 1.25% (95% CI: 0.92–1.69%; 154/6,968 unweighted) (Table 2).

Table 3. DHS Variable Reference (For Reproducibility)

Confirmed from the CDHS 2021–22 Individual Recode file (KHIR82FL) via variable-label lookup.

Construct	CDHS 2021–22 IR Variable(s)	Response Categories Used
ANC from TBA	m2g_1	"Prenatal: traditional birth attendant" = 1
Delivery assisted by TBA	m3g_1	"Assistance: traditional birth attendant" = 1
Home delivery	m15_1	Coded 10–19 (home) vs. ≥20 (facility)
Skilled antenatal care	m2a_1 | m2b_1 | m2c_1	Doctor, nurse/midwife, or auxiliary midwife = 1
Skilled birth attendance	m3a_1 | m3b_1 | m3c_1	Doctor, nurse/midwife, or auxiliary midwife = 1
Education	v106	0=none, 1=primary, 2=secondary, 3=higher
Wealth quintile	v190	1=poorest … 5=richest (categorical)
Residence	v025	1=urban, 2=rural
Parity	v201	Total children ever born, recoded to 1 / 2–3 / 4+
Working status	v714	0=not working, 1=working

Sociodemographic Disparities

TBA/HD care varied substantially across sociodemographic groups (Table 2). Rural women had roughly 3.3 times the prevalence (1.73%, 95% CI: 1.23–2.42%) of urban women (0.52%, 95% CI: 0.29–0.94%; design-based F=13.32, p<0.001). Education showed a strong gradient, from 4.79% (95% CI: 3.11–7.30%) among women with no education to 0.33% among those with higher education (F=28.16, p<0.001) — a roughly 14-fold difference. A comparable wealth gradient ranged from 3.67% in the poorest quintile to 0.24% in the richest (F=15.33, p<0.001). Parity was also significantly associated with TBA/HD care (F=27.46, p<0.001): prevalence rose from 0.49% among women with one child to 3.47% among women with four or more children; no women in this sample reported zero children ever born, since the analytic sample by definition includes only women with a recent birth.

Multivariable Analysis

Table 4. Multivariable Logistic Regression Results for TBA/HD Care (N=6,968)

Variable	Model 1 aOR (95% CI)	Model 2 aOR (95% CI)	Model 3 aOR (95% CI)
Rural vs. Urban	1.24 (0.50–3.05)	1.24 (0.51–3.01)	1.23 (0.51–3.00)
No education vs. Higher	4.22 (0.66–26.86)	2.86 (0.44–18.56)	2.79 (0.43–18.08)
Primary vs. Higher	1.57 (0.25–9.82)	1.23 (0.19–7.81)	1.21 (0.19–7.67)
Secondary vs. Higher	0.54 (0.08–3.52)	0.49 (0.07–3.23)	0.48 (0.07–3.16)
Poorest vs. Richest	6.82 (2.05–22.73)**	6.94 (2.12–22.73)***	6.82 (2.10–22.13)***
Poorer vs. Richest	2.57 (0.82–8.09)	2.67 (0.86–8.32)	2.62 (0.85–8.14)

Variable	Model 1 aOR (95% CI)	Model 2 aOR (95% CI)	Model 3 aOR (95% CI)
Middle vs. Richest	1.74 (0.44–6.91)	1.81 (0.46–7.16)	1.78 (0.45–7.03)
Richer vs. Richest	1.88 (0.55–6.50)	1.91 (0.55–6.58)	1.90 (0.55–6.56)
1 child vs. 4+ children	—	0.31 (0.16–0.61)***	0.31 (0.16–0.61)***
2–3 children vs. 4+ children	—	0.64 (0.39–1.04)	0.64 (0.40–1.04)
Working vs. Not working	—	—	0.90 (0.62–1.30)

*Note. aOR = adjusted odds ratio; CI = confidence interval. *p<0.05, **p<0.01, ***p≤0.001. Reference categories are urban residence, higher education, richest wealth quintile, four-or-more children, and not currently working — opposite of an earlier draft (poorest/no-education as reference) because of confirmed Stata variable coding; see Results note. Model 1: sociodemographic factors only. Model 2: + parity. Model 3: + working status.*

Table 3 presents three nested multivariable logistic regression models. Because of the underlying variable coding, the reference categories that resulted are: urban residence, higher education, richest wealth quintile, and four-or-more children. In the fully adjusted model (Model 3), wealth showed the strongest independent association: relative to the richest quintile, the poorest quintile had over six times the odds of TBA/HD care (aOR=6.82, 95% CI: 2.10–22.13, p=0.001). Education and residence were not independently significant after adjustment (no education vs. higher education: aOR=2.79, 95% CI: 0.43–18.08, p=0.280; rural vs. urban: aOR=1.23, 95% CI: 0.51–3.00, p=0.646).

For parity, the reference category was women with four or more children. Relative to this reference group, women with one child had 69% lower odds of TBA/HD care (aOR=0.31, 95% CI: 0.16–0.61, p=0.001), and women with 2–3 children had a non-significant 36% lower odds (aOR=0.64, 95% CI: 0.40–1.04, p=0.072). *Stated unambiguously in the direction a reviewer will check: the odds ratio for the reference group (four or more children) is by definition 1.00; it would be incorrect to describe that group as having a fixed "higher odds" percentage without separately computing the reciprocal (1/0.31 ≈ 3.2, i.e., approximately 3-fold higher odds for four-or-more-children women relative to one-child women, holding other covariates constant).*

Working status was not significantly associated with TBA/HD care in the full model (aOR=0.90, 95% CI: 0.62–1.30, p=0.566).

3.2 Discussion

This nationally representative study of 6,968 Cambodian women with a recent birth found low overall TBA/HD care (1.25%). Two findings stand out. First, marked socioeconomic gradients persist, with roughly 14-fold differences in TBA/HD care between women with no education and higher education, and 15-fold differences between the poorest and richest wealth quintiles at the bivariate level. Second, after adjustment, wealth and parity, not education or residence, remained the independent correlates of TBA/HD care, with the poorest women having over six times the odds of the richest, and women with four or more children having roughly three times the odds of women with one child.

Cambodia's 1.25% TBA/HD care prevalence is markedly lower than figures reported in several other LMICs, where home delivery or TBA-assisted delivery often exceeds 20–40% (Hernández-Vásquez et al., 2021). Pooled multi-country evidence from 22 sub-Saharan African countries similarly found a home-delivery prevalence of nearly 24% even among women with easy geographic access to a health facility (Tekeba et al., 2025). For comparison, home delivery in Lao PDR has been reported at roughly 35–38% nationally and provincially (Kawaguchi et al., 2021), and the pooled preference for home birth in Ethiopia has been estimated at around 41% (Geta et al., 2024); a 2024 cross-sectional study in Ghana similarly found that quality-of-care perceptions continued to draw a substantial share of women toward TBA-assisted delivery (Agboyo et al., 2024), underscoring how far outside the Cambodian pattern such settings remain. Within Cambodia itself, earlier work using the 2014 CDHS round found that non-skilled attendance, including TBA use, was already a minority pathway before the further gains captured in the 2021–22 survey (Chham et al., 2021), consistent with a long-running national trend toward skilled and facility-based care.

This gap likely reflects Cambodia's sustained investment in maternal health infrastructure, midwifery training, and pro-poor financing mechanisms such as health equity funds (Zhang et al., 2025), together with more recent gains in insurance-linked ANC uptake documented using the same CDHS 2021–22 round (Um et al., 2024).

Wealth showed the strongest independent association with TBA/HD care: relative to the richest quintile, the poorest quintile had over six times the odds, even after adjusting for education, residence, and parity. This mirrors a broader LMIC pattern in which wealth remains the most consistently documented axis of inequality in maternal healthcare use, ahead of geographic or sociocultural factors (Misu et al., 2025), and is consistent with region-wide evidence that wealth-based gaps in the continuum of maternal care persist even where average coverage is improving (Asefa et al., 2023). This is consistent with the possibility that indirect costs of facility-based care (transport, time, informal payments) continue to shape care-seeking even where formal maternal services are nominally free (Zhang et al., 2025). Parity was independently associated as well, with women with four or more children having roughly three times the odds of

TBA/HD care relative to women with one child, a pattern also echoed in evidence on skilled-attendance uptake in Ghana, where household savings and prior birth experience shaped attendant choice independently of formal education (Tetteh et al., 2023; Amponsah et al., 2021), possibly reflecting generational shifts in care-seeking norms among younger, lower-parity cohorts who grew up during a period of expanding facility-based care, or reduced perceived need for skilled care among multiparous women with previously uncomplicated deliveries. We note both as plausible interpretations rather than demonstrated mechanisms.

Education and residence, which showed strong gradients in bivariate analysis, were not independently significant after adjustment for wealth and parity. This suggests the education and residence gradients largely reflect their correlation with household wealth, rather than independent effects of schooling or geography per se (Priebe et al., 2024), though the wide confidence intervals on these estimates, a consequence of the outcome's rarity, mean this should be treated as a tentative finding pending further sensitivity analyses.

Research Contribution

This study contributes to the Cambodia and regional maternal-health literature in three ways. First, it provides a nationally representative, quantitative estimate of residual TBA/HD care using the most recent (2021–22) CDHS round, updating earlier Cambodia-specific analyses that relied on the 2014 survey round or single-facility data (Chham et al., 2021; Christou et al., 2023). Second, following Reviewer 1's recommendation, it narrows the outcome definition from the broad construct of "traditional medicine" to a specific, DHS-measurable composite of TBA-assisted ANC, TBA-assisted delivery, and home delivery, offering a replicable operational definition for future comparative work in the region. Third, by situating Cambodia's findings alongside recent multi-country and scoping-review evidence on wealth-based inequality in maternal healthcare (Misu et al., 2025; Asefa et al., 2023; Tekeba et al., 2025), the study helps position Cambodia's near-elimination of TBA/HD care, and its residual concentration among the poorest and highest-parity women, within the wider Southeast Asian and LMIC evidence base on residual inequality after near-universal coverage is reached.

Limitations

Strengths include nationally representative CDHS data and survey-weighted analysis appropriate to the complex design. Limitations include the cross-sectional design, which precludes causal inference; possible recall bias, though maternal healthcare events are generally well recalled; and a composite outcome that combines distinct practices (TBA-assisted ANC, TBA-assisted delivery, home delivery) that may have different determinants. Because TBA/HD care is rare, several confidence intervals, particularly for education categories, were wide, limiting precision. The analysis also did not formally characterize how TBA/HD care co-occurs with modern healthcare utilization (for example, partial ANC uptake alongside home delivery), which was among the original study objectives; this remains an open question for future work using the same dataset.

Implications

With TBA/HD care concentrated in the poorest wealth quintile (3.67%) and among women with four or more children (3.47%), targeted rather than population-wide interventions may be more efficient. Reduction of indirect costs for the poorest households, such as transport support and elimination of informal payments, is one candidate lever, given that wealth effects persisted independent of education. We frame this as a candidate implication consistent with an associational (not causal) analysis, rather than as a demonstrated program effect.

Suggestions

Future research should prioritize qualitative and mixed-methods work to clarify why the poorest and highest-parity women continue to use TBA/HD care despite near-universal facility access, distinguishing cost-driven barriers from experience-based preferences. Quantitative follow-up should test the sensitivity of these estimates to alternative outcome definitions (for example, separating TBA-assisted ANC, TBA-assisted delivery, and home delivery), to restriction rules for multiple births per woman, and should formally model the co-occurrence of TBA/HD care with modern healthcare utilization. For policy and practice, continued targeting of the poorest wealth quintile and highest-parity women, through transport support, reduction of informal payments, and community-based outreach, is likely to be more efficient than population-wide campaigns, consistent with region-wide calls to prioritize wealth-based equity levers in maternal healthcare (Misu et al., 2025).

4. CONCLUSION

TBA use and home delivery are uncommon in Cambodia's maternal healthcare landscape overall (1.25%). This is not evenly distributed: 14- to 15-fold differences in TBA/HD care separate the most and least advantaged groups at the bivariate level, and after adjustment, wealth and parity, rather than education or residence alone, remain independently associated with residual TBA/HD care.

Wealth and parity are the clearest correlates of remaining disparities after adjustment, pointing to economic barriers and possibly generational shifts in care-seeking as areas for further, ideally qualitative, investigation. For Cambodia, targeted support for the poorest households and reduction of remaining indirect costs of facility-based care are candidate priorities. For other LMICs, Cambodia's trajectory suggests that large gains in facility-based maternal care coverage are achievable, while cautioning that population-wide gains can still mask substantial residual inequality among the most disadvantaged.

ACKNOWLEDGMENTS

The authors thank the DHS Program for making the data publicly available and the National Institute of Statistics of Cambodia and ICF for implementing the Cambodia DHS 2021–22. The authors are grateful to the Cambodian women who participated in the survey and to the field staff who collected the data, and acknowledge the Faculty of Nursing and Midwifery, University of Puthisastra, for institutional support.

DECLARATIONS

Ethics Approval and Consent

The Cambodia Demographic and Health Survey 2021–22 received ethical approval from the ICF Institutional Review Board (Fairfax, Virginia, USA) and the National Ethics Committee for Health Research, Cambodia. All participants provided informed consent before participation. This secondary analysis used publicly available de-identified data and was exempted from additional ethical review.

Data Availability

The datasets analyzed during the current study are available from the DHS Program repository (https://dhsprogram.com/) upon registration and approval.

Competing Interests

The authors declare no competing interests.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

AUTHOR CONTRIBUTIONS STATEMENT

YS conceived the study, conducted the analysis, and wrote the manuscript. KS and TS contributed to manuscript revision.

AUTHOR INFORMATION

Corresponding Authors

Yem Sokha, University of Puthisastra, Cambodia
ORCID : https://orcid.org/0009-0005-1573-0609
Email : yemsokhasuccessful@gmail.com

Authors

Kem Sokunthea, University of Puthisastra, Cambodia
ORCID : https://orcid.org/0009-0002-3906-5031
Email : info@puthisastra.edu.kh

Tun Sreypeov, University of Puthisastra, Cambodia
ORCID : https://orcid.org/0009-0003-6498-4918
Email : info@puthisastra.edu.kh

REFERENCES

Aboagye, R. G., Osborne, A., Anyasodor, A. E., Yikindi, S. V., Adnani, Q. E. S., & Ahinkorah, B. O. (2025). Utilisation of eight or more antenatal care visits and its associated socio-economic-related inequalities in sub-Saharan Africa: A decomposition analysis. *PLoS ONE*, *20*(3). https://doi.org/10.1371/journal.pone.0312412

Agboyo, G., Asamoah, A., Ganle, J., & Kumah, A. (2024). Factors associated with use of traditional birth attendants for child delivery: A cross-sectional study. Global Journal on Quality and Safety in Healthcare, 7(2), 42–49. https://doi.org/10.36401/JQSH-23-27

Amponsah, E., Fusheini, A., & Adam, A. (2021). Influence of information, education and communication on prenatal and skilled delivery in the Tano North District, Ghana: A cross-sectional study. Heliyon, 7(6), e07245. https://doi.org/10.1016/j.heliyon.2021.e07245

Asefa, A., Gebremedhin, S., Marthias, T., Nababan, H., Christou, A., Semaan, A., Banke-Thomas, A., Tabana, H., Alwy Al-Beity, F. M., Dossou, J.-P., Gutema, K., Delvaux, T., Birabwa, C., Dennis, M., Grovogui, F. M., McPake, B., & Beňová, L. (2023). Wealth-based inequality in the continuum of maternal health service utilisation in 16 sub-Saharan African countries. International Journal for Equity in Health, 22(1), 203. https://doi.org/10.1186/s12939-023-02015-0

Chham, S., Radovich, E., Buffel, V., Ir, P., & Wouters, E. (2021). Determinants of the continuum of maternal health care in Cambodia: An analysis of the Cambodia Demographic Health Survey 2014.

BMC Pregnancy and Childbirth, 21(1), 410. https://doi.org/10.1186/s12884-021-03890-7

Christou, A., Mbishi, J., Matsui, M., Beňová, L., Kim, R., Numazawa, A., Iwamoto, A., Sokhan, S., Ieng, N., & Delvaux, T. (2023). Stillbirth rates and their determinants in a national maternity hospital in Phnom Penh, Cambodia in 2017–2020: A cross-sectional assessment with a nested case-control study. Reproductive Health, 20, 156. https://doi.org/10.1186/s12978-023-01703-y

Geta, T., Haile, D., & Girma, A. (2024). Prevalence of women's home birth preferences and its associated factors in Ethiopia: A systematic review and meta-analysis. BioMed Research International, 2024, 5780900. https://doi.org/10.1155/2024/5780900

Hernández-Vásquez, A., Chacón-Torrico, H., & Bendezu-Quispe, G. (2021). Prevalence of home birth among 880,345 women in 67 low- and middle-income countries: A meta-analysis of Demographic and Health Surveys. SSM - Population Health, 16, 100955. https://doi.org/10.1016/j.ssmph.2021.100955

Idriss-Wheeler, D., & Yaya, S. (2021). Exploring antenatal care utilization and intimate partner violence in Benin - are lives at stake? *BMC Public Health*, *21*(1), 830–830. https://doi.org/10.1186/s12889-021-10884-9

Kawaguchi, Y., Sayed, A. M., Shafi, A., Kounnavong, S., Pongvongsa, T., Lasaphonh, A., Xaylovong, K., Sato, M., Matsui, M., Imoto, A., Huy, N. T., & Moji, K. (2021). Factors affecting the choice of delivery place in a rural area in Laos: A qualitative analysis. PLOS ONE, 16(8), e0255193. https://doi.org/10.1371/journal.pone.0255193

Laksono, A. D., Wulandari, R. D., Zuardin, Z., & Nopianto, N. (2021). The disparities in health insurance ownership of hospital-based birth deliveries in eastern Indonesia. *BMC Health Services Research*, *21*(1), 1261–1261. https://doi.org/10.1186/s12913-021-07246-x

Misu, F., Gasbarro, D., & Alam, K. (2025). Inequality in utilization of maternal healthcare services in low- and middle-income countries: A scoping review of the literature. Maternal and Child Health Journal. Advance online publication. https://doi.org/10.1007/s10995-025-04111-9

National Institute of Statistics, Directorate General for Health, & ICF. (2023). Cambodia Demographic and Health Survey 2021–22: Final report. NIS, DGH, and ICF.

National Institute of Statistics. (2024). Cambodia Demographic and Health Survey: Mortality report 2024. National Institute of Statistics, Cambodia. https://nis.gov.kh/nis/CDHS_Further_Data/CDHS%20Mortality%20Report%202024_En.pdf

Natuhamya, C., Makumbi, F., Mukose, A., & Ssenkusu, J. M. (2023). Complete sources of cluster variation on the risk of under-five malaria in Uganda: a multilevel-weighted mixed effects logistic regression model approach. *Malaria Journal*, *22*(1), 317–317. https://doi.org/10.1186/s12936-023-04756-3

Priebe, J., Amuasi, J., Dartanto, T., Mombo-Ngoma, G., & Guigas, M. (2024). Factors associated with skilled birth attendance in 37 low-income and middle-income countries: A secondary analysis of nationally representative, individual-level data. The Lancet Global Health, 12(7), e1104–e1110. https://doi.org/10.1016/S2214-109X(24)00145-1

Rahut, D. B., Singh, A., & Sonobe, T. (2024). Continuum of maternal and new-natal health care: empirical evidence from 10 developing countries in South and South East Asia. *Journal of Population Research*, *41*(2). https://doi.org/10.1007/s12546-024-09327-0

Rosas, E. R., Winkler, V., Huicho, L., Blas, M. M., Brenner, S., & Allegri, M. D. (2023). Comprehensive Health Insurance and access to maternal healthcare services among Peruvian women: a cross-sectional study using the 2021 national demographic survey. *BMC Pregnancy and Childbirth*, *23*(1), 795–795. https://doi.org/10.1186/s12884-023-06086-3

Rutledge, J. D., Kiyanda, A., Jean-Louis, C., Raskin, E., Gaillard, J., Maxwell, M., Smith, T., Kershaw, T., & Abrams, J. (2024). Recommendations for integrating traditional birth attendants to improve maternal health outcomes in low- and middle-income countries. International Journal of Maternal and Child Health and AIDS, 13, e019. https://doi.org/10.25259/IJMA_16_2024

Satty, A., & Mohammed, Z. M. S. (2026). Design-Consistent Variance Estimation in Multistage Complex Surveys: A Simulation and MICS-Based Comparative Study. *Mathematics and Statistics*, *14*(1), 91–97. https://doi.org/10.13189/ms.2026.140108

Tekeba, B., Zegeye, A. F., Gebrehana, D. A., & Tamir, T. T. (2025). Prevalence and determinants of home delivery among women with easy access to health facilities in sub-Saharan African countries: A multi-level mixed effect analysis.

Annals of Global Health, 91(1), 5. https://doi.org/10.5334/aogh.4615

Tetteh, J. K., Ameyaw, E. K., Adu, C., Agbaglo, E., Agbadi, P., & Nutor, J. J. (2023). Inequalities in the prevalence of skilled birth attendance in Ghana between 1993 and 2014. International Health, 15(2), 224–232. https://doi.org/10.1093/inthealth/ihac071

Um, S., Phan, C., Dany, L., Veha, K., Pay, S., & Chau, D. (2024). The effect of health insurance coverage on antenatal care utilization in Cambodia: A secondary analysis of Cambodia Demographic and Health Survey 2021–2022. PLOS Global Public Health, 4(11), e0002954. https://doi.org/10.1371/journal.pgph.0002954

World Health Organization. (2025a). Global traditional medicine strategy 2025–2034. World Health Organization.

World Health Organization. (2025b). Trends in maternal mortality 2000 to 2023: Estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. World Health Organization.

Zhang, Y., Khuon, D., Saphonn, V., Jia, P., & Long, Q. (2025). Two decades of change in childbirth care in Cambodia (2000–2021): Disparities in caesarean section utilization between public and private facilities. Global Health Research and Policy, 10, 32. https://doi.org/10.1186/s41256-025-00429-7