BMC Health Services Research

RESEARCH

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Socio-economic and geographic equity in maternal health services utilization in Ethiopia: a community-based cross-sectional study

Zewditu Denu[1,2*], Atkure Defar[3,4], Lars Persson[3], Seblewengel Lemma[3,4], Della Berhanu[3,4], Theodros Getachew[4], Solomon Shiferaw[5], Amare Tariku[1], Tadesse Guadu[1], Meseret Zelalem[6,7], Girum Taye[4], Joanna Schellenberg[3], Tanya Marchant[3] and Kassahun Alemu[8]

Abstract

Background Addressing disparities in reproductive, maternal, newborn, and child health services is crucial in achieving the Sustainable Development Goal of universal health coverage. The persistence of social and geographic disparities in maternal health service coverage and utilization poses significant challenges. Ensuring equity in health service access and utilization as part of universal health coverage requires evidence whether these inequities exist. This study aimed to measure socio-economic and geographic equity in coverage and effective coverage of both antenatal care and skilled birth attendance.

Methods We conducted a secondary analysis of data collected from the Performance Monitoring for Action Ethiopia from 2019 to 2020, including 2714 postpartum women at around six weeks and service delivery point assessment data from 462 health facilities. We measured inequities in the utilization of four or more antenatal care visits and skilled birth attendance using equiplots and concentration index. Moran's I, Getis-Ord Gi statistics and Kriging interpolations were employed to analyze geographic variations of maternal health service utilization.

Results In this study, 40% (95%CI: 36, 45) utilized four or more ANC visits, and 12% (95%CI: 11, 14) received quality antenatal care. Over half (54%, 95%CI: 48, 59) of women utilized skilled birth attendance, but only 7% (95%CI: 4, 8) received quality delivery care. The absolute equity gap between the least poor and the poorest women was 43 percentage points for ANC visits and 65 percentage points for skilled birth attendance. A higher proportion of women in Central and Northern parts of Ethiopia had four or more ANC visits and utilized skilled birth attendance, while most parts of the Eastern part of the country and most areas in the South had low levels of utilization.

Conclusion The coverage of four or more antenatal care visits and skilled birth attendance was low and inequitable, with the poorest women receiving fewer services. The coverage varied across different parts of the country.

*Correspondence:
Zewditu Denu
zewditudenuabdissa@gmail.com

Full list of author information is available at the end of the article

Interventions that target groups of women and geographic areas with low coverage of services are crucial for reaching the goal of universal health coverage.

Keywords Maternal health, Socio-economic status geographic difference, Inequity

Background

Reducing inequities in reproductive, maternal, newborn, child health and Adolescent-Youth services are among the key strategies and forefront agenda of the country to reach the Sustainable Development Goal of universal health coverage, ending preventable maternal and neonatal mortalities in particular [1]. Globally, antenatal care, skilled birth attendance, and postnatal care have been implemented to improve maternal and newborn health outcomes. However, many women in low- and middle-income countries either do not utilize these services or drop out after the first visit [2], partly due to poor quality of services [3].

Social and geographic disparities in maternal and child health services utilization remain high between and within countries [4]. Notably, major socio-economic and geographic inequities in the use of maternal health services were observed in sub-Saharan African countries [5–7]. The 2030 Countdown Report revealed that 20% of the poorest women in low and middle-income countries did not receive any of these three essential interventions: antenatal care visits, facility delivery, and postnatal care. Only 40% received all the three interventions, while 75% of the least poor women received all the three interventions. These proportions highlight the vast disparities between socio-economic groups in access to maternal healthcare services [8]. Other studies have reported that social, cultural, financial, environmental, and geographical factors contributed to the inequities in maternal health service utilization in many low and middle-income countries [9–11].

Despite various efforts made so far in Ethiopia, maternal healthcare utilization is low, with only forty percent of women having four or more antenatal care visits [12], less than half getting skilled birth attendance, and only one in ten receiving postnatal care within 48 h of delivery [13].

There is limited evidence on social and geographic inequities in maternal health service utilization in Ethiopia. Most previous studies focused on factors associated with the utilization of maternal health care services [14], and levels of the maternal continuum of care [15–17]. Although some have assessed social inequities [18, 19] and geographic disparities in maternal health service utilization [20, 21], none used an effective coverage measure, combining coverage and quality of service into one measurement. Therefore, we aimed to measure socio-economic and geographic equity in coverage and effective coverage of four or more antenatal care visits and skilled birth attendance.

Methods

Study setting and design

This is a secondary analysis of Performance Monitoring for Action 2019–2021 (PMA) Ethiopia data. The design and setting of the original study have been described elsewhere [22]. The study involved enumeration areas selected in five Ethiopian regions: Tigray, Afar, Amhara, Oromia, the former Southern Nations, Nationalities, and Peoples region, and Addis Ababa city administration. Ethiopia has a three-tiered health system, with primary care offered by health centers in urban settings and primary hospitals, health centers and health posts in the rural settings, secondary care offered by regional hospitals at the regional level and tertiary care offered by comprehensive specialized hospitals [23].

Data source and sampling

The study employed two data sources from the PMA: women's data involving 2714 post-partum women and the facility assessment data for 462 health facilities serving these women. Data were collected from postpartum women at around six weeks after delivery at household level. The Geographic Positioning System coordinates for the households in the selected enumeration areas (EAs) were collected, and the geographic shape files were obtained from the Ethiopian Statistical Services [24].

The detailed sample size determination is described elsewhere [22]. PMA Ethiopia used a two-stage stratified sampling technique. The primary sampling units were the enumeration areas that the Ethiopian Statistical Service selected. The second sampling units were households in the enumeration areas [25]. Assuming a woman utilized a health facility near to her residence, we linked the two data sets using an ecological linking method [26]. The enumeration area identification number, which was the same for the woman and her health facility, was used in the linking.

Each enumeration area included about 200 households, of which 35–42 were randomly selected for interview. Location data were collected using global position system (GPS) coordinates at household level after the completion of every household interview. The GPS data were recorded as geographic coordinates (i.e., latitude and longitude). The households' locations were de-identified by displacing coordinates of the EAs centroids by direction and distance. Displacement direction was randomly selected between 0 and 360 degrees. The distance displacement differed between urban and rural EAs, considering the lower population density in rural areas. Urban

EAs were randomly displaced from their true location by up to two kilometers, and rural EAs were displaced from their true location by up to five kilometers [25].

Measurements

Household wealth was used as a stratifier to assess socio-economic equity in maternal health service coverage. The household wealth index was constructed by principal component analysis of data on durable assets, utilities, and infrastructure, and ownership of house and livestock. The continuous index was further categorized into quintiles. Hot spot and cold spot analysis and interpolations were employed to identify geographic equity in maternal health service coverage. There were five indicators measuring coverage of maternal health services: three for antenatal service coverage (utilization of at least one ANC, utilization of four or more ANC visits, and quality-adjusted ANC coverage [12]), two for skilled birth attendance (skilled birth attendance coverage and quality-adjusted skilled birth attendance coverage) (Table 1).

Equity analysis

Socio-economic equity analysis

We used four different methods to assess equity in the utilization of maternal health services. First, we displayed the distribution of maternal health service utilization across household wealth quintiles using equiplots. Second, we calculated the absolute differences (Q5-Q1) in maternal health service utilization between the least poor and the poorest women. Third, we calculated the ratio in maternal health service utilization between the least poor and poorest women (Q5: Q1), Fourth, we calculated the concentration index (CIX) to assess equity in health services utilization, using wealth index score. The concentration index offers the added benefit of indicating the direction of disparity in service utilization. It ranges from −1 to + 1, with a positive value suggesting inequity in service utilization and quality service provision that favors women who were the least poor [28].

Geographic equity analysis

ArcGIS 10.5 was used for geographic equity analysis. The geographic autocorrelation (Global Moran's I) statistic measure was used to evaluate whether maternal health services utilization coverage was dispersed, clustered, or randomly distributed in the study area. The Moran's I index measures geographic autocorrelation with a value ranging from −1 to + 1. A positive value of Moran's I indicates a clustered pattern for the maternal health care services utilization coverage, while a negative value indicates dispersed coverage of maternal health care services utilization, and a zero value indicates random maternal health care services utilization [29].

We analyzed Gettis-OrdGi* statistics to identify areas with high and low utilization of maternal health services, and used Z scores with corresponding p values to determine such clusters. A high positive Z-score with a small *p*-value indicated a geographic clustering of high service utilization. A low negative Z-score with a small *p*-value indicated a geographic clustering of low service utilization [30].

We employed ordinary Kriging to predict the coverage of four or more antenatal care visits and skilled birth attendance in unsampled areas, as it integrates geographic autocorrelation and considers sampling weights [31]. Before running Kriging interpolation for spatial data analysis, we checked assumptions and conducted statistical tests. The normality of the data was assessed using a histogram and Q-Q plot. Data stationarity was evaluated by examining Voronoi polygons to ensure consistent variation across the study areas. Additionally, we analyzed the presence of spatial autocorrelation in the data using Moran's I index (Supplementary Figs. 1, 2, 3 and 4).

Results

Participation and women's characteristics

Of the 2919 women screened, 2892 were eligible for this study, of whom 2714 completed interviews regarding their antenatal care visits, while 2605 completed interviews regarding skilled delivery care. The mean age was 27 years, and most were in the 19–34 age rangetwo in five had not attended any formal education, and the same

Table 1 Definition of outcome measurements

Outcome measures	Definition
One or more ANC visits	The proportion of women who received at least one ANC visit
Four or more ANC visits	The proportion of women who received four or more antenatal care visits
Quality-adjusted ANC coverage	The proportion of women who received four or more ANC from health care facilities where the necessary inputs were available, along with iron folate tablets and tetanus toxoid vaccination, according to good process quality
Skilled birth attendance coverage	The proportion of women who gave birth at health facilities attended by skilled providers
Quality-adjusted skilled birth attendance coverage	The proportion of women who gave birth at health facilities where the necessary inputs were available, and who received uterotonic injection after delivery, with delivery managed reflecting good process quality (supplementary table)

proportion attended primary-level education (grades 1–8) (Table 2).

Of the 2714 women consented for the first interview, 2605 completed the study. We conducted a sensitivity analysis to determine if missing cases impacted our results. Specifically, we examined whether there was a difference in wealth quintile between women who completed the repeat interview and those who did not. Out of the total, 850 women from the least poor category completed the interview, with antenatal care service utilization being three times higher compared to the poorest women. Analysis of the complete data revealed a nearly equal proportion (2.9 times higher) showing similar coverage.

Table 2 Background characteristics of women interviewed, PMA 2019–2020

Background Characteristics	Un-weighted n (%)	Weighted % (95% CI)
Region (n = 2605)		
Tigray	441 (17)	7 (6,7)
Afar	216 (8)	1.9 (1.8,2)
Amhara	452 (17)	20 (20,21)
Oromia	644 (25)	44 (43,44)
SNNP	603 (23)	23 (22,24)
Addis Ababa	249(10)	3.5 (3.4,3.6)
Residence, n = 2691		
Urban	1019 (38)	21 (21, 22)
Rural	1672 (62)	79 (78, 79)
Age of women, n = 2691		
15–19 years	247(9)	11 (9,12)
20.24 years	646 (24)	23 (20,25)
25–29 years	863 (32)	30 (28,32)
30–34 years	520 (19)	19 (17, 21)
35–39 years	342 (13)	13 (12, 15)
40–48 years	94 (3)	4 (3, 5)
Educational status of women, n = 2605		
No formal education	994 (38)	42 (40,44)
Primary education	944 (36)	40 (38,42)
Secondary education and above	667 (26)	18 (16,19)
Household wealth quintiles, n = 2605		
1 (Poorest)	466 (18)	21 (19,23)
2	396 (15)	20 (18,22)
3	409 (16)	20 (18,22)
4	482 (19)	20 (18,22)
5 (Least poor)	852 (32)	19 (18,20)
Family size, n = 2605		
1–4 members	1382 (53)	49 (46,51)
5–8 members	1092 (42)	45 (43,47)
> 8 members	131 (5)	6 (5,7)
Marital status of women, n = 2605		
Married	2542 (98)	98 (97,98)
Divorced/separated/widowed	38 (1)	2 (1,3)
Single	25 (1)	< 1
Parity, n = 2605		
1	499 (19)	17 (15,19)
2–4	1626 (60)	60 (57,62)
≥ 5	480 (22)	22 (20,25)

Socio-economic equity of maternal health services utilization

In this study, 70% (95%CI: 66, 74) of women had at least one ANC visit, 40% (95%CI: 36, 45) had four or more ANC visits, and 12% (95%CI: 11, 14) received four or more ANC visits from a facility ready to provide these services, along with tetanus vaccination and iron folate supplementation according with the recommended process quality.

Slightly more than half (54%, 95%CI: 48, 59) of the women had skilled birth attendance, but only 7% (95%CI: 4, 8) received quality delivery care. Quality delivery care refers to a childbirth being attended in a facility equipped with the essential equipment and items necessary to provide delivery services. We considered uterotonic injection immediately after delivery was considered as a compulsory intervention.

There were wide absolute equity gaps (Q5-Q1) between the least poor and the poorest women for four or more ANC visits (43 percentage points) and skilled birth attendance (65 percentage points) (Fig. 1).

The relative inequity analysis (Q5/Q1) showed that, compared to women in the poorest household, those in the least poor household were 1.22 times more likely to have had at least one ANC visit, 3 times more likely to get four or more visits and 2 times more likely to receive ANC from a facility equipped with the essential inputs, along with the essential intervention as per the recommended standards (Table 3). Similarly, as compared to women in the poorest household, those in the least poor household were 3.2 times more likely to get skilled birth attendance and 1.2 times more likely to receive delivery service from a facility where the necessary equipment and supplies were available and delivery service offered according to the recommended process quality (Table 3).

The concentration indices revealed expected patterns in our results. We found disparities in the utilization of at least one ANC visit, with the least poor women being more likely to use ANC services. Additionally, completion of the recommended number of visits was more common among women from the least poor households. Our study also highlighted an equity gap in the utilization of skilled birth attendance, with the least poor women being more likely to access this service compared to their counterparts (Table 3).

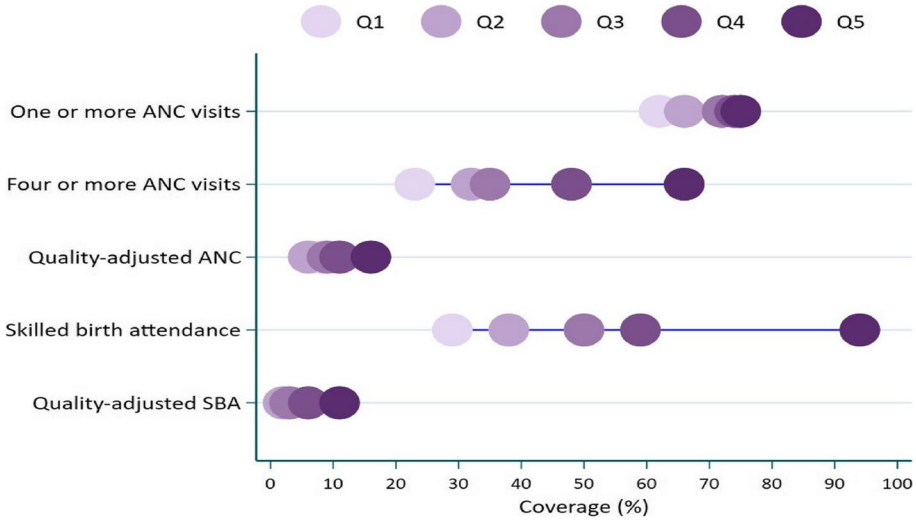

Fig. 1 Coverage (%) of maternal health services by household wealth quintiles. ANC = antenatal care, SBA = skilled birth attendance

Table 3 Equity analyses of coverage of maternal healthcare services by household wealth PMA Ethiopia, 2019–2020 (weighted sample)

Maternal Health Service Utilization	Sample	Wealth index					
		Overall	Q1[a]	Q5[b]	Absolute difference Q5-Q1	Ratio Q5/Q1	Concentration index
One or more ANC	2714	70%	62%	76%	14%	1.22	0.07 *P* < 0.001
Four or more ANC	2714	40%	23%	66%	43%	3	0.24 *P* < 0.001
Quality-adjusted ANC-coverage [c]	2714	12%	8%	16%	8%	2	0.17 *P* < 0.001
Skilled birth attendance coverage	2605	54%	29%	94%	65%	3.2	0.26 *P* < 0.001
Quality-adjusted SBA coverage [d]	2605	7%	2%	11%	9%	1.2	0.30 *P* < 0.001

[a]Q1: First Quintile (the poorest)

[b]Q5: Fifth quintile (the least poor)

[c]Quality-adjusted ANC coverage: The proportion of women who attended four or more ANC visit from a facility ready to provide antenatal care along with tetanus vaccination and Iron folate tablets according to standard care provision

[d]Quality-adjusted skilled birth attendance: The proportion of women who gave birth at a facility ready to provide skilled birth attendance and received uterotonic injection immediately after delivery according to standard care provision

Geographic autocorrelation of maternal health services

Due to the low coverage of quality-adjusted antenatal care visits and skilled birth attendance, we did not conduct a geographic analysis for this aspect. The Global Moran's index showed evidence of a statistically significant positive geographic autocorrelation of ANC four or more visits and skilled birth attendance utilization in Ethiopia. ANC four or more visits had statistically significant positive Moran's index (MI = 0.0054, Z score = 8.46 and $p < 0.0001$) (Figure S1 a). The geographic autocorrelation index for skilled birth attendance was positive and statistically significant (MI = 0.0055, Z score = 5.49, and $P < 0.0001$) (Figure S1 b). The Moran's I index for four or more antenatal care service utilization coverage and skilled birth attendance within regions also revealed statistically significant positive geographic autocorrelation. ANC four or more visits within regions showed a statistically significant positive Moran's index (MI = 0.20, Z score = 8.2, and $p < 0.0001$) (Figure S1 c). Similarly, the geographic autocorrelation index for skilled birth attendance within regions was positive and statistically significant (MI = 0.21, Z score = 8.6, and $p < 0.0001$) (Figure S1 d).

Geographical patterns (high or low utilization areas) of maternal health service utilization

A higher proportion of women in Central and Northern parts of Ethiopia had four or more ANC visits, while most eastern and Southern parts had low levels of utilization (Fig. 2). Most Central and Northern areas had higher

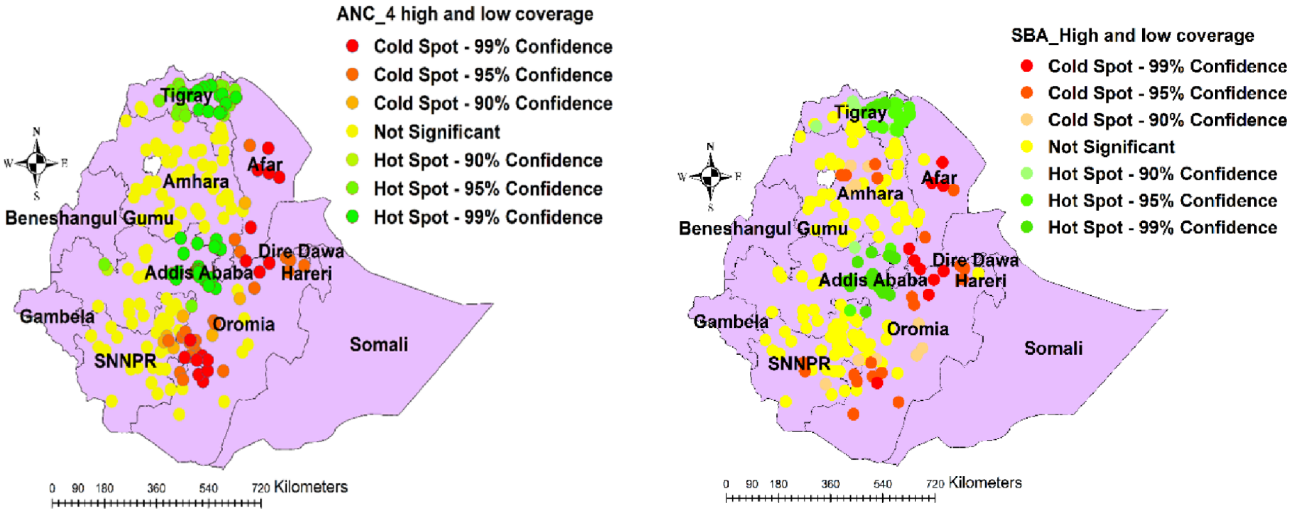

Fig. 2 Areas with higher and lower coverage for four or more ANC utilization (left) and skilled birth attendance utilization (right), PMA Ethiopia 2019–2020. ANC four or more utilization: Proportion of women who completed four or more ANC visits (left). Skilled birth attendance: Proportion of women who gave birth at health facilities and attended by trained professionals (right)

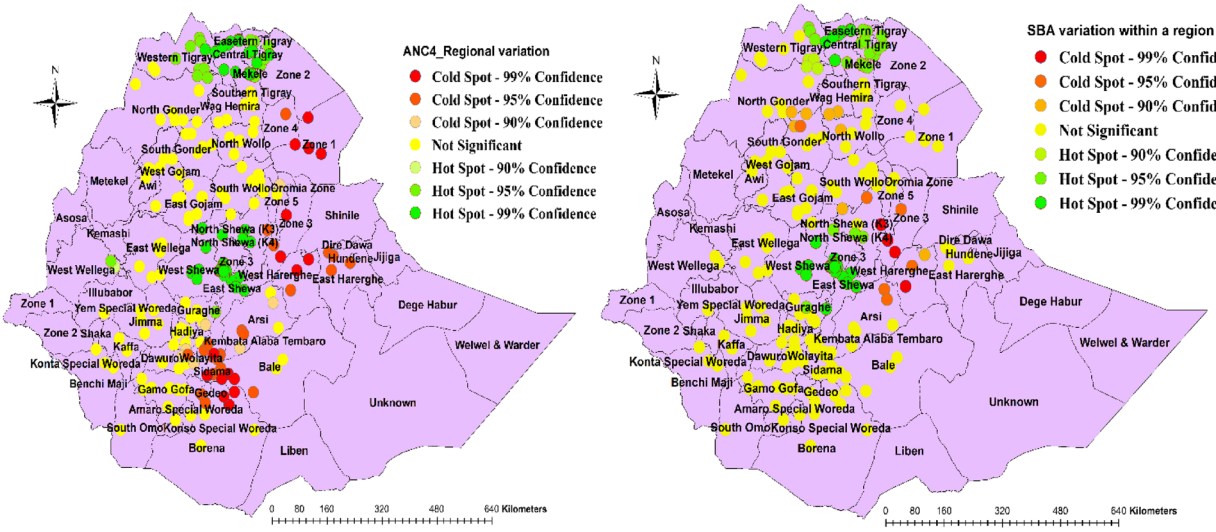

Fig. 3 Areas with higher and lower coverage for four or more ANC utilization (left) and skilled birth attendance utilization (right), PMA Ethiopia 2019–2020

proportions of skilled birth attendance, while areas in the east, and a few areas in the west and Southwest areas had low levels of utilization (Fig. 2).

Our analysis revealed disparities in maternal health service utilization between districts within regions. Clusters (EAs) in the Oromia region, such as West Showa, East Showa, and North Showa, which are located near the capital Addis Ababa, exhibited high coverage of four or more ANC services. Conversely, districts in the eastern Oromia region had lower coverage rates. In the Tigray region, most areas demonstrated high coverage of four or more ANC services, with the southern part showing no significant difference compared to the rest of the country. EAs selected in Afar region has a consistently low coverage of ANC utilization of four or more visits, with no variation observed between districts. When it comes to skilled birth attendance, EAs in Oromia region, administrative zones near the capital Addis Ababa have high coverage. However, EAs in the eastern Oromia and western Oromia areas, the distribution is low and random, respectively. As to the EAs in Amharic region, South Gondar, North Wollo, and Wagmira zones show low coverage for skilled birth attendance, while the other zones do not differ significantly from the rest of the country. Clusters in the then South Nations and Nationalities People region, EAs like Sheka, Keffa, Konta, Dawuro, Wolayita, Hadiya, and Kembata have a random distribution in skilled birth attendance utilization. On the other hand, Gamo Gofa, Bench Maji, and Gedeo districts

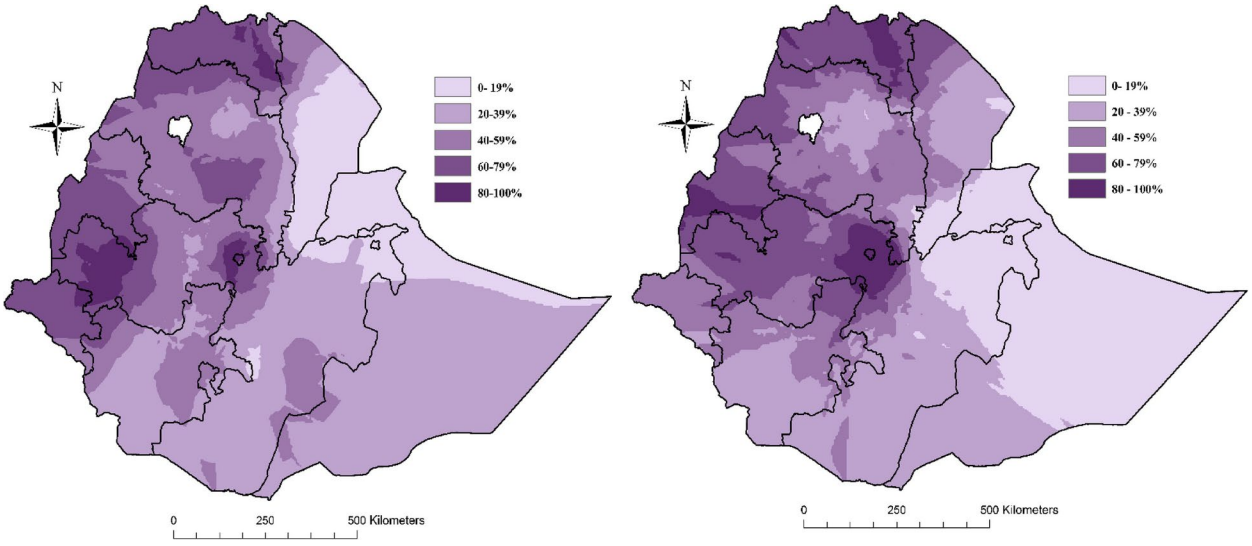

Fig. 4 Kriging interpolation of four or more ANC visits (left) and skilled birth attendance (right) in Ethiopia. PMA 2019–2020

have low coverage for skilled birth attendance utilization (Fig. 3).

Kriging interpolation of coverage of maternal health services

Based on the observed data points for specific areas, we predicted the coverage of four or more ANC visits, and skilled birth attendance in other areas, including the unsampled areas, using Kriging interpolation. The areas with light purple color indicates areas with a low proportion of service utilization, while the deep purple colored areas indicate areas with a high proportion of service utilization. Accordingly, very low utilization of both ANC and skilled birth attendance was seen in the eastern, southeastern and some central parts of Ethiopia (Fig. 4).

Kriging is considered an optimal predictor when the data follows a normal (Gaussian) distribution. By plotting our data as a histogram, we visualize the frequency distribution of the data and gather some summary statistics. In order to satisfy the assumption of data normality, the distribution in the histogram exhibit a bell-shaped curve; the mean and median values are close in proximity, the skewness value is around 0, and the kurtosis value is around 3.

In our data, the Arcsin transformed form of both ANC four or more and skilled birth attendance data displayed values that closely aligned with these assumptions (supplementary Fig. 1). The Q-Q plot of the transformed data also showed normal distribution (Supplementary Fig. 2). By dividing the data into five categories based on entropy or standard deviation, we were able to identify distinct areas of local data variability in the northeastern and southern regions of the sampling area (Supplementary Fig. 3).

Discussion

Our study revealed that there were inequities in maternal health service utilization between the least poor and the poorest. Women who lived in the household with the highest wealth status were more likely to utilize both four and more ANC and skilled birth attendance. The equity gap was more prominent in skilled birth attendance utilization than for four or more ANC service utilization. The overall coverage of quality-adjusted ANC and skilled birth attendance was very low, and consequently inequities were smaller. There was geographic clustering of four or more ANC and skilled birth attendance utilization in the study area, showing high utilization being clustered in the central and northern part of the country, while low utilization of four or more ANC and skilled birth attendance being clustered in the eastern part of the country and some areas in the southern region.

The highest utilization of four or more ANC visits and skilled birth attendance was observed among women from less-poor households. The fact that the poorest women were not utilizing maternal health services as much as their counterparts, despite most services being free in Ethiopia, suggests additional barriers hindering their access [31]. One potential reason for the underutilization of maternal health services among impoverished women may be the indirect costs, such as the costs for transportation, particularly for those residing in rural areas [32]. Earlier studies have consistently shown that women of higher socioeconomic groups were more likely to access and complete the recommended visits for maternal health services [18, 19, 33]. They could afford both direct and indirect costs associated with health services and make informed decisions when seeking care [34, 35]. This inequity highlights the need for targeted interventions designed to enhance access for these

disadvantaged groups. This finding aligns with previous studies conducted in sub-Saharan countries, showing that women from wealthier households tend to make better use of maternal health services [36].

The disparity in access to skilled birth attendance was more pronounced than the gap in utilizing four or more ANC visits. However, only small socio-economic inequities were noted in the quality-adjusted utilization of four or more ANC services and skilled birth attendance, due to the low overall quality-adjusted coverage. While most women in the least poor households were able to access skilled birth attendance, they did not receive quality delivery services due to suboptimal facility readiness and low intervention coverage [27]. This highlights the importance of improving service quality and increasing access to services.

This study revealed a geographic variation in the utilization of maternal health services in the study regions. The eastern areas, where highly mobile and pastoralist communities reside, had the lowest coverage for ANC visits and skilled birth attendance. In contrast, the central area and northern areas had better coverage of these services. The central areas proximity to the capital city, Addis Ababa, has likely led to improved road infrastructure and better transportation access. The difficulties in providing access to services to pastoralist communities and some cultural beliefs regarding pregnancy and childbirth may result in the low coverage in these areas [37]. These communities are highly mobile from place to place in search of favorable grazing land for their livelihood; hence the stationary health system may not fit their living style. A previous review in low-income countries among nomadic women showed that lack of decision-making power (with decisions being made by husbands), economic barriers, physical access, cultural barriers (fear of male midwives), static health system, and poor- quality health services in the rural areas were some of the key barriers for maternal health service utilization [38].

We have shown that apart from a low coverage of maternal health services utilization, there were socio-economic and geographical inequities in service coverage and quality, implying a need for specific measures to target women from the poorest households and geographically disadvantaged areas.

Strengths and limitations

The study included large geographic areas comprising 90% of Ethiopian women, representing women from different socio-cultural and geographic backgrounds. The data were collected with meticulous quality assurance. Our analysis assessed multiple dimensions of equity. However, the information used in this study was based on self-reports by respondents and is thus subject to bias, although maternal health service utilization is not likely to be a sensitive issue. Some of the measurements are subjective and rely on the women's level of understanding, such as the quality of care at health facilities, which could affect the estimates in either direction.

Conclusion

Although maternal health services have been expanded within the primary healthcare level in Ethiopia and due attention given by the government to reduce maternal mortality through investing across the health system, there continues to be low utilization of services and inequitable coverage. Our findings indicated inequities in maternal healthcare utilization based on socio-economic level and geographic location, showing low utilization among the poorest and in some large geographic areas. These findings suggest a need to re-design a tailored modality of service provision targeting the poorest community, by recognizing the pastoralist community living context residing more in the Eastern part of the country.

Abbreviations

ACI	Absolute Concentration Index
ANC	Antenatal care
CI	Confidence Interval
EA	Enumeration Area
GWR	Geographically Weighted Regressions
MI	Moran's Index
PMA	Performance monitoring for Action
Q	Quintile
SBA	Skilled birth attendance
SII	Slop Index for Inequality
SNNP	Southern Nations, Nationalities, and Peoples' region

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-025-12639-3.

Supplementary Material 1: Supplementary figure 1. Histogram of four or more ANC (left) and skilled birth attendance (right)

Supplementary Material 2: Supplementary figure 2. Q-Q plot for four or more ANC (left) and skilled birth attendance (right)

Supplementary Material 3: Supplementary figure 3. Voronoi polygons ANC four or more (left), skilled birth attendance (right)

Supplementary Material 4: Supplementary figure 4. The global spatial autocorrelation analysis of four or more ANC utilization (a) and skilled birth attendance utilization (b). PMA Ethiopia 2019-2020 survey

Acknowledgements

We would like to express our sincere gratitude to the PMA data managers, for their invaluable assistance in managing the data. Additionally, we extend our thanks to the Ministry of Health Maternal, Child, and Adolescent Health Service Lead Executive Office at the Federal Ministry of Health in Ethiopia for their guidance and support in identifying priority research areas.

Consent for participation

All women involved in this study gave their consent for participation.

Authors' contributions

All authors participated in the conceptualization of the study. ZD designed the analysis plan, incorporating feedback from all co-authors. ZD took the lead in drafting the manuscript, with contributions from all authors towards

the final version. Ultimately, KA, LP, AD, JS, DB, SL, TG, AT, TG, TM, SS, MZ and GT contributed to the editing and revision of the manuscript.

Funding
The source of funding was the Bill & Melinda Gates Foundation through the London School Of Hygiene and Tropical Medicine.

Data availability
The data used for this article can be available from the corresponding author on request.

Declarations

Ethics approval and consent to participate
This paper presents findings from a secondary analysis of data collected as part of the PMA Ethiopia project. The study was conducted according to the declaration of Helsinki. The original study underwent rigorous review and approval by the Ethical Review Board at Addis Ababa University, College of Health Sciences (AAU/CHS) (Ref: AAUMF 01–008), as well as the Johns Hopkins University Bloomberg School of Public Health (JHSPH) (FWA00000287). Authorization to utilize the dataset was granted by Addis Ababa University. Informed consent was obtained from all women before interviews.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia
[2]Department of Anesthesia, School of Medicine, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia
[3]Department of Disease Control, Faculty of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, UK
[4]Health System and Reproductive Health Research Directorate, Ethiopian Public Health Institute, Addis Ababa, Ethiopia
[5]School of Public Health, Addis Ababa University, Addis Ababa, Ethiopia
[6]Maternal, Child & Adolescent Health Service Lead Executive Office, Federal Ministry of Health, Addis Ababa, Ethiopia
[7]Department of Pediatrics and Child Health, School of Medicine, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia
[8]Department of Epidemiology and Biostatistics, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

Received: 7 June 2024 / Accepted: 21 March 2025
Published online: 26 April 2025

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