The Utilization of Quality Antenatal Care in Pakistan: Analyzing Health Inequity in Various Periods

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Abstract

This paper consists of two research questions, both which address socioeconomic inequalities of antenatal care in Pakistan. The first is a query probing whether, definitively, there is non-utilization of quality antenatal care, also referred to as skilled birth attendants. And the second is that, if there is such, what the specific factors are that bring about this inequality. To assess this, the Pakistan Demographic and Health Surveys of 1990-91, 2006-07 and 2012-13 were used to establish both absolute and relative measures of inequality. The results show that the rate ratio, a relative measure of quality antenatal care, increased from 2.3 in 1990-91 to 6 in 2006-07, and reached a higher value of 9.1 in 2012-13. In contrast, the range difference, the absolute measure, decreased throughout the sequence of the survey periods. While the Lorenz curves indicated a concentration of non-utilization of quality antenatal care amongst the poorest in the years studied in the surveys, the Slope index of inequality showed a decrease by 39% when women moved from the lowest to the highest socioeconomic status. Among the sources of inequality, the socioeconomic status contributed the largest percentage, which was 44%, followed by place of residence, at 21%, a husband's education at 14%, and the woman's age at 13%. Thus, the measure of inequality plays a vital role in determining the size and direction of inequity in quality antenatal care when examined in the context of multiple survey periods.

Keywords

Antenatal care; Lorenz curve; rate ratio; slope index; socioeconomic inequality

Introduction

Of the seventeen Sustainable Development Goals (SDG) that were advocated in a summit at the United Nations in 2015, SDG 3 emphasized the need to secure appreciable health advances and well-being of people of all age brackets. The targets set under SDG 3, especially *SDG 3A* and *SDG 3B,* had been previously charted in Millennium Development Goal 5 (United Nations, 2016), but now the goals were reiterated and attempts were made to secure them. Throughout 1990-2015 Pakistan showed little progress toward achieving the targets of MDG 5, especially those related to maternal health care. Although the maternal mortality ratio (per 100,000 live births) has declined from 431 to 178 deaths (World Health Organization, 2015), it is even now far below the target set for 2015 (140 per 100,000 live births). The reason for this is due to the under-performance of indicators related to maternal health care, particularly the use of skilled birth attendants (World Health Organization, 2014).

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In Pakistan, the use of skilled birth attendants increased from 18.8% in 1991 to 52% (by 176%) in 2015, which is considerably lower than the global target of 90% stated in the Millennium Development Goal-4 of 2015 (World Health Organization, 2014). Other South Asian countries have made significant improvements in the utilization of skilled birth attendants (SBA). Much of that improvement was between 1990 and 2015. But even India has maintained a comparatively higher proportion of the use of SBA. Much of these advances took place during 1990 (United Nations, 2015). Safe deliveries have increased from 7.4% to 55.6%, which is a 600% improvement. In Nepal infant mortality went from 9.5% to 42%, which is a 345% improvement. A similar situation occurred in Bangladesh during 1990-2015. Afghanistan witnessed an increase in SBA from 12.4% to 50.5% between 1990-2015, while India showed an improvement by 138% (from 34.2% to 81.4%) during the same period.

Sri Lanka has consistently maintained the highest rate of safe deliveries, ranging from 94.1% in 1993 to 99.8 in 2015 (United Nations, 2015). Like Sri Lanka and Bangladesh, which have brought massive improvements in safe deliveries through cash transfer and community midwife programs, Pakistan also initiated a series of reproductive healthcare interventions, namely Lady Health Worker (LHW), Pakistan Initiative for Mothers and Newborn (PAIMAN), and Maternal and Child Health (MNCH) [i] (Agha, 2011b). However, these programs were ill-conceived, and due in large part to inadequate supplies and funding, have failed to give universal coverage of reproductive health care services. But, the mechanized structure of programs, and the disregard of socioeconomic stratification, embedded in the society, made these attempts less successful than what they would be otherwise (Agha, 2011b; Mumtaz, O'Brien, Bhatti & Jhangri, 2012). The existing literature suggests that, in developing countries in particular, the level of education, stratification of the region of residence, occupation, socioeconomic mobility, and religious beliefs of the population are all factors that have some bearing on reproductive healthcare (Afzal & Yusuf, 2013; Arif & Ibrahim, 1998; Dhak, 2013; Midhet & Becker, 2010; Mumtaz et al., 2014; Mumtaz et al., 2012).

In Pakistan, quality antenatal care is not geographically dispersed equally (Memon, Zaidi & Riaz, 2016). A large majority (86%) of its richest women are shown to have used skilled birth attendants during 2012-13, whereas only 29% of the poorest got equally good antenatal healthcare (SBA) (National Institute of Population Studies, 2013). Only 44.4% of rural women received quality antenatal care (SBA) during 2012-13. The residence-ratio[ii] (2.4) indicates an almost double rate of the utilization of skilled birth attendants for urban women when contrasted with those in rural areas (World Health Organization, 2014). Balochistan, which is the largest province in terms of covered geographic area, has the lowest percentage (22% altogether) of women who received skilled attendants at birth followed by Khyber Pakhtunkhwa at 48.7% (National Institute of Population Studies, 2013).

The literature shows that rural women often depend on less educated, traditional birth attendants (called "Dai" in the local language) for the delivery of children in Pakistan. It is because of the prevailing cultural norms, higher expenses for quality antenatal care, the typically long commutes to and from the nearest medical facility, and lack of knowledge about the benefits of the utilization of services of qualified birth attendants that rural women forego having these skilled attendants assist them. (Mahmud et al., 2011; Majrooh, Hasnain, Akram, Siddiqui & Memon, 2014; Mumtaz et al., 2014; Mumtaz & Salway, 2007; Mumtaz et al., 2012; Sathar & Kazi, 2000). The limited use of skilled birth attendants increases the likelihood of obstetric complications for women, such as still-births, and deaths of newborn babies,

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[i] Lady Health Worker program (in continuation since 1994), Pakistan Initiative for Mothers and Newborn (2004-2010), and Maternal and Child Health (in progress since 2007).

[ii] Urban to rural residence ratio.

particularly in the poorest households (Majrooh et al., 2014; Rani, Bonu & Harvey, 2007 Rodney & Hill, 2014; Andrade, Noronha, Singh, Rodrigues & Padmadas, 2012).

Previously, studies have examined levels and determinants of socioeconomic inequality in maternal health care by using simple statistical measures (Mahmud et al., 2011; Pallikadavath, Foss & Stones, 2004; Van Malderen et al., 2013; Andrade et al., 2012). This indicates research gaps in two ways. Firstly, an appropriate assessment of inequality in the use of antenatal care across calls for a careful selection of the measure of inequality. As there are different means of measuring inequality, there have been diverse interpretations of the distribution of antenatal care, which may influence policy objectives in the direction of reproductive health care. Secondly, the analysis of trends in socioeconomic inequalities in reproductive health care may help in identifying the most vulnerable groups of women.

This paper analyzes inequity in the non-utilization of quality antenatal care in Pakistan during 1990-2012. It examines inequity in non-utilization of quality antenatal care in terms of a single dimension, as well as by household wealth, in multiple time periods. Moreover, it analyzes the decomposition of inequality in skilled birth attendants in terms of socio-demographics and economic characteristics during 2012-13.

The main research questions addressed in the paper are the following:

1. Are socioeconomic inequalities in the non-utilization of quality antenatal care (skilled birth attendants) subject to various measures of inequality in multiple-periods?

2. What are the factors of inequality that have spurred this failure to use quality antenatal care?

The study is organized with Section 2 presenting a detailed discussion on sampling and methodology, variables, an overview of inequality measures, measurement of socioeconomic inequality, and decomposition analysis of inequality, and Section 3 discussing research findings related to analysis of inequity in multiple periods and of inequality decomposition. Then this is followed by the conclusion.

Material and Method

Sampling and data

This article used three findings of the Pakistan Demographic and Household Survey (PDHS) for 1990-91, 2006-07, and 2012-13. It is a nationally representative micro unit as well as a recorded household survey. The data is set, and was collected through multi-stage stratified random samplings. It represents the population of the provinces of Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan, as well as the federally administered areas and Gilgit.

All the surveys include detailed information on socioeconomic and demographic characteristics of individuals and households, reproductive health of men and women, and children's health. This study mainly used information on household assets, the ages of women, antenatal care, and regions. The educational level of husbands, women's media exposure, and places of residence. The sample used in the paper excluded the federally

administered areas and Gilgit[iii] due to the lack of availability of data on the aforementioned regions in the former surveys (PDHS, 1990-91; PDHS, 2006-07).

Variables

Untrained birth attendants are still a proxy for quality antenatal care throughout most of the country. Even when in active communication with overseeing personnel such as doctors, nurses, mid-wives, and health workers, or other qualified health care personnel, these assistants are not particularly effectual. As so many have no training and little experience, only birth attendants with the highest qualifications should ever be considered. Even from Pakistan Demographic and Health Survey (1990-91, 2006-07, 2012-13) do not elucidate this ambiguous issue as they do not provide any degree of assurance about the dependability of these birth attendants. The only substantive information on nurses, mid-wives, and lady health workers lies in the range of merely 0.03-2% of all skilled birth attendants, and the certification of "qualified" birth attendants is largely a discretionary act on the part of a given doctor.

The information from PDHS on household assets, excluding home ownership, was used to construct the wealth index. Specifically, it was taken from *Pakistan Demographic and Health Survey*, PDHS 1990-91, PDHS 2006-07, and PDHS 2012-13, respectively. The Principal Component Analysis (*PCA*) was used to formulate the socioeconomic status or wealth index. Women who did not receive quality antenatal care from a skilled birth attendant were ranked by the socioeconomic status or SES (from lowest to highest on the SES scale). SES was used as a reference variable to highlight inequalities in the non-utilization of antenatal care among women aged 15-49 in Pakistan.

Other variables included women's ages (<20 years, 20-30, 31-40, and 41-49), the husband's education (having no education, having attained a primary school education, having attained a secondary education, and having attained higher education), the region each woman was from (Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan), and whether the region of residence was urban or rural. Among these provinces, Sindh is the most urbanized province with 56% of its total population living in urban areas. Balochistan is the largest province of Pakistan, consisting of 44% of the total land area of the country. For the most part, it is comprised of dry terrain and mountains, which increases difficulties in commuting, and consequently, poses obstacles for accessing maternal health care services which are largely centered in urban areas. Punjab has the largest share in the total population, while Khyber Pakhtunkhwa has the largest rural population of 80% of its residents (Social Policy and Development Centre, 2016). Media exposure and influence was measured using information on women who frequently have access to newspapers, televisions, and radios. A dummy variable of 1/0 was used in which 1 shows the proportion of women who had some media exposure (that being reading newspapers, watching TV, or listening to the radio) and 0 represented those who did not have any exposure to media on a weekly basis.

Inequality measures: overview

To answer the first research question, this paper used both absolute and relative measures of inequality, including range difference, rate ratio, Lorenz curve, Slope Index of Inequality, and the relative index of inequality. These were used to examine whether socioeconomic

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[iii] A northern region of Pakistan

inequality had any bearing on non-utilization of antenatal care. Relative inequality was assessed to determine the impact, if any, on the non-utilization of antenatal care while absolute inequality measured the absolute differences in the non-utilization of antenatal care. To address the second question, this paper analyzed various sources of inequality (i.e. socio-demographic and economic factors) in the non-utilization of quality antenatal care in 2012-13.

Measurement of socioeconomic inequality

This study used both absolute and relative measures of inequality for analyzing socioeconomic inequalities in the non-utilization of quality antenatal care (SBA) in multiple-periods. Absolute measures included Range Difference (RD), Slope Index of Inequality (SII), Relative Inequality Measures, Comprised Rate Ratio (RR), Concentration Index (CI) and Relative Index of Inequality (RII). RD was the difference in the mean values of antenatal health care among married women aged 15-49, between the lowest and highest wealth Quintiles. Range Difference was the simplest absolute measure (Sen & Foster, 1997). It is calculated as,

$$RD = \overline{y_L} - \overline{y_H} .... (1)$$

$\overline{y_L}$ and $\overline{y_H}$ referred to mean values of the variable (in this context the non-utilization of quality antenatal care) of the reference population. A greater difference between $\overline{y_L}$ and $\overline{y_H}$ indicated a greater size of inequality in the variable. In this article, a higher RD signified a larger inequality in the non-utilization of quality antenatal care between women of the lowest and of the highest wealth quintiles (Braveman, 2005; Kakwani, Wagstaff & Van Doorslaer, 1997; Mackenbach & Kunst, 1997; Moonesinghe & Beckles, 2015; Wagstaff, Paci & Van Doorslaer, 1991). Furthermore, this article calculated Rate Ratio by this equation:

$$RR = \overline{y_L} \Big/ \overline{y_H} .... (2)$$

The right hand term of Equation 2 showed the ratio of the mean values of the variable of interest of the lowest wealth quintile to the highest wealth quintile. This study used Slope Index of Inequality and a Relative Index of Inequality (RII) to analyze inequalities in the utilization and non-utilization of antenatal care, and the amount of skilled birth attendants. The Slope Index of Inequality measured inequalities in the healthcare utilization if a prospective beneficiary of the health care moved from one wealth quintile (lower) to another wealth quintile (higher). Conversely, RII measured the proportionate change (increase or decrease) between the beneficiaries of the group of the lowest socioeconomic status to the highest through SES. To obtain SII, the mean of the health care variable (non-utilization of skilled birth attendant) was regressed to on the mean values of the relative rank variable. Here wealth quintiles were ranked from lowest to highest. (Kakwani et al., 1997; Mackenbach & Kunst, 1997; Moonesinghe & Beckles, 2015). The regression formula that was used in the study, was

$$\overline{y_J} = \alpha + \beta \overline{R_J} .... (3)$$

$\overline{y_J}$ was the mean of skilled attendants (the non-utilization of skilled birth attendants). $\overline{R_J}$ was the average relative ranking of the socioeconomic group J, and α estimated the health care outcome of an individual in the lowest rank of the socioeconomic status. β measured the difference between the average health outcome of the individual in the lowest wealth quintile. $\overline{R_J} = 0$ was the individual, and when represented in the highest wealth quintile, it was

suggested $\overline{R_J} = 1$ in (Kakwani et al., 1997; Mackenbach & Kunst, 1997). This article used Weighted Least Square, as given by Equation 3 in STATA 12. Use of, $\overline{y_J}$ suggested the mean of the health care variable (with the absence of SBA). This study calculated the relative index of inequality or RII (a relative measure of inequality) as the following:

$$RII = \frac{SSI}{\overline{y_J}} \ldots\ldots\ldots\ldots(4)$$

A Concentration Curve plotted the cumulative proportion of those not receiving antenatal care on the y-axis. Then, on the x-axis, this was contrasted against the cumulative proportion of the population, chronologically arranged by socioeconomic status starting from the lowest rank, which was the poorest. (Lorenz, 1905). In this particular measurement if the Concentration Curve, known as Lorenz Curve $L(s)$, coincided with the line of equality, it indicated that a group was affluent. As alluded to earlier, the graph ranked groups from the lowest to the highest socioeconomic status irrespective of the merit of the respective groups. The larger the distance between the Lorenz Curve $L(s)$ and the line of equality, the greater would be the size of the difference in the shares of the health care outcome (the non-utilization of skilled birth attendants) of the ranked population groups on the x-axis. If the Lorenz Curve $L(s)$ was depicted as being above the diagonal, the health care outcome was concentrated on the lower socioeconomic strata. If the Lorenz Curve was shown to fall below the line of equality, the opposite would ensue.

The Concentration Index used in this study, CI, was derived from the Concentration Curve (CC), called $L(s)$. It was twice the area between CC and the line of equality. It took on the value of -1 if a health care outcome was concentrated amongst the poor and +1 if the health care outcome was concentrated amongst the wealthier population. The larger the negative value of the Concentration Index, CI, the greater was the concentration of the absence of antenatal care (in this context the absence of skilled attendants at birth). The Concentration Index (CI) is known to be an important indicator in a group of general class indicators called "*Measures of Disproportionality*" (Harper et al., 2008). This study followed sample weights and adjusted the formula and calculations of the Concentration Index CI (Kakwani et al., 1997) to the following:

$$CI = \frac{2}{N_u} \sum_{i=1}^{n} w_i z_i R_i - 1 \ldots\ldots\ldots(5)$$

$u = \frac{2}{N_u} \sum_{i=1} w_i z_i$ was the weighted proportion of the sampled women aged 15-49 who did not utilize antenatal care, in which N was the sample size, z_i, and indicated the absence of skilled attendants at birth, with w_i being the sample weight, and R_i suggesting a calculation of the weighted proportion of the population up to the midpoint of the individual weight. It was given as a socioeconomic fractional rank as listed below with

$$R_i = \frac{1}{N} \sum_{k=1} w_k + \frac{w_i}{2} \ldots\ldots\ldots(6)$$

Finally, a Concentration Index of CI was given as

$$CI = \frac{2}{u}\mathrm{cov}(z_i, R_i) = \frac{2}{Nu}\sum_{i=1}^{n} w_i(z_i - u)(R_i - \frac{1}{2})\ldots\ldots\ldots(7)$$

z_i was used to indicate the healthcare status of the unit of analysis (that being women aged 15-49). R_i was the socioeconomic fractional ranks of the individual in the population, and u was the mean value of the healthcare outcome. Hence, CI was simply the weighted co-variance of z_i and R_i.

Decomposition analysis

This article decomposed overall inequality in the health care outcome, with the absence of SBA, by use of the socioeconomic status and other characteristics of the sampled population (Kakwani et al., 1997; Wagstaff et al., 1991). Assuming linearity in the relationship between the health care outcome variable or z_i and a set of its determinants or x_{ki}. The regression would be shown to take the following formula, which is,

$$z_i = \alpha + \sum_{k=1}^{n} \beta_k x_{ki} + \varepsilon_i \ldots\ldots\ldots(8)$$

α is the mean value of the health care outcome. If explanatory variables have negligible influence on the health care outcome, z_i this would suggest a nonexistent influence. This article used information from an adverse maternal health care outcome in which there was a lack of antenatal care. Thus, it had a binary variable of 1 or 0. z_i was transformed into a natural logarithm of these odds. After transforming z_i, Equation 8 was written as,

$$\ln odds(z_i) = \alpha + \sum_{k=1}^{n} \beta_k x_{ki} + \varepsilon_i \ldots\ldots\ldots(9)$$

$\ln odds(z_i)$ was the log-transformed odds of the dependent variable z_i (non-utilization of antenatal care), and x_{ki} was the set of explanatory variables (the age of the woman, the place of the residence of the unit of analysis, the husband's education, the media exposure, and the socioeconomic status). The coefficient β_k measured the relationship between the explanatory variables of x_{ki} and the logit $l(\hat{z}_i)$. The relationship between the logit $l(\hat{z}_i)$ and explanatory variables x_{ki} can be given as,

$$m_k = \gamma(\sum_{k=1}^{n} \beta_k \overline{x_k})\beta_k \ldots\ldots\ldots(10)$$

$\gamma(\sum_{k=1}^{n} \beta_k \overline{x_k})$ was the logistic density function, and m_k was the average change in the probability of the health care outcome variable if any of the explanatory variables underwent change by one unit. In the present case, it calculated the probability of not having skilled

attendants for pregnant women aged 15-49 if explanatory variables changed by one unit. The Concentration Index $\hat{C}$ in the inequality decomposition analysis can be calculated as

$$\hat{C} = \sum_{k=1}^{n} \frac{\beta_k \overline{x_k}}{\hat{u}} C_k \ldots\ldots\ldots\ldots(11)$$

$\hat{C}$ was the concentration index of antenatal care, with β_k indicating the coefficients of the explanatory variables. $\hat{u}$ was the mean of antenatal care, and $\hat{x}_k$ was the mean of each explanatory variable. In Equation 9, C_k was the concentration index of each explanatory variable x_k; moreover, the absolute contribution of each explanatory variable to the inequality of antenatal health care (skilled attendants assisting doctors who are helping to deliver babies) can be written as

$$AC = \frac{\beta_k \overline{x_k}}{\hat{u}} C_k \ldots\ldots\ldots..(12)$$

In the calculation of AC, this study considered the marginal effect of each explanatory variable on the maternal health care outcome (the absence of skilled birth attendants as well as the distribution of each explanatory variable across wealth quintiles). Finally, the relative contribution of each explanatory variable to the overall inequality can be expressed as

$$RC = (\frac{\beta_k \overline{x_k}}{\hat{u}}) \frac{C_k}{\hat{C}} \ldots\ldots\ldots\ldots\ldots(13)$$

Results

The non-utilization of quality antenatal care (skilled birth attendants) declined from 77.3% to 33% (that being by 57%) during 1990/91-2012/13 in Pakistan. A relatively larger decline was observed in urban areas by as much as 67% as compared to rural areas (by 55%) during 1990/91-2012/13 (Table 1).

Table 1: The Non-utilization of Quality Antenatal Care (skilled birth attendants) by married women aged 15-49 with a birth history in Pakistan

Variables	1990/91 N=6,349	2006/07 N=5,699	2012/13 N=7,452
Antenatal care (absence)	77.3	43.6	33.0
Age (years)			
Age <20	79.8	45.2	29.3
Age 20-30	74.6	39.9	30.1
Age 31-40	81.0	47.4	35.0
Age 41-49	87.0	56.1	55.7
Place of residence			
Urban	48.3	25.9	16.0
Rural	90.3	51.3	40.4
Husband's education			
No education	87.7	58.9	48.6
Primary	81.9	49.1	37.3
Secondary	73.32	35.2	25.9

Variables	1990/91 N=6,349	2006/07 N=5,699	2012/13 N=7,452
Higher	60.0	19.8	12.4
Media exposure			
No	82.8	NA	55.3
Yes, some	61.6	NA	23.7
Socioeconomic status			
Poorest	94.3	65.17	53.6
Richest	38.8	10.7	5.9
Province/area			
Highest	Balochistan (92.9)	Balochistan (61.8)	Balochistan (72.2)
Lowest	Sindh (55.8)	Sindh (31.61)	Islamabad (6.6)

Source: PDHS, 1990-91; PDHS, 2006-07; PDHS, 2012-13

Amongst women who were younger than 20 years old, the non-utilization of quality antenatal care was lower compared to that of other age groups. It declined by 46% (the largest percentage in all age groups) during 1990/91-2006/07, and by 64% during 2006/07-2012/13. The minimum decline (35%) was observed amongst women who were forty years old and older, in the non-utilization of skilled birth attendants at the time of delivering a children during the years 1990/91-2012/13 (Table 1).

The non-utilization of quality antenatal care in the years 2012-13 was only 12.4% amongst women whose partners had obtained a higher degrees. The non-utilization of skilled birth attendants diminished from 87% in 1990-91 to 48% in 2012-13 (Table 1) amongst women having partners who lacked any formal education. This may be largely due to other factors such as supply-side interventions (MNCH) undertaken by the government, and that the shortage of SBA was mitigated during 1990/91-2012/13 (Hafeez, Mohamud, Shiekh, Shah & Jooma, 2011).

Among the provinces of Pakistan, and Baluchistan, more than any of the others, failed to ensure that quality antenatal care was provided. The use of skilled birth attendants here declined from 92.5% to 66.8% during 1990/91-2006/07, but then it increased slightly to 72.3% in 2012-13. This low number might be due to failure to maintain outreach health care intervention in rural areas. In addition, there was an increasing inefficiency in health care programs designed to target maternal health care needs of a sparsely distributed population within the province, and potentially, this contributed to the problem (Agha, 2011a; Midhet & Becker, 2010; Nishtar et al., 2013).

The rate ratio of failing to utilize quality antenatal care (SBA) increased from 2.3 in 1990-91 to 6.0 in 2006-07, and then to much higher levels of 9.1 in 2012-13, implying an increase in the likelihood of not having skilled attendants at the time of delivering a child (Table 2). In contrast, the range difference (a measure of absolute inequality) decreased throughout these years from 55.5% to 54.4% during 1990/91-2006/07, and further, to 47.4% in 2012/13 (Table 2). When measured with the Lorenz curve, the curve is shown as above the line of equality in each of these time periods:1990-91, 2006-07 and 2012-13 (see figures 1-3). The table depicts the rate in which there was a failure to use skilled birth attendants.

**Table 2**: Results of Absolute and Relative Measures of Inequality

Inequality Measures	1990/91	2006/07	2012/13
Range Difference	55.5	54.4	47.7
Rate Ratio	2.4	6.0	9.08
Concentration Index	-0.13	-0.23	-0.29

Absence of SBA (Dependent Variable) in 2012/13

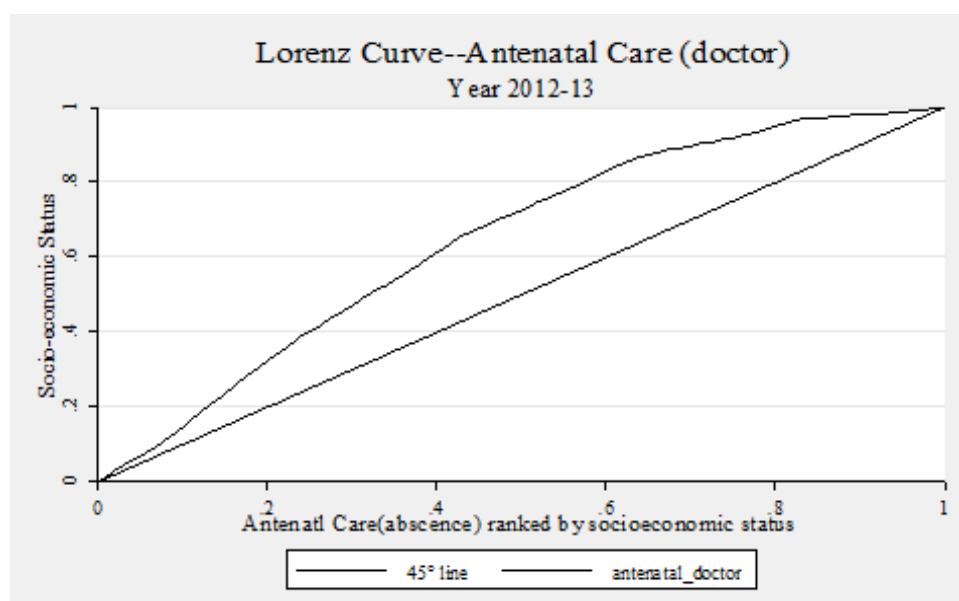|	
Slope Index of inequality	-39.8
Lower	-56.5
Upper	-23.41
Relative Index of inequality	-2.5
Lower	-3.8
Upper	-1.8

Source: PDHS, 1990-91; PDHS, 2006-07; PDHS, 2012-13

Figure 1: Lorenz curve – Antenatal care (doctor), Year 1990-91
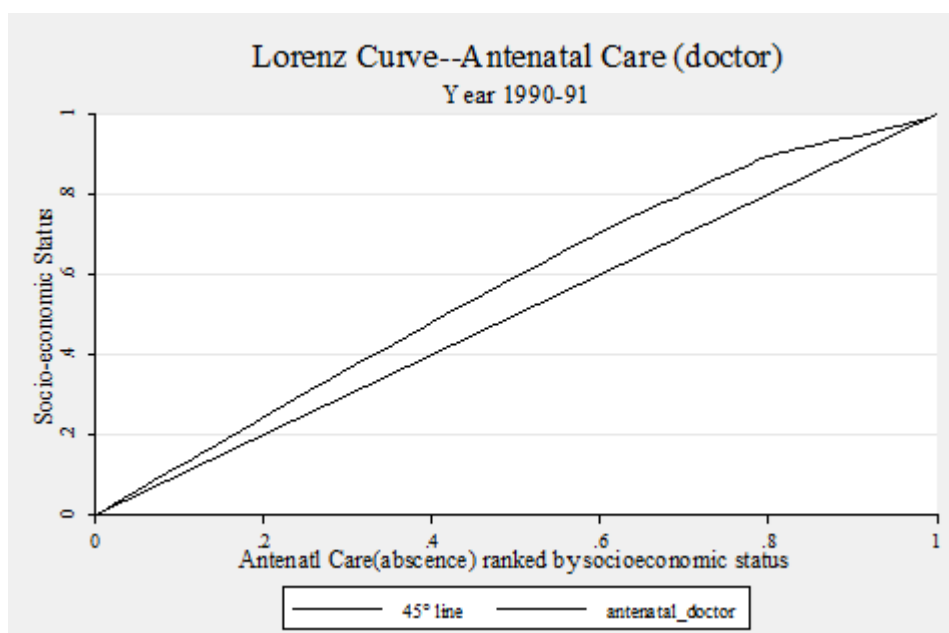
Figure 2: Lorenz curve – Antenatal care (doctor), Year 2006-07
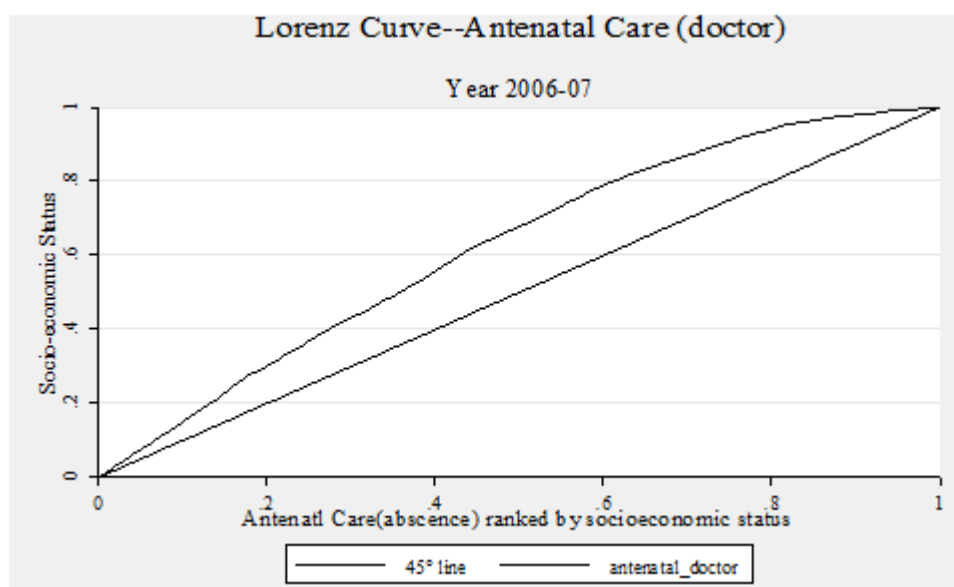
Figure 3: Lorenz curve – Antenatal care (doctor), Year 2012-13

The Slope Index of Inequality (a logistic regression coefficient, using Equation 9) decreased by 39% the result of women moving from the lowest to the highest socioeconomic status during the years of 2012-13. The Relative Index of Inequality shows that failing to use quality antenatal care was more likely (2.5 times) amongst women of the poorest households during 2012-13 (Table 2).

The vast amount of socioeconomic inequality suggests that age and place of residence of the women contributed to a widening of the gap in failing to use antenatal care amongst all aspects of Pakistani society from the poorest to the richest households during 2012-13. Concentration indices and coefficients of the absolute contribution of the woman's age and place of residence indicate a similar direction of change (each concentration index having a negative value) during 2012-13 as shown in Table 3.

Table 3: Mean, Concentration Index, Absolute and Relative Contributions in the Inequality behind the lack of the use of quality antenatal care (N=7,452) during 2012-13.

Variables	Mean	C_k	Absolute Contribution	Relative Contribution
Age of respondent	0.33	-0.29**		
Age <20				
Age 20-30	0.30	0.22**	-0.02**	
Age 30-40	0.36	-0.31**	0.06**	
Age>40	0.55	-0.41**	-0.01**	0.14
Place of residence				
Urban				
Rural	0.40	-0.21**	-0.054**	0.21
Husband's education				
No education				
Primary	0.37	-0.09**	-0.04***	
Secondary	0.26	0.14*	-0.07*	
Higher	0.12	0.45*	-0.02*	0.13
Media's exposure				
No (R)				

Variables	Mean	C_k	Absolute Contribution	Relative Contribution
Yes, some	0.23	0.17*	-0.05***	0.08
Socioeconomic status				
Poorest	0.56	-0.77**	-0.002*	
Poor	0.47	-0.33*	-0.003*	
Middle	0.33	0.06*	-0.006*	
Richer	0.18	0.16**	-0.002*	0.44
Richest (R)				
L(z)	1.13			
Residual	-0.008			

*Source: PDHS, 2012-13   R implies reference category *statistically significant at *10 percent, ** at 5 percent, and *** at 1 percent.*

Approximately 14% of the socioeconomic inequality experienced in maternal health care was due largely to the ages of the respective women. In rural areas lack of quality antenatal care was relatively higher at 21%. Also, indirectly, a husband's education contributed significantly to either alleviating or increasing the likelihood of the procurement of antenatal care. A husband's income level increases the socioeconomic inequality by 13%. The media exposure was largely concentrated on the richest households (CI>0) and did not contribute profoundly (only 8%) to the socioeconomic inequality of antenatal care.

Discussion

Existing literature suggests that for pregnant women in developing countries socioeconomic conditions influence the use or non-utilization of skilled birth attendants. Those women who cannot easily afford to buy medicine or pay for medical treatment are not individuals who are prone to emphasize preventive health care services. And, ibso facto, women belonging to a higher economic status have better medical resources to choose medical facilities and are more likely to receive quality health care (Hajizadeh, Alam & Nandi, 2014; Andrade et al., 2012; Zere et al., 2013).

This article expands current studies by analyzing socioeconomic inequalities in the infrequency of employing skilled birth attendants in Pakistan when they are so instrumental in reducing the chances of maternal moralities. To do this, the statistical data of several time increments was perused.

Unlike most studies, which focus on examining the health benefits of utilizing skilled attendants at delivery, this study examined adverse antenatal health care outcomes, and in a more narrowed investigation, the failure to employ more skilled birth attendants as a dependent variable in the decomposition of socioeconomic inequality. The non-utilization of SBA indicates deprivation, and explains the impact of poverty in maternal health care. Moreover, it reveals the susceptibility of maternal mortality when lacking satisfactory care.

This paper used wealth quintiles to classify households into socioeconomic strata and analyzed the extent of the failure to utilize quality antenatal care (SBA) more fully amongst women irrespective of socioeconomic ranks. Three issues of the Pakistan Demographic Survey, (PDHS, 1990-91, PDHS, 2006-07, and PDHS, 2012-13) were used. The surveys were cross-sectional, but comparable due to the consistency in the sampling designs (stratified random sampling) and topics covered in each survey.

The research used logistic regression, inequalities in quality antenatal care (that being skilled birth attendants) by socioeconomic status of the household, and other characteristics of the respective individuals who were the subjects of the research. The research investigated the influence of socioeconomic inequality upon health care outcomes using a regression-

coefficient of the non-utilization of quality antenatal care (also referred to as skilled birth attendants), and the unequal distribution of their use across socioeconomic ranks (Van Malderen et al., 2013). The weighted-least-square (WLS) was used for estimating the Slope Index and the relative index of inequality.

The Lorenz curve and Concentration index show that non-use of quality antenatal care (SBA) was highly concentrated amongst the poorest women in Pakistan. The results of the decomposition of socioeconomic inequality show that the woman's age, place of residence, and husband's education widened socioeconomic inequalities, which precipitated the failure to use quality antenatal care. The result is consistent with previous studies, which have established the appreciable role of the husband in the decision-making of the household, and in particular, related to reproductive care of women in Pakistan (Mumtaz et al., 2014; Mumtaz et al., 2012; Sathar & Kazi, 2000). Another set of studies suggest that when the economic and social dimensions of the distribution of power between partners increases, the reproductive health care of women in developing countries improves (Mumtaz & Salway, 2007; Simkhada, Van Teijlingen, Porter & Simkhada, 2008; Andrade et al., 2012). The results of this study reveal that socioeconomic status was the major factor of the inequitable distribution of antenatal health care (SBA) in Pakistan during 2012-13, and in fact was a 44% impetus for all decisions made governing reproductive health for these women.

The results indicate that women in the richest households also had more exposure to media; accordingly, they were more likely to use SBA. These research findings are consistent with similar studies in developing countries which indicate that women, who have some knowledge of risk factors, are more likely to utilize health facilities compared to those with no such knowledge (Simkhada et al., 2008; Tun, Ratanawijitrasin, Phukao & Peak, 2019).

This analysis provides insight into the sensitivity of inequality in health care outcomes (SBA) to a measure of inequality. The research findings indicate that range difference decreased all through 1990/91-2012/13. In contrast, rate ratio and concentration index increased in the same period. A constantly higher value of the rate ratio indicates widening of inequality in antenatal health care and a consequent increase in the vulnerability of the poorest women to morbidity in Pakistan.

Hence, inequality has some bearing on the present study, and thus, it is important to consider governmental policies and the compliance of selected inequality measures with theoretically consistent criteria on policy research related to antenatal health care. The research findings of this article infer that appropriate selections of the measure of inequality call for a careful assessment of the susceptibility of women of various socioeconomic ranks to maternal mortality.

Conclusion

It is evident from the sensitivity analysis that non-utilization of quality antenatal care increases enormously amongst the poorest women, and this is shown to be true when looking at surveys from the years (1990-2012). When contrasted with absolute inequality during the same period (that being range difference and the Slope Index of Inequality), the selected measures of relative inequality (that being rate ratio, concentration index, and relative index of inequality) indicate a higher level of socioeconomic inequality in the non-utilization of antenatal care. Results of inequality decomposition during 2012-2013 highlight the major sources of inequality to which socioeconomic status contributes the largest, with 44%, followed by the place of residence (21%), a husband's education (14%), and a woman's age

(13%). Previous studies indicated that most developing countries do not have enough skilled birth attendants to deal with the high number of pregnancies, and as a result 15% of all pregnancies culminate in obstetric complications (Day-Stirk & Fauveau, 2012). But, in Pakistan, the problem is not lack of trained attendants but failure to use them appropriately. Here, high mortality rates are linked to pregnancy-related complications (Agha, 2011a). A series of earlier initiatives (LHW, MNCH, and PAIMAN) helped to bring down maternal mortality rates. However, except for the MNCH program, the interventions were largely supply-driven for the whole population (Agha, 2011b; Nishtar et al., 2013; Zaidi, Khowaja, Dharma, Khan & Chandir, 2014).

The research findings of this article suggest that women who were less likely to receive skilled birth attendants were, for the most part, poor, older, rural, and often a resident of Balochistan province. This necessitates bringing forth well thought out strategies in women's reproductive health care, which aim at reducing socioeconomic inequality. In the short term, an outreach of reproductive health care intervention initiatives such as SBA can be increased by encouraging participation of the poorest women through monetary and other in-kind incentives. To minimize the negative marginal effect of a woman's age on inequality, policymakers should implement women's welfare programs that lower the Slope Index of Inequality in the distribution of antenatal care for older women. The geographic targeting and increase in women's exposure to media may help in reducing socioeconomic disparities in the utilization of skilled birth attendants in similar settings. Moreover, the use of bad antenatal healthcare outcomes in academic research, especially in countries with a large proportion of poor residents, may reveal the scale of the non-utilization of quality antenatal care across the socioeconomic strata more meaningfully.

The present study has some limitations: first, it analyzed inequity in a single dimension of socioeconomic status or household wealth without taking in other factors. Previous studies examined the utilization of maternal healthcare through combinations of factors including inequity, wealth, education, region, ethnicity, religion, occupation, and migration status. (Arsenault et al., 2018; Braveman, 2005; Harper et al., 2008; 2010; Zere et al., 2013). Secondly, it used a single indicator (skilled birth attendant) of quality antenatal care whereas previous studies used a variety of measures, such as the number of antenatal care visits, institutional delivery of a child, and the increase of tetanus injections (Gebre, Worku & Bukola, 2018; Hajizadeh et al., 2014; Majrooh et al., 2014; Mwase et al., 2018; Nair & Panda, 2011).

List of abbreviations

LHW	Lady Health Worker
MDG	Millennium Development Goals
MNCH	Maternal and Child Health Care
PAIMAN	Pakistan Initiative for Mothers and Newborn
PDHS	Pakistan Demographic and Health Survey
SBA	Skilled Birth Attendant
SDG	Sustainable Development Goals

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References

Afzal, U., & Yusuf, A. (2013). The state of health in Pakistan: An overview. *The Lahore Journal of Economics*, *18*, 233-247.

Agha, S. (2011a). Changes in the proportion of facility-based deliveries and related maternal health services among the poor in rural Jhang, Pakistan: Results from a demand-side financing intervention. *International Journal for Equity in Health*, *10*(1), 57. doi: https://doi.org/10.1186/1475-9276-10-57

Agha, S. (2011b). Impact of a maternal health voucher scheme on institutional delivery among low income women in Pakistan. *Reproductive Health*, *8*(1), 1-10.

Andrade, M.V., Noronha, K., Singh, A., Rodrigues, C.G., & Padmadas, S.S. (2012). Antenatal care use in Brazil and India: Scale, outreach and socioeconomic inequality. *Health & place*, *18*(5), 942-950.

Arif, M.G., & Ibrahim, S. (1998). Diarrhoea morbidity differentials among children in Pakistan. *Pakistan Development Review*, *37*(3), 205-230.

Arsenault, C., Jordan, K., Lee, D., Dinsa, G., Manzi, F., Marchant, T., & Kruk, M.E. (2018). Equity in antenatal care quality: An analysis of 91 national household surveys. *The Lancet Global Health*, *6*, e1186-e1195.

Braveman, P. (2005). Health disparities and health equity: Concepts and measurement. *Annual Review of Public Health*, *27*, 17-194.

Day-Stirk, F., & Fauveau, V. (2012). The state of the world's midwifery: Making the invisible visible. *International Journal of Gynaecology and Obstetrics: The Official Organ of the International Federation of Gynaecology and Obstetrics*, *119 Suppl*, S39-S41. doi: https://doi.org/10.1016/j.ijgo.2012.04.003

Dhak, B. (2013). Use of maternal health care in rural India: Relative importance of socio economic status and accessibility. *Journal of Population and Social Studies, 21*(2), 99-144.

Gebre, E., Worku, A., & Bukola, F. (2018). Inequities in maternal health services utilization in Ethiopia 2000-2016: Magnitude, trends, and determinants. *Reproductive Health*, *15*(119), 1-9. doi: https://doi.org/10.1186/s12978-018-0556-x

Hafeez, A., Mohamud, B.K., Shiekh, M.R., Shah, S.A.I., & Jooma, R. (2011). Lady health workers programme in Pakistan: Challenges, achievements and the way forward. *Journal of the Pakistan Medical Association*, *61*(3), 210-215. doi: https://doi.org/10.1186/1742-4755-7-30

Hajizadeh, M., Alam, N., & Nandi, A. (2014). Social inequalities in the utilization of maternal care in Bangladesh: Have they widened or narrowed in recent years? *International Journal for Equity in Health*, *13*(120), 1-11. doi: https://doi.org/10.1186/s12939-014-0120-4

Harper, S., King, N.B., Meersman, S.C., Reichman, M.E., Breen, N., & Lynch, J. (2010). Implicit value judgments in the measurement of health inequalities. *Milbank Quarterly*, *88*, 4-29.

Harper, S., Lynch, J., Meersman, S.C., Breen, N., Davis, W.W., & Reichman, M.E. (2008). Harper et al. respond to "Measuring social disparities in health". *American Journal of Epidemiology*, *167*(8), 905-907.

Kakwani, N., Wagstaff, A., & van Doorslaer, E. (1997). Socioeconomic inequalities in health: Measurement, computation, and statistical inference. *Journal of Econometrics*, *77*(1), 87-103. doi: https://doi.org/10.1016/S0304-4076(96)01807-6

Lorenz, M.O. (1905). Methods of measuring the concentration of wealth. *Quarterly Publications of the American Statistical Association*, *9*(70), 209-219.

Mackenbach, J.P., & Kunst, A.E. (1997). Measuring the magnitude of socio-economic inequalities in health: An overview of available measures illustrated with two examples from Europe. *Social Science and Medicine*, *44*(6), 757-771. doi: https://doi.org/10.1016/S0277-9536(96)00073-1

Mahmud, G., Zaman, F., Jafarey, S., Khan, R.L., Sohail, R., & Fatima, S. (2011). Achieving millennium development goals 4 and 5 in Pakistan. *BJOG: An International Journal of Obstetrics and Gynaecology*, *118*, 69-77.

Majrooh, M.A., Hasnain, S., Akram, J., Siddiqui, A., & Memon, Z.A. (2014). Coverage and quality of antenatal care provided at primary health care facilities in the 'Punjab' province of 'Pakistan'. *PLoS ONE*, *9*(11), 1-11.

Memon, Z., Zaidi, S., & Riaz, A. (2016). Residual barriers for utilization of maternal and child health services: Community perceptions from rural Pakistan. *Global Journal of Health Science*, *8*(7), 53047.

Midhet, F., & Becker, S. (2010). Impact of community-based interventions on maternal and neonatal health indicators: Results from a community randomized trial in rural Balochistan, Pakistan. *Reproductive health*, *7*(30) 1-10.

Moonesinghe, R., & Beckles, G.L.A. (2015). Measuring health disparities: A comparison of absolute and relative disparities. *PeerJ*, *3*(1438), 1-10.

Mumtaz, Z., O'Brien, B., Bhatti, A., & Jhangri, G.S. (2012). Are community midwives addressing the inequities in access to skilled birth attendance in Punjab, Pakistan? Gender, class and social exclusion. *BMC Health Services Research*, *12*(326).

Mumtaz, Z., & Salway, S. (2007). Gender, pregnancy and the uptake of antenatal care services in Pakistan. *Sociology of health & illness*, *29*(1), 1-26.

Mumtaz, Z., Salway, S., Bhatti, A., Shanner, L., Zaman, S., Laing, L., & Ellison, G. T. (2014). Improving maternal health in Pakistan: Toward a deeper understanding of the social determinants of poor women's access to maternal health services. *American journal of public health*, *104*(S1), S17-S24.

Mumtaz, Z., Salway, S., Shanner, L., Zaman, S., & Laing, L. (2012). Addressing disparities in maternal health care in Pakistan: gender, class and exclusion. *BMC Pregnancy and Childbirth*, *12*(1), 1-10.

Mwase, T., Brenner, S., Mazalale, J., Lohmann, J., Hamadou, S., Somda, M.A.S., ... Allergi, D.M. (2018). Inequities and their determinants in coverage of maternal health services in Burkina Faso. *International Journal for Equity in Health*, *17*(58), 1-14.

Nair, H., & Panda, R. (2011). Quality of maternal healthcare in India: Has the national rural health mission made a difference? *Journal of Global Health*, *1*(1), 79-86.

National Institute of Population Studies. (2013). *Pakistan Demographic and Health Survey 2012-13*. Retrieved from: https://www.nips.org.pk/abstract_files/PDHS%20Final%20Report%20as%20of%20Jan%2022-2014.pdf

Nishtar, S., Bhutta, Z.A., Jafar, T.H., Ghaffar, A., Akhtar, T., Bengali, K., Rahim, E. (2013). Health reform in Pakistan: A call to action. *The Lancet*, *381*(9885), 2291-2297. doi: https://doi.org/10.1016/S0140-6736(13)60813-2

Pallikadavath, S., Foss, M., & Stones, R.W. (2004). Antenatal care: Provision and inequality in rural north India. *Social Science and Medicine*, *59*(6), 1147-1158.

Rani, M., Bonu, S., & Harvey, S. (2007). Differentials in the quality of antenatal care in India. *International journal for quality in health care*, *20*(1), 62-71.

Rodney, A. M., & Hill, P. S. (2014). Achieving equity within universal health coverage: A narrative review of progress and resources for measuring success. *International journal for equity in health*, *13*(72).

Sathar, Z. A., & Kazi, S. (2000). Women's autonomy in the context of rural Pakistan. *The Pakistan Development Review*, *39*(2), 89-110.

Sen, K.A., & Foster, J.E. (1997). *On economic inequality (Second).* Oxford Clarendon Press.

Simkhada, B., Van Teijlingen, E.R., Porter, M., & Simkhada, P. (2008). Factors affecting the utilization of antenatal care in developing countries: Systematic review of the literature. *Journal of Advanced Nursing*, *61*(3), 244-260. doi: https://doi.org/10.1111/j.1365-2648.2007.04532.x

Social Policy and Development Centre. (2016). *Social development in Pakistan: Annual review 2014-15.* Retrieved from http://www.spdc.org.pk/Data/Publication/PDF/AR2014-15.pdf

Tun, M., Ratanawijitrasin, S., Phukao, D., & Peak, S.C. (2019). Women's beliefs about the utilization of antenatal services and their determinants: A qualitative study in three township of Chin state, Myanmar. *Journal of Population and Social Studies*, *27*(1), 23-38.

United Nations. (2015). The millennium development goals report. *United Nations.* doi: https://doi.org/978-92-1-101320-7

United Nations. (2016). The Sustainable Development Goals Report, 2016. *United Nations.* doi: https://doi.org/10.18356/3405d09f-en

U.S Agency for International Development (USAID). (1990-91). *Pakistan demographic and health survey 1990-91.* Retrieved from https://dhsprogram.com/data/dataset/Pakistan_Standard-DHS_1991.cfm?flag=1

U.S Agency for International Development (USAID). (2006-07). *Pakistan demographic and health survey 2006-07.* Retrieved from https://dhsprogram.com/data/dataset/Pakistan_Standard-DHS_2006.cfm?flag=1

U.S Agency for International Development (USAID). (2012-13). *Pakistan demographic and health survey 2012-13.* Retrieved from https://dhsprogram.com/data/dataset/Pakistan_Standard-DHS_2012.cfm?flag=1

Van Malderen, C., Ogali, I., Khasakhala, A., Muchiri, S. N., Sparks, C., Van Oyen, H., & Speybroeck, N. (2013). Decomposing Kenyan socio-economic inequalities in skilled birth attendance and measles immunization. International journal for equity in health, 12(3).

Wagstaff, A., Paci, P., & van Doorslaer, E. (1991). On the measurement of inequalities in health. Social Science and Medicine, 33(5), 545-557. doi: https://doi.org/10.1016/0277-9536(91)90212-U

World Health Organization. (2014). *World health statistics 2014.* World Health Organization.

Zaidi, S.M.A., Khowaja, S., Dharma, V.K., Khan, A.J., & Chandir, S. (2014). Coverage, timeliness, and determinants of immunization completion in Pakistan: Evidence from the demographic and health survey (2006-07). *Human Vaccines and Immunotherapeutics*, *10*(6), 1712-1720. doi: https://doi.org/10.4161/hv.28621

Zere, E., Suehiro, Y., Arifeen, A., Moonesinghe, L., Chanda, S.K., & Kirigia, J.M. (2013). Equity in reproductive and maternal health services in Bangladesh. *International Journal for Equity in Health*, *12*(90), 2-8. doi: https://doi.org/10.1186/1475-9276-12-90