

BMJ Open Inequality trends in maternal health services for young Ghanaian women with childbirth history between 2003 and 2014

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ABSTRACT

Objective: To achieve universal coverage of reproductive healthcare and drastic reduction in maternal mortality, adequate attention and resources should be given to young women. This study therefore aimed to examine the inequality trends in the use of antenatal care (ANC) services and skilled birth attendance (SBA) within a subgroup of Ghanaian women aged 15–24 years between 2003 and 2014.

Design: This is a cross-sectional study that used data from the Ghana Demographic and Health Surveys (DHS) 2003, 2008 and 2014. We applied regression-based total attributable fraction (TAF) as an index for measuring multiple dimensions of inequality in the use of ANC and SBA.

Setting: Ghana.

Participants: Young women aged 15–24 years with at least one previous birth experience in the past 5 years prior to the surveys.

Main outcome measures: ANC visits and skilled attendance at birth.

Results: Urbanicity-related, education-related and wealth-related inequality in non-use of SBA declined between 2003 and 2008, but increased between 2008 and 2014. A consistent decline was observed in urbanicity-related inequality in non-use of four or more ANC visits from 2003 through 2008 to 2014. A similar reduction was observed for education-related inequality in relation to the same outcome. In contrast, wealth-related inequality in ANC usage increased over time.

Conclusions: The rise in urbanicity-related, education-related and wealth-related inequality in the usage of SBA between 2008 and 2014 threatens the sustainability of the general progress made in the usage of maternal health services in Ghana within the same period.

INTRODUCTION

Globally, maternal health indicators have shown dramatic improvement over the past decade, although the magnitude varies substantially from region to region and country to country, especially in several low-income

Strengths and limitations of this study

- The current study's use of the most recent nationally representative data makes the findings generalisable and applicable to countrywide policies and interventions.
- However, there could be a potential for recall bias since the data were collected retrospectively.
- Respondents consisted solely of mothers who survived the most recent birth experience, which could have resulted in selection bias since maternal mortality is still high in Ghana. For example, young women with high-risk pregnancies, who attended antenatal visits, had skilled attendance at delivery and who died during or after childbirth, could not be captured by this retrospective study design.
- Also, since women who deliver at home without skilled birth attendance are at increased risk for maternal mortality, it is most likely that this study misses some proportion of this subgroup, many of whom are disadvantaged. This could underestimate the magnitude of inequality observed in this study, although the overall trend over time will not be affected.

and middle-income countries.¹ Improvement in maternal health has accelerated since the introduction of the Millennium Development Goals (MDGs) in 2000.² Worldwide, maternal mortality ratio (MMR) declined by an average of 3.0% per year between 2005 and 2015, which is more than double the rate of decline of 1.2% recorded between 1990 and 2000.³ In some countries in sub-Saharan Africa, there has been considerable improvement in country-level estimates of MMRs, skilled birth attendance (SBA) and visiting antenatal care (ANC) at least once during pregnancy. However, the challenge still remains in most sub-Saharan African countries to drastically reduce maternal mortality and achieve universal coverage of reproductive health services, including skilled attendance at every birth and adequate ANC services. In 2015, around

99% of global maternal deaths occurred in low-income countries.⁴ Sub-Saharan Africa alone, with an average MMR of 546 (uncertainty interval 511–652), accounted for 66% of these deaths.^{1 3}

Equity in access to quality maternal and reproductive health services within countries plays a huge role in improving maternal and reproductive health outcomes. One of the factors shown to improve pregnancy outcomes and reduce maternal deaths is skilled attendance at birth.^{5–11} ANC is another factor that has to some extent been found to promote women's delivery with skilled birth attendants,^{12–14} mainly through the education received during antenatal visits and increased familiarity with healthcare personnel.¹⁵ While the use of ANC at least once during pregnancy has become almost universal in most low-income countries,¹⁶ adherence to the WHO recommendation of at least four antenatal visits during pregnancy^{17 18} has been less consistent, and some countries have a lower coverage.¹⁹ Although the MDGs did not address subnational inequalities in health, including maternal and reproductive health services, the 2005 World Health Assembly urged member states to ensure universal coverage of their citizens, especially children and women of reproductive age.²⁰ This contributed to the global movement, especially among resource poor countries, to develop or strengthen policies to achieve universal coverage.^{21 22} It is notable from previous studies that achieving universal coverage requires focus on social equity indicators such as wealth, education and area of residence, as well as on other societal, health service and policy constraints that discourage the use of services by vulnerable subgroups.^{11 21 23 24} Furthermore, the sustainable development goals (SDGs) adopted in September 2015 highlighted the need for renewed attention to inequalities in health. SDG 3 includes a target for reducing global MMR to <70 per 100 000 live births and achieving universal access to reproductive healthcare by 2030.²⁵ Success would require monitoring of inequalities in health and reassessment within countries and vulnerable populations of the barriers to the use of reproductive health services, including SBA and ANC, for targeted interventions during 2016–2030.

To achieve universal coverage of reproductive healthcare and drastic reduction in maternal mortality, adequate attention and resources should be given to young women, as women in this age group (15–24 years) belong to a cohort that will remain sexually active in the coming decades and thus in continued need of reproductive healthcare. Although women between the ages of 15–24 years show different patterns in the use of maternal and reproductive health services compared to the general population,^{26–28} studies on inequality in the use of reproductive health services have often been performed in the general population with little attention given to the dynamics and the pattern of inequalities that may be present in the younger population.²⁹

Ghana has shown an impressively positive trend in increased use of ANC services and skilled attendance at birth between 1988 and 2008 in the general population aged 15–49 years.³⁰ Despite this trend, we have previously shown that there was no direct translation into reduction in inequalities in service use between different subgroups of the population, especially among the most vulnerable.^{30 31} In this study, we extend our analysis beyond 2008 to examine current evidence in a subgroup of women aged 15–24 years, by including data from the most recent 2014 Ghana Demographic and Health Survey (DHS). A recent report from the 2014 Ghana DHS indicated further remarkable improvements among the general population in the use of ANC services and SBA in 2014.³² However, it is imperative to further monitor the recent developments in inequality trends related to the use of maternal and reproductive health services to provide current evidence for sustainable improvements in maternal and reproductive health and to identify threats and vulnerable subgroups for targeted interventions.

Thus, this study aims to examine inequality trends in the use of antenatal services and SBA among women aged 15–24 years, using data from the 2003, 2008 and 2014 Ghana Demographic and Health Surveys.

METHODS

Data collection

A database was compiled using data from the 2003,³³ 2008³⁴ and 2014³² Ghana Demographic and Health Surveys carried out by the Ghana Statistical Service and the Ghana Health Service, which employed standard DHS questionnaires and techniques for data collection.^{32–34} All eligible women were interviewed with the Women's Questionnaire. Eligible women were defined as women aged 15–49 years who had stayed in a selected household the night before the interview, irrespective of whether they were usual residents in the household or not. The Women's Questionnaire was used to collect information on the following topics: respondent's background characteristics, reproductive history, contraceptive knowledge and use, antenatal, delivery and postnatal care, infant feeding practices, child immunisation and health, marriage, fertility preferences and attitudes about family planning, husband's background characteristics, women's work, knowledge of STDs including HIV/AIDS, as well as anthropometric measurements of children and mothers. This current study analysed antenatal and delivery experiences among women aged 15–24 years with at least one previous birth experience in the past 5 years prior to the surveys.

Variables used in the study

Two outcome variables were used to assess trends in pregnancy or birth experiences, namely 'antenatal care

visits' and 'skilled birth attendance'. The maternity history contained up to six entries relating to births during the past 5 years prior to the survey. For young women with multiple birth experiences, the past birth experience was analysed in this study. The social equity indicators used in this study were as follows: urbanicity (rural/urban), educational level and wealth. Other independent variables included maternal age, current marital status, parity, region of residence and religion. **Table 1** describes the variables and how they were defined.

Statistical methods and analysis

Complex samples procedure

The Ghana DHS uses multistage cluster sampling to select respondents for the surveys. Thus, this study used the complex samples procedures available in SPSS, whereby the clusters (primary sampling units) and strata (region and rural–urban urbanicity) were used to adjust the SEs. The complex samples procedure also included the women's individual sample weights to adjust the estimates for the effect of oversampling and undersampling in subpopulations. All analyses (frequencies, cross-

Table 1 Summary of the variables used in the study

Variable name	[Coding, type]: definition
Antenatal care (ANC) visits	[Categorical, dependent variable]: ANC was assessed at three levels: (a) no antenatal care visit in the first trimester vs at least one antenatal care visit in the first trimester, (b) less than four antenatal care visits vs at least four visits and (c) inadequate antenatal care visits vs adequate antenatal care visits, where adequate was defined as attending at least four ANC visits, with the first visit made during the first trimester of the pregnancy.
Skilled birth attendance (SBA)	[Categorical, dependent variable]: women who lacked skilled attendance at birth vs those who received skilled attendance at birth (<i>doctor, nurse and midwife</i>). Auxiliary health staff and health assistants included in the 2008 and 2014 surveys were not considered as SBAs.
Maternal age	[Continuous variable, independent variable]: women 15–24 years with birth history
Urbanicity	[Two categories, independent variable]
Rural	Women who lived in rural areas based on national categorisations
Urban	Women who lived in urban areas based on national categorisations
Education level*	[Four categories, independent variable]
Never attended school	Women who confirmed having no formal education
Basic education	Women with some level of formal education not exceeding 9 years, including those with primary, middle school or lower secondary/high school education
Senior high school	Women who completed up to 12 years of formal education or those whose education ended at the upper secondary/high school level
Tertiary or higher education	Women who completed at least 15 years of formal education, including those with college, polytechnic or university level studies
Wealth	[Three categories, independent variable]: household wealth, which is consistent with expenditure and income among households, was calculated using household assets data collected from DHS surveys. These assets or consumer items consist of durable consumer goods, such as a television, bicycle and car, as well as dwelling characteristics, such as source of drinking water, sanitation facilities and type of flooring material. These were combined into a single wealth index†
Current marital status	[Two categories, independent variable]
Single	Women who had never married, were separated, divorced or widowed at the time of the interview
Married	Women who were married or living with a partner at the time of the interview
Parity	[Three categories, independent variable]: this variable was coded from the question that assessed the number of children ever borne by the woman. Nulliparous women (zero births prior to the survey) were not included in this study.
Para 1	Only 1 birth
Para 2	2 births
Para 3+	3 or more births
Region of residence	[Ten categories, independent variable]: these represented the 10 administrative regions of Ghana: Western, Central, Greater Accra, Volta, Eastern, Ashanti, Brong-Ahafo, Northern, Upper East and Upper West regions
Religion	[Nine categories, independent variable]: these categories were based on the reported religious affiliations as follows: Catholic, Anglican, Methodist, Presbyterian, Pentecostal/charismatic, other Christians, Islamic, Traditional/Spiritualist, no religion and other

*Educational level was reclassified as three categories: no education, basic education and senior high school or higher (secondary+).

†The index was constructed from household asset data using principal components analysis.^{32–34} They were then divided into five groups of equal size, or quintiles (poorest, poorer, middle, richer, richest), based on each household's relative standing on the wealth index. In this study, wealth was further ranked into three groups: poor (poorest and poorer), average (middle) and rich (richer and richest) using the fractional rank function in SPSS, in accordance with previous studies using DHS data from Ghana,^{30,31} where these subgroups have been shown to be comparable (more homogeneous in respect to the outcomes studied).

tabulations, simple and multiple logistic regressions) were carried out using the complex samples procedure.

Analyses

The statistical software IBM SPSS Statistics 22 was used for analyses. We pooled together data from the 2003, 2008 and 2014 surveys and analysed these in a single model using the complex samples procedure available in SPSS, taking into account the sampling procedures and weighting across surveys. We created an interaction term between the year of survey and the measures of inequality to allow for comparison of the trends in inequality across the years. We also adjusted for a set of potential confounders in the same model. The independent variables included in the logistic regression model were selected based on the aim of our study and review of previous literature. The selected variables were tested in a bivariate analysis to assess whether they were at least moderately associated with the outcome (p values < 0.25). Correlation analyses were performed between the independent variables so that covariates that were strongly associated with the main independent variables of interest could be excluded.

Measures of inequality

One of the root causes of health inequality is social inequality. Therefore, monitors of health inequality should reflect the relevant social conditions, including level of income/wealth, education and urbanicity, depending on the characteristics of the population and the health measure in question.³⁵ In this study, the measures of inequality we used were wealth, education and urbanicity.

The Ghana DHS 2003,³³ 2008³⁴ and 2014³² reports provide an overview of the proportion of women with at least one ANC visit and SBA, stratified by maternal age (categorised as < 20 , 20–34 and 35+years), birth order, region, education, wealth quintile and urban/rural urbanicity. Although simple prevalence between subgroups as shown in the DHS report could give a general idea of the differences between subgroups, the DHS report does this at a very crude level, without taking into account the effect of other factors. Thus, methodologically more refined measures of inequality such as the regression-based population attributable risk are needed to complement these simple measures.^{31 36 37} Also, the DHS report does not consider differences among subgroups of young people, even though it is well known that differences exist between young people and adult populations in the determinants of healthcare seeking behaviour and unmet needs for healthcare. Third, the Ghana DHS reports (2003, 2008 and 2014) only consider ‘at least one ANC visit’ in the cross-tabulations mentioned above. There is almost universal coverage for this indicator, although it is well known from the literature that attending ANC only once is inadequate, and that there are large differences between this and

attending four or more ANC visits or having adequate ANC visits (including the first ANC visit in the first trimester) as recommended by the WHO.^{17 18}

In this study, we applied regression-based total attributable fraction (TAF), also known as population attributable fraction,^{30 31 36} which is considered to be a robust method in measuring inequalities in health. The use of TAF as a measure of inequality has been described in detail elsewhere.^{30 31 36 38}

Total attributable fraction

TAF represents the proportion of the outcome that would be avoided if women in all subgroups had the same outcome prevalence as those with the highest socioeconomic status or the most favourable social determinants, under the assumption that a causal pathway exists between socioeconomic status (or women’s social background characteristics) and the outcome variable. The TAF was computed based on the ORs generated from the logistic regression model that adjusted for all the independent variables listed in table 1. The regression analyses examining one measure of inequality adjusted for the others. For example, in the regression analysis quantifying inequalities by wealth, we adjusted for education and urbanicity as well. The attributable fraction was calculated using the formula $AF = (OR - 1) / OR$, where OR is the adjusted OR generated from the logistic regression analysis. TAF was calculated as follows:

$$TAF = \sum (sTAF) = \sum AF_i * P_i, \quad (1)$$

where AF_i is the attributable fraction for the outcome variable for a specific stratum, and P_i represents the proportion of all cases that fall within this stratum. The product of AF_i and P_i represents the stratum-specific total attributable fraction (sTAF), and $\sum (sTAF)$ indicates the summation of all the strata-specific calculations, referred to as the overall TAF. For those with the highest level of education or wealth, the AF and sTAF are by definition zero. Similarly, for those with urban residence status, the AF and sTAF were by definition zero.

RESULTS

Table 2 shows the demographic characteristics and use of maternal health services among Ghanaian women aged 15–24 years who had at least one birth experience within 5 years prior to the surveys. The mean age of the respondents was 21 years in each of the survey years (2003, 2008 and 2014). The majority resided in rural areas (64.2% in 2003, 63.4% in 2008 and 60.6% in 2014). The proportion with secondary or higher education increased from 45.8% in 2003 to 58.1% in 2014, whereas the proportion of women who were married decreased from 78.7% in 2003 to 73.7% in 2008 and 62.6% in 2014. Almost half of the study respondents were from poor households, whereas close to one-third were from rich households. The timing of the first ANC visit, frequency of ANC and

Table 2 Sociodemographic characteristics, ANC, delivery under skilled care and valid per cent (%) among Ghanaian women aged 15–24 years with childbirth history from 2003 to 2014, presented in 5 year intervals

	2003 Unweighted count	Weighted estimate (%)	2008 Unweighted count	Weighted estimate (%)	2014 Unweighted count	Weighted estimate (%)
Age (15–24)						
Mean (SD*)		21.29 (2.09*)		21.33 (2.05*)		21.39 (2.17*)
Urbanicity						
Urban	189	224 (35.8)	166	185 (36.6)	332	349 (39.4)
Rural	460	402 (64.2)	352	351 (63.4)	591	538 (60.6)
Total	649	625 (100)	518	505 (100)	923	887 (100)
Highest educational level						
No education	211	164 (26.3)	143	114 (22.5)	193	158 (17.9)
Basic education	170	175 (27.9)	154	155 (30.7)	240	213 (24.0)
Secondary/Higher	268	286 (45.8)	220	236 (46.8)	490	516 (58.1)
Total	649	625 (100)	517	504 (100)	923	877 (100)
Missing	0		1		0	
Marital status						
Single	125	133 (21.3)	119	133 (26.3)	304	332 (37.4)
Married	524	492 (78.7)	399	372 (73.7)	619	556 (62.6)
Total	649	625 (100)	518	505 (100)	923	887 (100)
Missing		0		0		0
Wealth						
Poor (low)	329	272 (43.5)	279	238 (47.1)	521	413 (46.5)
Average	145	157 (25.0)	108	115 (22.8)	218	228 (25.7)
Rich (high)	175	196 (31.4)	131	152 (30.1)	184	246 (27.7)
Total	649	625 (100)	518	505 (100)	923	877 (100)
Missing	0		0		0	
Parity						
Para 1	409	397 (63.5)	306	301 (59.5)	546	523 (58.9)
Para 2	194	187 (29.9)	141	137 (27.2)	261	253 (28.5)
Para 3+	46	41 (6.6)	71	67 (13.3)	116	112 (12.6)
Total	649	625 (100)	518	505 (100)	923	887 (100)
ANC visit in first trimester						
No	319	319 (53.5)	240	238 (49.2)	352	348 (40.3)
Yes	292	277 (46.5)	254	246 (50.8)	542	515 (59.7)
Total	611	597 (100)	494	485 (100)	894	863 (100)
Missing	38		24		29	
Less than four antenatal visits						
No	450	437 (70.0)	373	372 (73.6)	769	739 (83.3)
Yes	199	188 (30.0)	145	133 (26.4)	154	148 (16.7)
Total	649	625 (100)	518	505 (100)	923	887 (100)
Inadequate ANC*						
No	251	237 (39.7)	229	225 (46.5)	516	488 (56.5)
Yes	360	360 (60.3)	265	259 (53.5)	378	375 (43.5)
Total	611	597 (100)	494	485 (100)	894	863 (100)
Missing	38		24		29	
Lacked skilled birth attendant						
No	281	297 (47.6)	263	270 (53.7)	653	644 (72.6)
Yes	368	328 (52.4)	254	233 (46.3)	270	243 (27.4)
Total	649	625 (100)	517	503 (100)	923	887 (100)
Missing	0		1		0	

*Inadequate ANC was defined as lack of at least four ANC visits including no visit in the first trimester. ANC, antenatal care.

use of SBA during delivery improved consistently from 2003 through 2008 to 2014. The proportion with at least four ANC visits increased from 70.0% in 2003 to 73.6% in 2008 and 83.3% in 2014. Similarly, 47.6% of the women

aged 15–24 years delivered with the assistance of a skilled birth attendant in 2003, 53.7% in 2008 and 72.6% in 2014. For the majority of the study respondents, this was their first birth experience.

Table 3 shows the results of the effect modification analyses of the measures of inequality and year of survey on non-use of maternal health services (ANC and SBA) among Ghanaian women aged 15–24 years, using pooled DHS data from 2003 to 2014. The prevalence of attending less than four ANC visits, inadequate ANC and lack of SBA showed a declining trend with increasing socioeconomic position. Among women of similar socioeconomic positions, there was a continual decline across the years, from 2003 to 2014 (p -trend <0.001). However, the rate of decline varied across residential status, educational level and wealth, from 2003 through 2008 to 2014.

Rural residence was significantly associated with attending less than four ANC visits (adjusted OR 5.3, 95% CI 2.0 to 13.7), inadequate ANC (adjusted OR 2.8, 95% CI 1.4 to 5.7) and non-use of SBA (adjusted OR 15.4, 95% CI 6.6 to 36.0) in 2003. The effect of rural residence on attending less than four ANC visits diminished in 2008 and completely disappeared in 2014 (adjusted OR 1.0, 95% CI 0.6 to 1.7). However, the effect of rural residence on non-use of SBA diminished after 2003 (adjusted OR 11.6, (95% CI 4.7 to 27.9) for 2008 and 2.4 (95% CI 1.4 to 4.4) for 2014), but remained statistically significant.

The odds of attending less than four ANC visits among respondents with no formal education was about three times that of respondents with secondary or higher education in 2003 (adjusted OR 2.9, 95% CI 1.8 to 4.8). The OR stagnated in 2008 and declined to 2.1 (95% CI 1.2 to 3.8) in 2014. Uneducated respondents had 2.7 times odds (95% CI 1.6 to 4.6) of delivering without the assistance of a skilled birth attendant in 2003, compared to young women with secondary or higher education. A slight decline in the OR was observed in 2008 (adjusted OR 2.3 95% CI 1.3 to 4.3), and a rise was observed thereafter in 2014 (adjusted OR 3.0 95% CI 1.7 to 5.3). For those with basic education, the decline in the odds of delivering without a skilled birth attendant was consistent from 2003 to 2014 (**table 3**).

Wealth had a statistically significant association with non-use of ANC and SBA, and the magnitude of effect showed a generally consistent increase from 2003 to 2014 with a slight drop in 2008 for some subgroups. In 2003, respondents from poor households were about two times more at odds to have less than four ANC visits compared to the rich (adjusted OR 1.9, 95% CI 1.0 to 3.8). The OR increased to 3.2 (95% CI 1.4 to 7.2) in 2008 and 3.4 (95% CI 1.7 to 6.9) in 2014. For average (middle class) respondents, the odds of attending less than four ANC visits increased from 1.5 in 2003, to 2.4 in 2008 and 3.8 in 2014 (**table 3**). Similar differences were observed for the lack of SBA within the wealth quintiles, although the pattern differed slightly before and after 2008. In 2003, poor women aged 15–24 years were 3.5 times more at odds not to deliver with the assistance of a skilled health professional compared to

their rich counterparts. This difference decreased slightly between 2003 and 2008 (OR 2.7, 95% CI 1.4 to 5.1) and increased sharply between 2008 and 2014 (OR 5.8, 95% CI 2.9 to 11.5). The same trend was observed for young women with average wealth (adjusted OR 2.0, 1.9 and 4.4 in years 2003, 2008 and 2014, respectively), compared to those who were rich.

Table 4 illustrates how socioeconomic (or social) inequalities in non-use of maternal health services have developed (using sTAF) within different subgroups of Ghanaian women aged 15–24 years over time, from 2003 through 2008 to 2014. Urbanicity-related inequality (sTAF) regarding non-use of four or more ANC visits showed a drastic decline from 2003 to 2014 (urbanicity (sTAF): 0.27 in 2003, 0.12 in 2008 and 0.00 in 2014). A similar trend was observed for women with no education and those with basic education, although the change was not as drastic. In contrast, there were generally increasing trends from 2003 to 2014 among women with poor (sTAF 0.11, 0.13, 0.13 in 2003, 2008 and 2014, respectively) and average wealth status (sTAF 0.03, 0.04, 0.07 in 2003, 2008 and 2014, respectively). Regarding lack of SBA, there was a general drop in inequality (sTAF) across all socioeconomic strata from 2003 to 2008 and a rise between 2008 and 2014.

Table 5 reports the overall inequality trends (TAF) concerning less than 4 ANC visits, inadequate ANC visits and lack of skilled attendants at birth for each socioeconomic indicator from 2003 to 2014. Urbanicity-related inequality decreased consistently from 2003 to 2014.

The overall urbanicity-related inequality (TAF) observed for non-use of four or more ANC visits declined consistently from 2003 to 2014. For education-related inequality, a similar reduction in inequality was observed for the same outcome (education (TAF): 0.16, 0.11, 0.08), whereas wealth-related inequality in ANC usage increased over time (less than four ANC visits (TAF) 0.14, 0.17, 0.20; inadequate ANC (TAF): 0.08, 0.09, 0.19 for 2003, 2008 and 2014, respectively).

For lack of SBA, the inequality trends observed were not consistent over the entire period. Urbanicity-related inequality in non-use of SBA declined consistently from 2003 to 2014 (TAF 0.33, 0.21 and 0.15 in 2003, 2008 and 2014, respectively). Similarly, education-related and wealth-related inequality in non-use of SBA declined between 2003 and 2008. Although education-related inequality stagnated after 2008, wealth-related inequality regarding non-use of SBA increased sharply between 2008 and 2014. The TAFs regarding non-use of SBA were 0.17, 0.09 and 0.10 for up to basic education in 2003, 2008 and 2014, respectively. The wealth-related TAFs were 0.23 in 2003, 0.15 in 2008 and 0.23 in 2014.

DISCUSSION

Evidence from this study indicates a consistent drastic decline in urbanicity-related inequality in non-use of

Table 3 Effect modification analyses of the measures of inequality and year of survey on non-use of maternal health services (ANC and skilled birth attendance) among Ghanaian women aged 15–24 years using pooled DHS data from 2003 to 2014

Effect modification between the measures of inequality and year of survey		n	% Cases*	p-trend	Less than 4 ANC visits	n	% cases*	p-trend	Inadequate ANC visits†	n	% Cases*	p-trend	Lack of skilled birth attendance
Urbanicity	Year			<0.001	OR‡ (95% CI)			<0.001	OR‡ (95% CI)			<0.001	OR‡ (95% CI)
Rural	2003	401	38.4		5.3 (2.0 to 13.7)	375	66.4		2.8 (1.4 to 5.7)	402	69.2		15.4 (6.6 to 36.0)
Rural	2008	319	32.9		2.2 (0.8 to 6.5)	303	57.1		1.5 (0.7 to 3.0)	319	57.4		11.6 (4.7 to 27.9)
Rural	2014	537	19.0		1.0 (0.6 to 1.7)	521	42.2		0.5 (0.4 to 0.8)	538	37.9		2.4 (1.4 to 4.4)
Urban	2003	223	14.8		2.2 (0.9 to 5.1)	221	50.1		1.9 (1.1 to 3.4)	224	22.3		3.8 (1.5 to 9.4)
Urban	2008	185	15.1		1.4 (0.5 to 4.0)	182	47.3		1.6 (0.9 to 3.0)	184	27.2		5.7 (2.5 to 13.0)
Urban	2014	349	13.2		1 (ref)	342	45.3		1 (ref)	349	11.2		1 (ref)
Education				<0.001				<0.001				<0.001	
No education	2003	164	42.7		2.9 (1.8 to 4.8)	144	70.8		1.9 (1.2 to 3.0)	164	67.7		2.7 (1.6 to 4.6)
No education	2008	114	39.5		2.9 (1.6 to 5.1)	109	60.6		1.2 (0.7 to 2.1)	113	63.7		2.3 (1.3 to 4.2)
No education	2014	158	22.8		2.1 (1.2 to 3.8)	150	52.0		1.6 (0.9 to 2.7)	159	50.9		3.0 (1.7 to 5.3)
Basic education	2003	174	34.5		1.8 (1.1 to 3.0)	169	59.8		1.1 (0.7 to 1.7)	175	62.3		2.4 (1.4 to 4.2)
Basic education	2008	155	32.3		1.9 (1.1 to 3.3)	144	54.2		1.0 (0.6 to 1.7)	154	52.6		1.7 (1.0 to 3.0)
Basic education	2014	213	22.5		1.7 (1.0 to 2.8)	204	46.6		1.1 (0.8 to 1.7)	213	32.9		1.5 (1.0 to 2.3)
Secondary+	2003	286	19.9		1§	284	55.3		1§	287	37.6		1§
Secondary+	2008	236	16.5		1§	230	49.6		1§	234	33.8		1§
Secondary+	2014	516	12.4		1 (ref)	509	39.7		1 (ref)	516	18.0		1 (ref)
Wealth				<0.001				<0.001				<0.001	
Poor (low)	2003	272	40.8		1.9 (1.0 to 3.8)	250	67.2		1.4 (0.8 to 2.6)	272	74.6		3.5 (2.0 to 6.1)
Poor (low)	2008	238	37.0		3.2 (1.4 to 7.2)	224	63.4		2.4 (1.3 to 4.6)	237	62.0		2.7 (1.4 to 5.1)
Poor (low)	2014	413	20.3		3.4 (1.7 to 6.9)	397	48.9		3.0 (1.7 to 5.3)	413	41.9		5.8 (2.9 to 11.5)
Average	2003	157	29.9		1.5 (0.8 to 3.0)	151	63.6		1.5 (0.9 to 2.5)	157	51.0		2.0 (1.2 to 3.5)
Average	2008	116	25.0		2.4 (1.1 to 5.5)	111	48.6		1.3 (0.7 to 2.4)	115	42.6		1.9 (1.0 to 3.7)
Average	2014	228	20.6		3.8 (1.9 to 8.0)	225	47.6		2.5 (1.3 to 4.8)	229	24.5		4.4 (1.9 to 10.2)
Rich (high)	2003	196	15.3		1§	195	49.2		1§	196	23.0		1§
Rich (high)	2008	152	10.5		1§	151	42.4		1§	151	24.5		1§
Rich (high)	2014	246	6.9		1 (ref)	242	31.0		1 (ref)	184	9.2		1 (ref)

*Cases were weighted by using women's sample weights.

†Inadequate ANC was defined as lack of at least four ANC visits including no visit in the first trimester.

‡One measure of inequality adjusted for the others and for parity, age, marital status, region of residence, religion, clustered sampling (primary sampling unit and stratifications) and women's sample weights.

§The OR, upper and lower confidence limits were exactly 1.

ANC, antenatal care.

Table 4 Logistic regression-based AF and sTAF of less than 4 ANC visits, inadequate ANC visits and lack of skilled attendant at birth among Ghanaian women aged 15–24 years from 2003 to 2014

	Year	Less than 4 ANC visits		Inadequate ANC visits		Lack of skilled birth attendance	
		AF	sTAF	AF	sTAF	AF	sTAF
Urbanicity							
Rural	2003	0.81	0.27	0.64	0.16	0.94	0.33
Rural	2008	0.55	0.12	0.33	0.06	0.91	0.21
Rural	2014	0.00	0.00	*	*	0.58	0.15
Urban	2003	0.55	0.04	0.47	0.05	0.74	0.05
Urban	2008	0.29	0.02	0.38	0.03	0.82	0.05
Urban	2014	Ref	Ref	Ref	Ref	Ref	Ref
Education							
No education	2003	0.66	0.10	0.47	0.05	0.63	0.09
No education	2008	0.66	0.06	0.17	0.01	0.57	0.05
No education	2014	0.52	0.04	0.38	0.03	0.67	0.07
Basic education	2003	0.44	0.06	0.09	0.01	0.58	0.08
Basic education	2008	0.47	0.05	0.00	0.00	0.41	0.04
Basic education	2014	0.41	0.04	0.09	0.01	0.33	0.03
Secondary+	2003	0.00	0.00	0.00	0.00	0.00	0.00
Secondary+	2008	0.00	0.00	0.00	0.00	0.00	0.00
Secondary+	2014	Ref	Ref	Ref	Ref	Ref	Ref
Wealth							
Poor (low)	2003	0.47	0.11	0.29	0.05	0.71	0.18
Poor (low)	2008	0.69	0.13	0.58	0.08	0.63	0.12
Poor (low)	2014	0.71	0.13	0.67	0.13	0.83	0.18
Average	2003	0.33	0.03	0.33	0.03	0.50	0.05
Average	2008	0.58	0.04	0.23	0.01	0.47	0.03
Average	2014	0.74	0.07	0.60	0.06	0.77	0.05
Rich (high)	2003	0.00	0.00	0.00	0.00	0.00	0.00
Rich (high)	2008	0.00	0.00	0.00	0.00	0.00	0.00
Rich (high)	2014	Ref	Ref	Ref	Ref	Ref	Ref

*Odds ratio was below 1.0 (OR_{rural 2014}=0.5).

AF, attributable fraction; sTAF, stratum-specific total attributable fraction.

four or more ANC visits among young Ghanaian women from 2003 through 2008 to 2014. The rural–urban residence difference in attending less than four ANC visits diminished from 2003 to 2008 and completely disappeared in 2014. A similar reduction in inequality was observed for education-related inequality in relation to the same outcome. In contrast, wealth-related inequality in ANC usage increased over time. The inequality trend observed in the usage of SBA was not consistent over time. Urbanicity-related, education-related and wealth-related inequality in non-use of SBA declined between 2003 and 2008, but increased between 2008 and 2014, which is paradoxical in the light of the ultimate aim of the free maternal healthcare policy introduced nationwide in 2008 to bridge the inequality gap in the use of maternal health services. Although the timing of the first ANC visit, frequency of ANC usage and use of SBA during delivery generally improved over time, as noted, the extent differed between subgroups of Ghanaian women aged 15–24 years.

The general improvement in the use of ANC services and SBA is remarkable, but the emerging inequality trends in the use of maternal health services are

worrisome. The Ghana National Health Insurance (NHIS) act, established in 2003, aimed to ensure equitable universal access to quality healthcare for all residents of Ghana, whereas the delivery exemption policy in 2005 and free maternal healthcare policy implemented in 2008 under the NHIS primarily sought to remove financial barriers regarding access to maternal health services. The current policies and, in particular, the free maternal healthcare policy and similar efforts aiming at the improvement in the use of maternal health services among women in Ghana are notably good,^{39–41} in that generally, we can observe a parallel increase in the use of maternal health services over the years that these policies have been in place. However, they provide a partial response to the ingrained issue of inequity in the use of maternal health services among vulnerable women.²¹ The successful aspect is that the use of these services has improved successively across all categories of young women after the introduction of the national health insurance scheme in 2003, the delivery exemption policy in 2005 and the free maternal healthcare policy in 2008. The drawback is that the inequality gap in the use of maternal health services is

Table 5 Overall inequality trends (TAF) concerning less than 4 ANCANC visits, inadequate ANC visits and lack of skilled attendant at birth for each socioeconomic indicator from 2003 to 2014

	Less than 4 ANC visits	Inadequate ANC visits	Lack of skilled birth attendance
Urbanicity-related (rural) TAF per year			
2003	0.27	0.16	0.33
2008	0.12	0.06	0.21
2014	0.00	*	0.15
Education-related TAF per year			
2003	0.16	0.06	0.17
2008	0.11	0.01	0.09
2014	0.08	0.04	0.10
Wealth-related TAF per year			
2003	0.14	0.08	0.23
2008	0.17	0.09	0.15
2014	0.20	0.19	0.23

*OR was below 1.0 (OR_{rural 2014}=0.5).
ANC, antenatal care; TAF, total attributable fraction.

widening between young women of higher socioeconomic status and the vulnerable, namely the poor and less educated.^{30 31} This could be attributed to the varying extent of usage of maternal healthcare services triggered by the introduction of the free maternal healthcare policy, as well as exposure to other barriers unaccounted for under the current policies.^{42 43} To attain universal coverage of maternal health services requires measures to increase use among women who are poor or less educated, as well as continuous improvement in usage among the entire population.²² The general improvement in coverage of maternal health services seen over the past decade is not likely to be sustainable if the disempowered majority, that is, vulnerable young women with poor socioeconomic backgrounds, do not have adequate opportunities under the current policies and interventions to improve their use of maternal health services.^{44–46}

Young women under 18 years of age can access healthcare benefits under the Ghana NHIS without paying a premium. However, they have to pay fees for card processing and renewal, and if they fail to renew their membership after 3 months of expiry, they are required to observe a 1 month waiting period before accessing healthcare under the NHIS. Their exemption from premium fees is also dependent on the registration of one, or in some cases, both parents.⁴⁷ This poses a barrier for this subset of young women, especially those from poor families where the parents cannot afford their own premium, card processing fee or renewal fee. Also, although pregnant women are not required to pay to access ANC and SBA services, they are required to be registered members with an NHIS card to access free care during pregnancy or childbirth. The systemic delays associated with the registration process, such as provision of a laboratory-certified pregnancy test by the

woman,^{40 42} side costs and time spent in getting their pictures taken for registration,⁴³ coupled with other societal, health service and individual level factors, create a barrier for young pregnant women to access these services. However, for young women from a higher socioeconomic background, the impact may be less. For example, for rich young women who have a greater ability to pay the NHIS premium and those with higher educational attainment who better understand the benefits and consequences of seeking ANC services, the prevailing conditions created by the current policies have become a window of opportunity to use these services to a greater extent.⁴³ Thus, most of these higher socioeconomic status women are already enrolled in the NHIS by the time they find out that they are pregnant.⁴⁰ As evidenced in previous studies, women who are enrolled in the NHIS attend more ANC visits compared to those not enrolled.^{40 47} Moreover, other studies have also suggested that enrolment in the NHIS could help reduce inequalities in access to ANC services.^{48 49} Although enrolment in the NHIS has been found to improve the frequency of ANC usage, seeking ANC in the first trimester was not found to be associated with NHIS enrolment status in previous studies,⁴⁰ but rather with the women's socioeconomic standing, similar to what was found in this study among young women. This could partly be explained by the low level of awareness of pregnancy status among young women, especially those with a low level of formal education and sexual and reproductive health knowledge. An alternative explanation is that, as mentioned above, young women with higher socioeconomic position are more likely to be already enrolled by the time they discover that they are pregnant,^{21 43} escaping the barriers created by the delays in the registration process and thereby making early ANC visits practically possible.⁴⁰ A novel finding from this study, however, is that contrary to Dixon and colleagues' finding in the general population using data from the 2008 DHS, young women aged 15–24 years with rural backgrounds in 2014 were more likely to access ANC services during the first trimester and continue for four or more times during pregnancy compared to those from urban settings. This was not the case in 2003 and 2008. Although the exact explanation for these findings is unknown, they could be related to recent interventions specifically targeting rural settings, easiness of access to ANC services in rural areas after the introduction of the free maternal healthcare policy and/or the counter effect of urbanisation (urban slums and urban poor). Future studies could explore this in more detail.

In Ghana, the decision to deliver with a skilled birth attendant is influenced by several factors associated with costs, and for women of low economic status these are presumably much more burdensome. The trend in SBA usage observed in this study before and after 2008 suggests that in all likelihood the free maternal healthcare policy integrated into the NHIS benefited all subgroups

of young women but to different extents (table 3). This could be linked to other barriers to seeking skilled birth delivery that have not been accounted for in the current policy framework. Thus, for women with lower socioeconomic status, even relatively minor costs that are not fully covered can act as a continued deterrent for seeking health services because their 'safety margin' is simply that much narrower. This, together with the possibility that the NHIS system is still so complicated that only better educated women know how to navigate it, would account for the rapidly increasing inequality. Factors found to deter low socioeconomic status women from delivering with a skilled health professional in previous studies include not being enrolled in the NHIS and a lack of understanding of what services are covered by the NHIS and who is eligible for free coverage.⁴³ Other factors include aspects such as unavailability of transport, fear of uncertainty and unknown costs related to referred cases, expenses not covered by the NHIS, poor provider–client relationship^{43 50} and sociocultural norms concerning SBA.⁵¹ The factors mentioned above provide a plausible explanation for the sharp rise in inequality related to SBA usage between 2008 and 2014 observed across all socioeconomic subgroups of young women. They also provide an explanation for the fact that wealth-related inequality increased the most.

Methodological considerations

This study uses the most recent nationally representative data, and thus the findings are generalisable and applicable to countrywide policies and interventions. However, there are some limitations that need to be considered. First and foremost, the potential for recall bias needs to be considered since the data were collected retrospectively. For example, women with high levels of education may have better recall of their use of maternal health services compared to uneducated women. Also, respondents consisted of mothers who survived the most recent birth experience, which could have resulted in selection bias since maternal mortality is still high in Ghana. Moreover, since women who deliver at home without SBA are at increased risk for maternal mortality, it is most likely that some proportion of this subgroup, many of whom are disadvantaged, is missed by this study. Finally, young women with high-risk pregnancies, who had attended antenatal visits, had a skilled attendant at delivery and who died during or after childbirth, could not be captured by this retrospective study design.

CONCLUSIONS

The rate of improvement in the usage of ANC and SBA is unequally distributed among young women of different socioeconomic backgrounds. The rise in education-related and wealth-related inequality in the usage of SBA between 2008 and 2014 threatens the sustainability of the general progress made in the usage of maternal health services in Ghana within the same period. For

Ghana to achieve universal access to reproductive healthcare by 2030, as indicated in the SDGs, would require targeted interventions towards the most vulnerable, including less educated and poor young women.

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