

Regional and Heterogeneous Perspective of Maternal Healthcare: Tracking the inequalities in Punjab



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Regional and Heterogeneous Perspective of Maternal Healthcare Services: Tracking the Inequalities in Punjab

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PREFACE

The fifth Millennium Development Goal (MDG 5) established the target of 75 percent reduction in the maternal mortality ratio (MMR; number of maternal deaths per 100,000 live births) between 1990 to 2015. A progress review report by the United Nation Development Programme (UNDP) on the Punjab's MDGs confirmed that the province has remained off-track in achieving the afore-mentioned goal. The province registered a maternal death ratio of 180 per 100,000, which is one of the highest maternal mortality ratios in the South Asia. Recently, the Sustainable Development Goals (SDGs) have been formulated with a transformative new agenda for maternal health towards ending preventable maternal mortality (target 3.1 of the SDG 3 is to reduce the global MMR to less than 70 per 100,000 live births by 2030). The planning and accountability for improving maternal health and an assessment of indicators influencing the maternal health require an accurate and internationally comparable measure of maternal mortality. Although countries have made notable progress in collecting data through the civil registration systems, surveys, censuses, and specialized studies over the past decade, Pakistan and specifically Punjab has lacked in collecting accurate and comprehensive district level data on the maternal mortality. The latest data on the province level for the maternal mortality ratio is measured in the Multiple Indicator Cluster Survey (MICS) 2018. The motivation of this study was to measure the levels and track trends in the maternal mortality indicators, which are the key causes contributing to the maternal death. By recognizing the need to provide an evidence for strengthening the programs and policies to reduce the maternal mortality and increase in the outreach of maternal healthcare, the Punjab Economic Research Institute (PERI) undertook an initiative to highlight the areas which need special attention by the Government of the Punjab. The aim is to provide a high quality and practical evidence with key messages for the policy makers to restructure the programing, implementation, monitoring, and advocacy efforts in maternal healthcare interventions. The research is based on an extensive review of existing literature. This effort will make a significant contribution in accelerating progress towards the maternal mortality target of the SDGs for reducing the MMR by 70 per 100,000 live births.

Dr. Shahid Adil
Director

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EXECUTIVE SUMMARY

Background of the Study

Since 1990, the Maternal Mortality Ratio (MMR) has been reduced to half in the world with most of this reduction occurring after the year 2000. Some of the developing regions with the highest MMR have made steady progress in this perspective such as; the South Asian countries where the MMR has been dropped by 59 percent and the Sub-Saharan African countries where the MMR dropped to 39 percent during 2000 to 2017. In Pakistan, the MMR has declined from 286 per 100,000 live births in 2000 to 140 per 100,000 live births in 2017. The average annual rate of decline in the maternal mortality during this period was 4.29 percent which is lower than the South Asian region average (5.2 percent). Being the largest province in terms of containing major share of the total population in Pakistan, the province of Punjab has managed to reduce the MMR by 2.61 percent annually during 2006 to 2018. Although the decline in average annual rate of the MMR was not striking to achieve the universal agenda of the SDGs related to the maternal health. These issues need dynamic policy response and are evaluated in policy circles. In the 26th Provincial Development Working Party (PDWP) meeting held on 21st November, 2019, it was observed that the MMR was still very high in the province of Punjab and there must be some documented evidence to find out the reasons of high rate of mortality in the province. Therefore, the motivation behind this study was to identify the factors that contribute to the maternal health and high MMR in the province of Punjab.

Introduction

The reduction in the maternal and child mortality has been a top priority in the province of Punjab, especially in light of the commitment made by the Provincial Government in achieving the SDGs. The Punjab Growth Strategy (PGS) 2023, Health Sector Strategy 2020, and the Roadmap Program were launched for pursuing significant improvements in the healthcare system of the Punjab. According to the World Health Organization (WHO) estimates, most of the pregnancy-related deaths can be prevented by facilitating the pregnant women with quality health care services. The maternal deaths in the province of Punjab can also be avoided by providing on-time and quality medical services and healthcare to mothers. The delay in seeking and providing medical care increases the risk that lead to uncontrollable maternal complications. This study is an attempt to analyze the supply and demand side barriers of the maternal healthcare to further identify the significant factors contributing to maternal morbidity and mortality. The study has also managed to highlight the inequalities in the utilization of the maternal health services across different socio-economic groups in the province of Punjab.

Objective of the Study

The objective was also to analyze the socio-economic inequalities in the use of the maternal health services in Punjab. The aim of this study was also to evaluate the levels and important determinants of the maternal healthcare and mortality in the province of Punjab by using a detailed descriptive analysis of supply and demand side indicators of the health care. The study has also analyzed the household level important determinants of the maternal mortality.

Methodology

Both quantitative and qualitative techniques have been utilized for the purpose of analysis. The simple frequency tables were generated to delineate data for showing the situational analysis and trends of maternal health variables. The analysis was also carried out to find the inequalities for poor-rich, rural-urban, and educated-uneducated in utilization of the maternal healthcare by using the MICS (2018) data. The inequalities have been measured by constructing the concentration index and concentration curves. A concentration index ranges between -1 to +1. The value closer to 1 depicts an unequal utilization of the maternal health services (antenatal care (ANC), institutional deliveries, skilled birth attendant, and place of delivery etc.), while a value closer to zero describes a more equal distribution of the maternal health care. The binary logistic regressions were employed to identify the household level risk factors of the maternal mortality in the province of Punjab.

Summary Findings

The low levels of the public health spending as percentage to the gross domestic product (GDP), low per-capita health expenditures as compared to other countries of the region, and high burden on households in terms of out-of-pocket expenditures on healthcare have major roles in the utilization of quality health services.

Furthermore, the geographical location of the health services indicated that around one-fourth of the first-level care facilities in the province of Punjab are located at a distance of more than 10 kilometers and burden the utilizers of facility in terms of cost and time. The basic health units (BHUs) and mobile health units (MCHs) were designed specifically for the provision of maternal health services in villages and towns where such facilities are inaccessible for prospective users. The key facts of the situational analysis of supply side depicted that there are only five public health facilities and 18 beds on an average for 100,000 people in the province of Punjab. The distribution of facilities across the districts also seems to be unequal in numbers. The utilization/demand for the maternal health services depicted that less than 4.0 percent women, from the poorest households, received the recommended 4 or more ANC contacts at the right time, while 36 percent women, from the richest households, received all recommended contacts at the right time. The ANC utilization with 4 or more visits (53 percent) in the province of Punjab is slightly higher than the South Asian (50 percent) regions average. The Skilled Birth Attendants (SBA) in the province of Punjab is 76 percent, while they stand at 99 percent in the developed region. The indicator ranges from 50 percent in the poorest quintile to 91 percent in the richest quintile. 73 percent deliveries take place at the health facilities in the province of Punjab as compared to 74 percent in the South Asian region and 99 percent in the developed countries. Discrepancies were also found in the indicator of wealth quintile (poorest; 53 percent, richest; 95 percent) and education wise utilization of service (poorest; 61 percent, richest; 96 percent). A high percentage of women (52 percent) were found illiterate in 2018. The incidence of poverty showed that about 26 percent people in the province of Punjab are facing multi-dimensional poverty. The analysis of concentration curve and concentration index showed an inequality in the utilization of the maternal health services among different socio-economic groups. The lowest quintile is underutilizing or low-utilizing the maternal health services as compared to the richest quintile. Furthermore, maternal health services are more pronounced amongst women living in the urban areas than those living in the rural areas. The occurrence of the maternal deaths is also higher in the lowest quintile. Therefore, it can be concluded that low utilization may contribute to higher maternal mortality, but there could be other factors such as nutrition and complications due to number of earlier children from the same mother etc. So, by putting it as the main cause of death, it may be concluded that maternal deaths occur due to low-utilization of the maternal health services.

Results of Statistical Analysis

The results showed the substantial inequalities amongst the poor–rich, educated–uneducated, and rural–urban in the utilization of maternity healthcare services. The households' wealth status [OR], 1.08-1.25, (CI, 1.16)] is a significant social determinant in minimizing the risk of maternal death with other determinants including the less educated household head and unsafe drinking water.

Recommendations

Targeted pro-poor interventions can bolster the efforts to lessen down the intensity of the maternal health indicators. The findings of this study pose a number of challenges to the supply of health services. The supply side factor is important for accessing the delivery care. In most of the districts in Punjab, the number of health facilities, beds, and medical personal per 100,000 people need to be increased. There is a dire need to remove the inequalities in the utilization of ANC and postnatal care (PNC) services. Education and poverty also correlate to the utilization of maternal health services. Therefore, the government needs to review and strengthen its community strategies in order to educate the mothers and their families for enhancing the outreach of health care facilities and improvement in the maternal health indicators.



CHAPTER 1

INTRODUCTION

1. Introduction

In the 21st century, the maternal healthcare has attained the attention of the international community as a global public health issue primarily in the MDGs and later in the SDGs. Globally, the maternal deaths have been reduced to 38 percent i.e., from 451,000 maternal deaths in 2000 to 295,000 maternal deaths in 2017. The MMR has also declined from 342 deaths per 100,000 live births to 211 deaths per 100,000 live births (UNICEF, 2019). According to these estimates, the global growth rate of a decline in the MMR during 2000 to 2017 was 2.9 percent (table 1). Despite of this significant decline, the maternal mortality has remained the major reason of death amongst women of reproductive age in many least developing countries (LDCs) and developing countries between 2000 to 2017 (WHO, UNICEF, UNFPA, World Bank, UN, 2015).

At the MDGs Summit meeting in 2000, countries committed to reduce the maternal mortality by 75 percent till 2015. More specifically, the MDG 5 is related to a commitment in improving the maternal healthcare. The indicator chosen to estimate the performance of countries in this respect was maternal mortality. Due to the countries' commitments to make efforts in reducing the maternal mortality, maternal survival was significantly improved since the adoption of the MDGs. Globally, some of the developing regions, with the highest maternal mortality ratios, have made steady progress in this respect such as in South Asian countries, there was a reduction in the MMR by 59 percent, while a 39 percent reduction in the MMR was seen in the Sub-Saharan African countries between 2000 to 2017 (table 1). The progress in reducing maternal mortality was not thrived to make most of the women circumvented from dying due to the pregnancy and childbirth-related complications. The main contributor in high maternal deaths was the developing region, where the MMR was 14 times higher than that of the developed region. In 2013, out of the global total, the maternal deaths in the Southern Asia and the Sub-Saharan Africa regions accounted for 86 percent of the maternal deaths (United Nations, 2015). The associated factors of maternal mortality and morbidity in most of the countries include the socio-economic, racial, and ethnic discriminations (Chukuezi, Comfort., 2010) (Howell, Elizabeth A, 2018) (Balhasan & Chauhan., 2020)

Most of the maternal deaths are preventable. Mothers can be prevented from deaths by giving them the right of good healthcare with non-discrimination and equality (OHCHR, 2009). The maternal health care rights' involve the best prenatal care, good care during childbirth, and postpartum checkups. These rights can be preserved by providing an enabling environment to support safe maternal health. One of the key strategies to prevent maternal deaths is to ensure that every mother give birth under the assistance of a skilled birth attendant i.e., a medical doctor, nurse or midwife etc. Globally, the proportion of deliveries attended by skilled health personnel was lowest in the Sub-Saharan Africa and South Asia in 2019. In South Asia, about 40 percent of the newborns and their mothers do not have any access to essential healthcare during birth. Wide discrepancies can be observed across regions in the coverage of skilled birth attendance. The highest coverage of this indicator is found in the Eastern Asia, Arab States, and Europe (figure 1). From figure 2, it can be observed that less than half of the women have received the recommended minimum of four ANC visits in the South Asia.

The WHO has recommended that for safe maternal health care, child must be delivered at a health facility. At the health facilities, women are able to receive medical care and any complication can be handled. On average, the percentage of deliveries at health facilities increased from 52 percent to 74 percent during 2013-19. Growth has been slow over the last 13 years, with an average increase in coverage to only 2.64 percentage points. In the Eastern and Western Europe, almost all deliveries are held at the health facilities (figure 3).

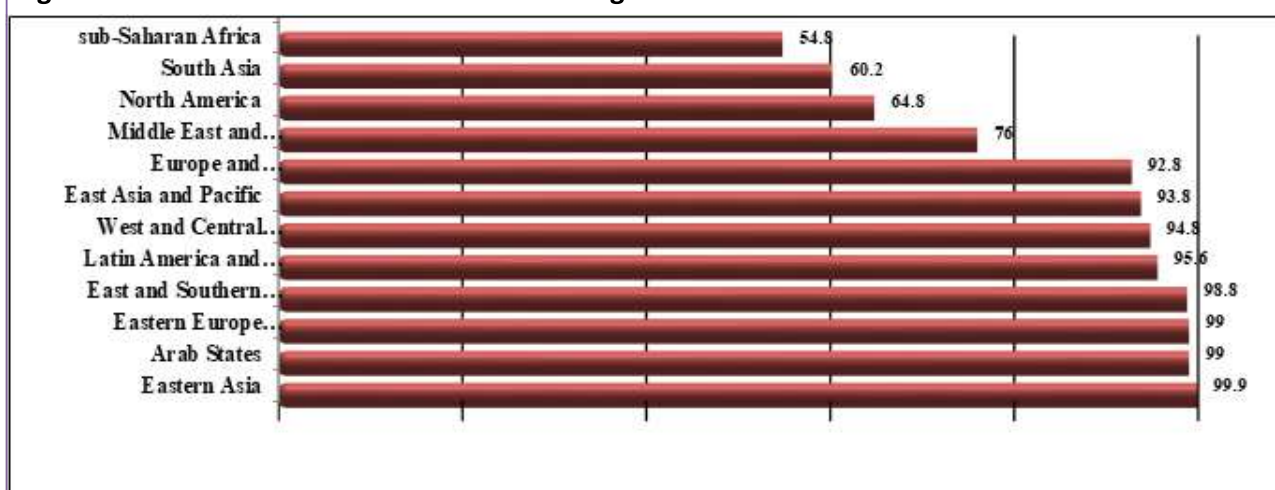
In the association of South Asian region, three countries namely Bangladesh, India, and Pakistan have high MMRs (table 2). Amongst these South Asian countries, Pakistan has the lowest annual change in reduction of the MMR. Additionally, the status of maternal deaths is extremely poor (Mehboob, R., Ahmad, F,J & Gilani, 2020). Although, the maternal mortality has declined from 286 per 100,000 live births in 2000 to 140 per 100,000 live births in 2017 in Pakistan (table 2), yet the average annual rate of decline in maternal mortality during this period was 4.29 percent, which is lower than the average rate of decline of maternal mortality in India, Bangladesh, and Maldives (table 2).

Table 1: Maternal Mortality Ratio

UNICEF Regions						Percentage Change in MMR 2000- 2017	Average Annual Rate of Reduction in MMR between 2000 and 2017 (%)
	2000	2005	2010	2015	2017		
West and Central Africa	962	847	755	699	674	30	2.1
Sub-Saharan Africa	870	746	626	557	533	39	2.9
Eastern and Southern Africa	780	645	494	406	384	51	4.2
Least developed countries	763	635	520	442	415	46	3.6
South Asia	395	309	235	179	163	59	5.2
World	342	296	248	219	211	38	2.9
East Asia and the Pacific	114	100	86	73	69	39	2.9
Latin America and Caribbean	96	91	85	77	74	23	1.5
Middle East and North Africa	95	81	63	59	57	40	3.0
Eastern Europe and Central Asia	45	36	26	20	19	58	5.1
Europe and Central Asia	27	22	17	14	13	-	4.4
North America	12	13	14	17	18	-52	-2.5
Western Europe	8	7	6	6	5	-	2.4

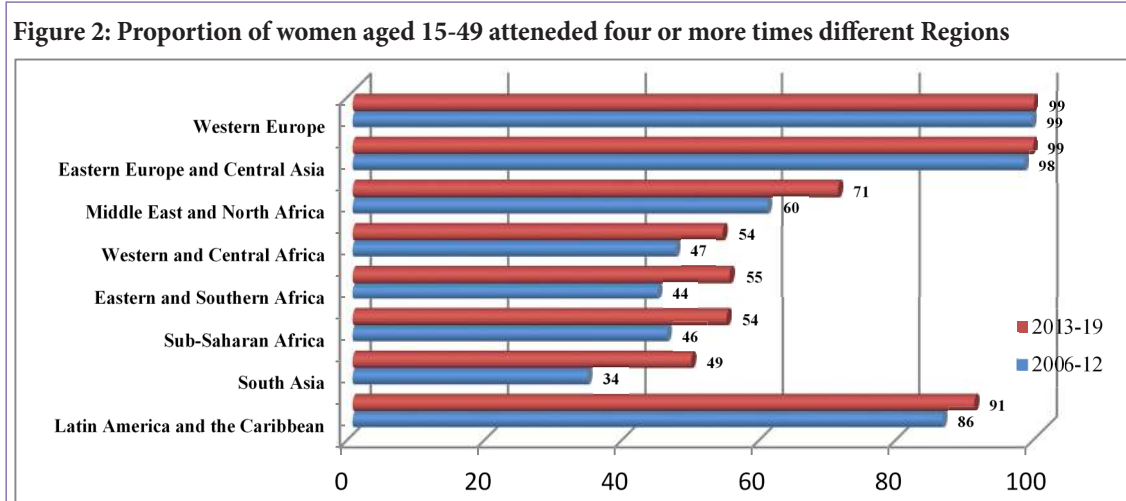
Source: WHO, UNICEF, UNFPA, WB Group, and UNPD (MMEIG) - September 2017

Figure 1: Skilled Birth Attendant in Different Regions in 2019

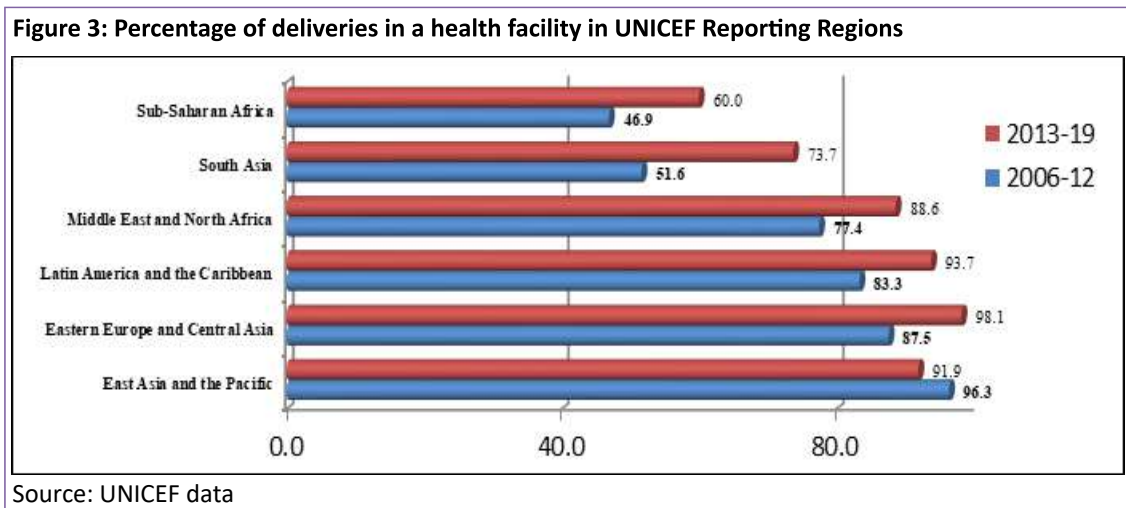


Source: UNICEF data

Due to this low decline in the MMR, Pakistan has remained off-track from achieving the maternal mortality goal of the MDGs. The commitment was to reduce the MMR by less than 75 percent, but it reduced by 54 percent.



Source: UNICEF data



Source: UNICEF data

As the world has now moved to a new set of goals, to be achieved since 2030 known as the SDGs, Pakistan has also made a long-standing international commitment to achieve the said goals. One of the goals is to reduce the maternal mortality to less than 70 maternal deaths per 100,000 live births. To achieve this goal, the required average annual rate of decline in MMR is 6 percent, but the rate of decline is currently slow to reach the desired level of the SDGs targets. Behind Pakistan's slow average annual rate of decline in the MMR, there must be some underlying factors that add to the problem in a significant way. It is important to address these factors for the success of maternal health care intervention and strategies. After devolution, it is the obligatory for the provincial governments in Pakistan to ensure the rights of maternal health. The devolution has created not only challenges, but also opportunities by demanding actions for the provincial governments. The women's health during pregnancy has been an important priority in the provincial health plans and programs in the province of Punjab. The better performance of the Punjab in maternal healthcare indicators will drive the country towards its commitment to achieve the worldwide agenda of the SDGs.

In the 26th PDWP meeting held on 21st November, 2019, it was observed that the MMR amounting to 180 per 100,000 live births is still very high in the province of Punjab and there must be some documented evidence to know the reasons of this high rate of mortality. Therefore, the motivation behind this study was to identify the factors that contribute to the maternal health and the high MMR in the province of Punjab.

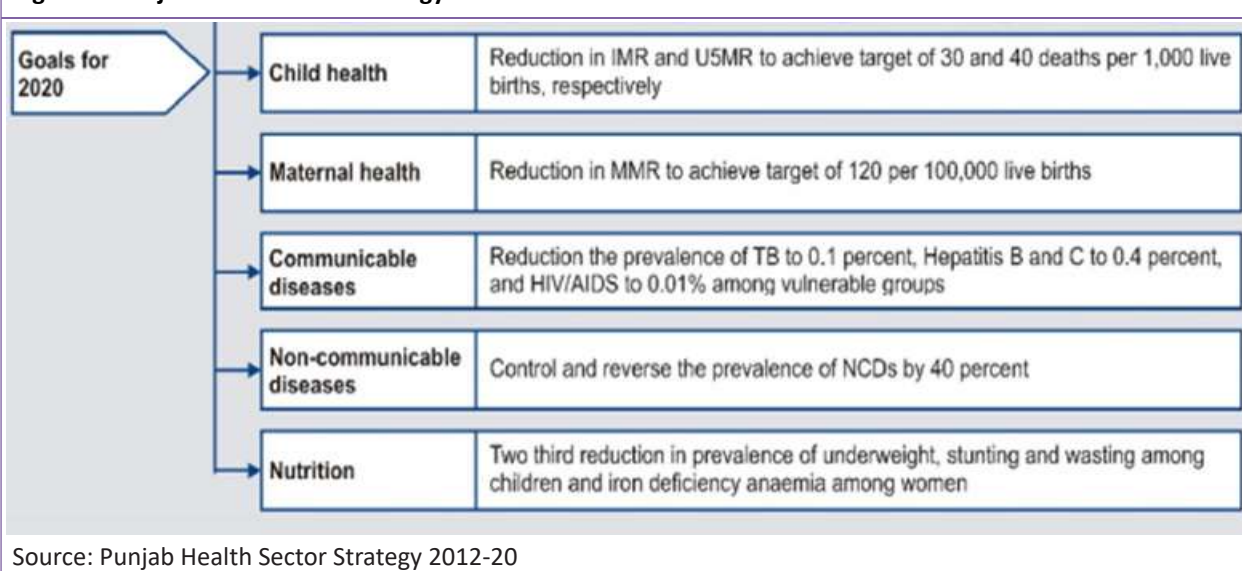
Table 2: Maternal Mortality Ratio in South Asian Countries including Pakistan in 2000-2017

South Asian Countries	2000	2005	2010	2015	2017	Average Annual Rate of Decline in MMR
Pakistan	286	237	191	154	140	-4.29
India	370	286	210	158	145	-5.36
Bangladesh	434	343	258	200	173	-5.26
Srilanka	56	48	45	32	27	-4.21
Maldives	125	75	67	54	53	-4.92

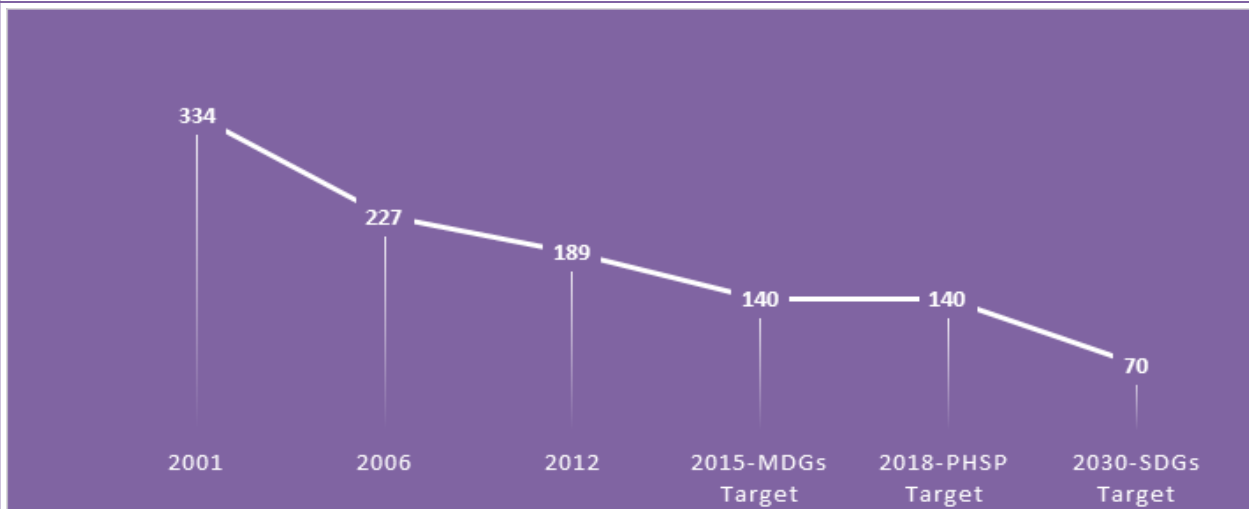
Source: World Health Organization, 2017

Punjab is the most populous province of Pakistan with more than 11 million people (Population Census Pakistan, 2017). The maternal healthcare in the province of Punjab has been given commendable importance during the last decade (Punjab Economic Report, 2017). Given the importance of maternal healthcare to reduce morbidity and mortality in the province of Punjab, the supply of efficient, affordable, and accessible health care services has been assured. Furthermore, numerous health strategies and reforms have been introduced by the government to improve the maternal health indicators and achievement of targeted maternal health outcomes. The Health Sector Strategy 2012-2020, PGS (2023), and the Roadmap Program were launched for pursuing significant improvements in the healthcare system of Punjab. In health sector strategy, amongst the goals set to be achieved for 2020, a reduction in the MMR to achieve the target of 120 per 100,000 live births was the second goal. Despite showing better progress in some health indicators, the maternal mortality indicator in the province of Punjab has unfortunately not shown promising results. According to the latest data from the MICS (2018), a substantial increase can be observed in the MMR. It has touched 180 deaths per 100,000 live births in 2018 which was previously recorded as 178 per 100,000 in 2015 by the World Health Organization (WHO) and World Bank (WB).

Figure 4: Punjab Health Sector Strategy 2012-2020



As signatory of the SDGs 2030 declaration, Pakistan as well as Punjab has also committed to reduce the MMR by 70 deaths per 100,000 (figure 4), but currently the MMR is identified as 180 deaths per 100,000 live births (MICS, 2018) for the province of Punjab. The data implied that the compound annual growth rate of decline, that is required to achieve the target of SDGs, is 7.6 percent, but if we analyze the previous trend, the rate of decline in the MMR is only 3.3 percent, which is lower than the South Asian and even Pakistan’s annual average rate of decline. The high indicator of the MMR discloses the quality and accessibility of healthcare services available to mothers

Figure 5: Maternal Mortality Trends and Targets in Punjab

Source: Punjab Health Sector Plan (PHSP) 2018.

The quality of maternal healthcare services can also be measured through the proportion of antenatal consultation, place of delivery, skilled birth attendant, contraceptive prevalence rate, total fertility rate, and postnatal care consultation etc. According to the WHO estimates, about 88 percent to 98 percent deaths due to pregnancy can be prevented by facilitating the pregnant women with quality health care services. The maternal deaths' related risk factors in the province of Punjab can be avoided by providing quality and timely medical services and healthcare. The delay in seeking medical care increases the risk factors and sometimes makes pregnancy related complications uncontrolled. The regional socio-economic disparities including poverty, illiteracy, inadequate infrastructure of water and sanitation, and cultural and social barriers are some of the risk factors which cause delays and repudiate the access to maternal health care services. Three types of delays have been observed in the province of Punjab in seeking medical care for pregnant women. The first delay may be attributed to decision making from households in seeking medical care for pregnant women, i.e., the family and household head may be reluctant to seek medical care at the health facility from skilled medical personnel and usually call traditional midwives. The second delay occurs due to the lack of transportation or other necessary arrangements to reach the health facility. The third delay occurs due to the unavailability of trained/skilled medical staff at the health facility (P. K.Yasir et al., 2009). All these delays negatively affect the maternal health indicators and leave no room for the MMR to decline. With a high MMR, the province of Punjab as well as Pakistan would not be able to achieve the SDG target of reducing maternal mortality to 70 per 100,000 live births by 2030. The quality and quantity of health services might differ significantly across districts and regions. In the province of Punjab, the maternal and child health indicators seem to be worst in some of the districts. It is imperative to identify the influencing factors and system-wide challenges of the maternal and child healthcare in these districts. Due to lack of district level data on the maternal mortality, the study is confined to the province level. The analysis of risk factors is very important for both the preventive and curative measures of maternal health care. Therefore, the aim of the study subsequently emerged from the above discussion and in light of the PDWP discussion. Mainly, we have attempted to develop the situational analysis and understand the trends of both supply and demand side factors influencing the maternal utilization of maternal healthcare services in the province of Punjab based on available data. The study also accomplished the quantitative analysis to identify the risky factors in the maternal mortality.

1.1. Objective of the study

The general objective of the study is to analyze the trend of supply and demand sides of maternal health care service utilization in the province of Punjab. Specifically, the study aims to analyze the inequalities in the utilization of maternal health services among different socio-economic groups. The study also had the objective to assess the important household level determinants associated with maternal mortality. Finally, recommendations were made to suggest the interventions for reducing the maternal morbidity and mortality. The research questions, variables, and models for the maternal mortality were derived separately by thoroughly reviewing the literature.



CHAPTER 2
VARIABLES, DATA AND
METHODOLOGY

2. Variables, Data and Methodology

The variables are derived from the literature that may lead the mother to death or possibly leaves her with risks that have been categorized into three groups including the supply side health indicators, the demand side health indicators, and the social/environmental factors. The supply side indicators include the health care expenditures and geographical distance of health facility. To provide an insight on the demand of maternal healthcare in province, the outcome variables including assisted delivery, skilled birth attendant, and place of delivery in women have been used. There also exist some social and environmental factors influencing the maternal health including maternal education level, age at marriage, contraceptive prevalence rate and number of children born per women, and household wealth status based on wealth quintile, etc. We have also analyzed the trend in the aforementioned factors.

2.1. Data Source and Methodology

In the context of developing and developed regions, data on the maternal cause of death has been primarily collected from civil registration along with surveys. The detailed data on the cause of death of deceased mothers has not yet covered in any of the survey in the province of Punjab. The civil registration of fatal events is also not a common practice. The WHO and other researches provided an evidence on the effectiveness of interventions to reduce the risk factors contributing to morbidity and mortality. These include amongst others antenatal care in pregnancy, skilled birth attendant, post-natal care, and usage of contraceptive to avoid pregnancy etc. In 2018, the MICS was conducted by the Punjab Bureau of Statistics (BOS) with the technical assistance of the United Nations International Children's Emergency Fund (UNICEF), which is one of the richest sources of information available to examine the determinants of maternal health in the province of Punjab. In this study, we have observed various maternal healthcare indicators in the province using the MICS data. The study has used quantitative techniques to analyze the data. A situational analysis has been used to describe the supply and demand sides' barriers of the maternal health in the province of Punjab by using the datasets of District Health Information System (DHIS), Household Integrated Economic Survey (HIES), and Poverty Reduction Strategy Paper (PRSP) etc., for identification of the strengths and weaknesses of important maternal health indicators. Then, an analysis on the inequalities for different socio-economic groups including poor-rich-rural-urban and educated- uneducated in utilization of the maternal healthcare is also conducted by constructing the concentration index and concentration curves. It is a widely used tool in research to measure the inequalities in health care. The advantage of the concentration curve and concentration index is that it can be computed from individual level data and gives a complete picture of the distribution of health care services. A concentration index ranges between -1 to $+1$. The concentration curve lies below the line of equity, if the concentration index has positive value and depicts that most of the maternal health services have been utilized by the socio-economic better off group. The concentration curve lies above the line of equity line, if the concentration index has negative value and shows that the maternal health services are regressive and utilized by the poorest group. The concentration index is measured as:

$$\hat{I}C_T = 1 - \frac{\hat{\varepsilon}_T}{\hat{\mu}_T} \quad (1)$$

where $\hat{\mu}_T$ is the average of variable T when the ranking variable Y is estimated as:

$$\hat{\varepsilon}_T = \sum_{i=1}^n \left[\frac{(V_i^2) - (V_{i+1}^2)}{V_i^2} \right]_i \quad (2)$$

$$\text{and where } V_i = \sum_{h=i}^n w_h \quad \text{and } y_1 \geq y_2 \geq y_3 \dots y_n^{-1} \geq y_n \quad (3)$$

2.2. Outcome and Explanatory Variables for Concentration Curve and Concentration Index

ANC Visits: The WHO recommended antenatal visits are 4 or more. Using the data from the MICS for 4 or more ANC visits, the responses were categorized into a binary outcome variable. The variable has taken the value “1” if respondent used the service, and has taken the value “2”, if not used.

Skilled Birth Attendant: If the delivery is attended by the skilled personnel, then the risk factors of the maternal deaths can be minimized, the response from the most recent birth of respondents was categorized into a binary outcome variable.

Institutional Delivery: These are the childbirths taking place at private or public health facilities. By using the MICS data, the institutional delivery variable took a value “1” for institutional delivery and value of “2”, for home delivery.

Postnatal Care: It is important to reduce the obstetric complications which mostly become the major cause of maternal death. Postnatal care within 2 days of delivery was considered as the outcome variable, taking a value of “2” if the respondent did not receive post-natal care and ,1 if received.

Explanatory Variables: The choice of socio-economic variables was guided by policy-relevant variables that have been identified through previous studies (Bon-Martens at al., 2012) (Goli, S. & Arokiasamy, P., 2014) (Srinivas Goli at al., 2017). The explanatory variables include poor-rich, educated- uneducated, and rural-urban settings, respectively.

2.3. Household Model Specification

The Binary Logistic Regression has been used to analyze the household determinants of maternal deaths. To find the important household level determinants of the maternal mortality in Punjab, the dependent variable and independent variables are taken as given in table 3. The dependent variable takes the value “0”, if there is no maternal death. Dependent variable will take the value “1”, if there is any maternal death according to the definition i.e., the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management.

2.4. Household Model of Maternal Mortality

Dependent Variable

Maternal death has been used as a dependent variable in the study. In the MICS 2018, information about the deceased siblings was obtained through the sisterhood method. For each sister who died at an age of 12 or above, the respondent was asked additional questions to determine the cause of maternity death if the sister was pregnant when she died, died during childbirth, or died within two months of the termination of a pregnancy or childbirth. If the sister died within two months of the termination of a pregnancy or childbirth, the exact number of days was sought, as a death within 42 days is classified as postpartum. We have assumed that the household characteristics of deceased sisters are the same as of the survival. In the literature, there is evidence that deceased siblings and respondents share similar characteristics (Meh, et al, 2019) (Ayadi, et al, 2015).

Explanatory Variables

Explanatory variables are defined as follows:

Variables	Description
helevel	Education of household head
windex5	Income Group
WS9	Treated water to make it safe for drinking
WS11	Improved sanitation

The models of the study are described as follows:

$$MM_i = \beta_0 + \beta_1 hlevel + \beta_2 WS11 + \beta_3 WS9 + \beta_4 windex5 + \varepsilon \quad (4)$$



CHAPTER 3
RESULTS AND
DISCUSSION

3. Results and Discussion

3.1. Situational Analysis of Public Spending on Health Care in the province of Punjab

In the context of supply analysis, the number of functional health facilities¹ in the province of Punjab have reached about 3,750 (including BHUs, RHCs, MCH, Disp, THQs, DHQs, and Teaching Hospitals etc.) in 2018-19. The public hospitals' beds capacity has reached 45,000 beds whereas, the private sector holds relatively larger share of beds in number at 53,000². The sector has an average spending of 0.8 percent from the gross regional product (GRP) on healthcare. The private sector health care delivery is also a major part of health care system in the province of Punjab which caters for a major chunk of the population at their out-of-pocket expenditure (OOPE). The share of private sector spending as a percentage to GRP is relatively higher than the public sector as it stands at 1.5 percent of the GRP. The proportion of budget spent specifically on the maternal and child health is increased from 3.21 percent in 2001-02 to 7.24 percent in 2015-16 in the province of Punjab. However, in contrast with other countries of the Asian region, the share of health expenditures as a percentage to GDP is consistently high in Maldives, Nepal, and Sri Lanka etc., while, the inequalities remain across countries. The countries that spend a high percentage of expenditures on health and hold low MMR include Maldives amongst others, where the MMR is 53 per 100,000 live births. Due to a lower level of budget spending on the maternal and child care, around 6,000 women died in the province of Punjab either due to pregnancy complications or during child-birth (Population Council Fact Sheet, 2015).

	Public		Private		Maternal & Child Health Budget as % to total Health Budget	Per Capita Health (Nominal) Spending	Per Capita Health (after adjusted for inflation)
	Rs Million (Nominal)	% of GRP	Rs Million (Nominal)	% of GRP			
2001-02	7,566	0.3	35,763	1.5	3.21	98.51	212.63
2002-03	9,386	0.4	40,728	1.6	3.66	118.74	243.12
2003-04	11,508	0.4	45,944	1.6	3.95	117.15	223.40
2004-05	12,587	0.4	51,422	1.5	4.05	140.96	247.73
2005-06	14,419	0.4	69,507	1.8	3.00	150.60	243.10
2006-07	22,116	0.5	71,091	1.6	3.46	168.91	250.46
2007-08	24,784	0.5	72,708	1.4	2.77	253.65	305.09
2008-09	35,089	0.5	74,360	1.1	3.93	278.30	302.86
2009-10	37,388	0.5	82,303	1.1	3.59	385.78	385.78
2010-11	42,346	0.5	90,634	1.0	6.01	402.45	346.40
2011-12	62,454	0.6	99,369	0.9	3.60	446.28	355.89
2012-13	74,482	0.6	137,480	1.2	3.04	644.43	470.70
2013-14	82,944	0.6	161,154	1.2	2.81	752.46	526.97
2014-15	95,803	0.7	190,943	1.3	2.51	820.42	556.82
2015-16	123,248	0.8	222,281	1.5	7.24	927.78	607.23
2016-17	148,761	0.8	249,098	1.3	-	1168.59	731.37

Source: Author's Calculation based on PRSP and HIES data

¹District Health Information System (DHIS) Annual Report 2019

²Annual Health Development Report 2016-17

Table 5: key health expenditure indicators, by South Asian Countries

	Bangladesh	Bhutan	India	Maldives	Nepal	Sri Lanka
Health Expenditures (% to GDP) Million	2.3	3.2	3.5	9.3	5.6	3.8
Health spending per capita (US\$)	36	97	69	1007	48	159
Out-of-pocket spending per capita (US\$) Million	27	13	44	207	28	79

Source: World Bank Data

Similarly, a major part of the health spending consists of out-of-pocket payments in the province of Punjab that puts extra pressure on the households and cause considerable hardships. According to the Household Integrated Economic Survey (HIES) 2018-19, the monthly out-of-pocket spending on medical care amounted to Rs. 1163/- (\$10) per household, equivalent to 3.16 percent of the total household income. The household belonging to the rich quintile can afford more out-of-pocket spending than the poorer households. However, the OOPEs cause greater burden on the poor households, since it is comprised of a greater share of their discretionary non-food expenditures. The incidence of OOPE in the poorest quintile is around 3.63 percent, while this ratio is 2.93 percent in the richest quintile. The OOPE in the province of Punjab is high (Khalid, Faraz, et al., 2020) and further increases poverty and reduces access to quality services (phsrp, 2012). These types of expenditures not only deter the use of required services, but also impoverish families. In the province of Punjab, the low proportion of maternal and child health budget enforce the households to pay the maternal health bill from their own pocket. These payments are of great burden on the pocket of the people belonging to poor families. These types of expenditures can be a cause of financial distress for the poor people as they are sudden, unexpected, and occur with greater frequency (Bonu, 2012). The fertility rate in poor is observed to be higher resulting in more children who often suffer with poor health due to the OOPE on health. The total allocation for health has been increased by Rs. 5,149/- million in 2018-19. It has been observed from the literature that extending the total share of public spending on health can limit the out-of-pocket payments. The real per-capita health expenditures during 2016-17 in the province of Punjab were Rs. 1,168/- in nominal term or \$10 on average. The average OOPE in the province of Punjab were \$10 in 2018-19 (table 6). The OOPEs are higher than the per-capita public spending on health.

Table 6: Monthly OOPE on health in Punjab as Percentage to Income (USD⁴)

	Quintile					
	Total	First	Second	Third	Forth	Fifth
OOPE	(1163)	(732)	(806)	(960)	(1168)	(1659)
(PKR)USD	9.55	6.01	6.62	7.88	9.59	13.62
Income	(36793)	(20152)	(24968)	(28636)	(34997)	(56630)
(PKR)USD	302.03	165.42	204.96	235.07	287.28	464.87
OOPE % to income	3.16	3.63	3.23	3.35	3.34	2.93

Source: Household Integrated Economic Survey 2017-18

3.2. Situational Analysis of Public Health Facilities in the province of Punjab

Given the commitment by the Punjab Government to reduce the maternal mortality and morbidity to achieve targets of the SDGs, the Health Sector in the province of Punjab claimed 195 hospitals, 314 RHUs, 2,499

³The data has been taken from Poverty Reduction Strategy Paper (PRSP) 2018-19.

⁴The rupees have been converted to USD by using the average exchange rate of 2018.

BHUs, and 49 MCHs etc. Beside these public facilities, large infrastructure of private health facilities is present. According to the District Health Information System (DHIS) Report 2019, the Primary and Secondary Healthcare Department in Punjab has deployed over 48,000 Lady Health Workers (LHWs) and 1,850 Lady Health Supervisors (LHSs) with the responsibility to educate women in their community about basic and preventive healthcare. Overall, there are, on an average, 5 facilities per 100,000 persons in the province of Punjab with one doctor for about 8,000 population and one nurse for about 6,500 people.

Table 7: Health facilities, Bed and Medical Personal per 100,000 Population

District	Population	Health Facility/100,000 Population	Beds/100,000 Population	Total Medical Staff/100,000 Population	Total Paramedical Staff/100,000
Attock	1883556	5	40	16	101
Bahawalnagar	2981919	7	33	8	101
Bahawalpur	3668106	5	68	19	120
Bhakkar	1650518	5	47	12	92
Chakwal	1495982	7	47	14	110
Chiniot	1369740	4	18	10	67
Dera Ghazi	2872201	4	30	11	68
Faisalabad	2872201	12	115	44	342
Gujranwala	5014196	4	22	8	70
Gujrat	2756110	5	36	14	117
Hafizabad	1156957	6	35	9	81
Jhang	2744085	4	28	9	57
Jhelum	1222650	8	49	15	146
Kasur	3454996	5	28	12	36
Khanewal	2921986	5	23	10	79
Khushab	1281299	9	45	20	116
Lahore	11126285	2	95	20	103
Layyah	1824230	5	43	15	111
Lodhran	1700620	6	26	12	113
MandiBahaud	1593292	6	31	11	102
Mianwali	1546094	6	50	15	112
Multan	4745109	4	47	20	151
Muzaffargarh	4325483	4	21	6	71
NankanaSahib	1356374	7	44	15	128
Narowal	1709757	6	29	12	127
Okara	3039139	6	29	11	113
Pakpattan	1823687	5	23	8	91
RahimyarKhan	4814006	4	38	14	50
Rajanpur	1995958	3	25	13	67
Rawalpindi	5405633	3	52	14	67
Sahiwal	2517560	6	42	5	45
Sargodha	3703588	5	45	12	114
Sheikhupura	3460426	3	38	10	61
Sialkot	3893672	4	31	11	57
Toba Tek Singh	2190015	5	39	14	91
Vehari	2190015	7	50	15	111

Source: Authors Calculation using DHIS Annual Report 2018

According to the WHO's minimum service delivery standard, there must be one District Head Quarter (DHQ) and a tertiary level hospital for provision of comprehensive Emergency Obstetric Care (EmOC) and four Tehsil Headquarters (THQ) Hospitals, MCH Centers, and BHU level health facilities to provide basic EmOC centers per 500,000 population. For better maternal health care service provision, the studies in the literature have highlighted the supply side barriers. The results of the study conducted by (Sumankuro, Crockett, & Wang, 2018) found that obstacles of inadequate medical equipment and essential medicines, infrastructural challenges, shortage of skilled staff, high informal costs of essential medicines, and general limited capacities were the main

supply side barriers in providing essential maternal care. In the province of Punjab, most of the districts are lacking tertiary level health facilities. The DHQs are located only in 26 out of the total 36 districts and highlight the insufficiency of public health facilities. The province of Punjab does not meet the minimum service delivery standards set by the WHO. According to the MICS (2018), about 60 percent of the institutional deliveries have been taken place in private sector health facilities, but the private sector facilities have not been studied well due to lack of data. The district wise data of health facilities, beds, and medical personal per 100,000 population is given in the table below.

Besides the number of health facilities, some other factors associated with the supply side barrier of the maternal healthcare include physical distance from health facilities (Titaley CR, Dibley MJ & Oberts CL, 2010). A study conducted in Karachi has described that about 10 percent of the women living in an urban settlement has not received the ANC due to long distances of health care facility from their homes. The study conducted by Singh, (2016) has examined the supply-side barriers of maternal service utilization at the health-sub-centers (HSCs) in rural India. The author found that the public health facilities which were geographically closest in rural areas played a significant role in providing affordable maternal health care. The accessibility and availability of services are usually determined by the geographic distance of healthcare facilities and their service hours. The physical accessibility of a healthcare facility, where the necessary staff is posted and available, is defined as the proportion of the served population living within 2.0-5.0 kilometers (kms), or alternatively, at 20-60 minutes' walking distances (Majrooh, *et al.*, 2013). In the province of Punjab, 26 percent of hospitals, 21 percent BHUs, and 31 percent Child and Maternal Care Centers are located at a distance of more than 10 kms from the Mouzas. The distance from the health facility influence the users in term of both, time and cost and social acceptability.

Table 8: Distance of Mouzas in Kilometer from Various Types of Health Facilities (%)

	less than 1Km	1 to 10km	11 to 25km	26 to 50km	51 and above
Hospital	10	64	22	3	1
Basic Health Units	13	67	17	3	1
Child and Mother Care Centre	8	60	27	5	1

Source: Pakistan Mouza Census 2008, Pakistan Bureau of Statistics

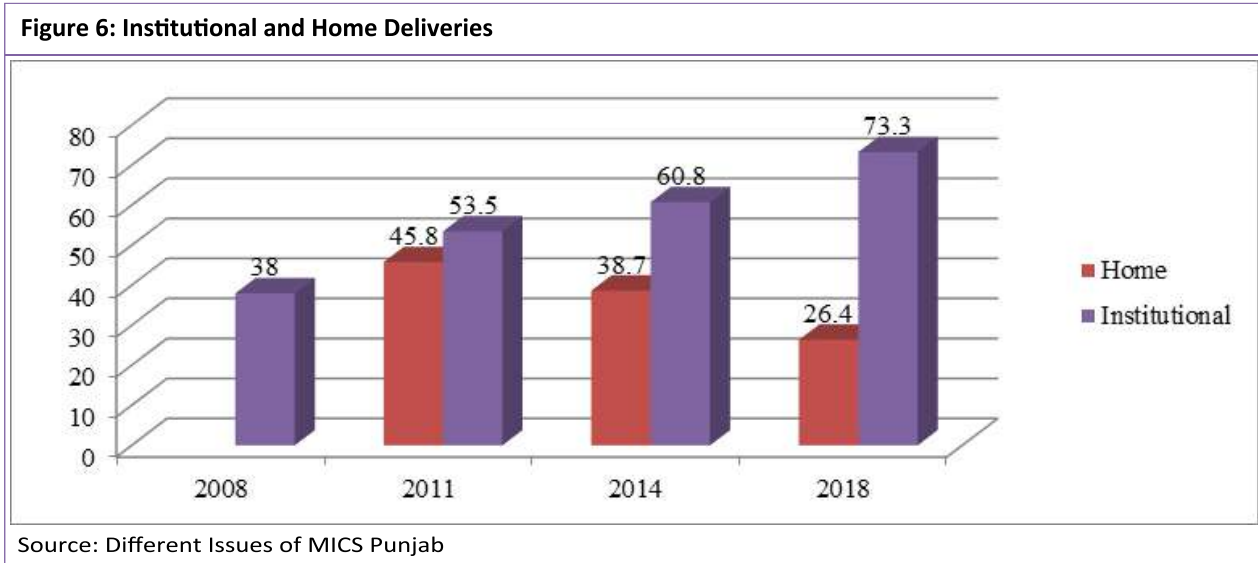
3.3. Utilization of Maternal Health Care Services in the province of Punjab

The literature has signified high MMR in developing countries and various studies, that identified the risk factors contributing to the maternal death, have repeatedly emphasized the need for institutional deliveries and skilled staff for women during labour and delivery, etc. The risk of maternal and neo-natal deaths can be reduced substantially through regular and proper ANC checkup and delivery under safe and hygienic conditions. To analyze the improvement in the maternal healthcare, the trend analysis of these indicators is given below.

3.3.1. Place of Delivery

Mostly, maternal complication arises during or immediately after the childbirth. So, delivery at home is a risky factor as home delivery especially by an unskilled attendant may result in a risk of an unknown magnitude. According to the WHO, hemorrhage is the most life-threatening risk factor, which may occur during labor or after birth due to failure of the uterus to contract or retained placental fragments. The risks may take in separation and hemorrhage of the placenta, in the form of lack of oxygen to neonatal due to poor blood supply to the placenta or umbilical cord accidents. Only skilled personnel who is treating the mother has the training to save mother and child's life. In case of such life-threatening conditions, there is an option for the skilled birth attendant to immediately deliver the baby by cesarean section or forceps. But these complications can be least

handled at home as the odds of mother or the fetus death can increase (Alan Hoff & Schneiderman , 2015). Therefore, the institutional deliveries have been increased in the province of Punjab between 2011 and 2018 yet, 26 percent deliveries are taking place at home.



3.3.2. ANC and PNC Coverage by Skilled Personnel

The adverse pregnancy outcomes in the maternal care include low rates of prenatal consultations. Despite the significant efforts made by the Government of Punjab (GoPb) in improving the health standards of women of a new born child, there still remains an ample room of improvement in the maternal health indicators, which is an embedding challenge in achieving the SDG 3. To look at the conditions of maternal care in the province of Punjab, The Authors have selected 3 indicators (table 9). The maternal health checkups following birth in facility or at home have been decreased from 86 percent to 70 percent during 2014 to 2018. Some studies have highlighted that the health indicators are involved in risk factors of maternal deaths. Mahwish (2004) explored that among all women seeking antenatal care, around 75 percent females visited doctors or a Lady Health Visitor (LHVs) only once for an ANC. The study investigated that the ANC was not a routine practice in pregnant women in the district under study. The author also explored that most of the women used the services of traditional birth attendant. Ali *et al.* (2004) has shown that postnatal health checkups were not very common in the poor urban settlements of Karachi. Only 24 percent of the women visited for postnatal health checkups and this proportion was lower than other developing countries including Philippines (58 percent) and India (40 percent). The result of the study revealed that prolonged labor pains and maternal age were associated risk factors with postpartum hemorrhage. So, the prenatal consultations are a valuable source to gather information and predict suspected dangers in pregnancy of women. The prenatal consultations can also help in alarming the partner regarding the upcoming decisions that he would have to make in case of hours of emergency during the child birth. Shenson (2015) has elaborated the role of prenatal consultation from a neo-natologist perspective as it can be helpful for not only mother but also for parents, child, physicians, and the health care delivery system as a whole. Thus, the vital role of PNC cannot be ignored in the maternal care.

Furthermore, the postnatal consultations are the most neglected component in the continuum of care of women in deprived areas due to the issue of affordability and lack of awareness regarding its importance. According to a study by (Rwabufigiri, 2016), PNC is most important for avoiding any danger to the child and mother mortality rates. Regular and careful prenatal and PNC can turn the tides in favor of the mother, present born child, and the future children. The value of PNC shows an improvement in the province of Punjab.

Indicator	2011	2014	2018
Percentage of mothers with have 4 or more ANC visit	40.5	48.0	52.9
ANC (BP, Urine Specimen & Blood Test Taken)	41.3	45.3	52.6
Health check following birth while in facility or at home		86.0	70.1

Source: Various Issues of MICS Punjab

3.3.3. Social Indicators Trends in Punjab

Apart from utilization of the health care services for maternal care, the income status, place of residence, and educational level of women are other important covariates for the maternal mortality and morbidity. Although, the literacy rate has increased in the province of Punjab during 2004 to 2018, the growth rate of this increase is still slow. It is evident from the literature that education increases the awareness of utilization of health services. Additionally, educated women are expected to have paid jobs and they are more likely to contribute in household expenditure that possesses their autonomy in decision-making process in individual and household issues including the utilization of health services. David (2014) found a significant number of maternal mortalities and morbidities from the Maputo Province of Mozambique as a result of economic factors including lack of money for medical costs and transportation. Delays and inappropriate transfers of high-risk mothers to specialized care facilities led to adelay in diagnosis, treatment, and response to emergency complications by the health care providers. The incidence of poverty is also high in the province of Punjab. It can be observed that around 26 percent of the total population of Punjab is multi-dimensionally poor. The status of poverty significantly affects the utilization of the health care services. Women who belong to wealthy households are three times more likely to receive adequate ANC than those in the lowest quintile (Acharya, 2017). Moreover, early childbearing at an age below 18, when adolescents are not physically mature, increases pregnancy-related complications and the odds of damaging the reproductive tract (Goli, Rammohan, & Singh, 2015). In the province of Punjab, the early childbearing has decreased from 59.5 percent to 54.2 percent. The use of contraceptive is one of the basic components' in maternal health to regulate and control fertility and saves the mothers from the hazards of unwanted pregnancy (Fathalla., 1993). However, the use of contraceptive has no significant improvement in the province of Punjab since last decade.

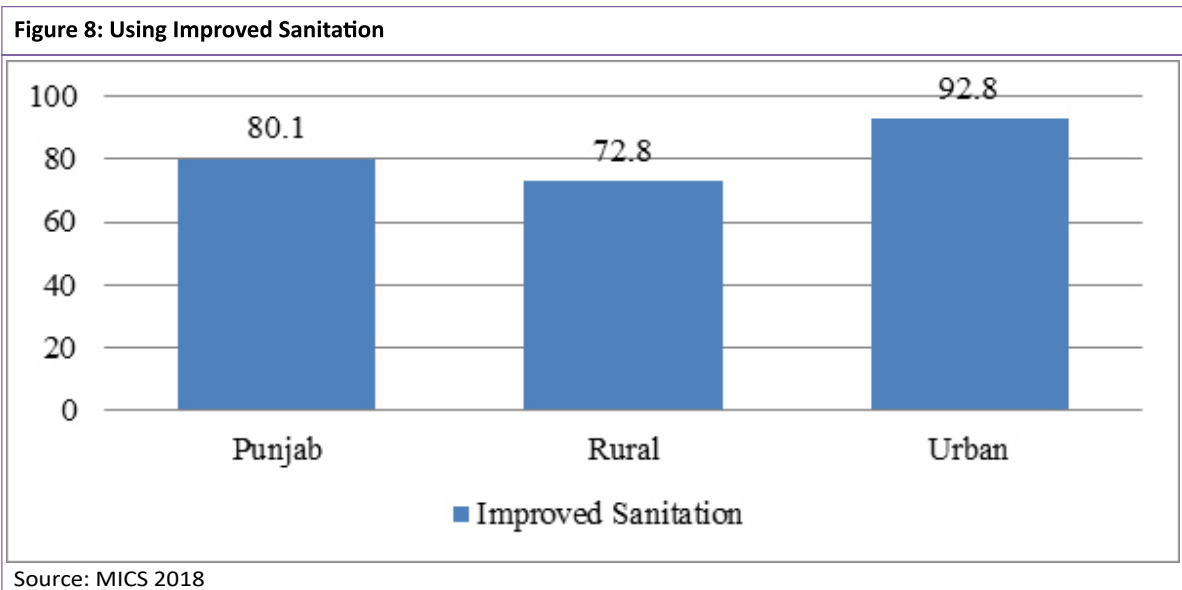
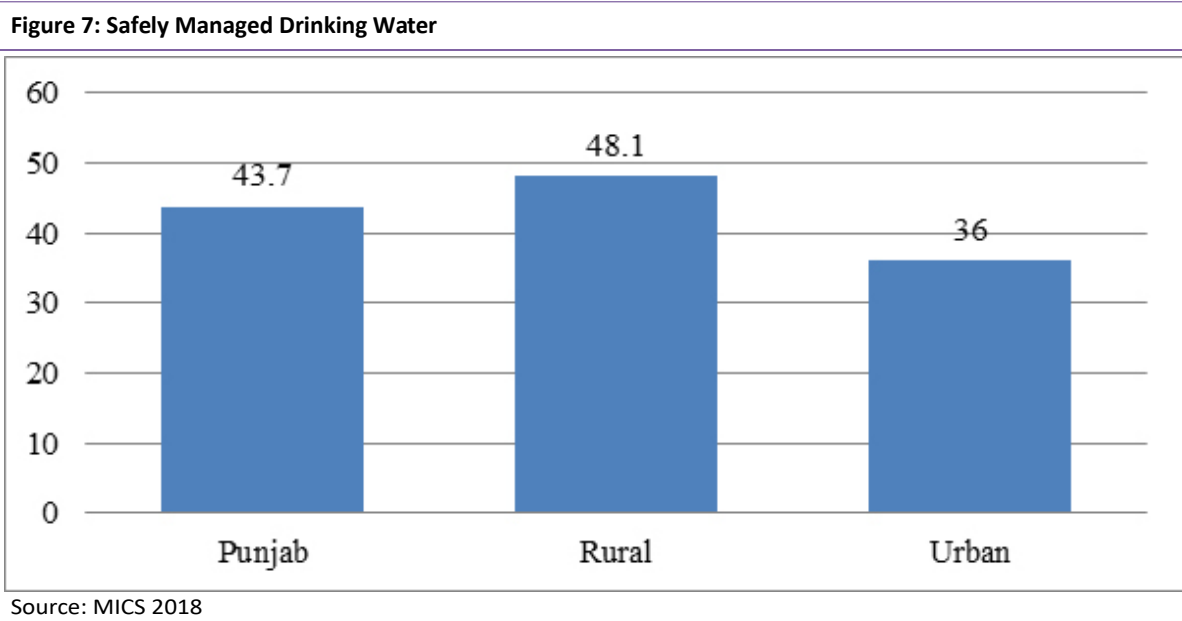
	Adult Literacy Rate (15-24)	Incidence(H) of Poverty ⁵	Early Child Bearing Women (15-19) who have had a Live Birth or are Pregnant with First Child	Percent of Women currently married who are using any type of Contraceptive
2004	68.0	49.7	-	36.0
2008	73.0	43.2	-	32.0
2011	66.0	38.1	59.5	35.2
2014	72.6	31.4	58.8	38.7
2018	74.9	26.1	54.2	34.4

Source: Different Issues of MICS Punjab

3.3.4. WASH Trend in the province of Punjab

Safely Managed Water and Improved Sanitation

The leading frameworks for improving maternal mortality exclusively focus on improving the access and quality of maternal health care services with little focus on widening the social and environmental determinants. However, an evidence from the literature strongly suggests that poor Water and Sanitation Hygiene (WASH) influences maternal and reproductive health outcomes to the extent that it should be given importance in health strategies (Cheng et al., 2012). The routes through which the poor WASH facilities can possibly influence the maternal and reproductive health include ill health, distress, harmful behaviors, and other adverse outcomes (Lenka Benova , Oliver Cumming , & Oona M. R. Campbell, 2014). An easy access to safe water and sanitation improve the women health as good quality water can protect the pregnant women from serious diseases including typhoid and hepatitis etc. The access in the province of Punjab is 43.7 percent which indicates that more than half of the population is not drinking⁴ safe water (figure 7). As far as improved sanitation is concerned, 80 percent of the total population in the province of Punjab is using improved sources of sanitation (figure 8).

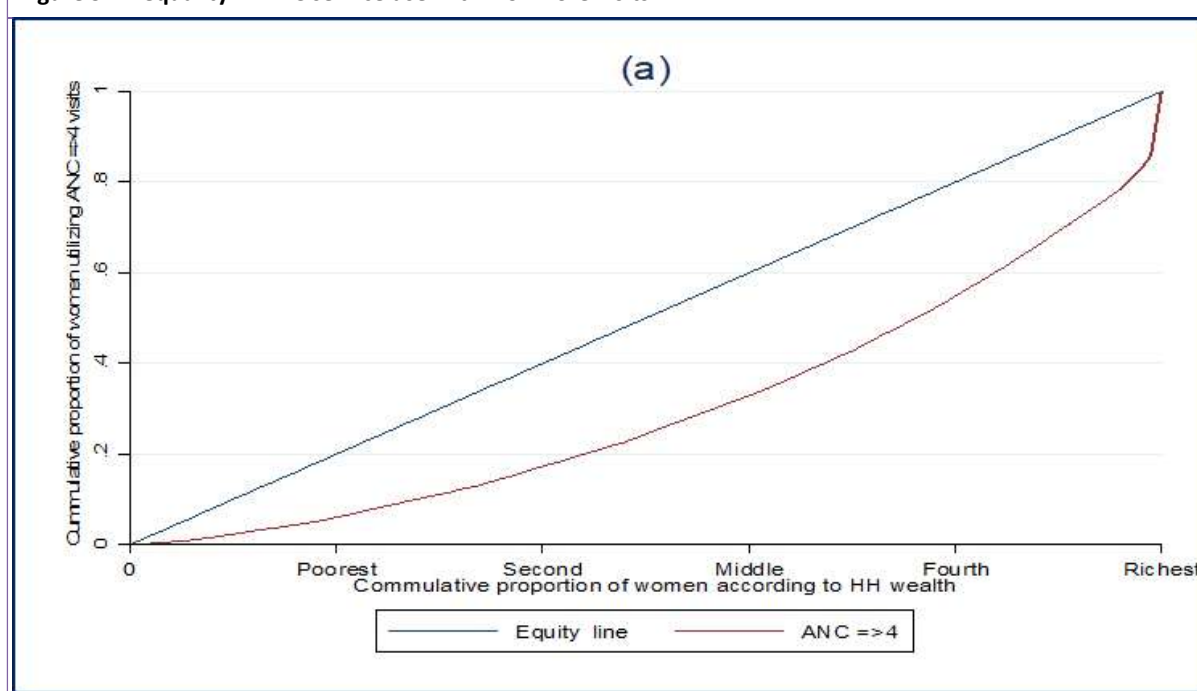


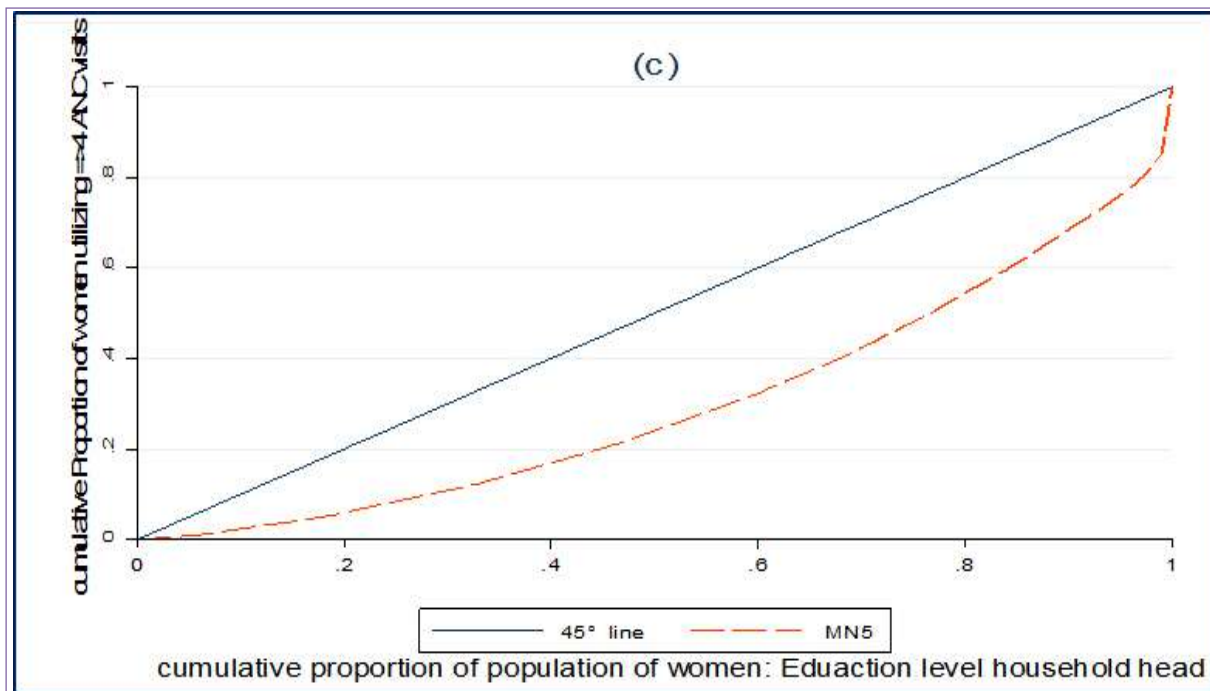
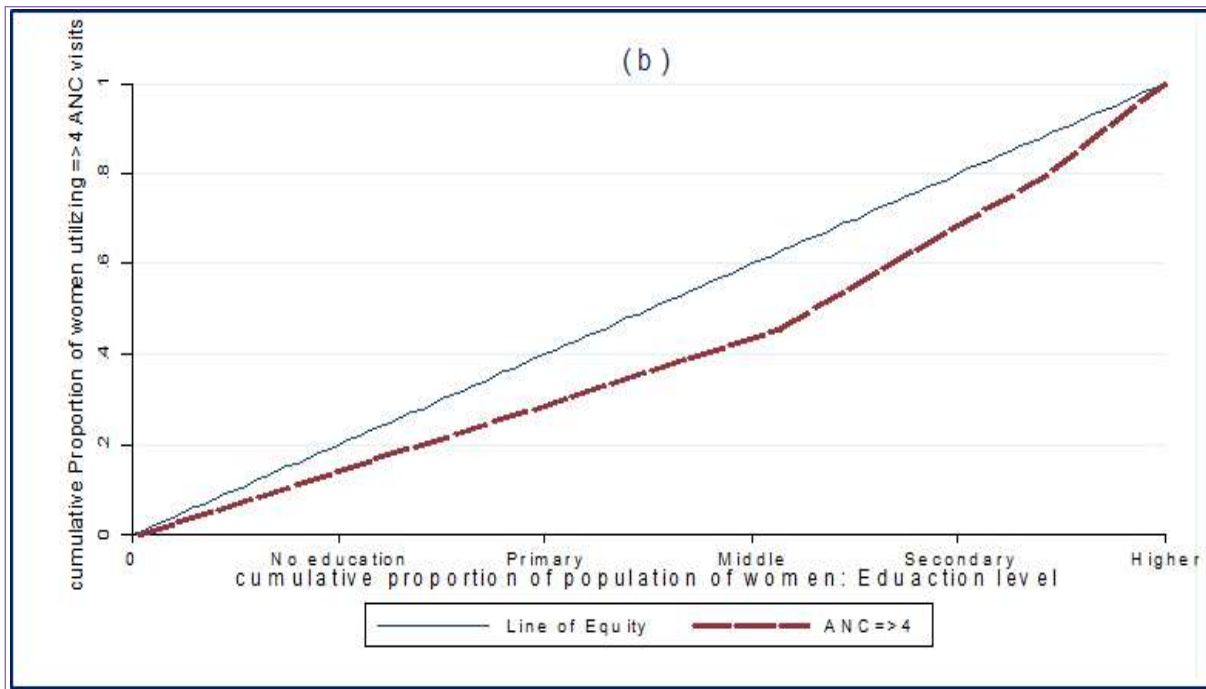
⁵The data is extracted from the Multi-dimensional Poverty in Pakistan 2014-15, whereas the value for the year 2018 is extracted from MICS 2018.

3.4. Concentration Curves to Show Inequalities in Maternal Health Services Utilization

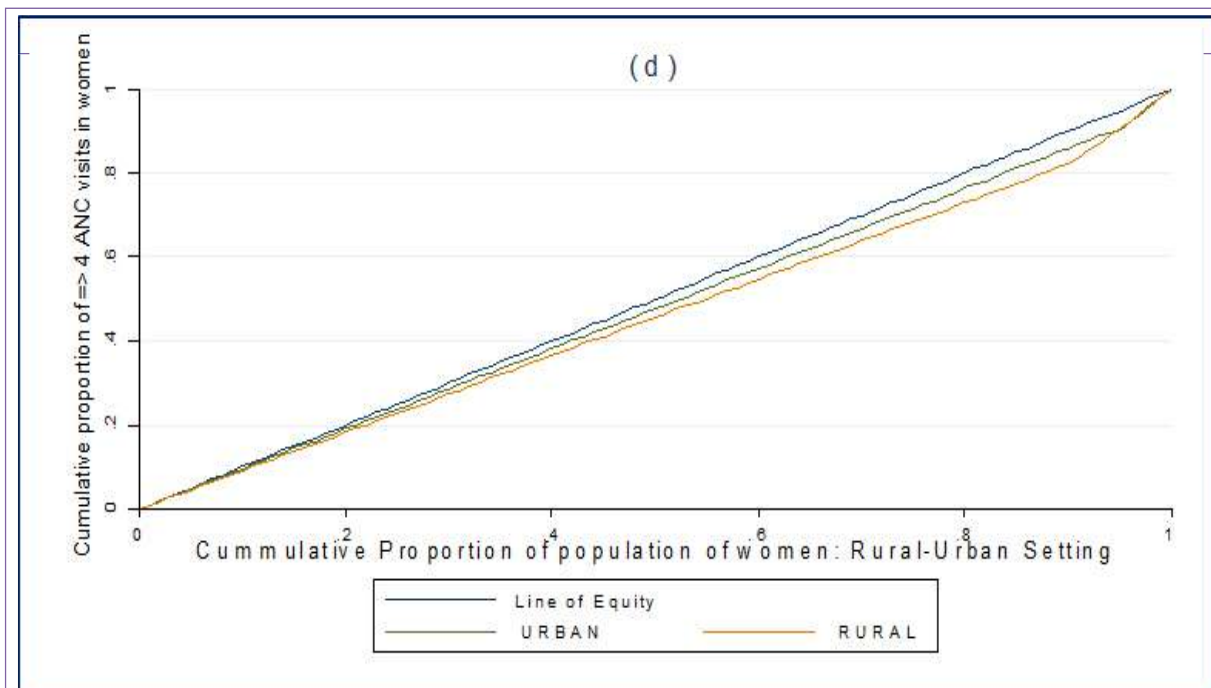
The MICS (2018) was the only latest dataset, in the last decade, which has covered the indicator of maternal mortality. However, even in this dataset, the reported number of maternal deaths was not enough to allow for certainty in analysis, while measuring the indicators of maternal mortality. We cannot establish a statistical model to identify influential factors contributing to maternal mortality, because the correlates of maternal mortality are missing in the data. However, it has been proven in literature that the health-care interventions can prevent or manage the risk factors of the maternal deaths including better coverage ANC visits, skilled birth attendant, institutional deliveries, and PNC after childbirth. The key factors that influence the maternal health are well presented in the MICS (2018) and have been outlined in previous studies as discussed in Chapter 2. The inequalities have been observed in utilization of the maternal health services as summarized in the analysis given below. The inequalities in the use of ANC services with 4 or more visits can be observed in the concentration curves for the outcome variable of ANC with 4 or more visits against different the explanatory variables including wealth status (figure 9a), education level of mothers (figure 9b), education level of household head (figure 9c), and area of residence (figure 9d). The line of equity in each figure showed the utilization of service in all groups irrespective of wealth, education, and rural-urban division. A concentration curve that lies below the equity line exemplified the situation where maternal health services are more concentrated to rich segment of society. The distance of concentration curve from line of equity showed the level of inequality. Figure (a) below demonstrated the wealth-related inequalities in utilization of ANC 4 or more visits. The figure for ANC clearly depicted that the curve is concentrated to the richer households. The fourth-ranked households are catching up to the richest households. There is an under-utilization or non-utilization of recommended ANC visits in the lowest quintile. Similar inequalities can be observed with education level of mothers (figure b) and education of level of household head (figure c), and the mothers with no or primary level of education are underutilizing the service. The low variability in utilization of ANC services can be observed in the rural and urban areas. The utilization is slightly high in the urban area as compared to the rural areas (figure d).

Figure 9: Inequality in ANC service use with 4 or more visits



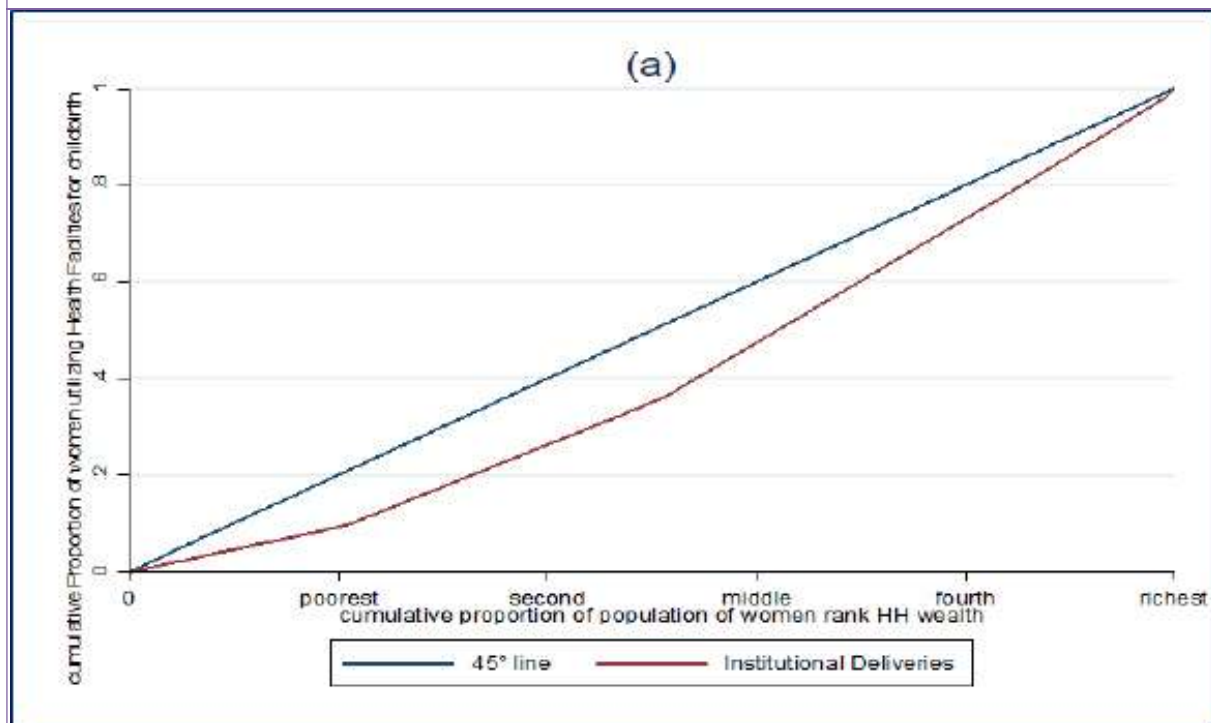


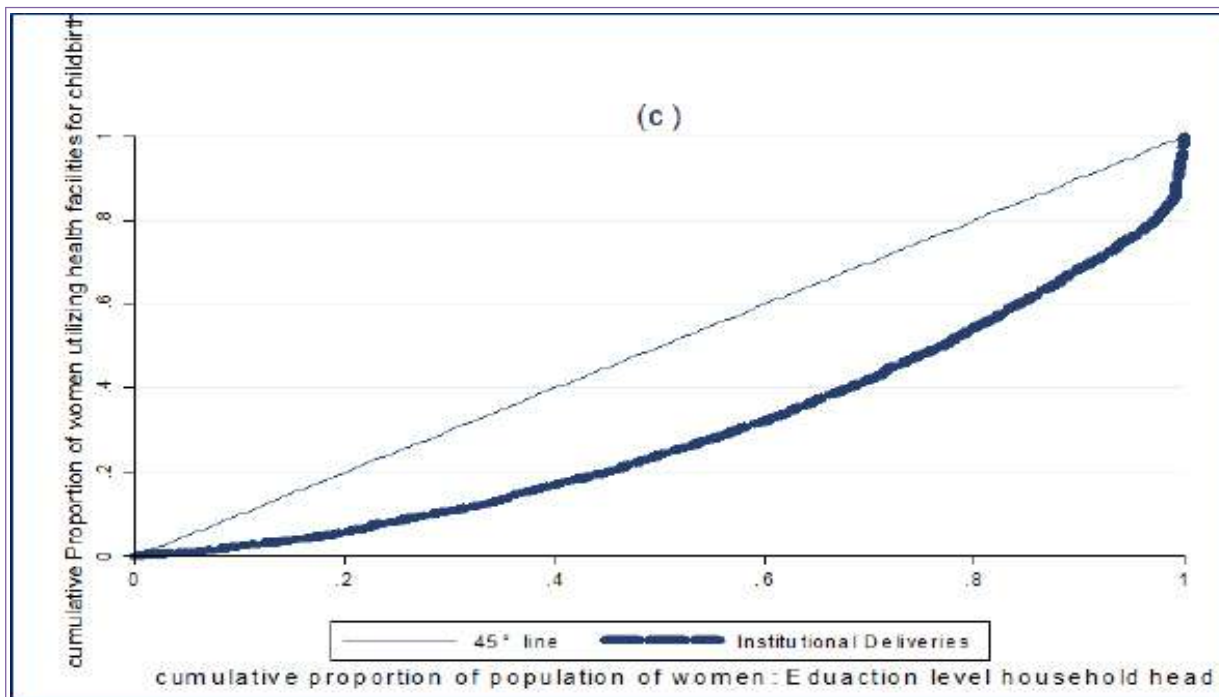
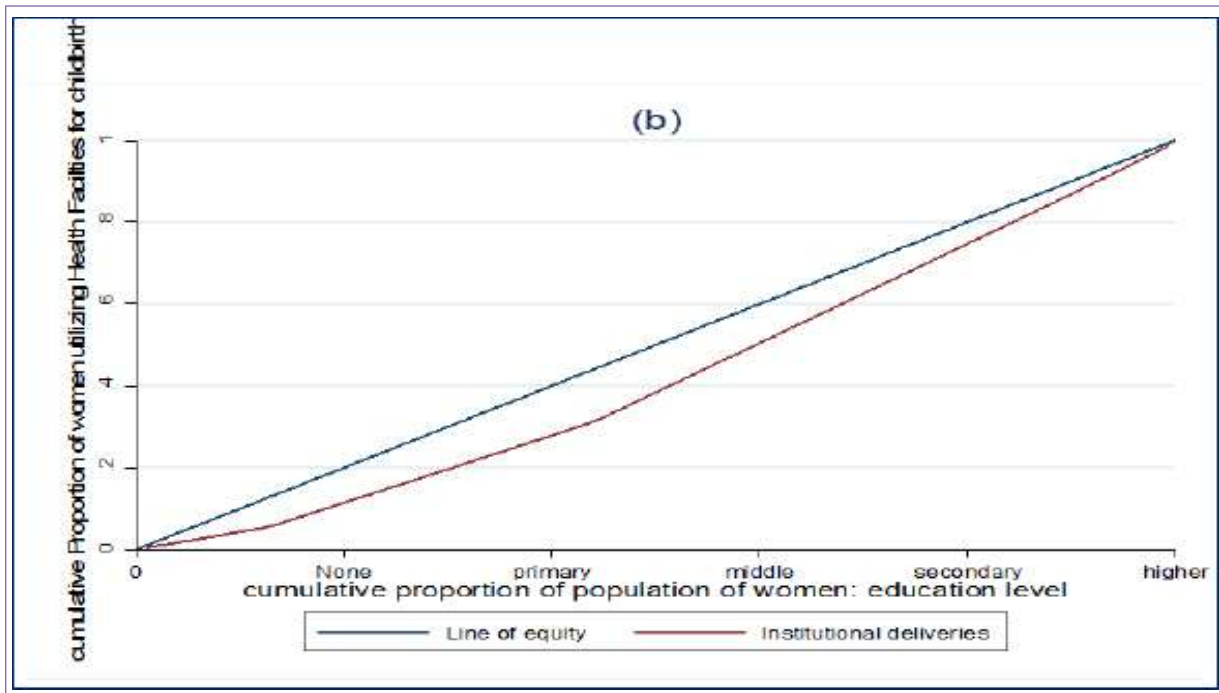
The figure 10 showed the concentration curves of utilization of health facilities for childbirth. The concentration curve for the poorest quintile (figure 10a) lies below the line of equity, the concentration curve diverges from equity line for poorest and second quintile thereby indicating the non-utilization or low utilization of health facilities for childbirth among the poorest, while it is converging to equity line for fourth and richest quintile thereby indicating most of the utilization of health facilities for child birth by the two upper quintiles. Same is the situation with other explanatory variables such as the distance between the concentration curve for uneducated and primary level education of women (figure 10b), and uneducated household head (figure 10c) with the 45-degree diagonal that is highest than that of higher education level in both women and household head. The larger distance of concentration curve utilization of the institutional deliveries with women ranking to their household head education indicates the lower utilization of health facilities if household is uneducated or less educated. Similarly, the women living in rural areas are also less utilizing the institutional delivery services than the urban areas (figure 10d).

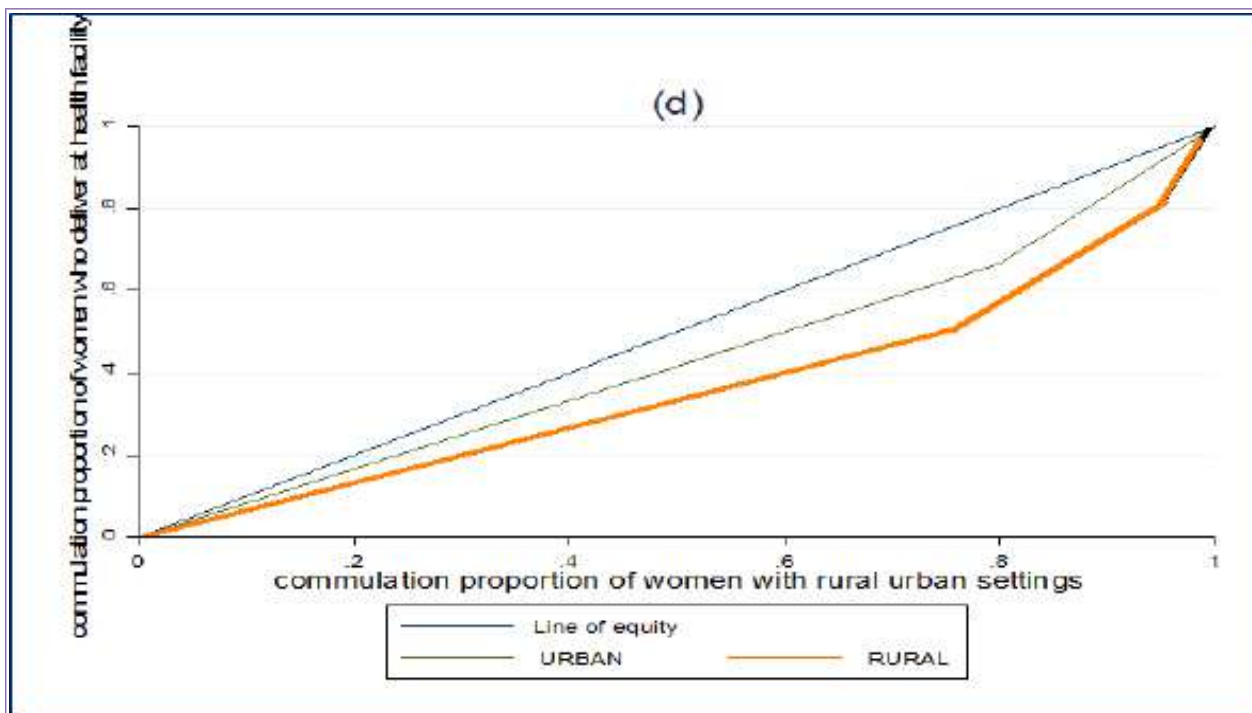


Source: Author's calculations

Figure 10: Inequality in Utilization of Health Facility for Childbirth



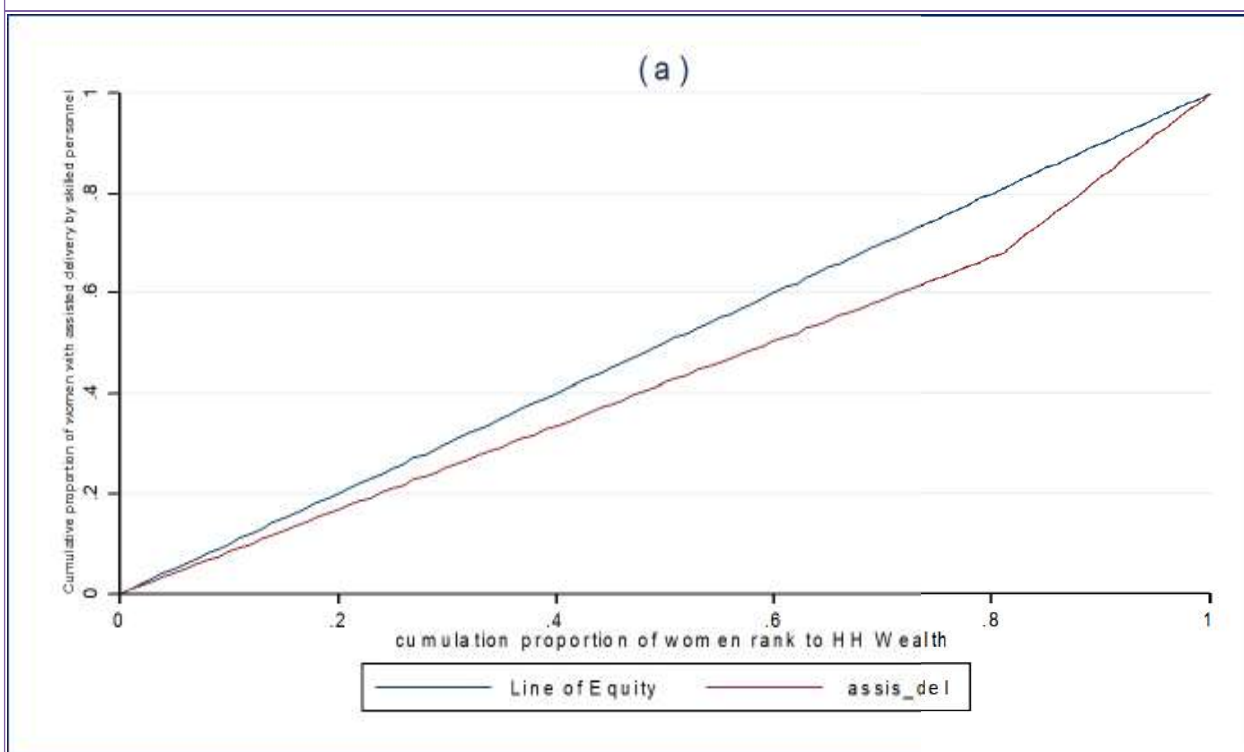


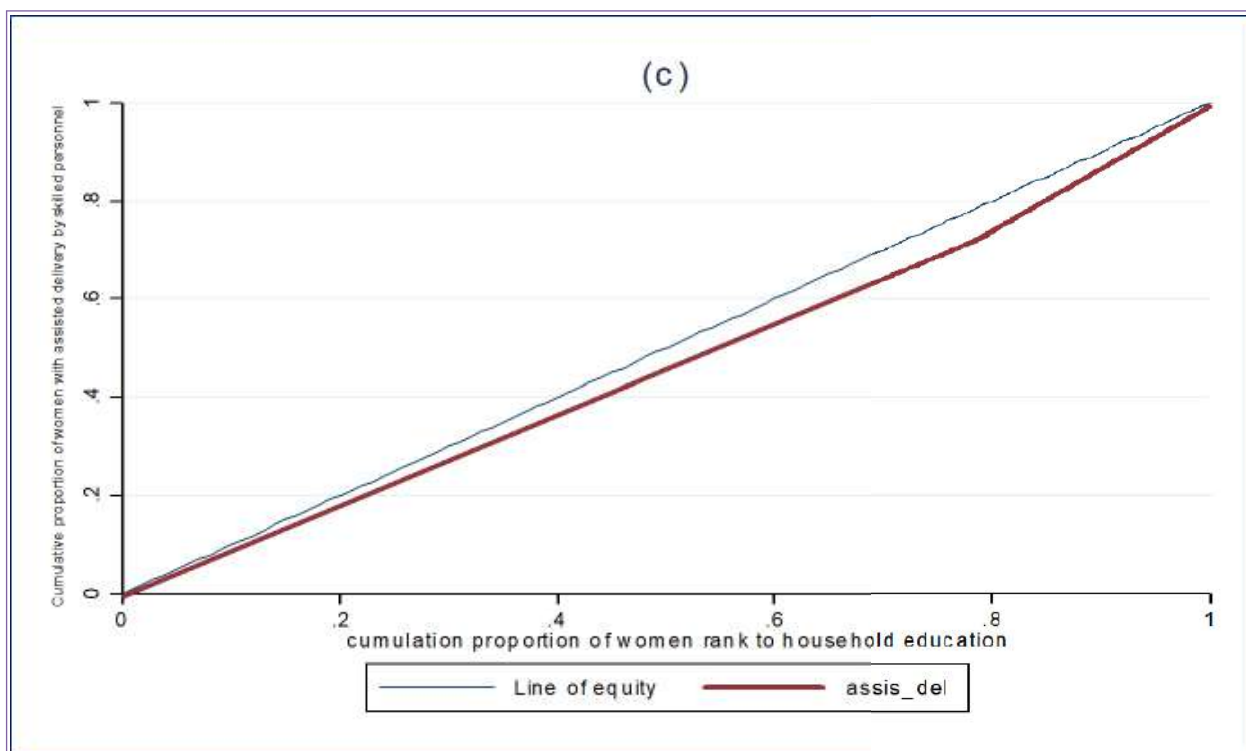
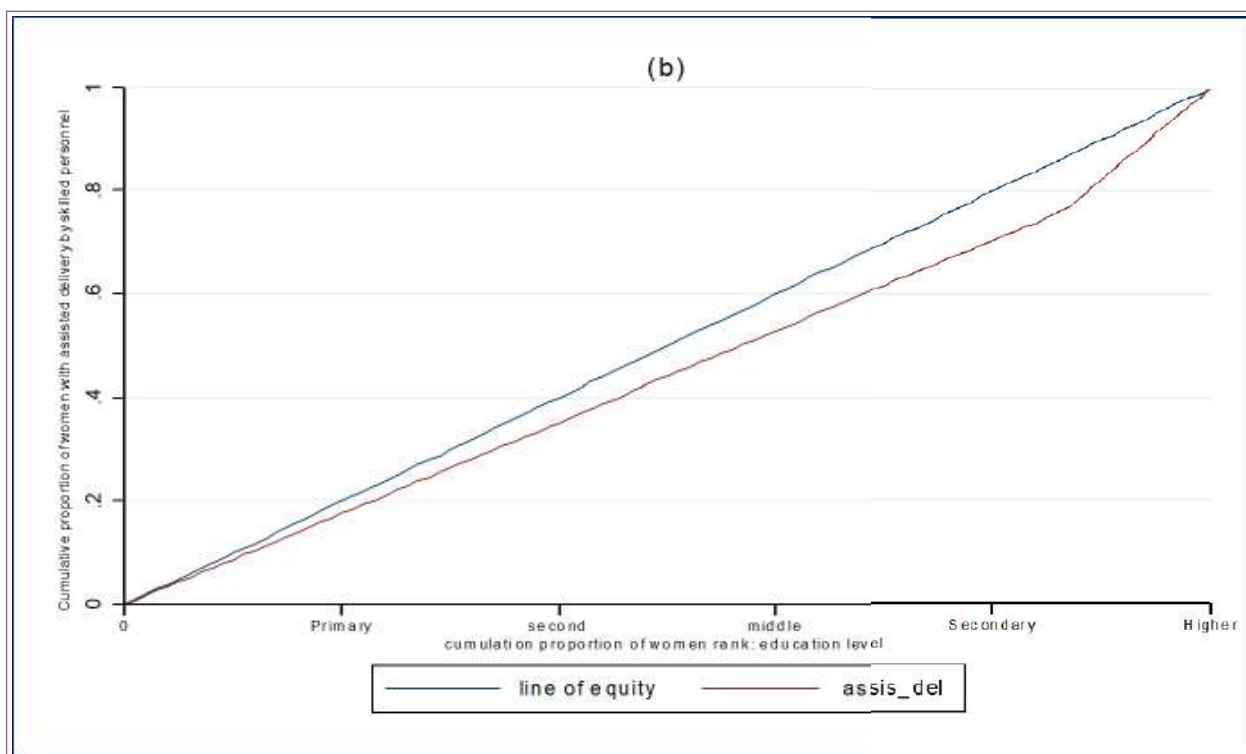


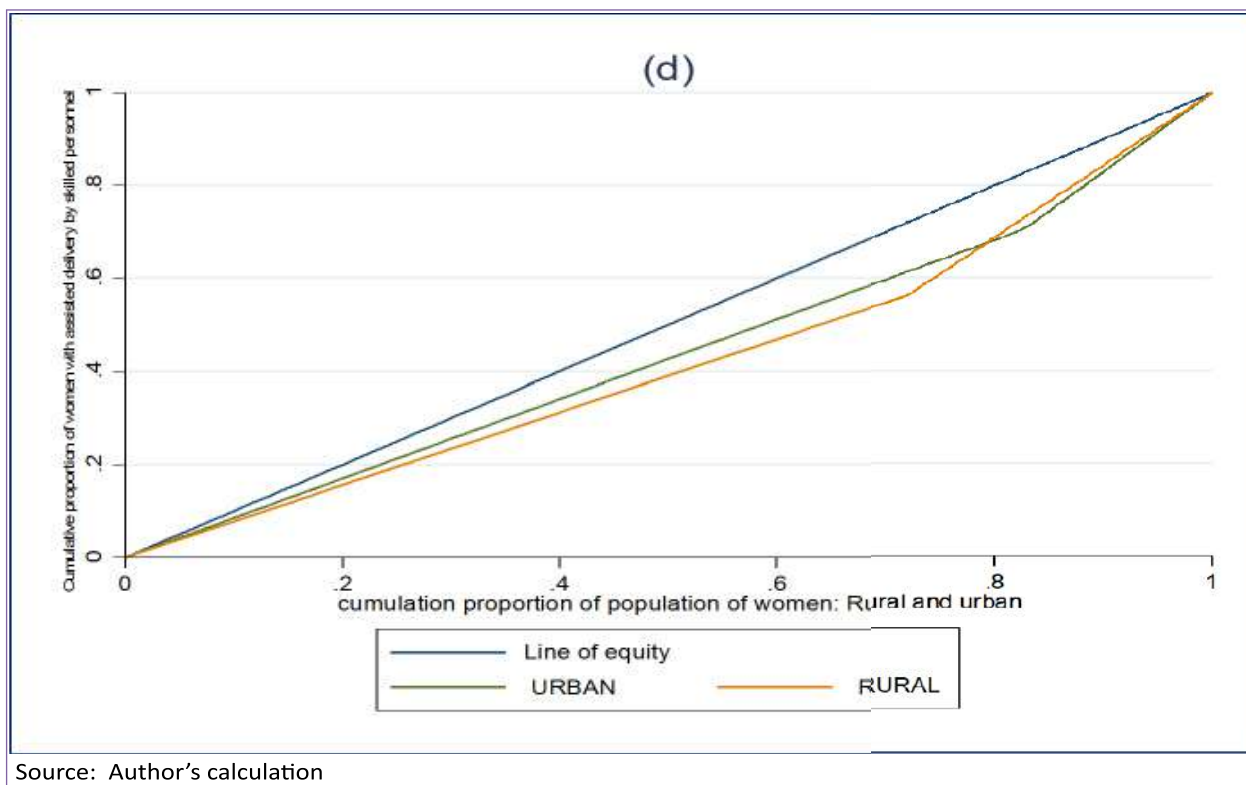
Source: Author's calculations

Likewise, women from the poorest quintile least use the assisted deliveries by the skilled personnel than other quintiles. Like other maternal health services discussed above, assisted delivery by skilled personnel was much affected by the maternal education and household head education. Women residing in an urban area has a higher uptake of this variable than those living in the rural areas.

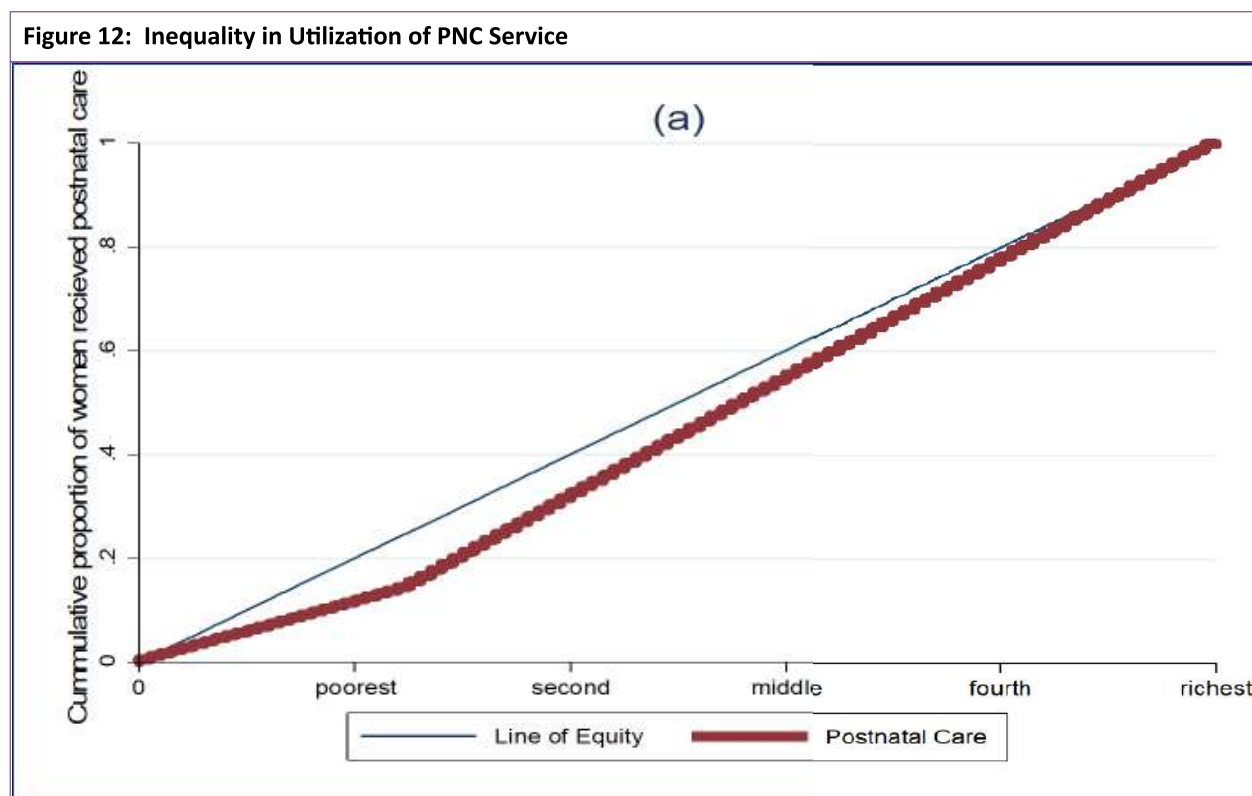
Figure 11: Inequality in Utilization of Skilled Birth Attendant

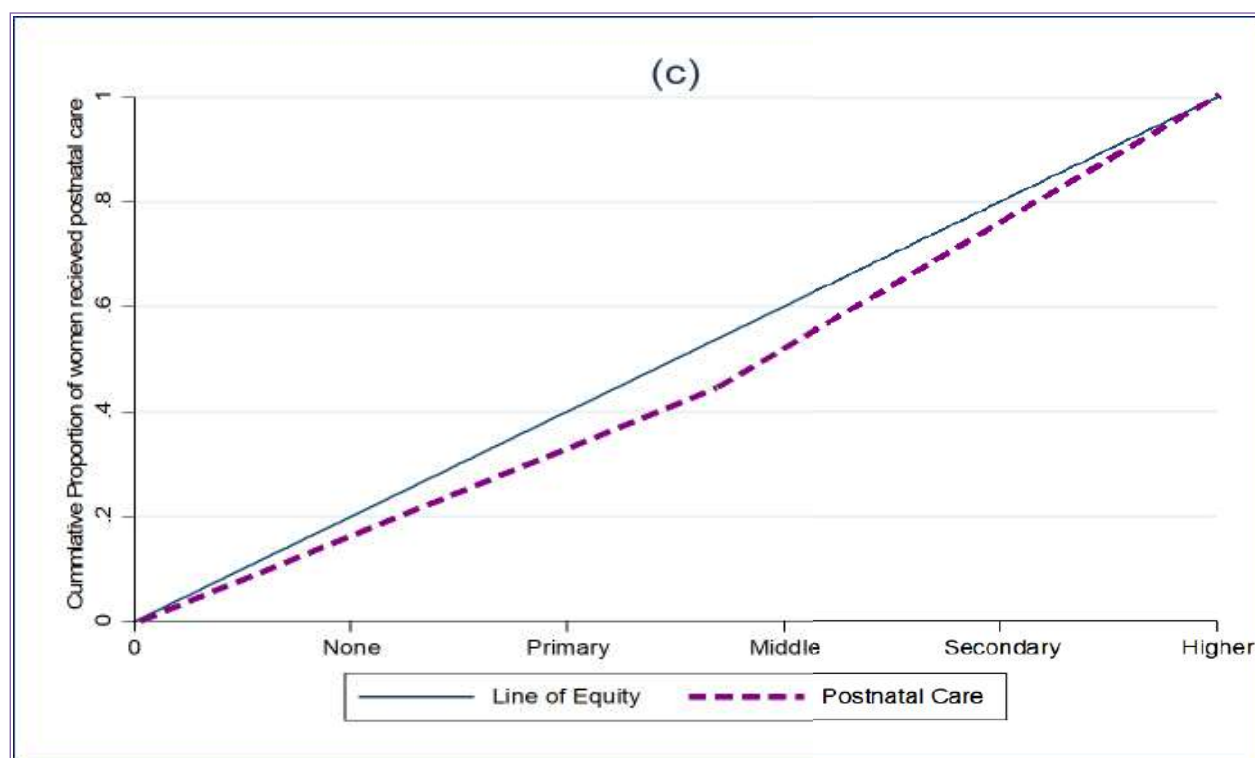
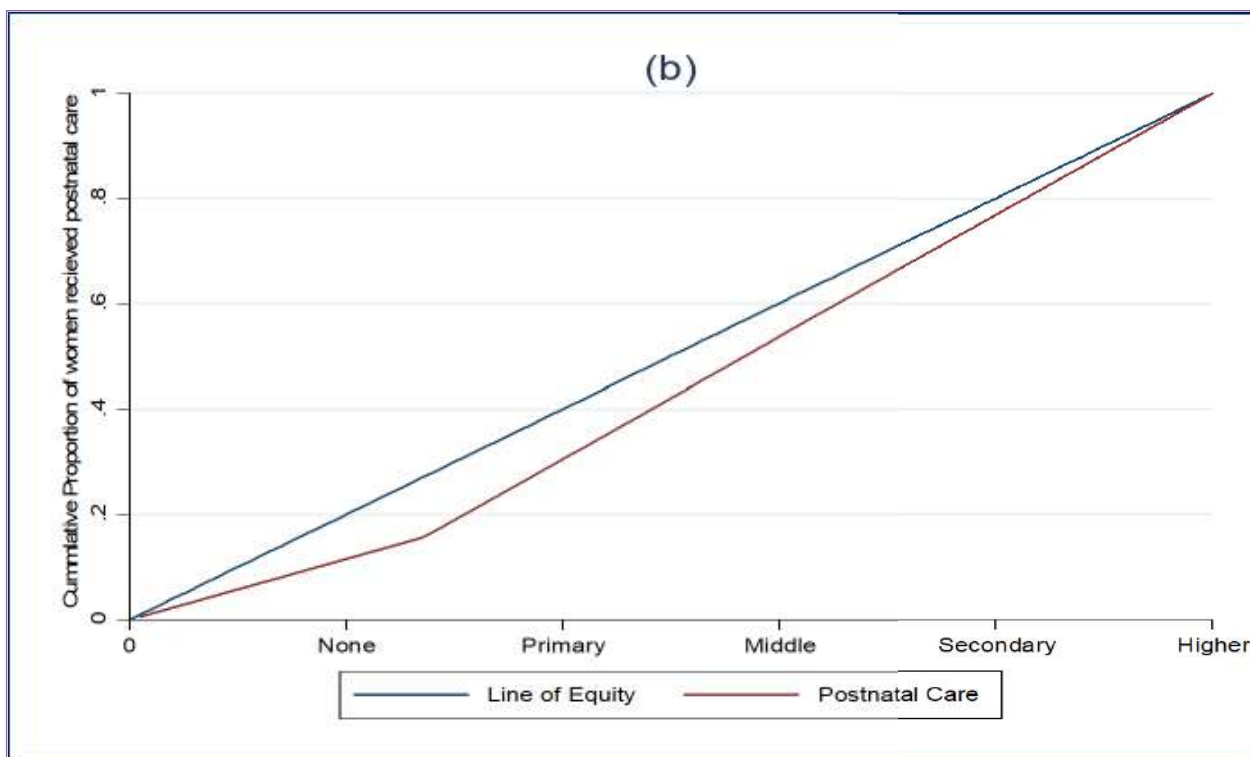


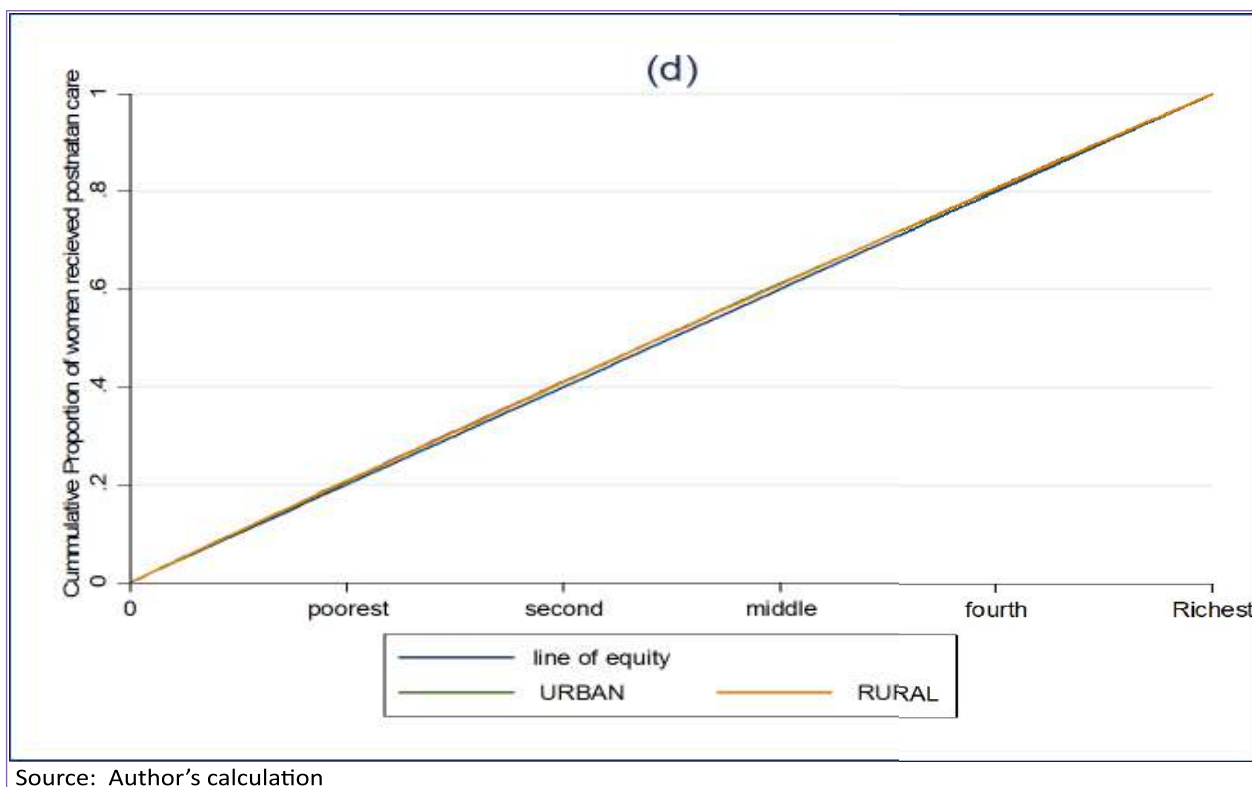




The computed CI: 0.016 revealed that the richest women used the PNC service slightly higher than the poorest. The rate of PNC service in women among top wealth quantile was 1.87 times than that of the women at the bottom wealth quantile. But in case of rural-urban population, least inequalities can be observed in the utilization of PNC service. The concentration curve is overlapping the line of equity (figure d).







3.5. Rate-ratio and Concentration Index for Maternal Health Services

The concentration indices (table 11-13) supported our findings of concentration curves. The ANC service with 4 or more visits was, by far, utilized by pregnant women belonging to the richest quintile than those from the lowest quintile. While analyzing the demand side barriers, Fawole (2015) analyzed that women who were resourceful throughout the year, received the skilled ANC frequently and childbirth through skilled attendant. Resultantly, they were less likely to be involved in risk factors associated with the maternal mortality as compared to those who were not economically independent. The households' economic resources are also found to be important determinants in seeking health care. Michael *et al.*, (2010) conducted their study in Bangladesh and found that the household wealth is positively related to healthcare utilization. The involvement of economic factors is associated with a low rate of maternal death rates. The results of Rate/Ratio analysis depicted that the rate of ANC service is 10 times higher in women at the richest quintile to that in the lowest wealth quintile. The concentration index was 0.157, which indicated that the rich women are more likely to use this maternal service. The computed concentration index also indicated that other maternal health services are utilized by women who are economically better-off (table 11). These findings are similar with those reported in Namibia (Zere, et al., 2019). The education disparities can also be observed in table 12. The women with higher level of education are 5.33 times more likely to use the ANC service with the concentration index of 0.131 thereby supporting an evidence from Ethiopia (Firew Tekle Bobo, 2017). The computed rate-ratios revealed that the uptake maternal health services are higher amongst women living in the urban areas than those living in the rural areas with the positive value of concentration index providing the evidence that the maternal health services are more concentrated to women living in the urban areas than those living in the rural areas (table 13).

Table 11: Rate-ratio (richest/poorest), Concentration indices standard error, and confidence interval for maternal health services

Indicators	Rate-ratio (Richest/poorest)	Concentration Index	SE	Confidence Interval	
				Lower	Upper
ANC =>4	9.89	0.157	0.002	0.151	0.162
Institutional Deliveries	1.79	0.068	0.001	0.067	0.069
Skilled Birth Attendant	1.38	0.121	0.001	0.119	0.123
PNC	1.87	0.016	0.001	0.017	0.015

Source: Author's Calculations

Table 12: Rate-ratio Education Level (Higher/None), Concentration indices standard error, and confidence interval for maternal health services

Indicators	Rate-ratio (Women Education) (None/Higher)	Concentration Index	SE	Confidence Interval	
				Lower	Upper
ANC =>4	5.33	0.131f	0.002	0.125	0.135
Institutional Deliveries	1.64	0.065	0.001	0.066	0.064
Skilled Birth Attendant	1.56	0.110	0.001	0.108	0.113
PNC	1.33	0.018	0.001	0.019	0.017

Source: Author's Calculations

Table 13: Rate-ratio Residential Areas (Urban/Rural), Concentration indices, standard error and confidence interval for maternal health services

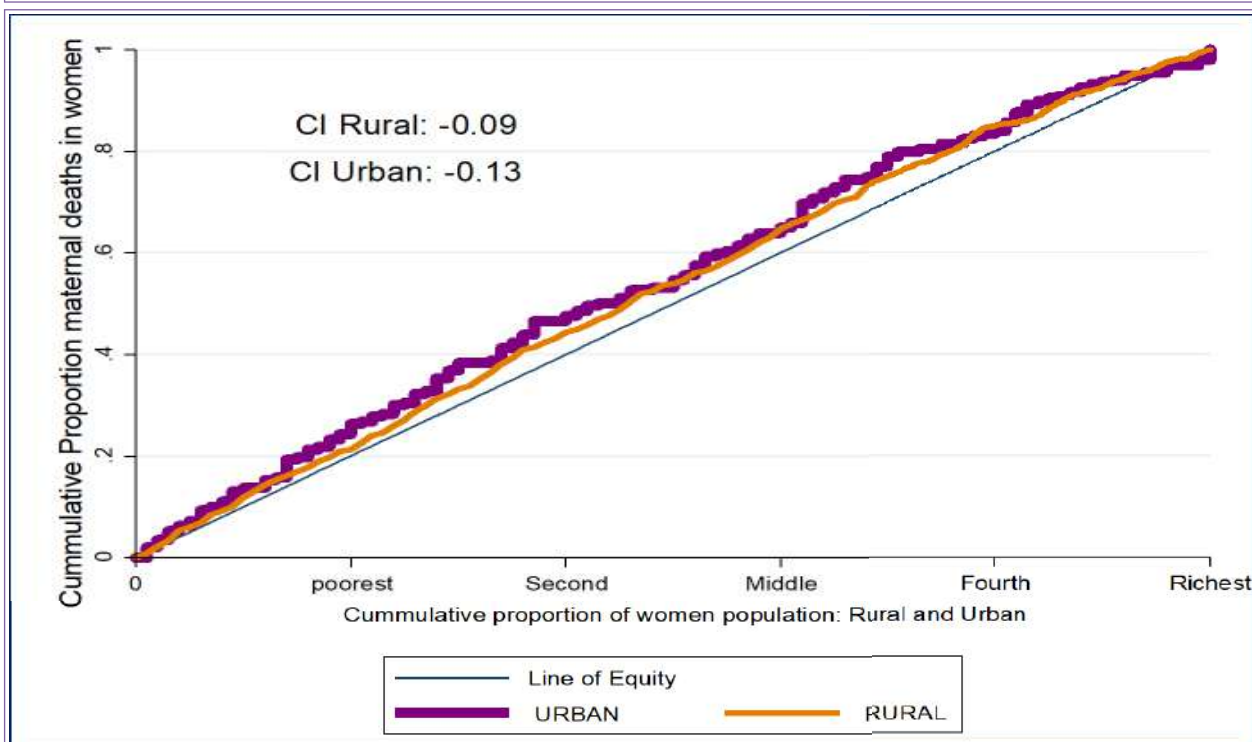
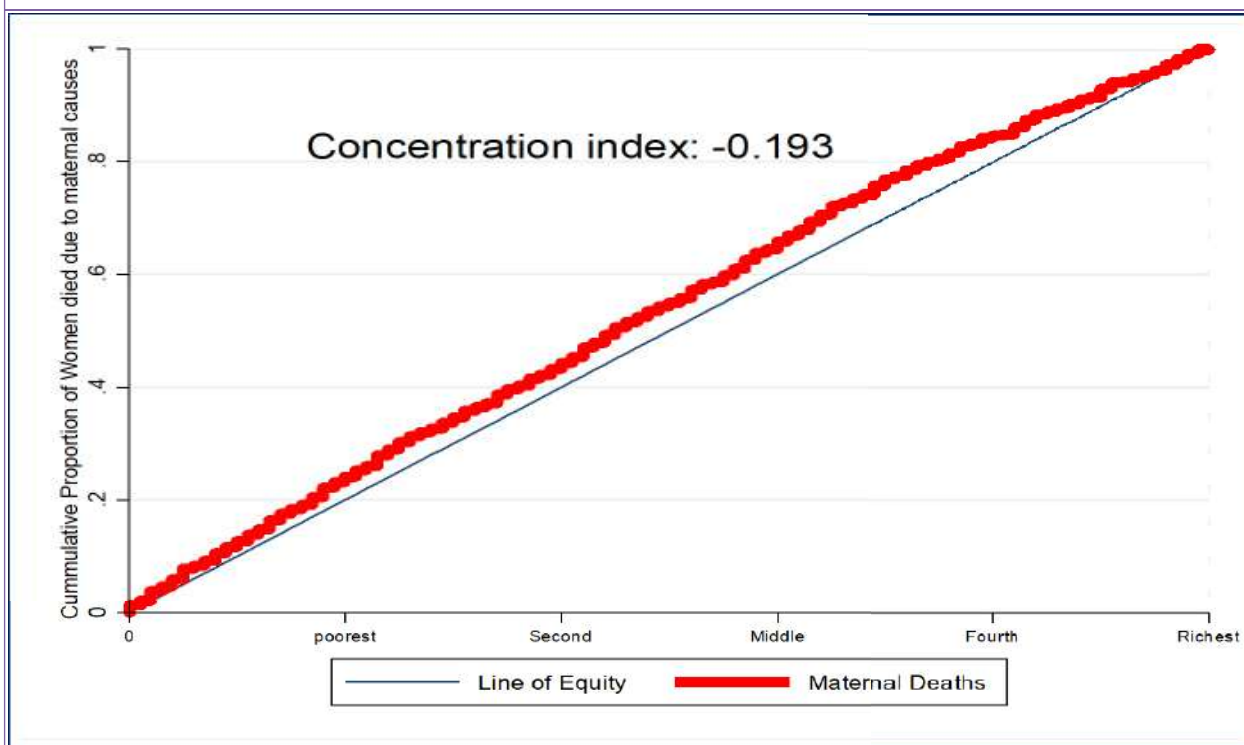
Indicators	Rate-ratio (Urban/Rural)	Concentration Index	SE	Confidence Interval	
				Lower	Upper
ANC =>4	2.17	0.028	0.000	0.027	0.029
Institutional Deliveries	1.18	0.005	0.001	0.003	0.006
Skilled Birth Attendant	1.17	0.008	0.001	0.007	0.009
PNC	1.08	0.003	0.001	0.002	0.004

Source: Author's Calculations

3.6. Inequalities in Maternal Deaths in Wealth Quintiles and Geographical Regions in the province of Punjab

According to micro data of the MICS (2018), most of the maternal deaths during pregnancy or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy and its management occurred in poor women than the richest women. The concentration curve of maternal deaths lies above the line of equity which showed that most of the maternal deaths occurred in the lowest quintile. The reason is cleared from the above analysis. There is an under-utilization of maternal health services in the lowest quintile than the other quintiles, which increases the risk factors of the maternal deaths. Although, the concentration curve is very close to the line of equity indicating that the inequalities are minimal in the maternal deaths. The concentration curves for urban/rural divisions also lie above the equity diagonal and both curves are overlapping, thus indicating minimum inequalities according to the geographical region existed in maternal deaths, yet the poorest in both of the regions suffer with more deaths than the richest ones.

Figure 13: Concentration Curve for Maternal Deaths



Source: Author's Calculations

3.7. Results and Discussion of Regression Analysis with Household Characteristics

The logistic regression is performed to analyze the social determinants of the maternal mortality for potential household in the province of Punjab. The significant risky social factor of maternal death was wealth status. The base category in “helevel” indicators is the primary literacy level or more i.e., if the household head is literate, there will be a lower level of risk of maternal death. The odd ratios of household heads and a lower risk of

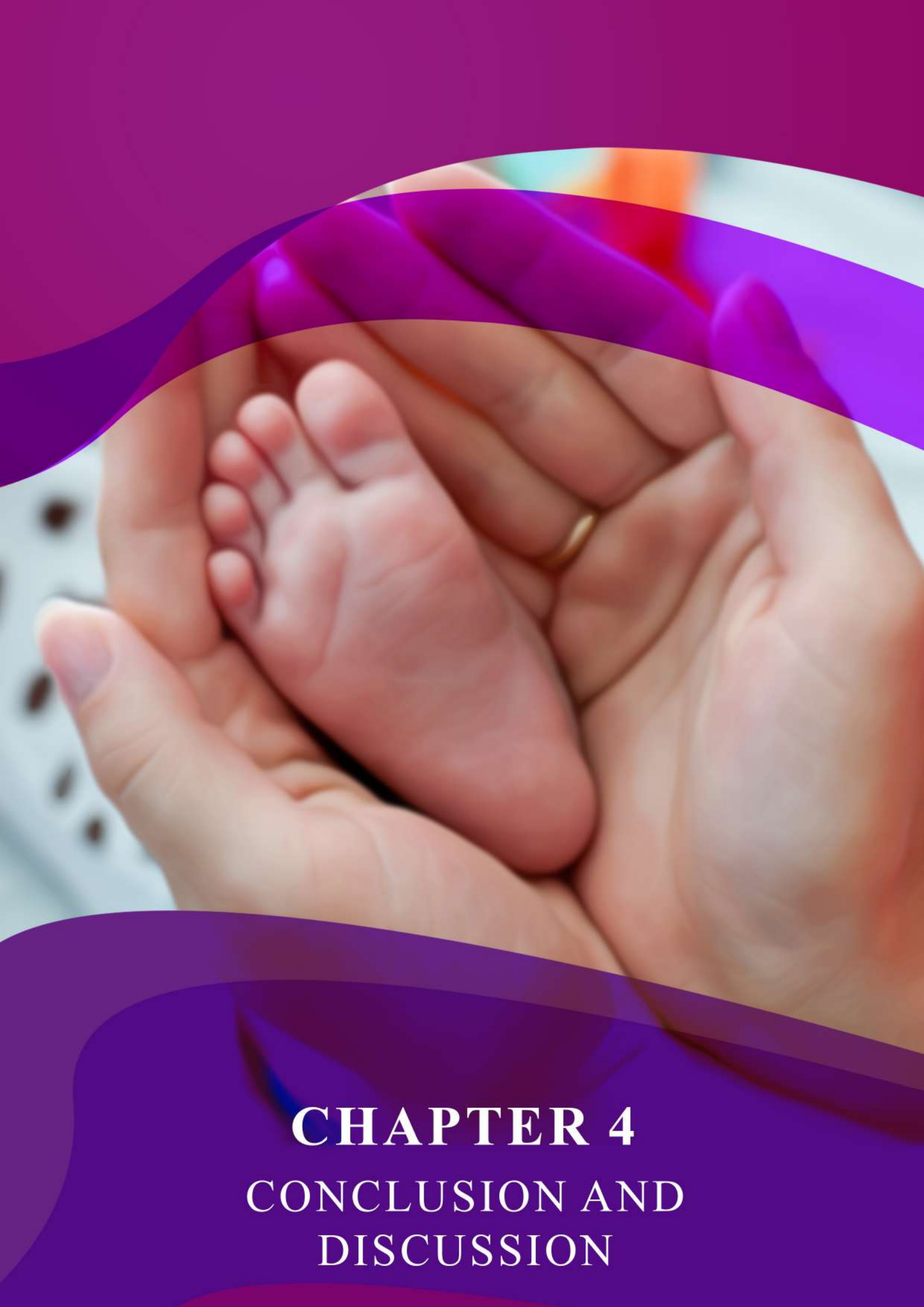
mortality persisted over 1.0002 times. The same has been reported in an early study by (Karlsen, 2011). In the province of Punjab, education of the household head is not significantly related to the survival of mothers. As the base category in safe drinking water, the WS9 variable is the household who is not treated water to make it safer. The estimated odds ratio of the WS9 showed that unsafe water will increase the risk of maternal deaths by 1.142 times. Several reasons articulated in the scientific literature may contribute to this relationship. The unsafe water increases the physical burdens on women of carrying water which translates into the decline of health of expectant women as they may suffer from anemia, vitamin deficiency, trachoma, and hepatitis with harmful effects. (Cumming, 2016). However, the unimproved sanitation is least associated with maternal deaths. The wealth status of the household plays a significant role and as the base category is the mother belongs to poorest families. It is evident from the results that mothers from poor families are more prone to deaths, because an increase in income is more likely to enhance the chance of maternal survival by 1.16 times. The poor spend least, in absolute terms, but face the highest burden, in relative terms, thus making themselves the most disadvantaged in other expenditures that also affect the health condition of expectant mothers (Leone, 2013).

Table 14: Result of Logistic regression

Maternal Mortality	Odds Ratio	Std.Err.	z	p>z	[95% Conf. Interval]	
helevel	1.00026	0.031	0.01	0.995	0.939	1.094
WS9	1.14254	0.025	0.05	0.555	0.734	1.777
WS11	0.91521	0.094	-0.85	0.393	0.746	1.121
Windex5	1.16671	0.04	4.10	0.000	1.081	1.255
_cons	3.06973	1.44	2.38	0.017	1.221	7.216

Number of observations = 5003 LR chi² (4) = 20.90 Prob> chi² = 0.0003 Pseudo R² = 0.0049

Source: Author's Calculation



CHAPTER 4
CONCLUSION AND
DISCUSSION

4. Conclusion and Discussion

Some of the main interventions to reduce the maternal morbidity and mortality include early identification and management of pregnancy related complications. The United Nation Development Program (UNDP) is encouraging the nations to achieve the international agenda of the SDGs through various maternal care interventions including the ANC visits, skilled birth attendant, PNC, and contraceptive prevalence etc. The ANC utilization with 4 or more visits (53 percent) in the province of Punjab is slightly higher than the South Asian (50 percent) region, but lower when compared to that of the developed countries (98 percent). The skilled birth attendants' is 76 percent in the province of Punjab which is far less than many developed regions (99 percent), similarly 73 percent of deliveries take place at the health facilities in the province of Punjab as compared to 74 percent in the South Asian region and 99 percent in the developed countries. This study has analyzed the factors contributing to the availability and accessibility of maternal health indicators. The low level of public health spending as a percentage of GDP, low per-capita health as compared to other countries of the region, and high burden on households in term of OoPE on health have major roles in the provision of health services. Furthermore, the geographical location of health services indicated that one-fourth of the first-level care facilities in the province of Punjab are located at a distance of more than 10 kms from the Mouzas, which is also a burden on the utilizer of facility in terms of cost and time. The BHUs and MCHs were designed specifically for provision of maternal health services in villages and towns where it was inaccessible to prospective users. The key facts of situational analysis of supply side depicted that there are only five public health facilities and 18 beds, on an average, for per 100,000 populations in the province of Punjab. The distribution of facilities across the districts seems to be unequal in numbers, like Faisalabad have the highest number of facilities i.e., 12 for per 100,000 populations. A high percentage of women (52 percent) were found to be illiterate in 2018. The incidence of poverty is alarming in the province of Punjab. 26 percent people in the province of Punjab are facing multi-dimensional poverty. The percentage of population with an access to safe managed drinking water is 44 percent and improved sanitation is 80 percent. The concentration curves and concentration index of maternal health services have depicted that women belonging to the poorest quintile use less maternal health services than the richest ones. Similarly, uneducated women, women whose household head is uneducated, and women living in the rural areas are prone to maternal death. The individual characteristics inter-mingle with household factors to further worsen the risk. In many ways, women who are extremely poor or have less educated husbands are at the risk of deaths. So, the results showed substantial inequalities amongst the poor-rich, educated-uneducated, and rural-urban in the utilization of maternal healthcare services. These inequalities have also been observed in maternal deaths. It can be concluded that despite the progress in the utilization of maternal healthcare services during the last two decades, the MMR remained unacceptably high in the province of Punjab due to these socio-economic inequalities in maternal healthcare utilization. These results are important for policy makers in establishing more efficient policies and monitoring improvements in the maternal health services.

4.1. Recommendations

The study provides evidence to focus on following areas for reducing maternal deaths.

- Inequality in the provision of healthcare facilities across districts especially in rural areas in the province of Punjab should be minimized. In this regard, health care budget as a percentage of GDP, maternal health care budget as percentage of total healthcare budget, and efficiency of utilizing the budget must also be increased.
- Various inequalities especially the low utilization of ANC, childbirth, PNC, and institutional deliveries are linked to uneducated women belonging to poor households. Interventions or specific programmes

that offer some of the largest possible gains for the disadvantaged mothers can decrease disparities. The current inequities in the utilization of maternal health services impede progress towards the SDG target of reducing the MMR by 70 per 100,000 live births between 2015 and 2030. So, this deserves attention of policy makers and program designers.

- Our study suggests that the provision of safe drinking water and improved sanitation in the province of Punjab must also be enhanced in order to improve the standard of living of pregnant women.
- The government needs to review and strengthen its community strategies to educate the mothers and households to enhance the outreach of health care facilities to improve the maternal health indicators.
- The production of reliable and authenticated data on maternal cause-of-death must be ensured for all districts of Punjab, so that targeted interventions can be introduced in the districts with worse conditions. The civil registration for all vital statistics can be considered in this perspective.

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