

Inequality in Skilled Birth Attendance Service Utilization in Ethiopia across Geographic, Residential Differences and Level of Women's Education

Habtamu Alemay Anteneh*

Department of Medicine, Addis Ababa University, Addis Ababa, Ethiopia

Corresponding Author*

Habtamu Alemay Anteneh
Department of Medicine,
Addis Ababa University,
Addis Ababa,
Ethiopia
Email: habtamu.alemay@moh.gov.et

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Received: 07-March-2022, Manuscript No. JPHC-23-56461; **Editor assigned:** 10-March-2022, PreQC No. JPHC-23-56461 (PQ); **Reviewed:** 24-March-2022, QC No. JPHC-23-56461; **Revised:** 13-February-2023, Manuscript No. JPHC-23-56461 (R); **Published:** 13-March-2023, DOI: 10.35248/2376-0389.23.13.2.487

Abstract

Global health status in general and maternal mortality in particular, showed positive progress in the last 20 years in the developing world. Ethiopia has a good record in achieving the Millennium Development Goals (MDGs) related to child mortality and maternal mortality reduction. Although such positive results have been reported, there is a huge disparity in the utilization of high-impact interventions for maternal health including births assisted by skilled health personnel (SBA) in different population groups. Equitable health service provision is the center piece of many global initiatives such as Sustainable Development Goals (SDGs), Universal Health Coverage (UHC) and the International Conference on Population and Development (ICPD) to improve maternal and child health.

This study was conducted based on Ethiopian Demographic and Health Surveys (EDHS). The decomposition analysis of the EDHS of 2000, 2005, 2011, 2016 and 2019 were conducted. The source owners were asked officially to get access to raw data in SPSS format. Then the data on skilled birth attendance and associated geographic and socio-economic characteristics were extracted and analyzed using SPSS, EDHS Statcompiler and WHO HEAT tool kit.

In general, the proportion of birth attended by skilled health personnel increased from 5% in 2000 to 49.8% in 2019 in Ethiopia. However, the skilled birth attendant service utilization is highly different among socio-economic statuses and geographic differences. The urban resident women benefited more than those in rural. In the 2019 EDHS, women living in urban areas were 1.76 (95% CI 1.2-2.3) times higher to give birth with the assistance of skilled health professionals. The rate difference between women with higher education and no education showed an increasing trend from 42.4% (95% CI 34.6, 50.3) in 2000 to 69.1% in 2011 (95% CI: 60.8, 71.8) and started to decrease after 2011 from 69.1% in 2011 to 57.9% in 2019 EDHS. Based on the 2019 EDHS, the richest were 6.2 (95% CI; 4.9-8.2) times more likely to use SAB services compared to the poorest counterparts and the relative concentration of the SBA service utilization of EDHS 2016 was 31.5 (95% CI; 29.5, 33.4) for the richest in wealth quartile based analysis. The disparities in using SBA service persisted among different types of residence, geographical location, level of education of pregnant women and the wealth status of the household. In all

cases, there is an increasing trend of using SBA services. Although the inequalities are significant, there is a tendency of reduction in the level of disparities in the relative concentration index of health status and differences among education levels. The urban residents, the richest and those with higher education level benefited more than their counterparts.

Keywords: Skilled birth attendance • Equity • Maternal health • Level of education • Strategy regions • Wealth index • Residence

Abbreviations:

ANC: Antenatal Care; DHS: Demographic and Health Survey; EDHS: Ethiopian Demographic and Health Survey; ERB: Ethical Review Board; HEAT: Health Equity Analysis; HSTP: Health Sector Transformation Plan; IPCD: International Conference on Population and Development; MDGs: Millennium Development Goals; PNC: Postnatal Care; RCI: Relative Concentration Index; RD: Rate Difference; RR: Rate Ratio; SBA: Skilled Birth Attendance; SDG: Sustainable Development Goals; SPSS: Statistical Package for Social Science; UHC: Universal Health Coverage; WHO: World Health Organization

Introduction

Background

Global health status in general and maternal mortality, in particular, showed positive progress in the last 20 plus years in the developing world. Although there was an improvement, many countries did not achieve the millennium development goals related to maternal health. Ethiopia has a good record for working towards the MDGs related to child mortality and maternal mortality reduction and now aims at fulfilling the Sustainable Development Goals (SDGs) that replaced the MDGs. Although such positive results have been observed, there is significant disparity in the utilization of high-impact interventions for maternal health including births assisted by skilled health personnel (SBA) in different population groups. Equitable health service provision is the center piece of many global initiatives such as SDG, Universal Health Coverage (UHC) and the International Conference on Population and Development (ICPD) to improve maternal and child health. According to the World Health Organization (WHO), health equity is defined as the absence of an avoidable disparity among different groups of people with different social, economic, demographic and geographical statuses. Therefore, health inequity involves more than inequality regarding determinants of health, access to the resources to improve and maintain health outcomes. They also explain a failure to avoid inequalities that trespass on fairness and human rights norms [1].

The concept of health equity has long been ideal, with roots in social medicine reaching back into the mid-nineteenth century when visionary public health leaders and social critics recognized that social and class inequalities led to inequities in health. The constitution of the World Health Organization (WHO) states that health should be within reach to all without restrictions of race, religion and political belief, economic or social condition with the highest standards possible. The universal declaration of human rights of the United Nations also provided a similar definition by focusing that health is everyone's right [2].

Dimensions of inequity

Inequity refers to unfair, avoidable differences arising from poor governance, corruption or cultural exclusion while inequality simply refers to the uneven distribution of health or health resources as a result of genetic or other factors or the lack of resources. Inequity invokes moral outrage, it is unfair and indefensible, a result of human failure, giving rise to avoidable deaths and disease. Social justice in this case is literally a matter of life and death. Inequity is often measured in terms of the inequality of health or resources, which is appropriate where one might reasonably expect equality. For example, there is no reason for differences in access to health resources between men and women within a country other than cultural prejudice and/or a failure of governance, basic health services should be available to all citizens within a community according to need. Health inequity can be attributed due to different parameters like gender, age, education, geography, residence, religion, income, traditions and other socio-cultural factors. Gender, geography, residence, demographic and socio-economic factors including level of education, age and household income are among the common dimensions of health equity that attribute differences for health service utilization [3].

Globally, about 810 women died from preventable causes of pregnancy and childbirth in 2017. From 2000 to 2017, the maternal mortality ratio dropped by about 38% worldwide. The causes of obstetric maternal death are to a large extent preventable with high-impact interventions including skilled birth attendants. WHO defined Skilled Birth Attendant (SBA) as an accredited health professional such as a midwife, doctor, nurses who have been educated and trained to be proficient in the skills needed to manage women during normal childbirth and the immediate postnatal period as well as in the identification, management or referral of complications in women and new-borns. Skilled birth attendance service provision at the time of childbirth is an important lifesaving intervention for both women and babies. On the other hand, unable to obtain access to this key assistance is detrimental to women's health because it could cause death or long-lasting morbidity, especially in vulnerable settings [4].

The proportion of births attended by skilled health personnel has increased from 59% in 1990 to 71% in 2015 and up to 80% in 2017 in the world. Globally, 81 percent of births were assisted by skilled health professionals in 2019, which generally include a medical doctor, nurse and midwife. However, population growth brings an approaching challenge for essential maternal and newborn health care service coverage. While most regions are projected to experience a decline in the number of annual births between 2019 and 2030, 14% increase is expected to be observed in Africa. Based on this projection in the number of births and assuming current coverage levels of skilled birth attendants will stay the same, and an estimated 19 million births in Africa will not obtain SBA service in 2030. This prospect means that substantially more resources will be required to increase intervention coverage levels and to stay at a pace with population changes happening in the continent [5]. Ethiopia has transformed from a country of low health profile to an exemplary nation of better health services and outcomes in sub-Saharan Africa through its innovative primary health care program over the last three decades. However, while the nation has scored impressive reduction in morbidity and mortality and seen the narrowing disparities in access to primary health care, there is still a huge regional and intra-regional disparity in most health outcomes and impact indicators pointing to the critical importance of better targeting populations with the poorest health. Only by addressing these equity challenges, Ethiopia will be able to fulfill its vision of achieving UHC by 2030 for the increased economic productivity of the whole country.

Ethiopia endorsed health policy in 1993 which was mainly focus on prevention strategies which is generally states health development shall be seen not only in humanitarian terms but as an essential component of the package of social and economic development as well as being an instrument of social justice and equity. Four years later the government designed the health extension program which focuses on addressing the rural community through awareness creation and accessing essential health services at kebele level by the health extension workers. The program full implementation in 2004. This was one of the turning point for the prevention of communicable

disease and reduction for the child and maternal mortality [6].

Based on the health policy the government of Ethiopia design a 20 year health road map classified in two four categories to address millennium development goals. Each five year term was planned with Health Sector Transformation Plan (HSTPs).

The target set by the Ethiopian health sector transformation plan of 2016-2020 SBA was 90% by 2020. According to projections based on 2019 Mini DHS data, the national SBA coverage is expected to increase to 94% by 2025. Thus, maintaining efforts to the most recent year level or more is necessary to achieve the national target as the smoothed average (low) projections indicate that level of effort would not be enough to achieve the target. In Ethiopia, maternal and child health service coverage is increasing. On the other hand, the service coverage improvement is not similar across different equity markers *i.e.*, different regions, residential differences, demographic factors and economic status of households. Therefore, the researcher aimed to analyse the level of inequality across geographic, type of residence, level of women's education, and household income level to support policy makers and stakeholders to use the evidence and design appropriate intervention to avert inequalities in using skilled birth attendant service in the country [7].

Rationale

Health equity is the global agenda, which gets a focus on SDG and other global commitments including universal health care initiatives with the slogan of no one behind. Ethiopia through the HSTP I and HSTP II flag health equity as a priority agenda thereby developed a national health equity strategic plan 2021 to 2025. But there is still a shortage of concrete evidence about the magnitude and reasons for health inequality that can support for design of appropriate interventions (SDG, HSTP). Therefore, this study will be supportive to initiate appropriate interventions to reduce inequity in maternal health in general and SBA. Geography and residence dimension are least addressed in the previous studies followed by education level and wealth index when compared to other dimension that can be applied for skilled delivery. In Ethiopia, there are significant variations (difference) of dimensions (variables). Therefore addressing the inequality with in the geographic, residential, level of education and wealth index is very critical. The level of education, economic status and type of residence are different in Ethiopian population. The poor, uneducated and rural population accounts the majority of the Ethiopian population which needs to address the inequality in terms of health service including skilled birth attendant [8].

Significance of the study

Health services in Ethiopia have shown improvement in the past three decades. According to EDHS report, the maternal mortality rate has declined from 871 (2000) to 401 (2017) per 100,000 live births, which means a reduction of 54%. Similarly, under 5-year children mortality has declined from 166 to 59 and infant mortality has declined from 97 to 47 in 2000. In addition, neonatal mortality has declined from 49 (2000) to 29 in 2016. The coverage of ANC4+ has increased from 31.8% (EDHS 2016) to 43.0% (mini EDHS 2019). The skilled birth attendance has increased from 27.7% (EDHS 2016) to 49.8% (mini EDHS 2019), showing an increase of 22.1% in four years. However, disparity across different equity markers is still challenging in addition to the low coverage of health services. Therefore, knowing the level of the disparities, the trend of these disparities whether increasing or decreasing and at how much level the inequity level is going on will help health policymakers and program level implementers to design appropriate interventions. This study aims at providing the magnitude, trend and selected associated issues of inequity services for SBA in Ethiopia. The special contribution of this study will be addressing the unaddressed equity dimension that is sub-regional (geographic inequality) and residential inequality status. It also includes the latest EDHS data (EDHS 2019) which is not included in the previous studies [9].

An analysis of demographic and health surveys showed that maternal health service inequalities are high in countries with low overall coverage.

The inequalities between low and high coverage *i.e.*, 80% overall coverage are high. A cross sectional analysis of 80 countries on SBA showed that only 25 countries have more than 90% coverage while this high coverage was associated with the level of income across countries and within countries. Another study carried out in 37 low-income countries showed that SBA average rural coverage was 72.8% while the average urban coverage was 80% with a significant difference between urban and rural residents. The same study showed that the rural poorest women in rural had lower utilization of SBA compared to the poorest urban women. Recent data also indicated that Antenatal Care (ANC) and SBA coverage showed significant disparities across continents particularly in Asia and Africa with the poorest in Afghanistan, Somalia and south Sudan having more than three-quarters of the women did not get ANC and SBA services during 2012 and 2015 [10].

A study on social and health inequality conducted in north African countries argued that though the health, education and living standard, in general, have substantially improved on average, the North African countries have to work much to reduce social and health inequalities between rural-urban, advantaged-marginalised regions and cities, different level of income and wealth. The future challenge for this region is mainly to reduce avoidable inequalities in addition to improving economic, social and health conditions on average. In 2019, a study conducted in subnational health management and the advancement of health equity in Ethiopia showed that geography is a factor for the health service inequity, especially when intersecting with poor infrastructure. Hard to reach or pocket areas of the countries suffered from low utilization of health services including maternal health services when compared to the central area.

These differences are also noted in Ethiopia within the country across different parameters. The difference could be between urban and rural, educated and non-educated, low income and high income and across different provincial states. Another study also showed that in Ethiopia there are substantial improvements in health outcomes and health services. Although there is still a considerable gap between the rich and the poor, inequalities in health services have been reduced. However, child nutrition outcomes have mainly improved for the rich. The changes observed in wealth-related inequality tend to reflect the changing direct effect of household wealth on child health and health service use. Another study report conducted on the inequity of health care uptake showed that the inequity level is higher during delivery than other maternal health care services like ANC, PNC and contraceptive use. Ethiopia is striving to address the inequity of maternal and reproductive health services by aligning with the agenda of gender inequalities. Ethiopia has a strong commitment to promoting health equity and development more broadly through global, regional and national initiatives. The country signed the United Nations (UN) 2030 agenda of sustainable development goals that include addressing the inequity of primary health care service. A cross sectional analysis of 2011 EDHS data indicated that education of women, place of residence, ethnicity, parity, women's autonomy and household wealth had a significant association with the use of maternal health services. Women who completed higher education and from urban areas were more likely to use ANC, skilled delivery attendants and PNC more than women who did not attend formal education and women from rural areas respectively. Similar studies in Ethiopia also showed that there is an increasing trend of inequities in maternal health care services including ANC, SBA and PNC. A comparison of serial national household surveys conducted in south Africa showed that high levels of inequalities were noted in most measures of service access in both 2008 and 2012. Inequalities between socio-economic quartiles worsened over time in antenatal clinic attendance, with overall coverage falling from 97% to 90.2% [11].

Objectives

General objective: The general objective of this study is to conduct a longitudinal analysis of the level of inequity of skilled birth attendant coverage across geographic, residential and level of education using EDHS data from 2000 to 2016 of Ethiopia.

Specific objectives: To analyze the trend of SBA in Ethiopia from the EDHS data of the last two decades. To analyze the level of inequity of SBA services among different geographic, residence, level of education and wealth status of the household of EDHS data sources of the last two decades.

Expected result: The expected results are that there will be regional variations in service utilization of SBA and urban women are more beneficial to the SBA service than their rural counterparts in Ethiopia. Besides, the trend of inequality will be decreased as the country is implementing different interventions to narrow the gap between these parameters.

Materials and Methods

Study area and study setting

The study was conducted based on Ethiopian demographic and health surveys. Ethiopia is the second-most populous country in Africa with a population of 102,850,793 and a growth rate estimate of 2.6% in 2020, ranking 12th in the world. The country is home to various ethnicities with more than 80 different spoken languages. The male to female ratio is almost equal and the country has the total fertility rate of 4.6 with 2.3 in urban areas and 5.2 in rural areas. Eighteen percent of dwellers are in rural areas and mainly based on subsistence agriculture [12].

Study design and period

The decomposition analysis was based on the Ethiopian Demographic and Health Survey (EDHS) of 2000, 2005, 2011, 2014, 2016 and 2019. The study was conducted in Ethiopia from May 2021 to July 2021. Ethiopia had conducted four major DHSs (2000, 2005, 2011 and 2016) and two mini EDHSs (2014 and 2019). Each major EDHS covered five year performance or status of the country. The EDHS started with the first 20 years health sector development plan of the country. Each survey also evaluates the one HSDP plan implementation status [13].

Variables

Dependent variable: Births attended by skilled health personnel.

Independent variable:

- **Geography (administrative regions or provinces):** The rate difference between the highest performer region and lowest performer region will be calculated. In addition the ratio of highest performer to the lowest performer region will be calculated to measure the level of inequality in each EDHS report.
- **Residence (urban or rural):** The difference between urban and rural, the ratio urban to rural and the relative concentration index will be analysed to measure the level of in equality among the urban and rural residents of the EDHS participants.
- **Women level of education (Uneducated, primary education, secondary education and higher education):** Similar to the type residence level of inequality in different level of education will be measure terms of difference between higher education and uneducated, ratio of higher education to uneducated and concentration index across different level of education will be analysed.
- **Wealth status of the household (wealth quintile):** Rate difference, RCI and ratio will be analysed.

Data source and collection tools

This study used secondary data of EDHS collected for another purpose periodically. The source owners were asked officially to get access to raw data in SPSS format. Then the data on skilled birth attendants and associated geographic and socio-economic characteristics were extracted and analysed using SPSS and WHO equity analysis tool [14].

Data processing and analysis

The extracted data was checked for data quality. The data disaggregation by geography (administrative provinces or regions), residence (urban or rural) and level of education (no education, primary education and secondary and higher) were conducted.

To know the level of inequity the Rate Difference (RD), Ratio^o (R) and Relative Concentration Index (RCI) was analysed for wealth index and RD and R analysed for all dimensions. EDHS stat compiler (for trend), WHO HEATPLUS 2020 update (for RD, RR) and SPSS V28 (for RCI, regression and frequency) were used to measure the level of inequity in skill birth attendant coverage [15].

Operational definitions

Skill Birth Attendants (SBA): Births delivered with the assistance of skilled health professionals (Medical doctors, nurses, midwives and health officers) with the presence of essential delivery facilities in a conventional health facility including health centers and above. So the analysis did not include birth attended by health extension workers (community health workers) and home deliveries attended by any type of professionals.

Education level: It entails the woman’s level of education based on the Ethiopian curriculum.

Geography: In this study, the term geography indicates the administrative provinces based on the current Ethiopian government structure *i.e.* is regions and city administrations.

Wealth index: Households are given scores based on the number and kinds of consumer goods they own, ranging from a television to a bicycle or car, in addition to housing characteristics such as source of drinking water, toilet facilities and flooring materials.

These scores are derived using principal component analysis. National wealth quintiles are compiled by assigning the household score to each usual (de jure) household member, ranking each person in the household population by her or his score and then dividing the distribution into five equal categories, each comprising 20% of the population.

Research dissemination plan

The result of this study will be submitted to Tsinghua university, to the Ethiopian federal ministry of health and all regional and city administration health bureaus.

Results

Trend of Skill Birth Attendance (SBA) service utilization

Ethiopia conducted four main EDHSs (2000, 2005, 2011 and 2016) and two mini EDHSs (mini EDHS 2014 and 2019). The latest EDHS survey conducted was the survey of the 2019 *i.e.* mini EDHS. In this survey 8,885 women of the reproductive age group (15-49 ages) were participated in the interview with a 99% response rate. The mean ages of the participants were 31 years of age.

Among them, 68% did not attend formal education while only 3.1% have attended higher education. About 19.3% were urban and 80.7% were rural residents. Regarding their level of household income, the majority *i.e.* 34.5% were in the poorest category while 17.2% were in the richest level and the remaining was under the poorer, middle and richer levels. In 2019 EDHS, 5753 mothers gave birth in the five years preceding the survey (Figure 1).

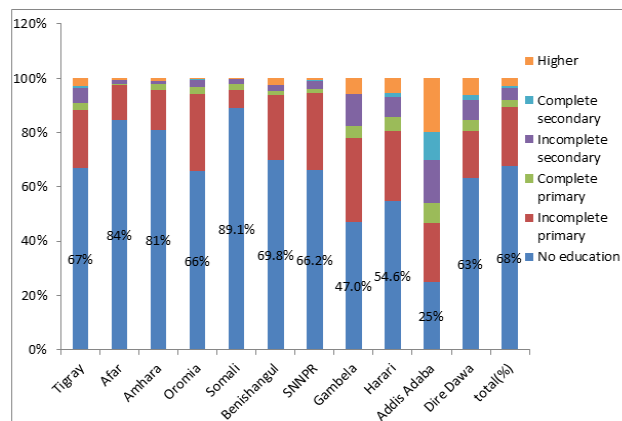


Figure 1. Participants level of education by region in Ethiopia, EDHS 2019.

As illustrated above, based on the latest EDHS (EDHS 2019) the participant’s educational status by region shows little difference. Among participant uneducated women account for more than 50% in most regions with the highest proportion in the Somali region followed by Afara and Amhara in which uneducated women participants account for 89.1%, 84% and 81% respectively. In general, except Addis Ababa and Gambella, there is no significant variation among regions in terms of level of women’s education as shown in Figure 2.

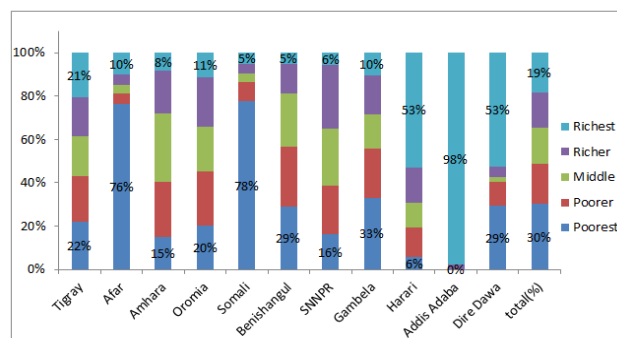


Figure 2. Participants wealth status (Wealth quintile) by subnational regions, EDHS 2019.

Among the EDHS 2019 total participants, 30% account for the poorest population group. The richest group account for 19%, the poorer 18%, the middle level 17% and richer 16% of the total participants which showed almost similar proportion among different wealth status level at the national level. However, when disaggregated by the sub-regions there was significant difference in composition. Addis Ababa contains only two categories (the richest 98% and the richer 2%). Seventy eight percent (78%) participants in Somali and 76% in Afar regions were under the poorest categories as shown in Figure 3.

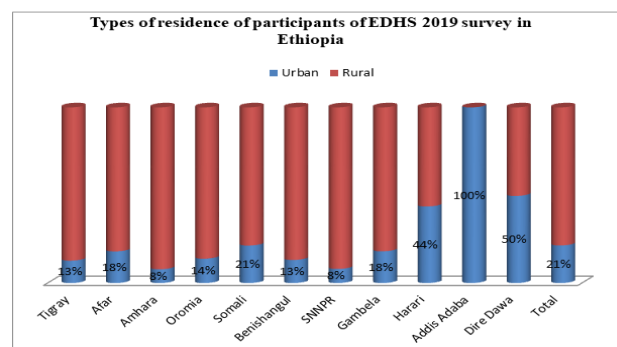


Figure 3. Types of residence of the participants of the survey disaggregated by regions in Ethiopia, EDHS 2019.

From the total of 2019 EDHS study participants 21% were urban and 79% were rural residents in general. When disaggregated by sub regions, Addis Ababa is 100% urban, Dire Dawa 50% urban and 50% rural while Hara contains 44% urban and 56% rural. The remaining sub regions mainly represented by rural residents as shown in Figure 3.

In general, from the above three figures the major difference in participants between sub-regions was the economic status compared to educational status and type of residence which could be the major cause of disparities in the service utilization including SBA service (Table 1).

Table 1. Births attended by skilled health professionals five years preceding each EDHS survey in Ethiopia.

EDHS	Total (n)	No	Yes	Percent
2000	10858	10315	543	5%
2005	9832	9311	521	5%
2011	11631	10480	1151	10%
2016	10641	7693	2948	28%
2019	11552	5799	5753	50%

As well indicated in the above table each EDHS report used different number of eligible sample for assessing the prevalence of skilled birth attendance. In all cases the number of births attended by skilled health professionals increased through time (Figure 4).

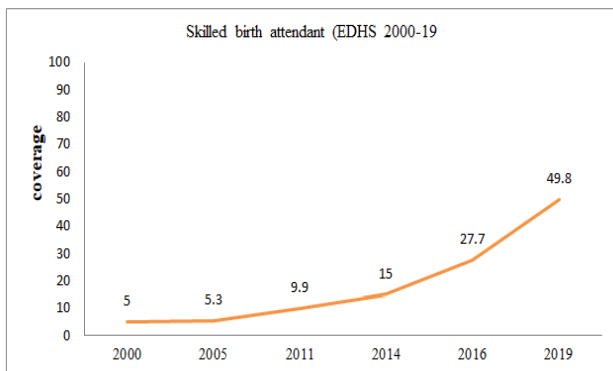


Figure 4. Trends of SBAs in Ethiopia EDHS 2000, 2005, 2011, 2014, 2016 and 2019, EDHS.

The descriptive analysis showed that the level of service utilization of skilled birth attendants increased from 5% in 2000 to 49.8% in 2019 in Ethiopia. Though there are improvements compared to earlier times, still the service utilization level is very low compared to targets set by the health sector transformation plan which was 90% by 2020.

Geography (Administrative regions): Administratively, Ethiopia is divided into ten provinces (regions) and two city administrations; these are Addis Ababa, Afar, Amhara, Benishangul Gumuz, Diredawa, Gambella, Harari, Oromiya, Tigray, SNNP, Sidama and Somali. Off these Sidama region is recently established from SNNP. Therefore, this analysis will not include Sidama separately. From the analysis, all nine regions and two city administrations had achieved significant improvements in the last twenty years (2000 to 2019) in SBA coverage. The highest improvement was achieved by the Tigray region followed by the Benishangul Gumuz and Amhara regions i.e. from 4.8% to 73.3%, 9.1% to 65% and 3.1% to 55.7% respectively (Figures 5 and 6).

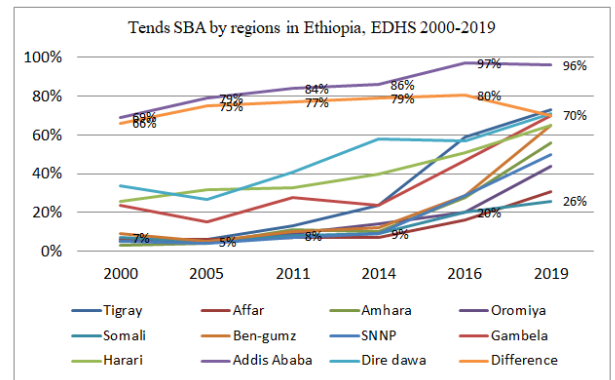


Figure 5. Trends skilled birth attendance by regions in Ethiopia, EDHS 2000-2019. **Note:** EDHS: Ethiopian Demographic and Health Survey; SNNP: Southern Nations, Nationalities and People

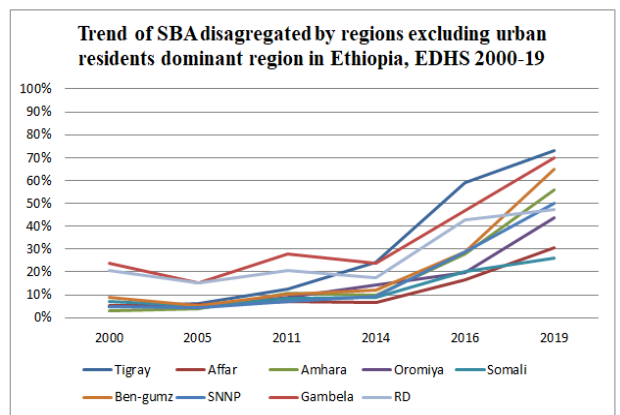


Figure 6. Trend of SBA service utilization and difference (RD) disaggregated by sub regions excluding the three regions (AA, DD and Harari) in Ethiopia, EDHS 2000-19. **Note:** RD=Rate Difference, AA=Addis Ababa, DD=Dire Dawa, SNNP=Southern Nations Nationalities and People

The result also showed that the difference between the highest and the lowest performing region increased from 66% in 2000 to 77.1% in 2016 and again decreased to 69.1% in 2019 mini EDHS. When we compared the regions by excluding the three sub regions which are dominantly urban (Addis Ababa, Hara and Dire Dawa), the shape of the trend line and the level of Rate Difference (RD) changed as we can see from Figure 6.

This showed the influence of the types of residence on the SBA attendance service utilization.

Types of residence: The trend analysis of the EDHS showed that the SBA coverage among rural residents showed a slow increment from 2000 to 2011 when compared to the period from 2011 to 2019 EDHSs. Similarly, it has a slower improvement when compared to urban residents in the last two decades. The coverage increased from 2% in 2000 to 19.5% in 2016 among rural resident women while there was an increase from 31.5% to 79.5% among urban resident women in the same period. But there was a sharp increase from 2016 to 2019 among rural residents while there is a decrease among urban residents from 19.5% to 40% and 79.2% to 70.1% in respective residents (Figure 7).

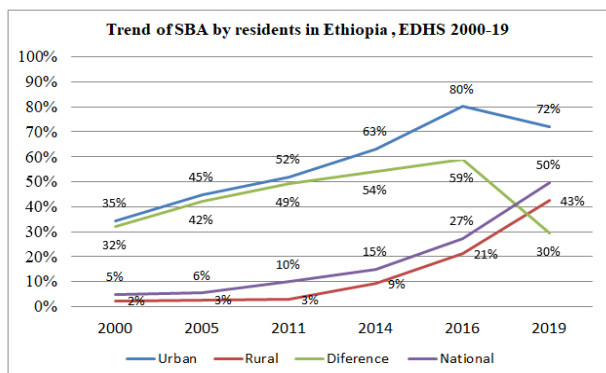


Figure 7. SBA coverage trend in Ethiopia across urban and rural residents, EDHS 2000, 2005, 2011, 2016 and 2019.

Generally, urban residents are more benefited from the skilled personnel assisted delivery service compared to that of their similar counterparts of the rural women with SBA 70% in urban and 43% in rural according to the latest survey of Ethiopia, EDHS 2019 (Figure 7).

Table 2. Skilled delivery inequality by wealth, residence and education characteristics of mothers gave birth with five years preceding the survey in Ethiopia during 2000-2016.

EDHS	Equity dimension	Rate Difference (RD)	95% CI
2000	Urban vs. rural	32.2	27.3 - 37.2
	Geography	66	60 - 72.1
	Women's education	42.4	34.6 - 50.3
	Richest vs. poorest	24.1	19.4 - 29
2005	Urban vs. rural	42.1	33.8 - 50.4
	Geography	74.8	65.8 - 83.9
	Women's education	55.3	49.2 - 61.4
	Richest vs. poorest	27.8	22.5 - 33.2
2011	Urban vs. rural	46.8	39.4 - 54.2
	Geography	76.7	69.9 - 83.5
	Women's education	69.1	61.3 - 77
	Richest vs. poorest	47.5	40.7 - 54.3
2016	Urban vs. rural	58.9	50.8 - 66.9
	Geography	80.4	75.8 - 85.1
	Women's education	66.3	60.8 - 71.8
	Richest vs. poorest	64.3	58.1 - 70.4
2019	Urban vs. rural	30	26.3 - 33.4
	Geography	70	64.5 - 75.8
	Women's education	60.4	55.2 - 65.4
	Richest vs. poorest	47.3	42.1 - 51.9

Note: CI: Confidence Interval; EDHS: Ethiopian Demographic and Health Survey

The proportion of births attended by skilled health personnel was significantly different between regions; the Rate Difference (RD) between

Women's level of education: When we see the trend in terms of the different equity diminutions, there is a similar increasing trend in general. The SBA service utilization among women who are uneducated and with primary education had sluggish improvement between 2000 and 2011, while relatively good improvement in the last 10 years i.e. between 2011 and 2019. On the other hand, women with secondary and above education levels showed consistently high-level improvement among those who participated in the survey (Figure 8).

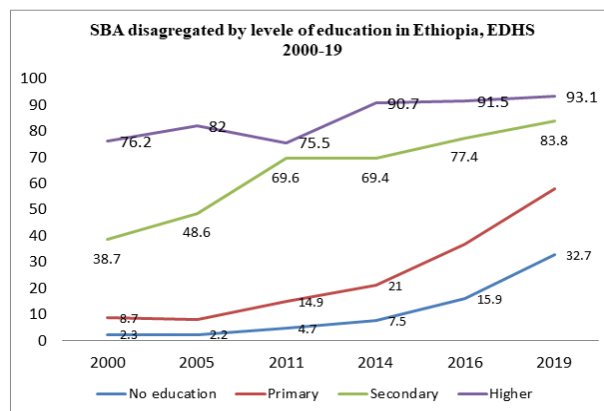


Figure 8. Trend of SBA disaggregated by level of education in Ethiopia (EDHS 2000 to 2019).

Level of inequity of SBA in Ethiopia

Sub national (region): From the latest EDHS 2019, about 50% of women gave birth with the assistance of skilled health personnel (Table 2).

highest and lowest ranging from 66.0 (95% CI: 60, 72) in 2000 to 80.4 (95% CI: 75.8, 85.1) in 2016 and declined to 70 in EDHS 2019.

The lowest and highest coverage was registered in Amhara region with 3.1% and Addis Ababa city administration respectively in 2000 and Somali region was the lowest coverage with 20% and Addis Ababa was the highest with 95.1% of births attended with skilled health personnel in 2019 EDHS as shown in Figure 9.

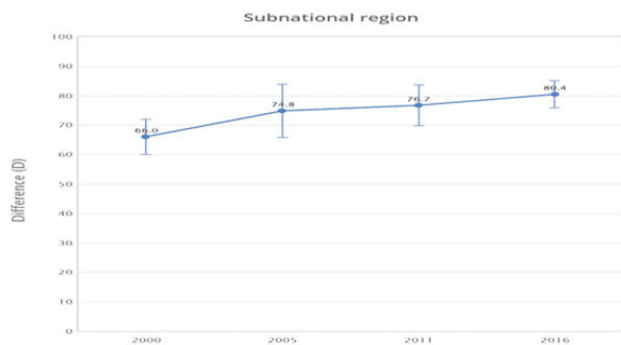


Figure 9. Births attended by skilled health personnel (in the five years preceding the survey) (%) with different administrative regions in Ethiopia, EDHS 2000-2016.

Similarly, the ratio between the region with higher proportion and region with lower proportion of births attended by skilled health personnel decreased significantly from 22.4 in 2000 to 5.9 in 2016 (Figure 10).

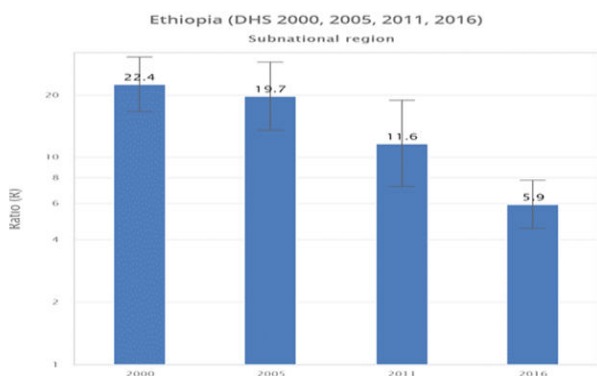


Figure 10. Ratio between regions with highest proportion of birth attended by SBA to the lowest proportion in Ethiopia, EDHS 2000-16.

Place of residence: One of the dimensions of inequality of skilled birth attendant services is the women’s place of residence (urban or rural). The urban residents are more benefited from the service. The rate difference between urban and rural is constantly increasing in Ethiopia from 2000 to 2016. The rate difference between urban women to rural women increased from 32.2% in 2000 to 58.9% in 2016 and decreased to 30% in 2019 EDHS report as shown in Figure 11 below. Women of urban residents have a larger proportion of birth with the assistance of skilled health personnel in urban residents were 1.76 times higher when compared with their rural counterparts in the same data.

The ratio of higher beneficial to lower one generally showed a decreasing trend in all dimensions of equity (residence, level of education, geography, and wealth status) from 2000 to 2019 EDHS. The ratio of SBA among urban to rural decreased from 15.0 in 2000 to 3.8 in 2016 with 95% CI of (11.4, 19.8) and (3.2, 4.4) respectively (Figure 11).

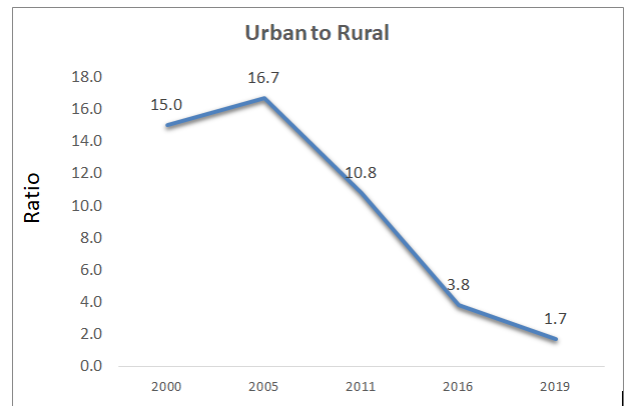


Figure 11. Ratio of urban to rural residences of skilled birth attendants in Ethiopia, EDHS 2000-19.

In addition, based on the EDHS 2019 data analysis, the RCI of rural residents compared to urban residents were -20 which means 20% of the rural women were less likely to obtain SBA compared to their counterparts of urban women (Figure 12).

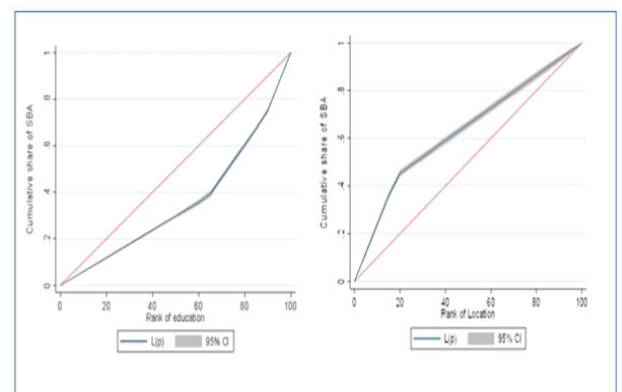


Figure 12. Slope of concentration for SBA with women’s type residence and level of education in Ethiopia, EDHS 2016.

Education: The rate difference of SBA between the women who attend above secondary education and uneducated is generally in increasing trend from 42.4% (95% CI: 34.6, 50.3) in 2000 to 69.1% (95%CI: 60.8, 71.8) in 2011 and it starts to decrease after 2011. The difference decreased from 69.1% in 2011 to 60.4% in 2019 EDHS (Figure 13 and Table 3).

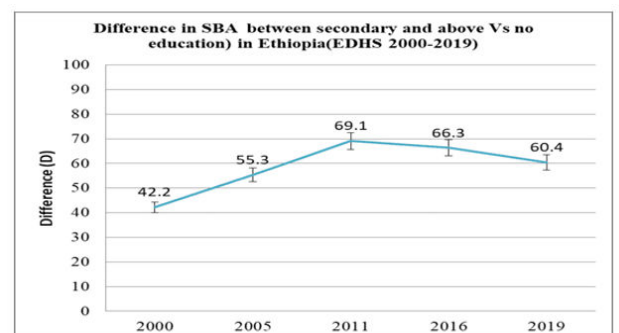


Figure 13. Skill birth attendance coverage difference among level of education (no education vs. higher education) in Ethiopia, EDHS 2000-2019.

Table 3. Difference of proportion of births attended by skilled health personnel (in the five years preceding the survey) (%) in Ethiopia, EDHS 2000-2016.

Equity dimension	Year	Rate difference	SE	CI_lb	CI_ub	Setting average
Subnational region	2016	80.4	2.4	75.8	85.1	27.7
	2011	76.7	3.5	69.9	83.5	10.8
	2005	74.8	4.6	65.8	83.9	5.8
	2000	66	3.1	60	72.1	5.6
Education	2016	66.3	2.8	60.8	71.8	27.7
	2011	69.1	4	61.3	77	10.8
	2005	55.3	3.1	49.2	61.4	5.8
	2000	42.4	4	34.6	50.3	5.6
Place of residence	2016	58.9	4.1	50.8	66.9	27.7
	2011	46.8	3.8	39.4	54.2	10.8
	2005	42.1	4.2	33.8	50.4	5.8
	2000	32.2	2.5	27.3	37.2	5.6
Economic status (wealth quintile)	2016	59.2	3.1	53.2	65.3	27.7
	2011	44.2	3.2	37.9	50.4	10.8
	2005	25.8	2.1	21.7	29.8	5.8
	2000	24.5	1.9	20.7	28.2	5.6

The proportion of birth attended by skilled health personnel among women with secondary and higher education to those with uneducated decreased from 17.7 (95% CI: 13.7, 22.8) in 2000 to 2.0 (95% CI: 1.2, 2.8) in 2019. The proportion of SBA among women who attended higher education was about 2.85 [95% CI (1.53, 4.17)] times higher compared to uneducated women in 2019 mini-EDHS (Figure 14).

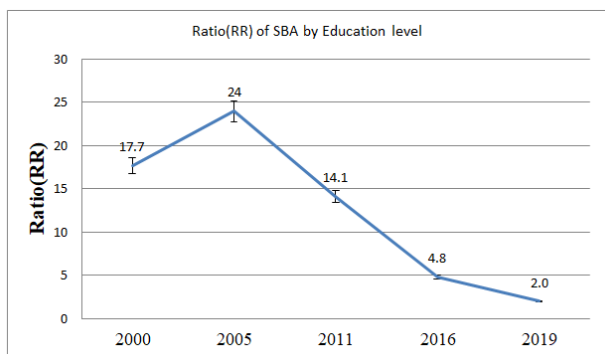


Figure 14. Ratio births attended by skilled health personnel (in the five years preceding the survey) (%) in women with higher education to no education in Ethiopia, EDHS 2000-2016.

The relative concentration index of SBA among different levels of education showed a descending order from 2000 to 2016 EDHS. However, the latest EDHS showed still significant inequity with 28.1% of RCI. That means women with higher education were more benefited. The 28.1% of services were obtained only by women who attained higher education in Ethiopia five years preceding the survey of EDHS 2016 (Figure 15).

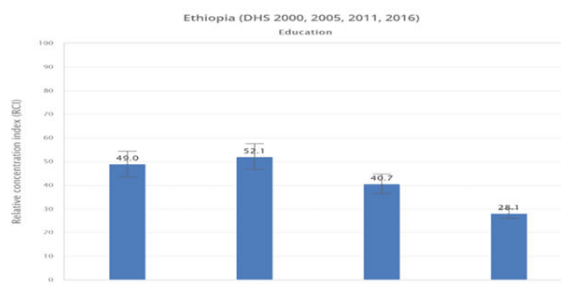


Figure 15. RCI of SBA among different education level of women in Ethiopia, EDHS 2000-16.

Wealth index (Economic status of household): As shown in Figure 12 below, the inequity level among the poorest and the richest in using skilled birth attendant service is significantly high and showed an increasing trend in the four consecutive DHS surveys which increased from 24.5% in 2000 to 64.8% (95% CI: 59.4, 69.3) in 2019 (Figures 16 and 17).

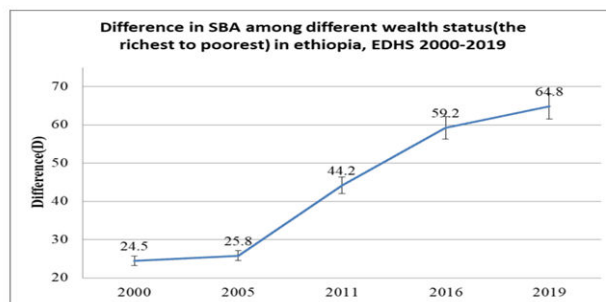


Figure 16. Rate difference among births attended by skilled health personnel (in five years preceding the survey) % in terms of wealth quintile in Ethiopia, EDHS 2000-19.

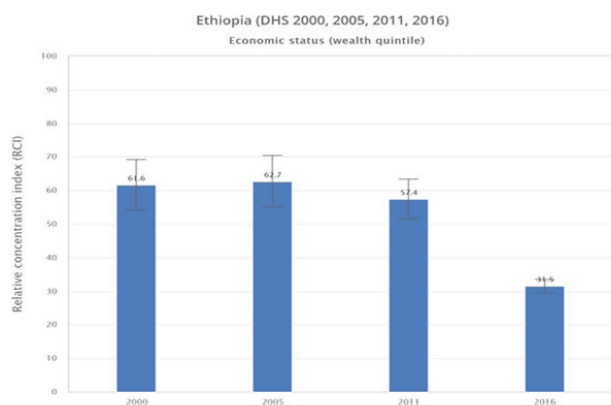


Figure 17. Relative concentration index of SBA service among women of different wealth status in Ethiopia, EDHS 2000-2016.

The trend of disparity in terms of relative concentration index is significantly high between the richest and poorest women to obtain SBA service in which most of the services obtained by women with the richest house-hold. According to EDHS 2016, a Relative Concentration Index (RCI) was 0.32 (31.5%), with women in the richest subgroup accounting for a disproportionately larger fraction of skilled delivery services. However, there is a reduction tendency in the last 2005 to 2019 EDHS reports both in terms of RCI and ratio.

Discussion

This study tried to examine the trend of skilled birth attendance service utilization and trends among different administration regions, residents, levels of education and wealth status (wealth quintile). It also tried to determine the level of inequity of births attended by skilled health personnel in terms of the level of residence, geography, education and economic status of the women. In Ethiopia, the proportion of birth attended by skilled health personnel increased from 5% in 2000 to 49.8% in 2019. The increasing trend could be because of improvement in health infrastructure access, improvement in health care workers' development and community awareness intervention being implemented. When we see women with different socioeconomic statuses, the proportion of SBA showed an increasing trend from 2000 to 2019. However, the skill birth attendant service utilization is still low when compared to the target set by the Health Sector Transformation Plan (HSTP I).

The improvement is also highly different among different socio-economic statuses and geographic differences. Urban residents are more benefited compared to rural residents. For example, the 2019 EDHS showed that women living in urban areas were 1.76 (95% CI: 1.2-2.3) times higher to give birth with the assistance of skilled health professionals. A study conducted in Niger, Sierra Leone and Mali showed similar results that rural women are less likely to get skilled birth attendance service (OR=0.21; 95% CI: 0.16-0.28) when compared to their rural counterparts. Similarly, the EDHS 2019 data analysis showed that the rural women were less likely to obtain SBA compared to their counterparts of urban women with RCI -20%. This difference could be attributed due to poor health service access, low health care workers employment and lack of information on health care services. Other studies also indicated that the lack of media access in rural areas is also a determining factor for the poor SBA service utilization in rural women. The education level of the women was another reason for the disparity in using the service of SBA. Based on the 2019 EDHS result, uneducated women and women with primary education only were less likely to obtain skilled birth attendance service (OR=0.32; 95% CI: 0.28, 0.39) when compared to women with secondary and higher education levels, which is similar to the finding of a study conducted in the south and Southeast Asian region showing that women with a primary, secondary and higher level of education were 1.65, 2.21 and 3.14 times more likely to access SBA care during childbirth respectively compared to women with no formal education.

Based on the EDHS 2016 data analysis, the RCI of SBA in educational level was 28.1% as shown. That means women with secondary education and above benefited 28% more compared to women with no education. These differences are attributed to the awareness of women on the benefit of giving birth with the assistance of skilled health personnel. Studies also showed that although similar determinants are there for SBA service utilization the level, frequency and strength of factors are different in an urban and rural setting which brought an actual difference in service utilization. Higher frequency of Antenatal Care (ANC) in urban, physical access and higher education attendance and distance from health facilities are possible factors. Although there continues to be a significant difference in using SBA service among women with different education levels, there is a trend of reduction on the level of disparity in the latest two EDHSs which may be due to the community-based health interventions. In Ethiopia, health extension workers provide health promotion and health education services at the kebele (lower administrative level in Ethiopia) level in different modalities, which brought a significant improvement in community awareness that intern fills the gap for lack of education.

The Ethiopian government had been working to reduce sub-regional disparities of socio-economic development including health service coverage. As part of a government initiative, the federal ministry of health of Ethiopia organized its structure to deliver special technical and financial support for disadvantaged sub-regions particularly in low-land regions including Afar, Gambella, Somali and Benishangul Gumuz regions. Although the government is striving and exerting great efforts in the area, the disparities of SBA service coverage among subnational regions persist and are still significantly high. The rate difference between the highest and lowest performing regions showed an increasing trend from 66 with SE 3.1 (95% CI: 60, 72.1) in 2000 to 80.4 with SE 2.4 (95% CI: 75.8, 85.1) in 2016. Except for the administrative data of the minister of health, no study has conducted the regional comparison in SBA service coverage. But the administrative report of MoH of similar years showed significant differences among the regions in alignment according to the survey results. However, the lowest performing regions are different in the administration report.

From the analysis of 2019 EDHS, regions with low performance (coverage) constitute a higher proportion of poorest households and a higher proportion of uneducated women. These are among the reasons for SBA service utilization differences in different sub-regions. In addition, the health infrastructure (physical access) is very poor in these low-performing regions (Somali and Afar) compared to Addis Ababa, Tigray, SNNP and others. Somali region is the second-largest region in the country in terms of geography but the least in physical access for health facilities. Similarly, Afar and Benishangul Gumuz regions have low physical access to health services. Moreover, there are areas where the community's livelihood depends on pastoral in which there are community movements from place to place for searching grass and water for their cattle depending upon the rain situation. When this situation is coupled with the service delivery modality that is not tailored for these communities or regions, the difference might increase among regions. A recent health facility mapping showed that the distance in kilometres between each nearby health facility is highest in the Somali region followed by the Afar region which is the list performers in SBA service. In addition, there are also variations in community health insurance coverage among regions with the lowest or almost none in Somali, Afar and Gambella regions which could affect the level of healthcare-seeking behavior in the community as large. This intern could be the attributing factor for the SBA service utilization differences among different regions.

The same data analysis showed that women of the richest household benefited more often from SBA service compared to those poorest when analyzed with wealth quintile. Based on the 2019 EDHS, the richest were 6.2 (95% CI: 4.9-8.2) times more likely to use SBA services compared to the poorest counterparts and the relative concentration of the SBA service utilization of EDHS 2016 was 31.5 (95% CI: 29.5, 33.4) for the richest by wealth quartile based analysis. It showed improvement compared to the result of 2000 EDHS, which could be attributed to the government's strategy on health exemption for maternal and child health services implemented in the last 15 years. This result is similar to the finding on the study conducted on

the study conducted on maternal health services, which showed women from the richest households at the three-time points were 2.7 (95% CI: 2.1, 3.6, $p < 0.0001$), 4.4 (95% CI: 3.3, 6.0, $p < 0.0001$) and 3.9 (95% CI: 2.8, 5.5, $p < 0.0001$) times higher to use ANC services compared with the poorest households.

Conclusion

From the finding, the investigator concluded that the disparities in using SBA service persisted among different types of residence, geographical location, level of education of women and the wealth status of the household. In all cases, there is an increasing trend of using SBA service but the inequalities are significant however there is a tendency of reduction in the level of disparities in relative concentration index of health status and differences among different education levels. Moreover, the regional improvements are quite different. Some regions which were the least performer in 2000 became among the highest in the 2016 survey. But the difference between the lowest and highest still increased. Overall in the four mentioned parameters, the disparities observed are significant. The urban residents, the richest, women in some regions and the more educated are more benefited than their counterparts.

Recommendations

To address the existing sub regional disparities, the Ministry of Health, Ethiopia (MOH) should work closely with regional health bureaus, thereby identifying the major root causes of disparities and intervene accordingly including facilitation of experience sharing among regional health bureaus. On the other hand, the MOH should address the uneducated women through appropriate health education (SBCC, IEC and health extension program). The other variable in which the second largest disparity observed was the wealth status of the household. Therefore, appropriate health service provision that considered the poor population group is of paramount important and improving income of the community in the general population will be helpful. The urban and rural differences are still significantly high and also increased in the last two decades. Therefore, the government should address to reduce this inequality.

In general, the following interventions may support the reduction of inequalities in the midterm and short-term solution and the community-based health programs (health extension programs) should be strengthened to improve community awareness. The physical access for the health infrastructure should get focus to address regional differences. Moreover, experience from regions that score high improvement in the last 20 years should be examined to scale up to other regions with low performing. Policy issues related to health insurance should be reconsidered to address the wealth-related issues to make them benefited from maternal health services including SBA service. The other important thing the policymakers should focus on is that the rural residents are not benefited as much as urban counterparts. Therefore, barriers like long distance, transport access and quality health care should be addressed.

Limitation of the study

The limitation of study is that some of the EDHS raw data cannot be obtained (mini EDHS 2014 and mini EDHS 2019) from the official source to analysis all issues as other EDHS surveys. But the investigator tried to get these report from published reports.

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