INEQUALITY IN MATERNAL HEALTH CARE UTILISATION IN KENYA

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Abstract

Africa has worse maternal and child health outcomes compared to the rest of the world. Kenya, in particular, has less maternal and child mortality compared to sub-Saharan averages, but it still performs worse compared to the world averages. One of the ways that have been touted as a way of improving these outcomes is the utilisation of maternal health care from skilled providers. However, high inequalities exist in the utilisation of these services due to differences in socioeconomic, demographic and access to health facilities. The data utilised is mainly from the Kenya demographic and health surveys (DHS). The study endeavoured to analyse the inequality arising from differences in wealth. It describes the evolution of inequality in the utilisation of maternal health care using Wagstaff concentration indices and assesses the differences in inequality arising from the introduction of the free maternal care (FMC) program in Kenya. A decomposition of the factors that explain the inequality in the utilisation of maternal health care between the poor and non-poor is also conducted using recentred influence functions (RIFs). The results show the presence of substantial inequalities which favour the non-poor. The largest contributor to this inequality is the maternal level of education. The introduction of the FMC program saw an increase in the utilisation of maternal health care by both the poor and non-poor groups. However, the difference in inequality levels was not significant. The study recommends the government ramps up information sessions for women of childbearing age on the importance of utilising maternal health care. Secondly, while making maternal and child health free does improve utilisation, other barriers to utilisation do exist to utilisation which must be dealt with to increase the utilisation of maternal health care and consequently improve maternal and child health outcomes.

1. Introduction

In Africa, every year around 250,000 women die of pregnancy-related causes and at least 1 million newborns die in their first month of life—half of them already on the first day, which is the time of highest risk for both mother and child. Sub-Saharan Africa (SSA) has high maternal and neonatal mortality compared to the rest of the world. Kenya performs better than SSA but still has higher maternal and neonatal mortality rates. One of the ways that have been touted to improve maternal and child health outcomes is the utilisation of maternal health care. According to the World Health Organisation (2015a), attendance of antenatal care (ANC), delivery and postnatal care (PNC) from skilled providers (i.e., doctor or nurse) importantly determines maternal and child health outcomes. At least four ANC visits are recommended—one in each of the first two trimesters and two in the last trimester—along with PNC checks to be conducted within the first 48 hours, as well as three days, one to two weeks, and six weeks after delivery.

Research shows that high inequalities exist in the utilisation of maternal health care, which often fails to reach the poor.[1] Inequality in utilisation may arise from differences in service provision—such as long distances to health facilities, a lack of transport, long waiting times, and low service quality which limit access, particularly in spatially remote areas. In addition, socioeconomic, demographic and cultural factors influence the take-up of maternal health care utilisation. For example, a lack of education may limit awareness and a lack of economic empowerment may limit a woman's decision-making and ability to seek quality maternal health care (Ahmed *et al.*, 2010; Fleurbaey and Schokkaert, 2011; Kim *et al.*, 2016).

To address inequalities in the utilisation of health care stemming from socio-economic factors, one of the interventions that have been employed by governments around the world is the reduction or removal of user fees. In Kenya, free maternal care was introduced in public health facilities in June 2013, to encourage women to seek care in health facilities during pregnancy, delivery and up to 6 weeks after birth. However, this measure does not automatically imply that utilization will increase, as other barriers persist (Ganle *et al.*, 2014; McKinnon *et al.*, 2015; Ahmed *et al.*, 2017; Santas, Celik and Eryurt, 2018; Fenny *et al.*, 2019). Particularly,

1 Equality is categorised into horizontal and vertical equality. Vertical equality means that individuals with different health needs are treated differently according to their level of need. Factors that lead to vertical equality include age, disability and level of health. Horizontal equality implies that individuals with the same needs are treated the same way regardless of their socioeconomic status. I focus on horizontal inequality in this study.

access to quality care is a major determinant of whether women seek maternal health care, and differences in access may be key to understanding inequality in service utilisation. This aspect of analysis has majorly been missing from existing analyses, which mainly focus on socioeconomic and demographic characteristics.

Using three rounds of Demographic and Health Surveys (DHS) collected in 2003, 2008/09 and 2014, I quantify the extent of inequality in the utilisation of maternal health care, track its evolution over time, and investigate key drivers that contribute to inequality in the utilisation of maternal health care between the poor and non-poor in Kenya. Specifically, I first descriptively compare differences in service utilisation between poor and non-poor groups, defined in terms of relative asset wealth, and contrast utilisation rates before and after the removal of user fees. Second, I employ an Oaxaca-Blinder type decomposition analysis using recentered influence function (RIF) regressions to assess the drivers of inequality in the utilisation of maternal health care. Going beyond the demand-side focus of existing studies, I combine the DHS data with information on the availability and characteristics of health facilities, which allows me to account for supply-side factors in the decomposition analysis.

2. Theoretical and Conceptual Framework

This study adopts the flow model of demand for health care by Oliveira (2002) since it incorporates the health care system characteristics as determinants for hospital utilisation alongside user characteristics. Demand for health care is the maximisation of the sum of individual demands subject to the interaction between accessibility to health facilities, population/individual characteristics and supply-side factors such as perceived availability and institutional characteristics of hospital systems. Assuming an individual i and hospital j, demand, therefore, constitutes the maximisation of utility, subject to individual characteristics, accessibility costs and hospital characteristics; i.e.,

$$U_i = f_i\left(X_i, G_{i,j}, A_{i,} I_{i,j}, \widetilde{D}_{i,j}\right) \qquad (1)$$

Where:

- X_i represents individual characteristics
- $G_{i,j}$ represents accessibility costs
- A_i represents perceptions of hospital care availability
- $I_{i,j}$ represents institutional characteristics

- $\widetilde{D}_{i,j}$ represents the alternative supply of health facilities

Accessibility costs are directly related to the distance to the health facility. The higher the distance, the higher the accessibility cost.

$$G_{i,j} = f_i(d_{i,j}) \tag{2}$$

Perception of hospital care availability depends on accessibility costs. Additionally, it also depends on hospital supply and institutional characteristics.

$$A_i = f_i(G_{i,j}, I_j, \widetilde{D}_{i,j}) \tag{3}$$

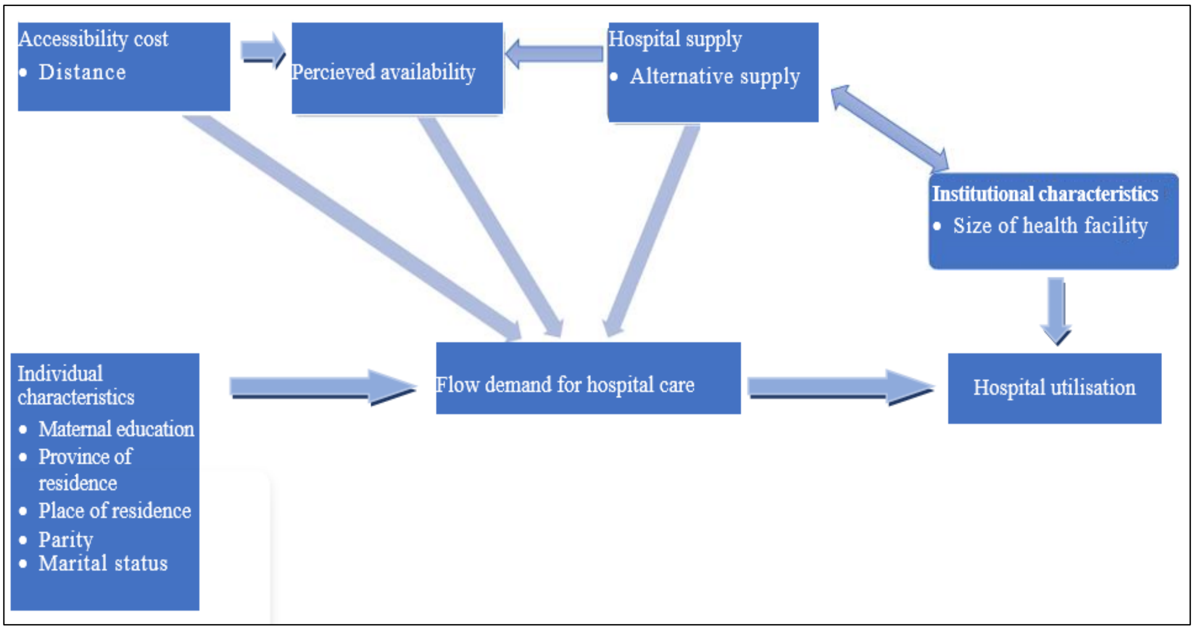
Where:

- I_j is the size of hospital site j
- $D_{i,j}$ is an index for alternative supply

The flow demand model will then be augmented with the World Health Organisation (2015) framework for analysing inequalities in reproductive, maternal, newborn and child health using among others, demographic and health surveys (DHS) data. Inequality from the demand side for the indicators measuring maternal health interventions; i.e., utilisation of maternal health care, has three dimensions of inequality, namely economic status, education levels and place of residence. In this study, economic status is measured using the household asset index which shows the private assets owned by a household and access to public services. Education levels are measured using the mother's education levels and place of residence is measured by rural-urban differences. In addition, studies on inequality in the utilisation of maternal health care have found the province of residence, marital status, the age at which pregnancy occurs and the number of children to be important determinants of inequality and thus, these variables will be included in the analysis in addition to the variables recommended by the WHO as the individual factors affecting utilisation.

A summary of the conceptual framework is thus presented in figure 1.

Figure 1: Framework for analysing inequality in the utilisation of maternal health care



Adapted from Oliveira (2002)

Table A1 in appendix A presents the definition of variables as used in the context of this study. The explanatory variables used throughout this study are at various levels:

- Individual mother's level; i.e., mother's education, province of residence, mother's age when the child was born, parity and marital status.
- Household-level; i.e., asset wealth.
- Cluster level; i.e., place of residence, distance to the nearest health facility, size of nearest health facility and alternative supply of health facilities within 5 km of an individual's dwelling.

The characteristics of individuals predispose them to seek maternal health care. However, the woman must also deem the health facility to be available, both in terms of numbers and quality of the health facilities in the vicinity of the individual. The bridge between the demand for health care and the supply of health facilities is the distance between the two entities; i.e., individual women and the health facilities, which determines the accessibility cost, both monetary and time costs that are associated with going to a health facility. The interaction of these three components determines the utilisation of maternal health care.

3. Data, Methodology and Results

3.1. Data Sources

The analysis done in this study utilises data from the 2003, 2008/09 and 2014 DHS surveys. The choice of these three surveys is mainly driven by the availability of a homogenous set of data that is used in the construction of the asset index. The data used has births that occurred within five years of the 2003, 2008/2009 and 2014 surveys. Within this period, 32930 children were born; i.e., 5940, 6059 and 20931 children in the 2003, 2008/2009 and 2014 surveys, respectively. These children were born to 22963 individual women; i.e., 3968, 4071 and 14924 women in the 2003, 2008/2009 and 2014 surveys, respectively. The decomposition will be done only using 2014 DHS data since it is not possible to determine the health facilities that were open at the time when the 2003 and 2008/2008/09 DHS surveys were conducted. Thus, it is not possible to create supply-side variables for these two surveys.

The data on health facility characteristics are sourced from the Kenya master health facilities list (KMHFL). Geographical coordinates of health facilities are then sourced from the district health information system (DHIS2), Google Earth and ArcGIS. These data sources provide data on the latitudes and longitudes of the facilities offering maternal health care in Kenya. This information is then used with the geographical coordinates of clusters interviewed in DHS surveys to calculate distances from the clusters to the health facilities (Kenya Ministry of Health, 2018, 2021; Google, 2019; Environmental Systems Research Institute, 2020).

3.2. Definition of Asset Poverty

The relative poverty line is set at a cut-off point which is a percentage α of a set standard (Foster, 1998)[2]. This study utilises the asset index to measure a household's socioeconomic situation since the demographic and health surveys (DHS) do not contain data on the incomes of individuals and households. The asset index allows for the ranking of households based on their ownership of private assets and their access to public assets relative to other households. The assets utilised are from 2003, 2008/09 and 2014 DHS surveys since they have a much more

2 Poverty is defined as either absolute or relative. Absolute poverty refers to a situation in which a household's income is low such that access to basic needs such as food, water, sanitation facilities, health, shelter, education and information is curtailed. The absolute poverty line is fixed. Relative poverty is the deprivation of a household compared to other households and it is prone to changes depending on whether the livelihoods of other households in a particular administrative unit, mostly a country, are improving or worsening.

homogenous set of assets compared to earlier DHS surveys. This allows for comparability across time. Booysen *et al.*(2008), Filmer and Scott (2012) and Ngo and Christiaensen (2018) use the 40th percentile asset index cut-off point. This is recommended by the World Bank by Filmer and Scott (2012) which found a high correlation in the households classified as the poorest 40% using both per capita expenditures and asset indices. Booysen *et al.* (2008) also use the 60th percentile cut-off point to classify the poor and non-poor since Africa is deemed to have higher poverty levels and the asset index does not discriminate well between the poor and non-poor at lower levels due to the clustering of households at the lower end of the asset index distribution. Other studies also use the 20th percentile asset index cut-off point to represent extreme poverty (Department of Social Development, 2008). This study will thus utilise all three cut-off points; i.e., 20th, 40th and 60th percentiles to define the poor and non-poor and compare results based on the different definitions of poverty. Figure 2 shows the cumulative distribution function for the asset index across surveys. The asset poverty shows a decrease between the 2003 and 2014 surveys with the proportion of households classified as poor at the 20th, 40th and 60th percentiles, reducing across the surveys.

Figure 2: Cumulative density functions for household asset index across surveys and the 20th, 40th and 60th percentile cut-off points

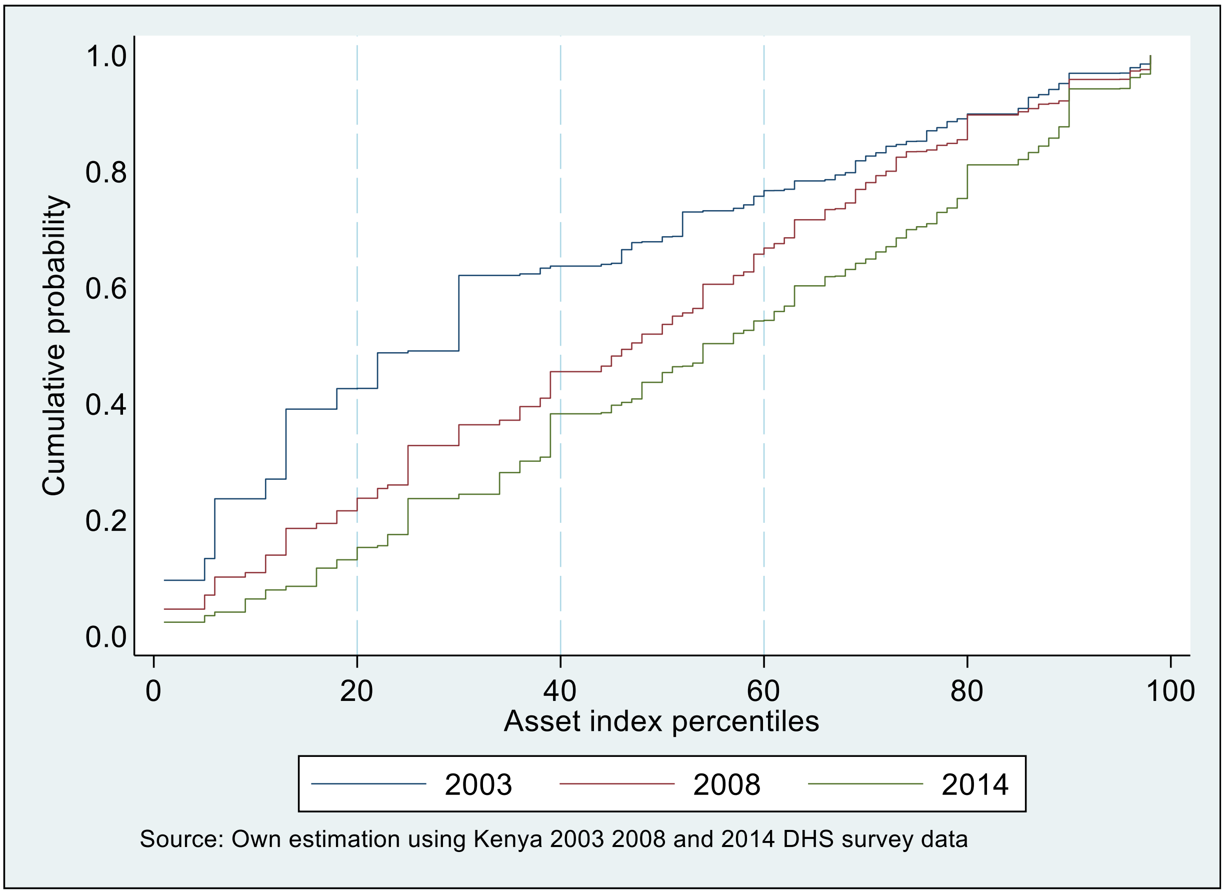
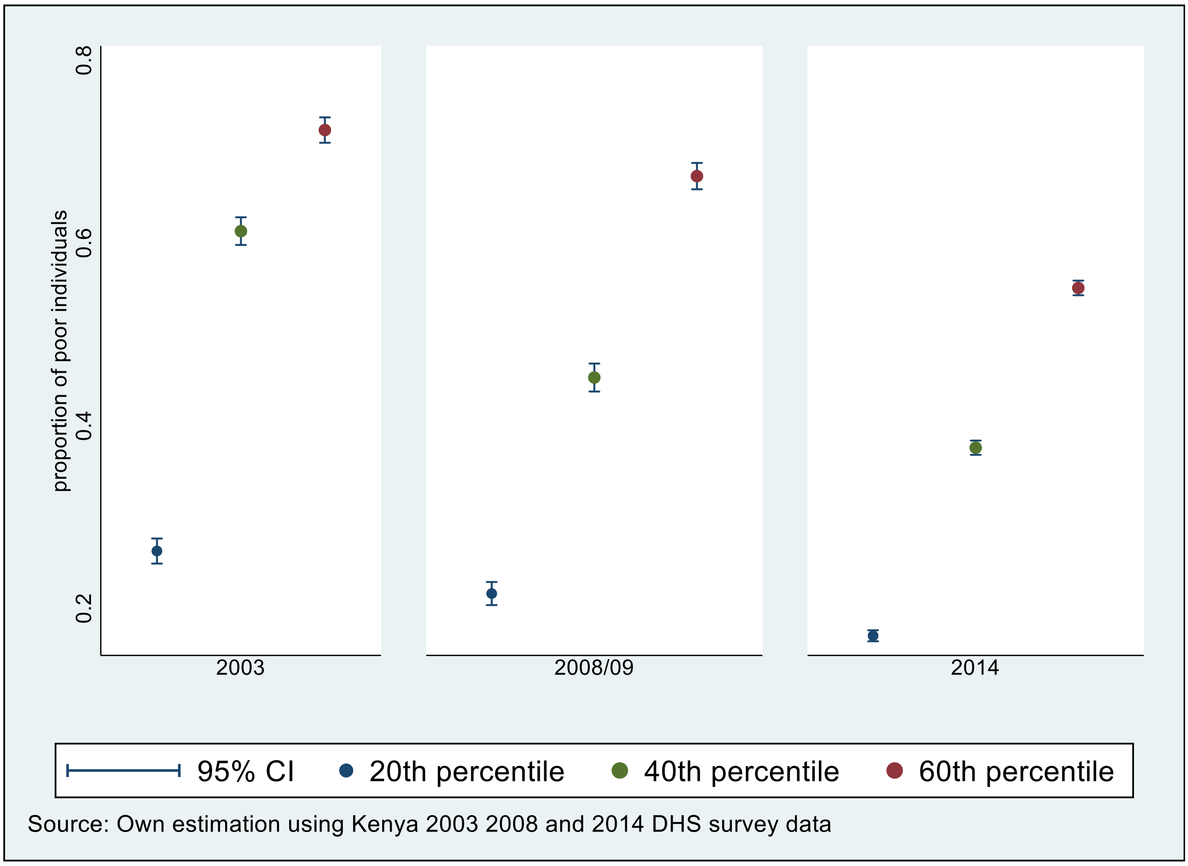


Figure 3 shows the proportion of individual women who came from asset-poor households in 2003, 2008/09 and 2014 surveys using the 20th, 40th and 60th percentile cut-off points. The proportion of the asset poor shows a reduction between 2003 and 2014 surveys at the 20th, 40th and 60th asset index percentiles. This also reinforces the result in figure 2 which shows a reduction in the asset index poverty between surveys.

Figure 3: Proportion of individuals from poor households across surveys



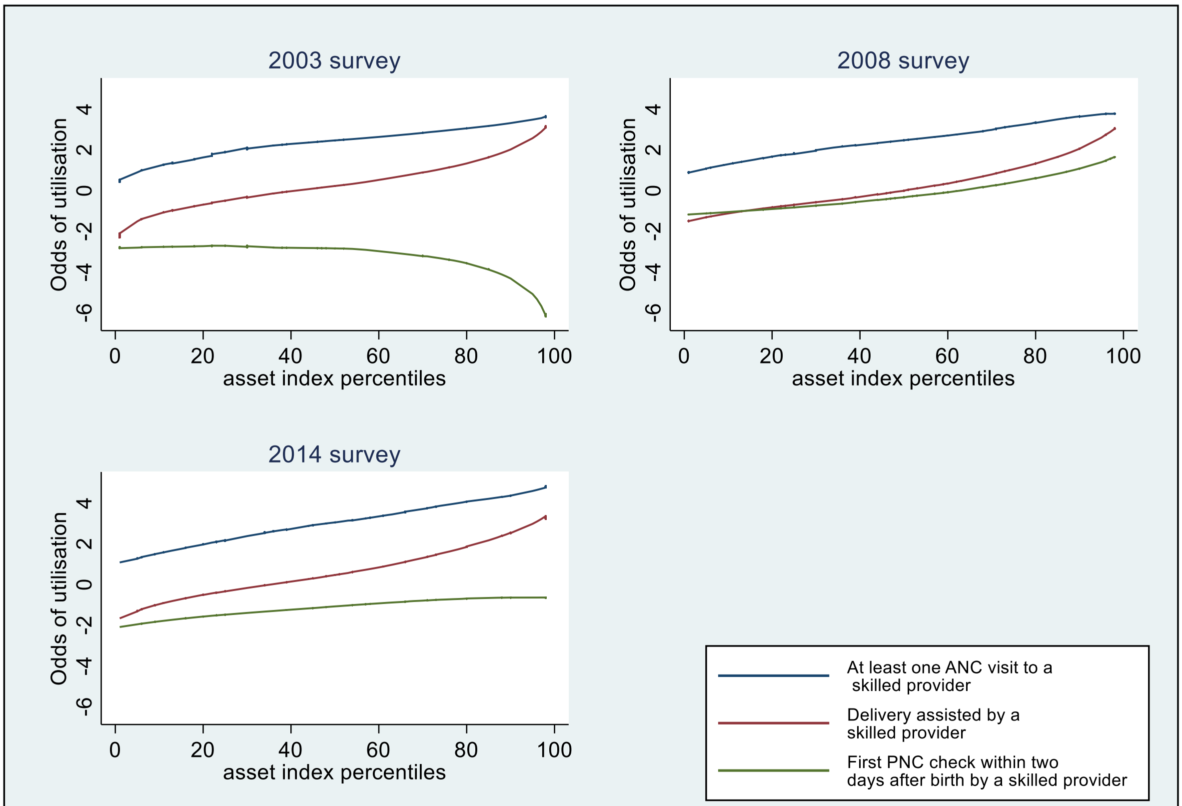
3.3. Inequality in the Utilisation of Maternal Health Care in Kenya

3.3.1. Determination of Outcomes to Include in Inequality Analysis

First, I determine the variables to include in the analysis of inequality by calculating the odds of the utilisation of maternal health care services under consideration across the asset index distribution. This is achieved by a non-parametric locally weighted regression that predicts the odds of utilising maternal health care across the wealth distribution. At each point (x_i, y_i), the odds of utilisation are calculated by regressing the binary health outcomes against the asset index using the observations which are within a specified bandwidth. The point (x_i, y_i), is given a higher weight compared to points further away within the bandwidth (Royston, 1992).

Figure 4 shows the smoothed distributions for the odds of utilising maternal health care in the 2003, 2008 and 2014 DHS surveys plotted against the asset index distribution across surveys.

Figure 4: Odds of the utilisation of maternal health care in Kenya across the asset index distribution



Source: Own estimation using Kenya 2003 2008 and 2014 DHS survey data

The odds of the utilisation of the maternal health care in question increase with an increase in the asset index except for the utilisation of PNC services by a skilled provider in the 2003 survey. The anomaly in this distribution might be explained by the fact that the women who utilised this service make up 3.56% of the sample, most of whom are in the lower end of the asset index distribution as shown in Figure A1 in the appendix. The odds of having one PNC check within two days after delivery by a skilled provider are lower than zero across the entire asset wealth distribution for the 2003 and 2014 surveys. Therefore, the analysis of this maternal health care service will not be included in the subsequent analysis of the trends of inequality in the utilisation of maternal health care across surveys.

Figures A2.1-A2.3 in the appendix show the utilisation of maternal health care across surveys with the asset index divided into two groups; i.e., poor and non-poor, classified using the 20th, 40th and 60th percentile asset index cut-off points. The proportion of utilisation for at least one ANC visit to a skilled provider and deliveries assisted by a skilled provider shows an increase from 2003 to 2008 and finally to the 2014 survey. However, the proportion of utilisation is consistently higher above the asset wealth cut-off points across the surveys. This points to asset wealth offering an advantage in the utilisation of maternal health care.

3.3.2. Measurement of Inequality in the Utilisation of Maternal Health Care in Kenya across Surveys

Now that the maternal health outcomes which have inequality have been determined, I proceed to characterise the extent to which the inequality exists over time. The conventional method used to portray inequality is the concentration index which is a bivariate rank-dependent index that shows the relationship between a cumulative health outcome and the cumulative socioeconomic variable of interest; i.e., the asset index, ranked from the lowest to the highest. The concentration index is bounded between -1 and 1. A value of zero implies perfect equality, negative values show that the distribution is skewed toward the lower end of the cumulative distribution of socioeconomic status while positive values show that the distribution is skewed toward the higher end of the cumulative distribution of socioeconomic status (Regidor, 2004; Fleurbaey and Schokkaert, 2011; Kjellsson and Gerdtham, 2013; Kim *et al.*, 2016; Ahmed *et al.*, 2017; Bobo, Yesuf and Woldie, 2017; Nghargbu and Olaniyan, 2017). The concentration index is represented as in equation 1:

$$C = \frac{2}{n^2 \mu_h} \sum_{i=1}^{n} z_i h_i \tag{1}$$

Where:

- h is the binary health outcome of interest; i.e., utilisation of at least one ANC visit to a skilled provider and delivery assisted by a skilled provider
- μ_h is the mean of the health outcome
- n is the number of observations

- $\sum_{i=1}^{n} z_i h_i$ is the normalized sum of the weighted health outcome
- $z_i = \frac{(n+1)}{2} - \lambda_i$. n is the number of observations while λ_i is the ranking of the individuals using the asset index with $\lambda_i = 1$ being the richest and λ_i=n being the poorest

The range of the concentration index for binary variables is determined by the mean which is the proportion of times the variable is equal to one; i.e., the proportion of utilisation for a maternal health care service. For binary variables, the range of the concentration index ranges between μ-1 and 1-μ. The study uses the concentration index stipulated by Wagstaff which makes adjustments when the outcome variable is binary. The Wagstaff index is standardised by dividing it by the maximum possible value that the concentration index for binary variables can take; i.e., 1-μ, to ensure the concentration index lies within the specified bounds (Wagstaff, 2005; Kjellsson *et al.*, 2011; Kjellsson and Gerdtham, 2013; Ahmed *et al.*, 2017; Fenny *et al.*, 2019). The Wagstaff concentration index is represented as in equation 2:

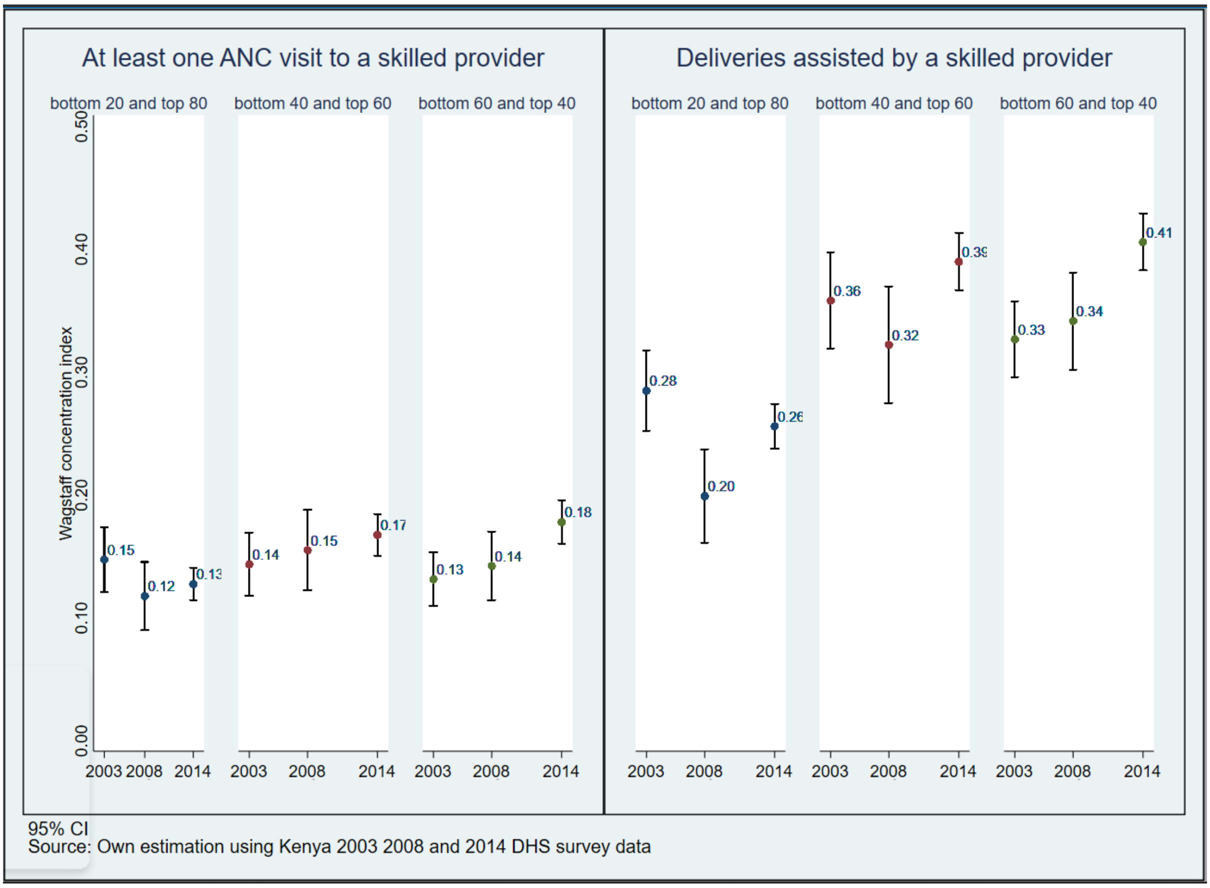
$$W = \frac{2}{n^2(1-\mu_h)\mu_h} \sum_{i=1}^{n} z_i h_i \tag{2}$$

Where the variables are defined the same as in equation 1

Inequality indices are calculated to ascertain the presence of inequality in the utilisation of maternal health care. The indices compare inequalities using the asset index cut-off points; i.e., 20^{th}, 40^{th} and 60^{th} percentiles as determined in section 3.2. Figure 5 presents the Wagstaff concentration indices for the variables of interest across surveys when the cut-off points are set at the 20^{th}, 40^{th} and 60^{th} percentiles, respectively.[3]

3 The Wagstaff index is calculated on Stata using a user-written command conindex (O'Donnell et al., 2016).

Figure 5: Wagstaff concentration indices for utilisation of maternal health care across surveys



All the indices presented are positive and statistically significant as indicated in table A2 in the appendix. This indicates the presence of pro-non-poor inequality in the utilization of maternal health care. This confirms the earlier scenario in figures A2.1 -A2.3 which showed higher utilisation of maternal health care among the non-poor as compared to the poor. The inequality is especially high for deliveries assisted by a skilled provider. The trend in inequality shows an increase in inequality in the attendance of at least one ANC visit to a skilled provider and deliveries assisted by a skilled provider for the 60th percentile asset index cut-off points. As a robustness check, a comparison is done for the individuals from the bottom 20th and 40th percentiles against the top 40 percentile who are classified as non-poor under all the 3 asset index cut-off points. The inequality is higher at the 20th and 40th percentiles when compared to the top 40th percentile relative to when the comparison is done to the 80th and 60th percentiles, respectively as shown in Figure A3. The differences in inequality between the 2003 and 2014 surveys are statistically significant only when comparing individuals in the bottom 40 to the top 40th percentile asset index cut-off point for both utilisation of at least one ANC visit to a skilled provider and deliveries assisted by a skilled provider as shown in table A3 in the appendix.

One of the programs used in an attempt to reduce the effect of the cost barrier on the utilisation of maternal health care and make the services more affordable is the reduction/ removal of user fees. Kenya introduced such an intervention in June 2013. Given that the presence of inequality in the utilisation of maternal health care has been confirmed in this section, I now proceed to describe the utilisation of maternal health care before and after the start of the FMC program and examine whether the program had an effect on inequality.

3.4. Inequality in the Utilisation of Maternal Health Care in Kenya Before and After the Start of the Free Maternal Care (FMC) Program

3.4.1. Determination of Outcomes to Include in Inequality Analysis

The odds of the utilisation of maternal health care across the asset index distribution are estimated using the locally weighted regression described in section 3.3.1. Figure 6 shows the smoothed distributions for the odds of utilising maternal health care before and after the start of the FMC program plotted against the asset index distribution. The odds of utilising maternal health care increase as asset wealth increases with the pattern of odds of utilisation being similar before and after the start of the FMC program. The odds of having one ANC visit to a skilled provider are higher than zero while the odds of having one PNC check within two days after delivery by a skilled provider are lower than zero across the asset wealth distribution both before and after the start of the FMC program. Therefore, the analysis of these two maternal health care services will not be included in the subsequent analysis of the trends of inequality before and after the start of the FMC program.

Figure 6: Odds of the utilisation of maternal health care across the asset index distribution before and after the start of the FMC program

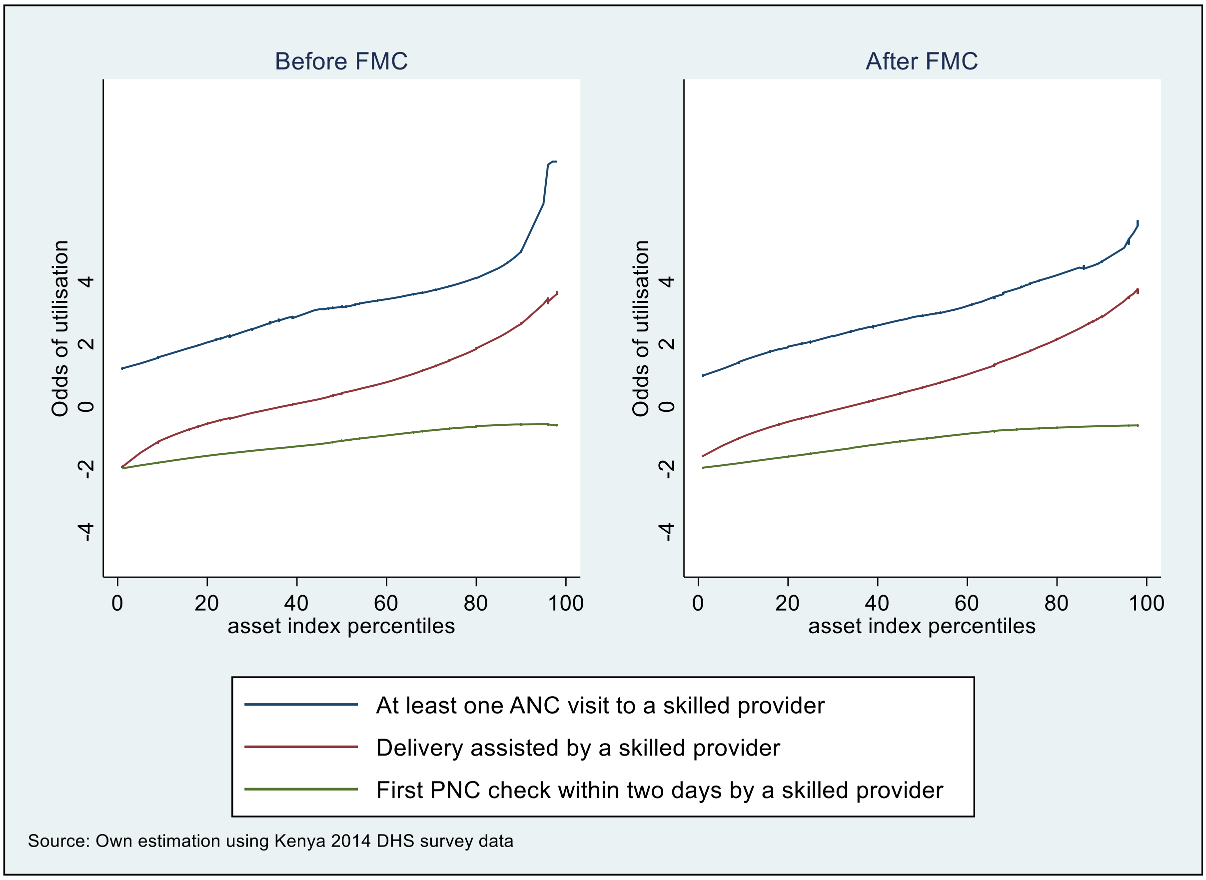
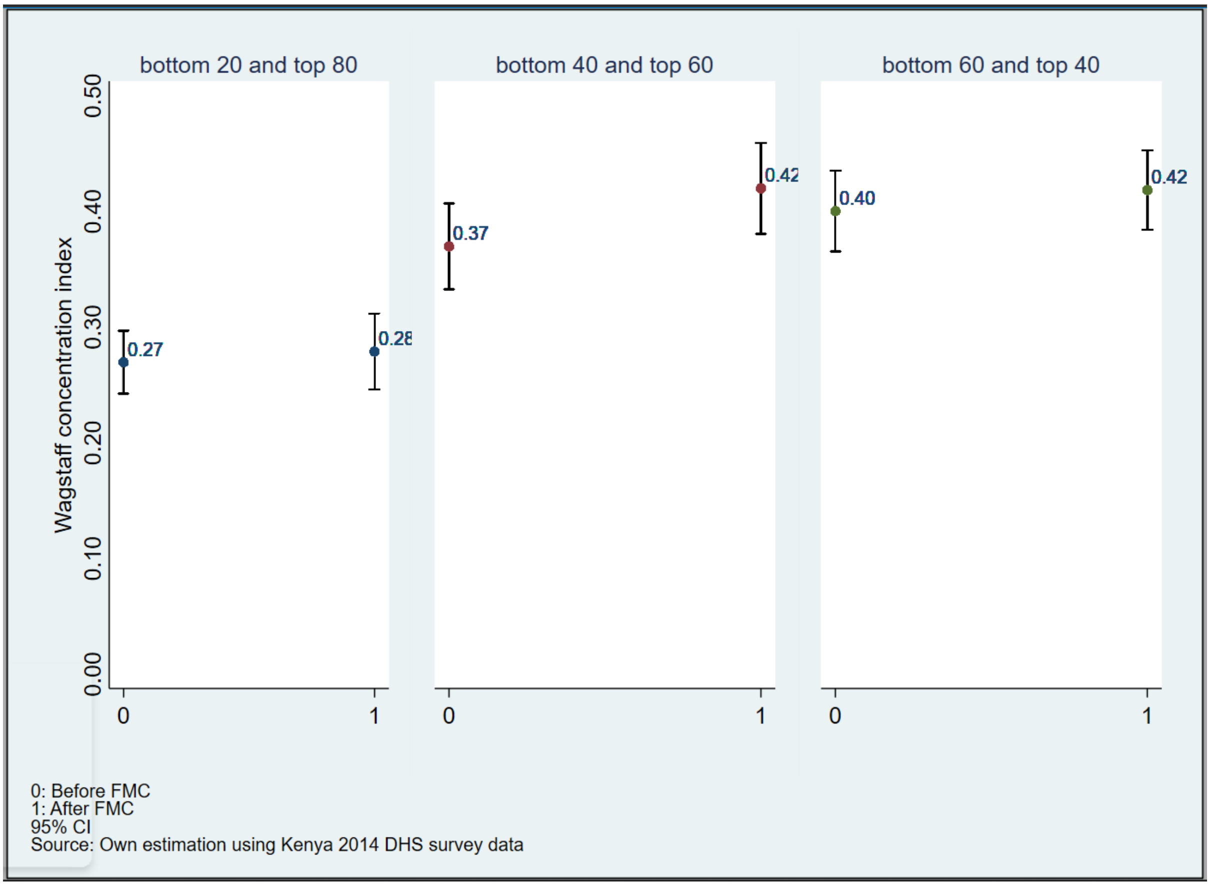


Figure A4 in the appendix shows the utilisation of delivery by a skilled provider of the two asset index groups before and after the start of the FMC program. The proportion of utilisation is higher among the non-poor compared to the poor. While the proportion of utilisation increased after the start of the FMC program across the asset index distribution, the proportion of utilisation is still higher for individuals in the non-poor groups. Now that the maternal health outcomes which have inequality have been determined, I proceed to characterise the extent to which the inequality exists before and after the start of the FMC program.

3.4.2. Measurement of Inequality in the Utilisation of Maternal Health Care in Kenya Before and After the Start of the Free Maternal Care (FMC) Program

This section compares the inequality in utilisation of delivery assisted by a skilled provider before and after the start of the FMC program. Figure 7 shows the calculated Wagstaff indices.

Figure 7: Wagstaff concentration indices for utilisation of delivery by a skilled provider before and after the start of the FMC program



The calculated Wagstaff indices are positive and significantly different from zero as shown in table A4 in the appendix indicating inequality does exist with the non-poor having a higher utilisation of delivery assisted by a skilled provider. A robustness check is conducted by calculating inequality when the bottom 20 and 40 percentiles are compared to the top 40 percentile. The inequality is higher than when the comparison is done to the top 80 and top 60 percentiles, respectively as shown in Figure A5 and table A5 in the appendix. The reduction or removal of user fees is meant to increase utilisation regardless of socioeconomic status thus improving equality. However, contrary to expectations, the differences in inequality before and after the start of the FMC program are not statistically significant except when comparing the bottom 40 percentile to the top 60 percentile which is statistically significant at 10%. This shows that there are other crucial factors explaining the utilisation of maternal health care apart from the cost which might be discouraging women from accessing maternal health care services. In light of this, I extend the analysis to determine other factors that explain the differences in utilisation of maternal health care between the poor and non-poor.

3.5. Decomposition of Inequality in the Utilization of Maternal Health Care in Kenya Using Recentered Influence Functions (RIF)

Assume that $H \in (a_H, b_H)$ is a health variable; i.e., utilisation of at least one ANC visit to a skilled provider and delivery assisted by a skilled provider, with mean μ_H and probability measure F_H. a_H and b_H are the lower and upper bounds of the variable. Assuming a function $v(F)$ where F is a probability measure for $v(F)$. F_Y is the fractional rank of an individual when ranked according to a socioeconomic variable Y; i.e., the asset index. The functional form for a rank-dependent index is thus given by the joint distribution of H and Y (Firpo, Fortin and Lemieux, 2009, 2018; Heckley, Gerdtham and Kjellsson, 2016; Finn and Leibbrandt, 2018; Rios-Avila, 2019).

$$I = v^I(F_H, F_Y) = v^\omega(F_H) v^{AC}(F_H, F_Y) \tag{6}$$

where:

- $v^\omega(F_H)$ is the weighting function for the rank-dependent index
- AC is the absolute concentration index

An influence function measures how a change in an observation changes a distributional statistic F_H to a new distribution G_H; i.e., how the distributional statistic changes when the wealth of an individual i changes. A function G_H can be defined as:

$$G_H = (1 - \varepsilon)F_H + \varepsilon\delta_h \tag{7}$$

Where $\varepsilon \in (0,1)$ is the relative change in the population as a result of changing F_H by a quantity δ_h

An influence function is thus defined as:

$$IF = \frac{\partial v(G_H)}{\partial \varepsilon}|_{\varepsilon=0} \tag{8}$$

The decomposition is done in two steps. The first step estimates a RIF for the rank-dependent index e.g. the mean, quantile etc. The recentered influence function linearizes the rank-dependent index by adding the influence function back to the health variable functional form $v(F_H)$.

$$RIF(h;v) = v(F_H) + \left(IF(h;v)\right) \tag{9}$$

$RIF(h;v)$=f (mother's education levels, region of residence, place of residence, mother's age, parity, marital status, distance to the nearest health facility, size of nearest health facility, alternative supply of health facilities)

The decomposition analysis using RIFs allows for the construction of a counterfactual distribution to determine what the outcomes of a subpopulation would be if they had the characteristics of a different subpopulation. Reweighting creates a counterfactual group for the non-poor by giving them similar characteristics to the poor to determine whether significant differences in wealth contribute to inequality. The covariates used for the creation of the counterfactual are the same as the ones used in the estimation of the RIFs (Fortin, Lemieux and Firpo, 2010; Firpo and Pinto, 2011).

$$F_{Y^C_{non-poor}}(y) = \int F_{Y_{non-poor}|X_{non-poor}}(y|X)\Psi(X)dF_{X_{non-poor}} \tag{10}$$

Where Ψ is the reweighting factor = $\frac{dF_{X_{non-poor}}(X)}{dF_{X_{poor}}(X)}$

The second step utilises ordinary least squares (OLS) to regress the RIF on individual covariates to determine the marginal effects on the RIF due to a change in the individual covariates (Firpo, Fortin and Lemieux, 2007, 2018; Heckley, Gerdtham and Kjellsson, 2016).

$$E[RIF(h;v)] = X\beta \tag{11}$$

where the covariates are the same as in the estimation of the RIF.

The expected value of the RIF, $E[RIF(h; v)]$, is equal to the expected value of the distributional statistic, $v(F_H)$ since the expected value of the influence function,$(IF(h; v)$ is equal to zero.

Having described the theoretical framework for the decomposition of inequalities using recentered influence functions, I now proceed to a multivariate framework to determine the factors that explain the inequality in the utilisation of maternal health care between the poor and non-poor in Kenya which was shown to exist in section 3.3.2. The decomposition is done while controlling for the other socio-economic and demographic factors that explain the inequality as determined in the framework presented in section 2. The mean is decomposed using the recentered influence function which allows for reweighting. The explained/compositional component shows the differences in utilisation arising from the differences in observed characteristics while the unexplained/structural effect encompasses the differences in utilisation that are not explained by the observed characteristics and the effect of other factors which are not included in the decomposition model (Fairlie, 2006; Jann, 2008; Rios-Avila, 2019). Decomposition of the mean is done while controlling for the mother's education, province of residence, place of residence, mother's age at a child's birth, parity, and marital status[4] [5]. Table 1 shows the results of the aggregate decomposition of the differences in utilisation of maternal health care.

4 Stata user written command Oaxaca_rif (Rios-Avila, 2021) is used for decomposition of mean differences. The author recommend the use of bootstrap standard errors. However, since bootstrap and svy are not automatically supported together by the command, I replicate the weights from the survey using the user written command bsweights (Kolenikov, 2010). To achieve balanced bootstrap: i.e. same number of replications from each strata, the number of replications recommended for the bsweights command is equal to the least common multiple of the number of primary sampling units in each stratum. However, for the data used in this study, that number of replications is too high. is too high, (the data used has 92 strata with the lowest number of clusters in a stratum being 8 and the highest being 56. This results in a least common multiple of 80313433200 which is not feasible to run). For all the decomposition analysis in this study, I therefore use 1900 replications which is the highest number of replications I can run without an error message from the Stata program.

[5] *Computations were performed using facilities provided by the University of Cape Town's ICTS High Performance Computing team: hpc.uct.ac.za*

Table 1: Aggregate decomposition of the mean differences in utilisation of maternal health care between the poor and non-poor using Recentered Influence Functions (RIFs) when controlling for socioeconomic and demographic factors

	ANC by a skilled Provider			**Delivery by a skilled provider**		
	Top 80 - Bottom 20	***Top 60 - Bottom 40***	***Top 40 - Bottom 60***	***Top 80 - Bottom 20***	***Top 60 - Bottom 40***	***Top 40 - Bottom 60***
Non-poor	0.7379***	0.7642***	0.7949***	0.6939***	0.7754***	0.8516***
	(0.0046)	(0.0053)	(0.0063)	(0.0073)	(0.0073)	(0.0073)
Counterfactual	0.6869***	0.6596***	0.6997***	0.4858***	0.4900***	0.6356***
	(0.0129)	(0.0089)	(0.0524)	(0.0211)	(0.0251)	(0.0680)
Poor	0.5702***	0.6207***	0.6424***	0.3113***	0.3958***	0.4565***
	(0.0075)	(0.0053)	(0.0048)	(0.0121)	(0.0099)	(0.0094)
Difference	0.1677***	0.1436***	0.1525***	0.3827***	0.3796***	0.3951***
	(0.0087)	(0.0073)	(0.0077)	(0.0137)	(0.0115)	(0.0120)
Compositional	0.1167***	0.0390***	0.0573	0.1745***	0.0942***	0.1791***
	(0.0127)	(0.0087)	(0.0519)	(0.0208)	(0.0254)	(0.0676)
Structural	0.0510***	0.1046***	0.0952*	0.2082***	0.2854***	0.2160***
	(0.0134)	(0.0096)	(0.0518)	(0.0216)	(0.0257)	(0.0684)
Observations	20,783	20,783	20,783	20,783	20,783	20,783

*Bootstrapped standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$*

The results show that the non-poor have consistently higher utilisation of maternal health care than the poor with the difference in utilisation between the two groups being highly significant. The difference is especially high for the deliveries assisted by a skilled provider. While the utilisation of the non-poor does reduce if they are given the same characteristics as the poor as shown by the counterfactual coefficients, the utilisation is still higher than the poor thus indicating that wealth does offer an advantage in the utilisation of maternal health care. A robustness check is done by decomposing the difference in mean utilisation by the bottom 20 and 40 percentiles to the top 40 percentile. The differences are higher compared to when the comparison is done to the top 80th and 60th percentiles, respectively as shown in Table A6 in the appendix. The non-poor still have significantly higher utilisation of maternal health care compared to the poor. Figure 8 shows the detailed decomposition of the contribution of the mother's observable characteristics to the total difference in utilisation of maternal health care between the poor and non-poor with the coefficients and significance levels presented in Table A7 in the appendix.

Maternal level of education is the largest contributor to the mean differences in utilisation of maternal health care between the poor and non-poor in Kenya followed by the province of residence and place of residence. Maternal education and place of residence have positive and statistically significant coefficients thus indicating that differences in education levels between the poor and non-poor increase inequality and poor women living in rural areas are much more disadvantaged in the utilisation of maternal health care compared to their counterparts living in urban areas. Province of residence while having a significant effect on inequality presents mixed results in terms of the sign of the coefficients. Parity also has a small but statistically significant effect on inequality in the deliveries assisted by a skilled provider. The specification errors are not significant. Therefore, a linear specification gives a good approximation of the inequality decomposition being investigated in this section. The reweighting error is not statistically significant except when comparing the deliveries assisted by a skilled provider by the bottom 20th percentile poor to the top 40th and 80th percentile non-poor thus indicating that the reweighting procedure replicates the means of the poor group well when creating a counterfactual for the non-poor group.

Figure 9 shows the detailed decomposition of the contribution of the structural effect to the total difference between the poor and the non-poor. The constant term, which captures other factors that are not included in the model makes the largest component of the structural effect of the total difference in utilisation of maternal health care between the non-poor and the poor except when comparing the mean utilisation of the top 80 percentile to the bottom 20 percentile utilisation of ANC services. Therefore, the current model does not capture all the relevant factors that explain inequality in the utilisation of ANC and delivery services by a skilled provider.

Figure 8: Detailed decomposition of the contribution of the compositional effect to the total mean difference in utilisation of maternal health care between the poor and non-poor when controlling for socioeconomic and demographic factors

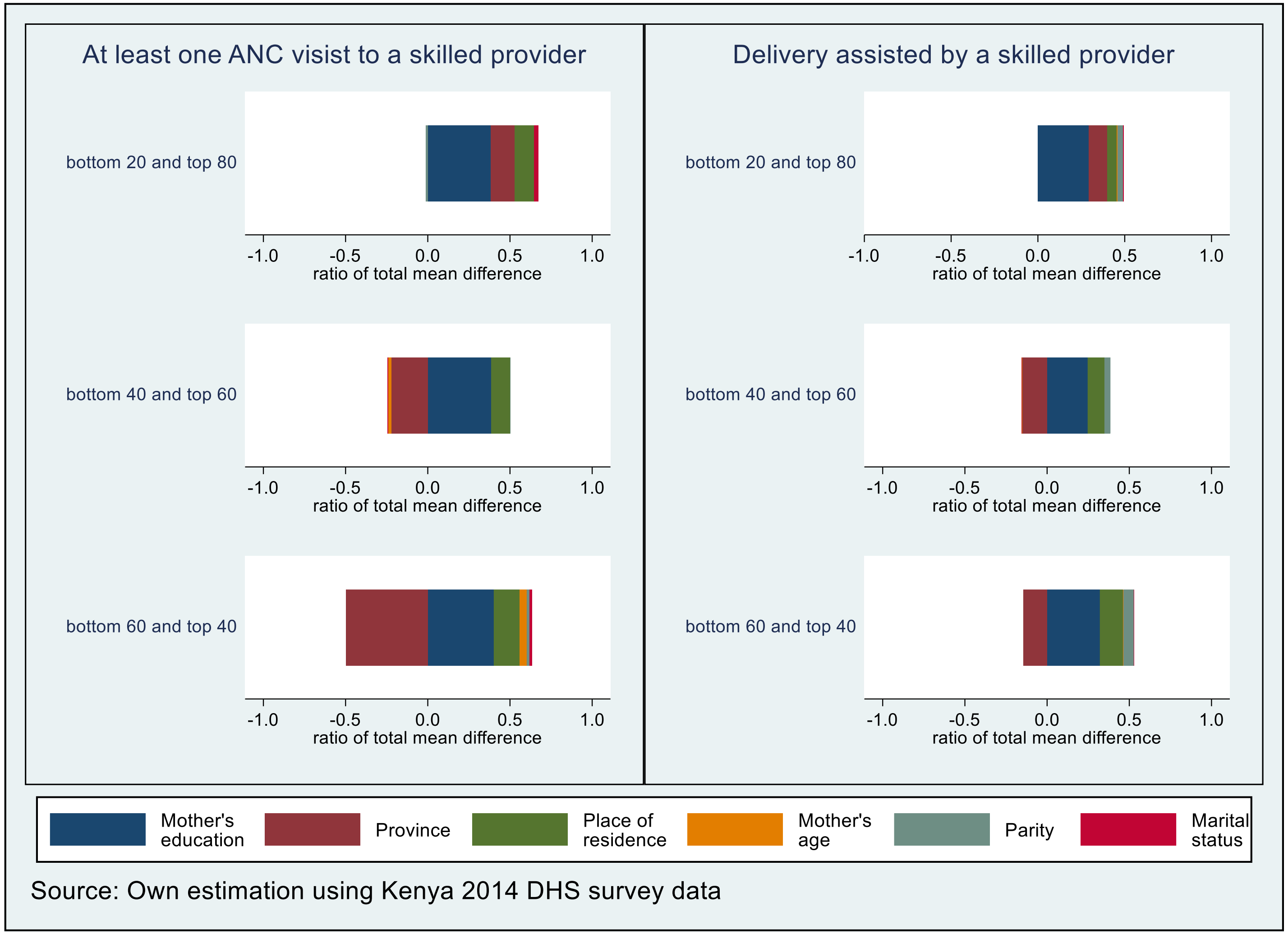
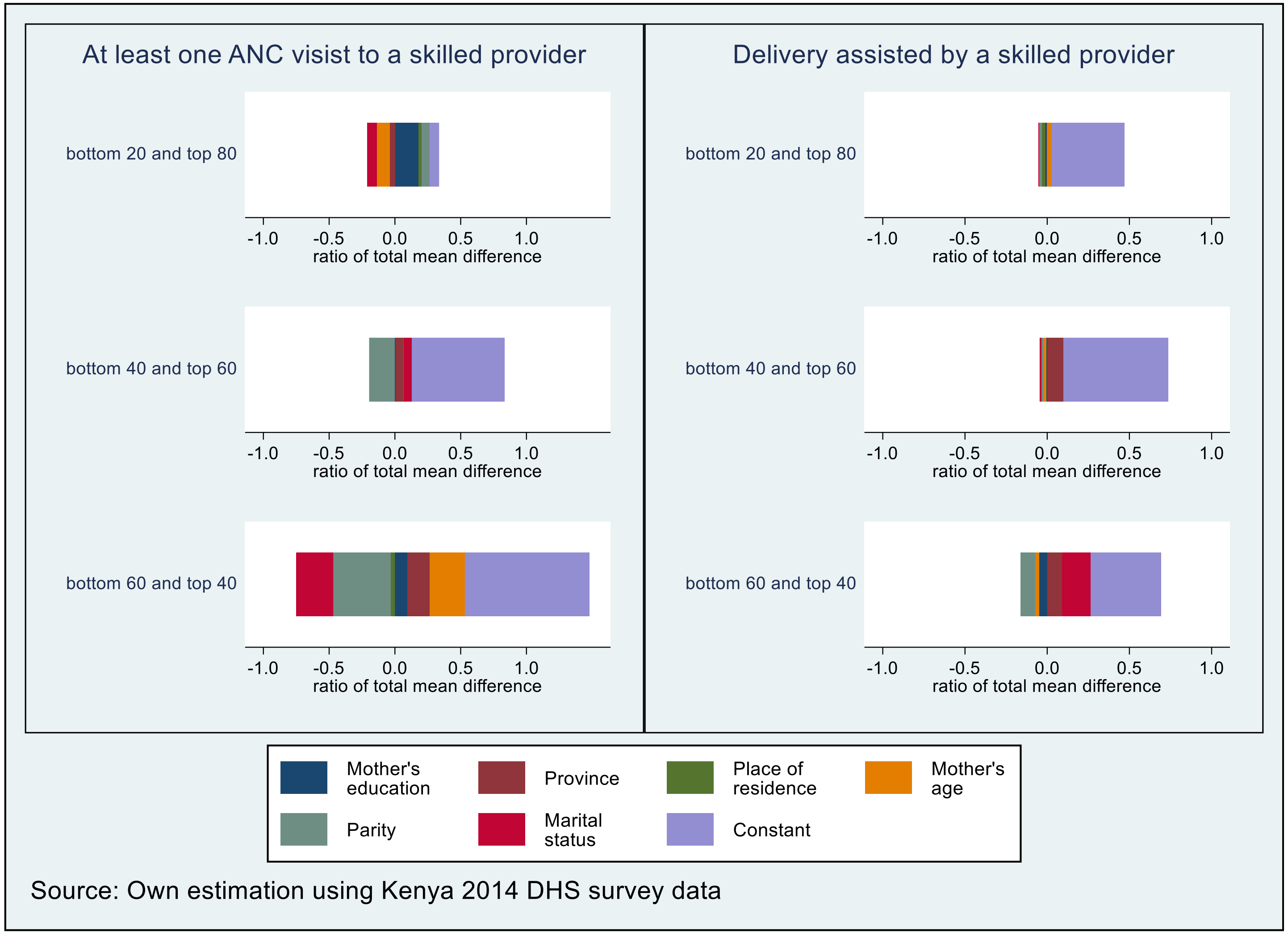


Figure 9: Detailed decomposition of the contribution of the structural effect to the total mean difference in utilisation of maternal health care between the poor and non-poor when controlling for socioeconomic and demographic factors



One of the objectives of this study is to include supply-side variables in the decomposition model in an attempt to determine the significance of these variables in explaining inequality in the utilisation of maternal health care and thus make the model more robust. Therefore, the decomposition of the mean difference in utilisation of maternal health care between the non-poor and the poor is repeated while including supply-side variables in addition to the socioeconomic and demographic variables that were controlled for earlier. Table 2 presents the aggregate decomposition of the mean utilisation of maternal health care when the distance to the nearest health facility, size of the nearest health facility and alternative supply of health facilities within a 5 km radius of an individual are included in the decomposition analysis. The results for the robustness checks are presented in table A8 in the appendix comparing the bottom 20 and 40 percentiles to the top 40 percentile. The results are similar to table 1 with the non-poor having a higher utilisation of maternal health care compared to the poor. However, there is no clear direction of change in the compositional effect of the model when compared with the earlier model that controlled only for socioeconomic and demographic characteristics.

Table 2: Aggregate decomposition of the mean differences in utilisation of maternal health care between the poor and non-poor using Recentered Influence Functions (RIFs) when controlling for socioeconomic, demographic and supply-side factors

	ANC by a skilled provider			**Delivery assisted by a skilled provider**		
	Top 80– Bottom 20	***Top 60 – Bottom 40***	***Top 40 – Bottom 60***	***Top 80 – Bottom 20***	***Top 60 – Bottom 40***	***Top 40 – Bottom 60***
Non-poor	0.7379***	0.7642***	0.7949***	0.6939***	0.7754***	0.8516***
	(0.0042)	(0.0052)	(0.0062)	(0.0073)	(0.0074)	(0.0072)
Counterfactual	0.6878***	0.6413***	0.6953***	0.4942***	0.4817***	0.5933***
	(0.0123)	(0.0194)	(0.0394)	(0.0222)	(0.0242)	(0.0616)
Poor	0.5702***	0.6207***	0.6424***	0.3113***	0.3958***	0.4565***
	(0.0074)	(0.0053)	(0.0048)	(0.0124)	(0.0098)	(0.0091)
Difference	0.1677***	0.1436***	0.1525***	0.3827***	0.3796***	0.3951***
	(0.0086)	(0.0073)	(0.0078)	(0.0141)	(0.0118)	(0.0118)
Compositional	0.1176***	0.0207	0.0529	0.1829***	0.0859***	0.1368**
	(0.0121)	(0.0194)	(0.0389)	(0.0215)	(0.0243)	(0.0614)
Structural	0.0501***	0.1229***	0.0996**	0.1997***	0.2937***	0.2583***
	(0.0127)	(0.0198)	(0.0387)	(0.0224)	(0.0248)	(0.0619)
Observations	20783	20783	20783	20783	20783	20783

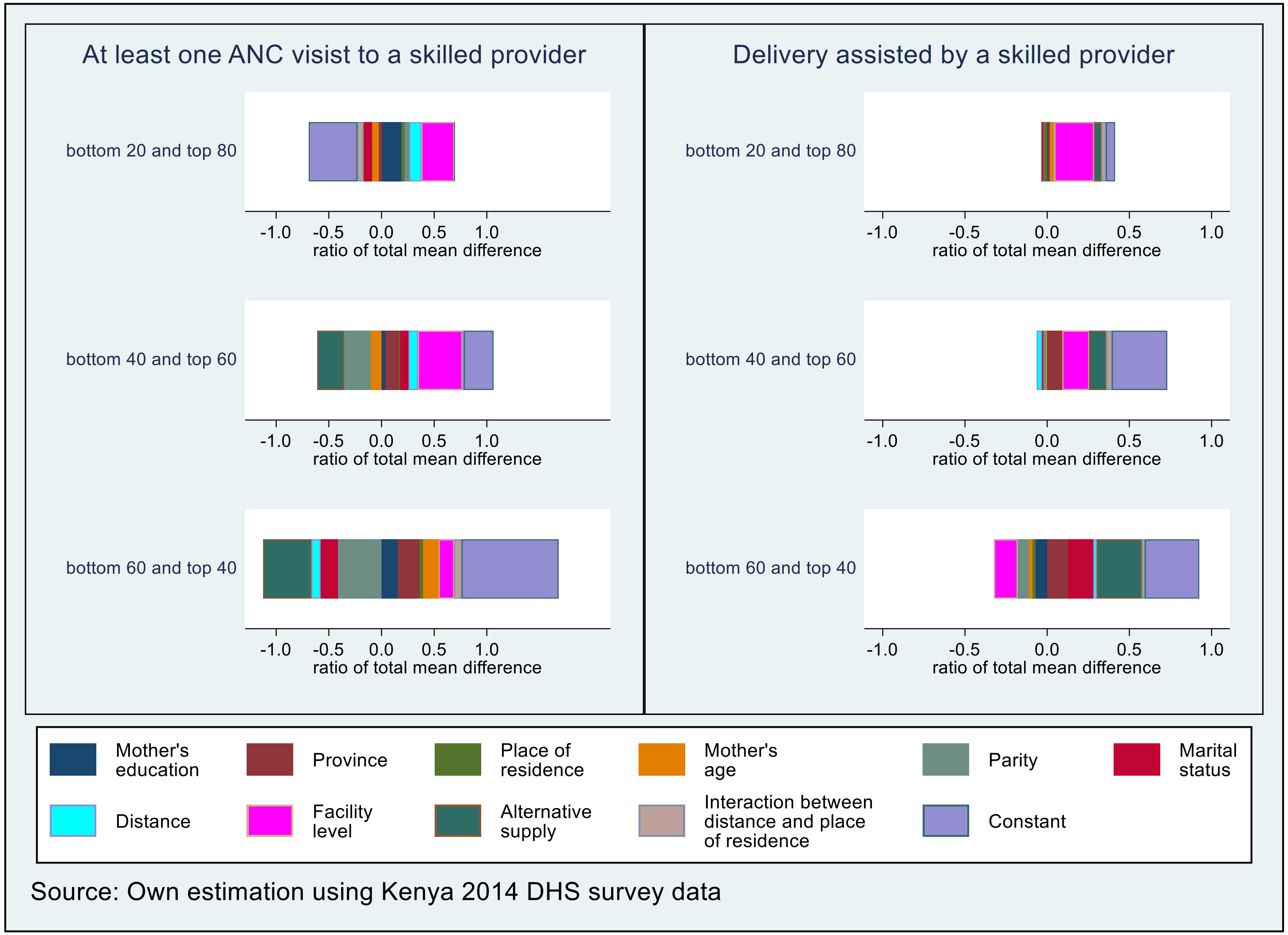
*Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Figure 10 shows the contribution of the mother's observable characteristics to the compositional component of the total difference in mean utilisation of maternal health care between the poor and non-poor when supply-side variables are included in the decomposition analysis. The coefficients and statistical significance of the detailed decomposition are included in Table A9 in the appendix. Same as before in figure 8, the mother's level of education has a substantial contribution to the differences in the utilisation of maternal health care followed by the place of residence. While the effect of living in rural areas is still positive, the significance level is dampened by the introduction of supply-side variables. Distance to the nearest health facility is worse for individuals in rural areas as shown by the interaction term. The alternative supply of health facilities also has quite an effect on inequality, especially for ANC services.

Figure 11 shows the contribution of the structural component of the total difference in utilisation of maternal health care between the non-poor and the poor after supply side factors are included in the decomposition model. The structural effect of the differences in utilisation of maternal health care is higher for the utilisation of at least one ANC visit to a skilled provider. The contribution of factors not controlled for in the model as shown by the proportion of the constant to the total mean difference in utilisation of maternal health care between the non-poor and the poor is much smaller compared to when supply-side factors are not controlled for in figure 9. Therefore, supply-side factors are important in explaining inequality between the poor and non-poor in Kenya and therefore will be included in the subsequent analysis in this study. Having established the importance of supply-side variables, I then proceed to analyse inequality in the utilisation of maternal health care in Kenya before and after the start of the FMC program.

Figure 10: Detailed decomposition of the contribution of the compositional effect to the total mean difference in utilisation of maternal health care between the poor and non-poor when controlling for socioeconomic, demographic and supply-side factors

Figure 11: Detailed decomposition of the contribution of the structural effect to the total mean difference in utilisation of maternal health care between the poor and non-poor when controlling for socioeconomic, demographic and supply-side variables



3.6. Decomposition of Inequality in the Utilisation of Maternal Health Care in Kenya Before and After the Start of the FMC Program using the Recentered Influence Functions

3.6.1. Decomposition of the Mean Utilisation

Table 3 presents the aggregate decomposition of the mean utilisation of deliveries assisted by a skilled provider before and after the start of the FMC program at the 20th, 40th and 60th percentiles. While the utilisation does increase for both the poor and non-poor groups, the differences remain highly significant even after the introduction of the FMC program in June 2013.

Table 3: Aggregate decomposition of the mean utilisation of deliveries assisted by a skilled provider before and after the start of the FMC program using Recentered Influence Functions (RIFs)

	Top 80 - Bottom 20		**Top 60 - Bottom 40**		**Top 40 - Bottom 60**	
	Before FMC	**After FMC**	**Before FMC**	**After FMC**	**Before FMC**	**After FMC**
Non-poor	0.7027***	0.7507***	0.7716***	0.8359***	0.8512***	0.9044***
	(0.0109)	(0.0097)	(0.0113)	(0.0097)	(0.0124)	(0.0090)
Counterfactual	0.5279***	0.4876***	0.6173***	0.5106***	0.6603***	0.6772***
	(0.0371)	(0.0407)	(0.0202)	(0.0346)	(0.0484)	(0.0973)
Poor	0.3081***	0.3739***	0.4122***	0.4598***	0.4642***	0.5209***
	(0.0184)	(0.0207)	(0.0150)	(0.0150)	(0.0129)	(0.0131)
Difference	0.3945***	0.3767***	0.3594***	0.3761***	0.3871***	0.3834***
	(0.0204)	(0.0228)	(0.0187)	(0.0177)	(0.0173)	(0.0160)
Compositional effect	0.2198***	0.1136***	0.2052***	0.0508	0.1961***	0.1562
	(0.0376)	(0.0376)	(0.0200)	(0.0345)	(0.0476)	(0.0966)
Structural effect	0.1748***	0.2631***	0.1542***	0.3253***	0.1909***	0.2272**
	(0.0377)	(0.0418)	(0.0223)	(0.0364)	(0.0494)	(0.0983)
Observations	5,582	4,867	5,582	4,867	5,582	4,867

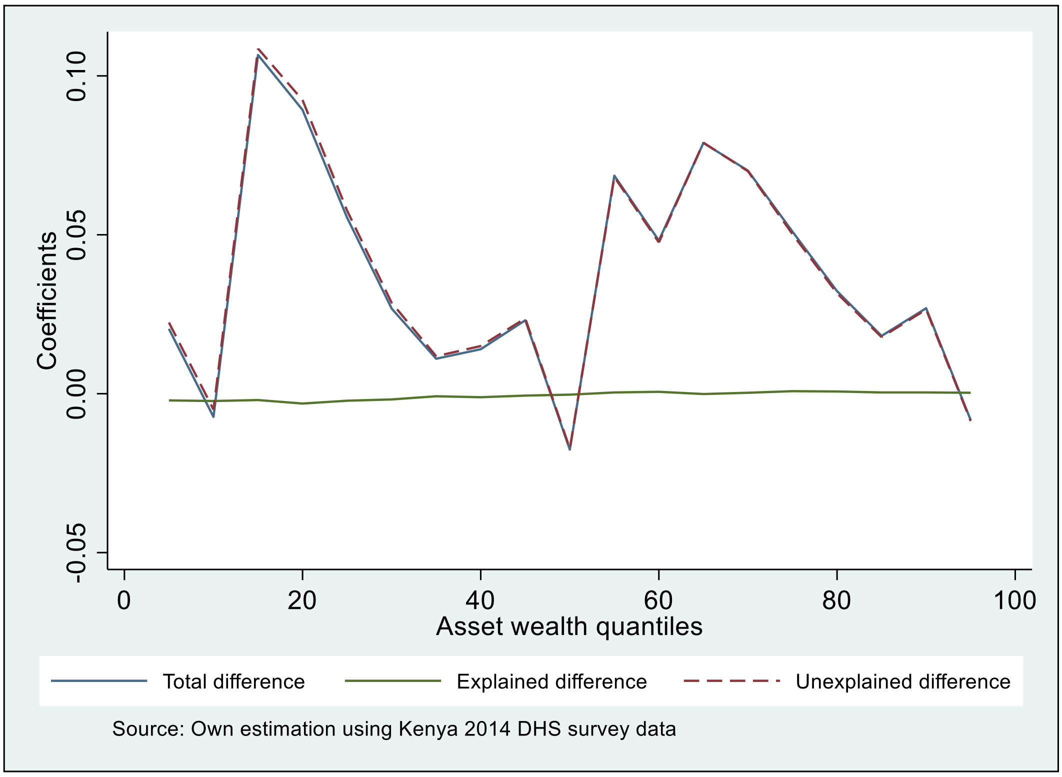
*Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

3.6.2. Decomposition of the Mean Utilisation across the Asset Index Distribution Before and After the Start of the FMC program

One advantage that has been cited for using RIFs over the standard Oaxaca-Blinder decomposition is the allowance to decompose other distributional statistics apart from the mean e.g. quantiles (Rios-Avila, 2019). This section seeks to utilise this advantage to decompose the mean differences in utilisation of delivery by a skilled provider before and after the start of the FMC program across the asset index distribution. The binary outcome variable is converted into a continuous variable by calculating the mean of the outcome variable at each quantile on the asset index distribution.

Figure 12 presents the results of the decomposition of the mean utilisation of deliveries assisted by a skilled provider along the asset index quantiles with the detailed aggregate decomposition presented in Table A10.

Figure 12: Quantile decomposition of the total mean difference in utilisation of delivery assisted by a skilled provider before and after the start of the FMC program across the asset wealth quantiles



The results display a positive increase in mean utilisation after the start of the FMC program. The compositional effects of the difference are not statistically significant. This is expected since the DHS data used for analysis is for the 16 months before and after the start of the FMC program. Therefore, the covariates used in the decomposition are not likely to have changed much to explain the differences in utilisation between the two periods. While the largest increase in mean utilisation is at the 15^{th} percentile, significant differences are also observed towards the upper end of the asset index distribution.

4. Discussion of Results and Conclusion

The utilisation of maternal health care has been shown to improve maternal and child health outcomes. However, high inequalities exist due to barriers that disadvantage some sections of society due to differences in socioeconomic and demographic characteristics. Another contributor to these high inequalities is differences in access to health facilities and skilled providers. This study, therefore, endeavoured to determine whether inequality does exist in the utilisation of maternal health care between the poor and non-poor in Kenya and if so, what drives this inequality. It also aimed at introducing supply-side factors to the analysis of inequality of maternal health care, which is primarily missing, especially in studies utilising DHS data. The variables introduced are distance to the nearest health facility, size of the nearest health facility to indicate the quality of the health facility and alternative supply of health facilities within a 5 km radius of an individual to account for the fact that individuals do not always visit the health facility closest to them.

The household asset index is used to rank individuals and classify them into poor and non-poor categories. The asset index shows a decline in asset poverty from the 2003, to the 2008/09 and ultimately to the 2014 survey. The probability of utilising maternal health care increases with an increase in household asset wealth. The Wagstaff indices calculated show the presence of inequality which favours the non-poor. Inequality is especially higher in the utilisation of deliveries by a skilled provider. This is similar to the findings by Fenny *et al.*(2019) which showed higher inequality to exist in the utilisation of deliveries assisted by a skilled provider compared to other maternal health care services.

Reduction/removal of user fees has been used by governments to remove the cost barrier to the utilisation of health care services. Kenya introduced free maternal care on 1^{st} June 2013 which made utilisation of antenatal care, deliveries and postnatal care in public health facilities free.

The expectation is that all women would now be able to access maternal health care thus improving maternal and child health outcomes. However, the results show that while utilisation increased, the non-poor still have significantly higher utilisation of maternal health care compared to the poor after the start of the FMC program with the differences in inequality between the two periods not being statistically significant. The largest increase in utilisation is at the 15^{th} percentile with substantial differences also observed toward the upper end of the asset index distribution. Santas, Celik and Eryurt (2018) found comparable results in Turkey where inequalities were still present even with the introduction of a health transformation program in 2003 which sought to provide equal access to health services. Therefore, while the removal of user fees is an important program, it might not achieve the desired results if it is not augmented with other programs that reduce/remove other barriers to utilisation of maternal health care e.g. provision and equipping of more health facilities and employing more skilled providers in these facilities to improve access to quality maternal health care.

A decomposition of the factors that drive inequality shows the same results as portrayed by the Wagstaff concentration indices; i.e., inequality favouring the non-poor does exist. The creation of a counterfactual that gives the non-poor the characteristics of the poor such that the only difference between the two groups is the asset wealth shows the utilisation of maternal health care would still be higher for the non-poor group. This indicates that the asset wealth does offer great advantages in the choice of women to seek maternal health care. The mother's education level explains a significant proportion of the differences in the utilisation of both antenatal care and deliveries by a skilled provider. Table A11 in the appendix shows the non-poor are more educated; i.e., have secondary education or higher, compared to the poor. Higher education levels imply that women are more aware of their health care needs and any interventions that the government has put in place to lighten the burden of seeking maternal health care. More educated women are also more likely to have better jobs, earn better and therefore be better placed to foot the direct and indirect costs associated with seeking maternal health care. They are also more likely to live close to social amenities such as hospitals thus easing the process of seeking maternal health care.

Place of residence is also shown to be an important determinant of inequality. Rural areas tend to have a higher proportion of poor individuals as shown in Table A11 in the appendix. They also have a lower density of health facilities compared to urban areas and therefore have poor accessibility. The coefficient for the explained component of the interaction of the distance and place of residence variable shows that the rural areas are more likely to have individuals living further away from health facilities thus creating an additional barrier to utilisation.

An alternative supply of health facilities also gives the mother a choice of where to seek maternal health care. While the same supply-side factors affect both the non-poor and the poor, the situation is much more dire for the poor who have to travel relatively long distances to health facilities and have lesser means of mitigating the barriers brought about by supply-side factors e.g. higher travel costs, higher time costs etc. A higher proportion of women with high parity are the poor. Women with more children are also more likely not to deliver in health facilities. This is especially likely if the previous births were without complications.

The proportion of the differences in utilisation that are not explained by the covariates controlled for in the decomposition is also quite substantial. While the study endeavoured to control for as many covariates as possible by including supply-side variables, some of the reasons given by women not seeking maternal health care in health facilities cannot be controlled for. For example, in the Kenya DHS 2014 survey, some women cited the reluctance to go to health facilities alone as one of the reasons for not seeking health care in health facilities. However, the proportion of the inequality that is explained by factors not included in the model did reduce after the introduction of supply-side variables.

The utilisation of maternal health care increased for both the poor and non-poor after the start of the FMC program. However, the difference in utilisation between the two groups is still statistically significant. This could be explained by the fact that the data collection for the data used in this study started within a year of the start of the FMC program. Therefore, the analysis only captures the short-term effect of the policy. Another possibility is that wealth is not a substitute for money. Therefore, while an individual could be coming from a non-poor household in terms of assets, monetary wealth is needed to access and utilise health facilities. Therefore, low income could mean that an individual still cannot access services even when they are free. The compositional effect of the decomposition of the utilisation of deliveries assisted by a skilled provider before and after the start of the FMC program across the asset index quantiles is not statistically significant. The covariates controlled for in the decomposition are not likely to have changed substantially within the 16 months before and after the start of the FMC program.

The study recommends the government ramps up information sessions for women of childbearing age on the importance of utilising maternal health care before, during and after delivery. The information should be tailored such that it can be understood by everyone, regardless of their education level. Secondly, while making maternal and child health free does improve utilisation, other barriers do exist, especially from the supply side. The distance to health facilities is quite high, especially for individuals living in rural areas. Most individuals live close to level 2 facilities which are not operational for 24 hours. The density of health facilities is also quite low, especially in rural areas. Therefore, the services being provided have no direct cost in public health facilities but the indirect cost from travel and time costs are still a barrier to utilisation. While the non-poor are better placed to mitigate these costs, the poor might not be in a position to do so.

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Appendix

Table A1: Variable Definition

Variables	*Definition*
Outcome Variables	
ANC by a skilled provider	It refers to ANC being provided by either a doctor or a nurse. It is measured by a binary variable with 1 representing at least 1 visit from a skilled provider and 0 otherwise.
Delivered by a skilled provider	It refers to a woman being assisted during delivery by a doctor or a nurse. It is measured by a binary variable with 1 representing deliveries done by a skilled provider and zero otherwise.
First postnatal check by a skilled provider	It refers to a woman receiving PNC within two days after delivery from a doctor or nurse. Measured by a binary variable where 0 represents no postnatal care or first postnatal check after 2 days and 1 represents receiving the first postnatal check within two days after delivery by a skilled provider.
Individual (mother) level variables	
Mother's education	Measured by a categorical variable with 0 =no education, 1 = primary education, 2 = secondary education and 3 = higher than secondary education
Province of residence	Measured by a categorical variable with 0==Nairobi, 1=Central, 2=Coast, 3=Eastern, 4=Nyanza, 5=Rift valley, 6=Western and 7=North eastern province
Age of the mother at the child's birth	Measures the age of the mother at the time a child was born. Represented by a discrete variable. Ranges between 15 and 49 years.

Parity	Measures the number of children that have ever been born to a woman. Measured by a binary variable with 0 = less than four children and 1 = four or more children
Marital status	Measured by a binary variable with 1 =women who are married or living with a partner and 0 = women living alone.
Household-level variables	
Wealth	Measured by an asset index that is represented by a discrete variable with 0 = 1st quintile, 1=2nd quintile, 2=3rd quintile, 3=4th quintile and 4=5th quintile.
Cluster level variables	
Place of residence	Measured by a binary variable with 0 =urban dwellers and 1 = rural dwellers.
Distance	It measures how far a DHS cluster is from the nearest health facility in kilometres. It is represented by a continuous variable.
Size of health facility	It is represented by a discrete variable measuring the level of the nearest health facility where 0=level 2, 1=level 3, 2=level 4, 3=level 5 and 4=level 6.
Alternative supply	It is measured by the number of health facilities within a 5 km radius of the cluster.

Figure A1: Cumulative distribution function for women who had the first PNC check within two days of delivery by a skilled provider in the 2003 DHS survey

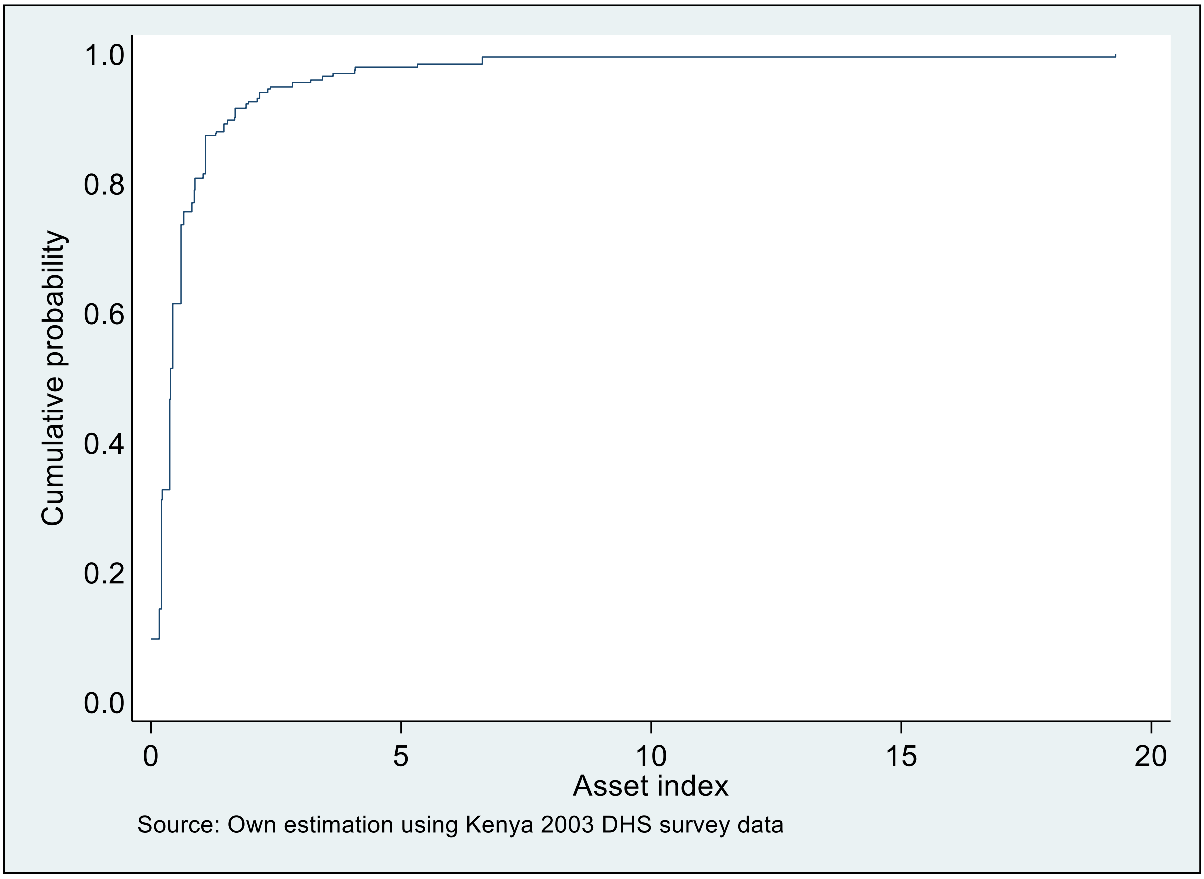

Figure A2.1: Utilisation of at least one ANC visit to a skilled provider and deliveries assisted by a skilled provider by the asset poor and non-poor across surveys using the 20th percentile asset index cut-offs across surveys

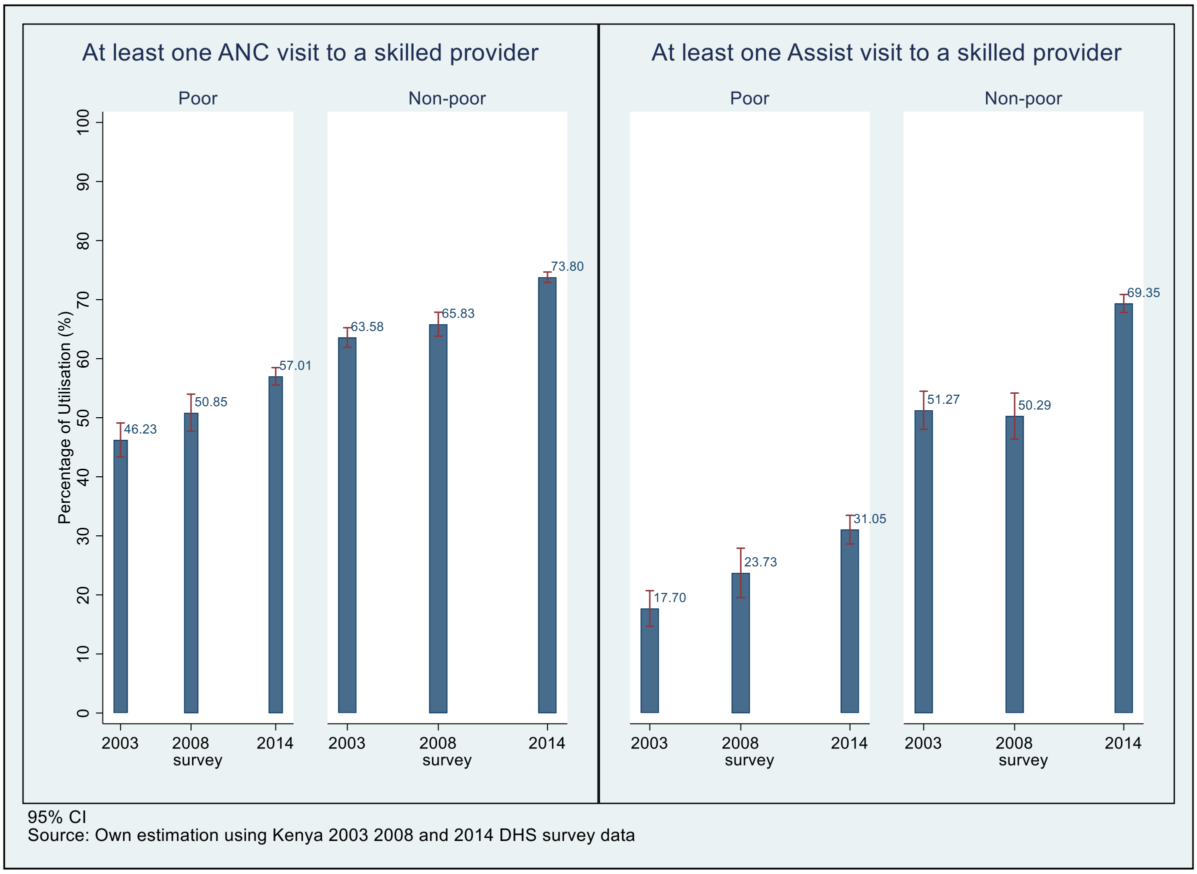

Figure A2.2: Utilisation of at least one ANC visit to a skilled provider and deliveries assisted by a skilled provider by the asset poor and non-poor across surveys using the 40th percentile asset index cut-offs across surveys

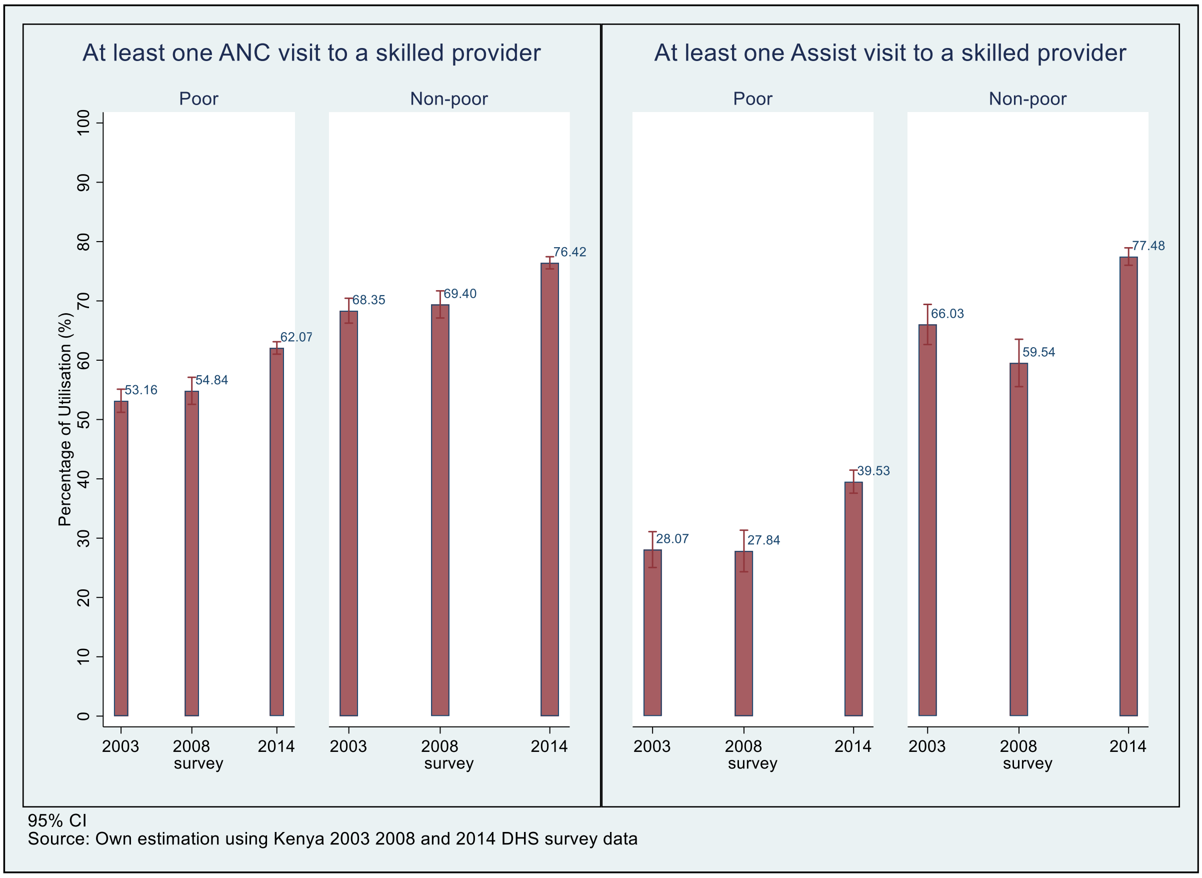

Figure A2.3: Utilisation of at least one ANC visit to a skilled provider and deliveries assisted by a skilled provider by the asset poor and non-poor across surveys using the 60th percentile asset index cut-offs across surveys

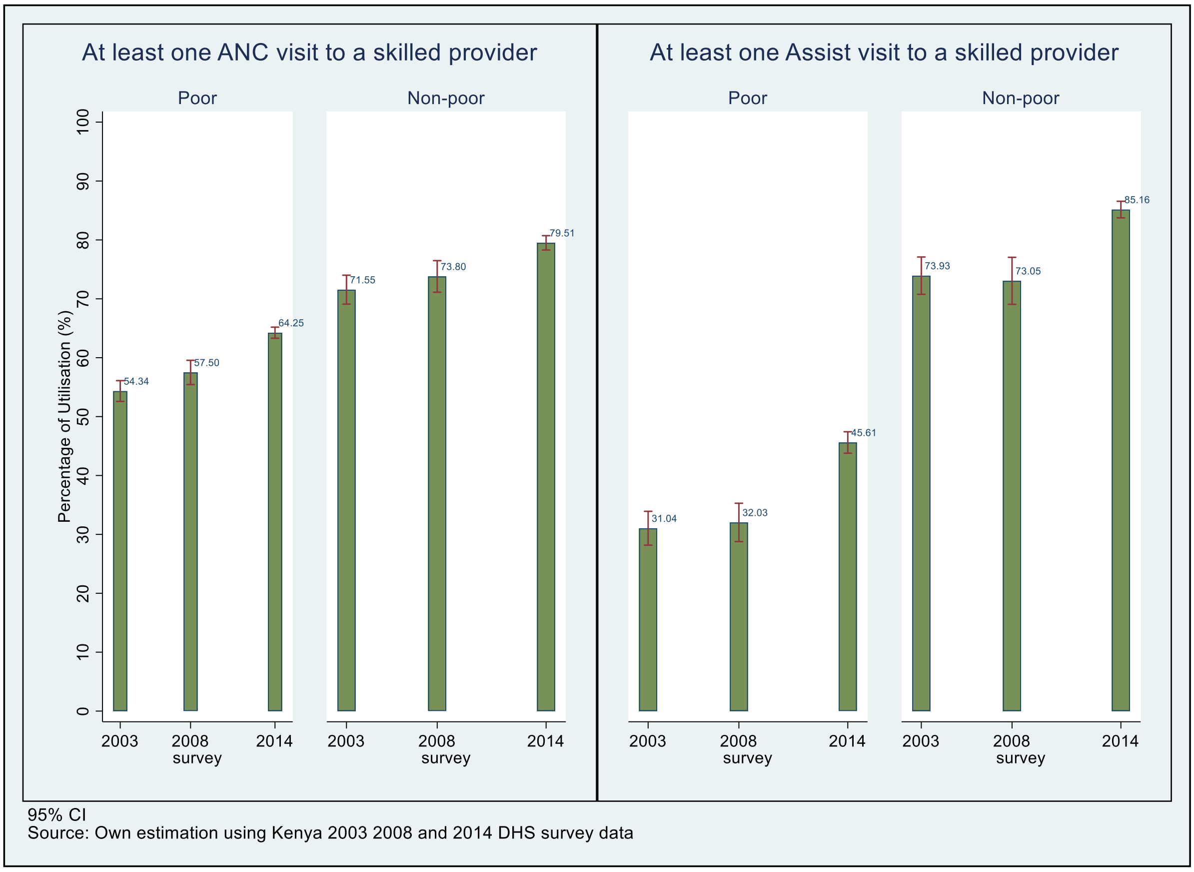

Table A2: Wagstaff concentration indices across surveys

Variable	Survey	Top 80 - Bottom 20 percentiles			Top 60 - Bottom 40 percentiles			Top 40 - Bottom 60 percentiles		
		Index value	**Std. error**	**p-value**	**Index value**	**Std. error**	**p-value**	**Index value**	**Std. error**	**p-value**
At least one ANC visit to a skilled provider	**2003**	0.1472	0.0135	0.0000	0.1433	0.0131	0.0000	0.1311	0.0111	0.0000
	2008	0.1174	0.0142	0.0000	0.1548	0.0167	0.0000	0.1420	0.0143	0.0000
	2014	0.1272	0.0066	0.0000	0.1672	0.0086	0.0000	0.1776	0.0091	0.0000
	Difference (2014 CI-2003	-0.0200	0.0150	0.1810	0.0239	0.0157	0.1270	0.0465	0.0144	0.0012
Delivery assisted by a skilled provider	**2003**	0.2846	0.0166	0.0000	0.3579	0.0200	0.0000	0.3265	0.0157	0.0000
	2008	0.1987	0.0193	0.0000	0.3219	0.0243	0.0000	0.3413	0.0201	0.0000
	2014	0.2556	0.0093	0.0000	0.3896	0.0119	0.0000	0.4056	0.0118	0.0000
	Difference (2014 CI-2003	-0.0290	0.0190	0.1278	0.0317	0.0233	0.1732	0.0791	0.0196	0.0001

Figure A3: Robustness check for Wagstaff concentration indices for utilisation of maternal health care across surveys

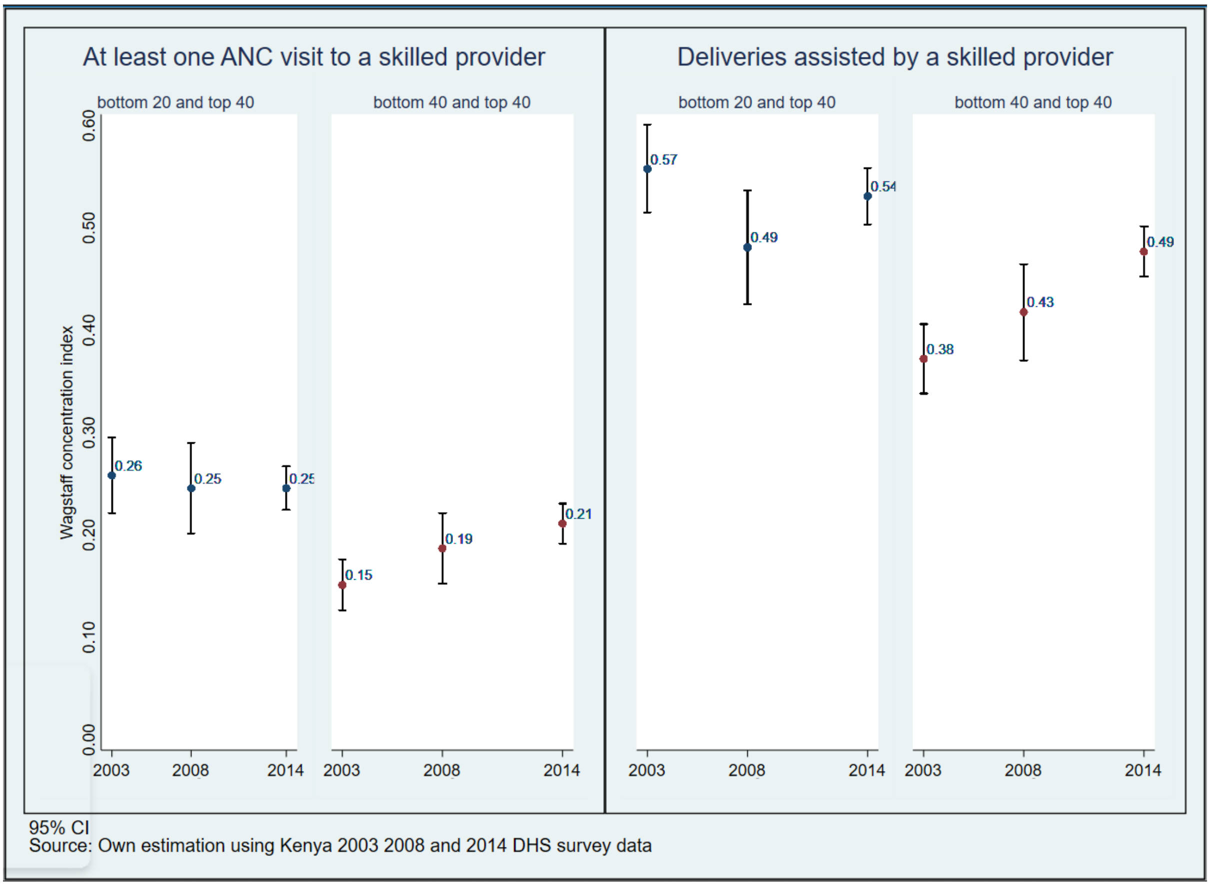

Table A3: Robustness check for Wagstaff concentration indices across surveys

Variable	Survey	Top 40 - Bottom 20 percentiles			Top 40 - Bottom 40 percentiles		
		Index	Std.	p-value	Index	Std.	p-value
At least one ANC visit to a skilled provider	2003	0.2578	0.0188	0.0000	0.1508	0.1226	0.0000
	2008	0.2452	0.0225	0.0000	0.1865	0.0177	0.0000
	2014	0.2453	0.0108	0.0000	0.2107	0.0100	0.0000
	Difference (2014 CI-2003 CI)	-0.0125	0.0217	0.5688	0.0600	0.0161	0.0002
Delivery assisted by a skilled provider	2003	0.5681	0.0223	0.0000	0.3789	0.0176	0.0000
	2008	0.4899	0.0291	0.0000	0.4254	0.0245	0.0000
	2014	0.5409	0.0144	0.0000	0.4857	0.0128	0.0000
	Difference (2014 CI-2003 CI)	-0.0272	0.0265	0.3046	0.1068	0.0217	0.0000

Figure A4: Utilisation of deliveries assisted by a skilled provider before and after the start of the FMC program by the poor and non-poor

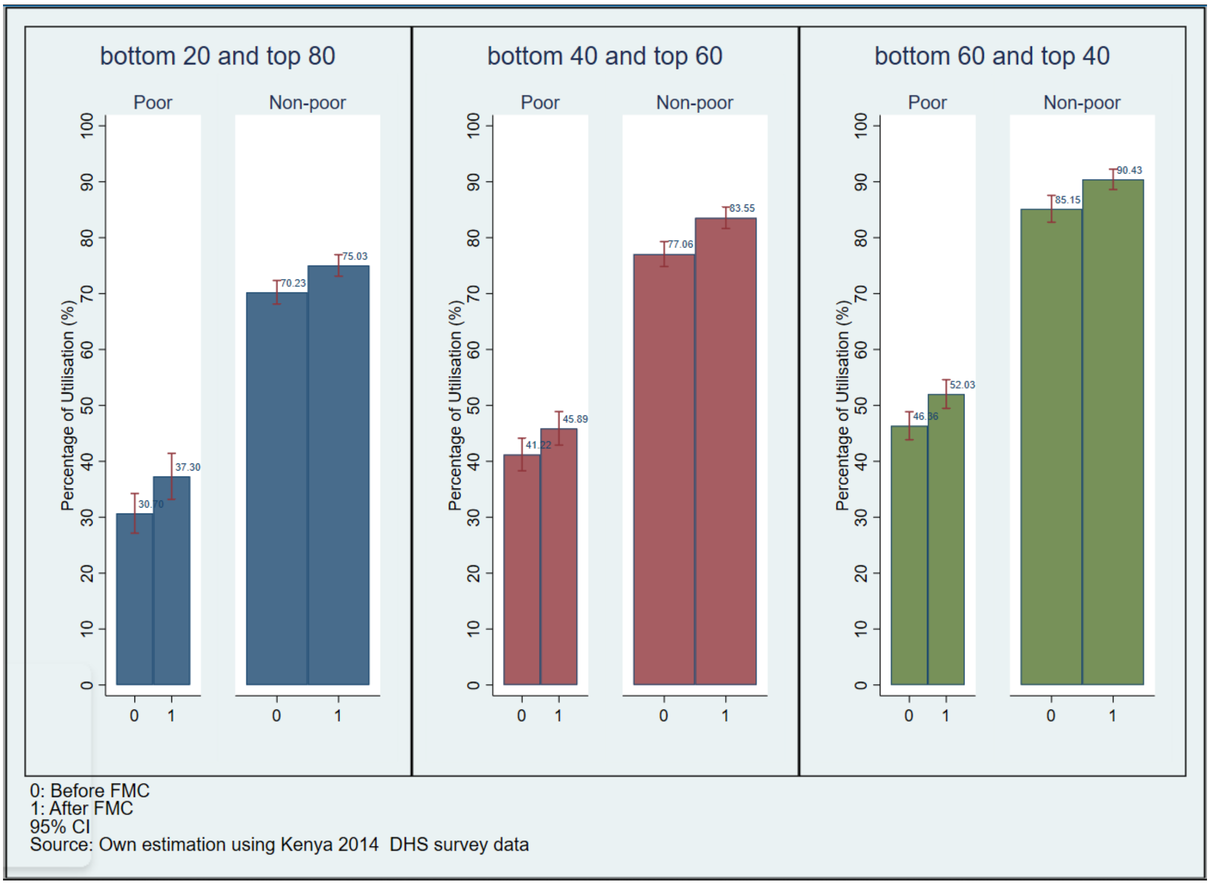

Table A4: Wagstaff concentration indices for utilisation of deliveries assisted by a skilled provider before and after the start of the FMC program

		Top 80 - Bottom 20 percentiles			Top 60 - Bottom 40 percentiles			Top 40 - Bottom 60 percentiles		
		Index value	**Std. error**	**p-value**	**Index value**	**Std. error**	**p-value**	**Index value**	**Std. error**	**p-value**
Delivery assisted by a skilled provider	**Before FMC**	0.2695	0.0139	0.0000	0.3696	0.0189	0.0000	0.4001	0.0178	0.0000
	After FMC	0.2787	0.0168	0.0000	0.4198	0.0201	0.0000	0.4183	0.0174	0.0000
	Difference	0.0092	0.0218	0.6713	0.0502	0.0276	0.0692	0.0182	0.0249	0.4649

Figure A5: Robustness check for Wagstaff concentration indices for utilisation of maternal health care before and after the start of the FMC program

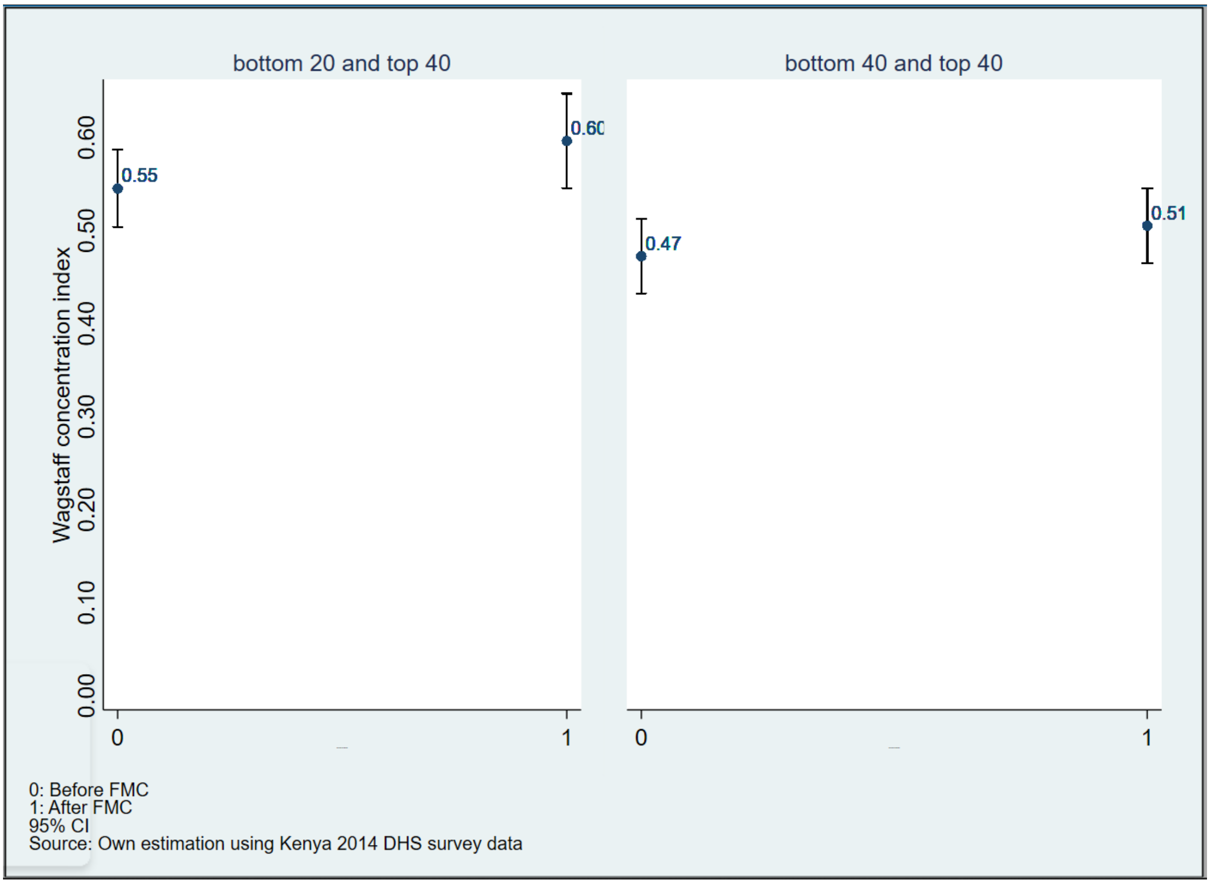

Table A5: Robustness check for Wagstaff concentration indices for utilisation of maternal health care before and after the start of the FMC program

Variable		***Top 40 - Bottom 20 percentiles***			***Top 40 - Bottom 40 percentiles***		
		Index value	**Std. error**	**p-value**	**Index value**	**Std. error**	**p-value**
Delivery assisted by a skilled provider	**Before FMC**	0.5450	0.0212	0.0000	0.4722	0.0204	0.0000
	After FMC	0.5960	0.0260	0.0000	0.5050	0.0205	0.0000
	Difference	0.0510	0.0335	0.1286	0.0328	0.0289	0.2565

Table A6: Robustness check for aggregate decomposition of the mean using Recentered Influence Functions (RIFs) when controlling for socioeconomic and demographic factors

	ANC by a skilled Provider		**Delivery by a skilled provider**	
	Top 40 - Bottom 20	***Top 40 - Bottom 40***	***Top 40 - Bottom 20***	***Top 40 - Bottom 40***
Non-poor	0.7949***	0.7949***	0.8516***	0.8516***
	(0.0063)	(0.0063)	(0.0072)	(0.0072)
Counterfactual	0.7449***	0.6676***	0.5454***	0.5010***
	(0.0228)	(0.0112)	(0.0381)	(0.0402)
Poor	0.5702***	0.6207***	0.3113***	0.3958***
	(0.0075)	(0.0053)	(0.0124)	(0.0097)
Difference	0.2247***	0.1742***	0.5404***	0.4558***
	(0.0100)	(0.0082)	(0.0143)	(0.0119)
Compositional effect	0.1747***	0.0469***	0.2342***	0.1052***
	(0.0235)	(0.0117)	(0.0387)	(0.0402)
Structural effect	0.0500**	0.1273***	0.3062***	0.3506***
	(0.0233)	(0.0118)	(0.0386)	(0.0414)
Observations	12,104	16,677	12,104	16,677

*Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Table A7: Detailed decomposition of the contribution of the compositional effect to the total mean difference in utilisation of maternal health care between the poor and non-poor when controlling for socioeconomic and demographic factors

	ANC by a skilled provider					**Delivery by a skilled provider**				
	Top 80– Bottom 20	*Top 60 – Bottom 40*	*Top 40 – Bottom 60*	*Top 40 - Bottom 20*	*Top 40 - Bottom 40*	*Top 80– Bottom 20*	*Top 60 – Bottom 40*	*Top 40 – Bottom 60*	*Top 40 - Bottom 20*	*Top 40 - Bottom 40*
	Explained/compositional component									
Total Explained	0.1167***	0.0390***	0.0573	0.1747***	0.0469***	0.1745***	0.0942***	0.1791***	0.2342***	0.1052***
	(0.0127)	(0.0087)	(0.0519)	(0.0235)	(0.0117)	(0.0208)	(0.0254)	(0.0676)	(0.0387)	(0.0402)
Pure explained	0.1107***	0.0373***	0.0207	0.1661***	0.0442***	0.1895***	0.0880***	0.1522**	0.2760***	0.0922**
	(0.0124)	(0.0086)	(0.0508)	(0.0216)	(0.0126)	(0.0210)	(0.0245)	(0.0741)	(0.0342)	(0.0380)
Mother's education	0.0645***	0.0555***	0.0612***	0.0883***	0.0720***	0.1124***	0.0937***	0.1268***	0.1565***	0.1213***
	(0.0087)	(0.0092)	(0.0147)	(0.0138)	(0.0121)	(0.0148)	(0.0143)	(0.0251)	(0.0237)	(0.0187)
Province	0.0240***	-0.0318**	-0.0760	0.0282***	-0.0470***	0.0406***	-0.0580**	-0.0574	0.0452**	-0.0974**
	(0.0068)	(0.0127)	(0.0502)	(0.0097)	(0.0180)	(0.0129)	(0.0265)	(0.0607)	(0.0210)	(0.0378)
Place of residence	0.0198***	0.0165***	0.0241***	0.0417***	0.0219***	0.0210**	0.0393***	0.0559***	0.0440**	0.0522***
	(0.0058)	(0.0063)	(0.0063)	(0.0118)	(0.0083)	(0.0082)	(0.0102)	(0.0116)	(0.0176)	(0.0133)
Mother's age	-0.0002	-0.0026	0.0065	0.0017	-0.0017	0.0013	-0.0001	0.0010	0.0018	-0.0003
	(0.0033)	(0.0052)	(0.0069)	(0.0058)	(0.0069)	(0.0014)	(0.0011)	(0.0024)	(0.0025)	(0.0014)
	-0.0019	0.0004	0.0027	-0.0038	0.0005	0.0127***	0.0133*	0.0253***	0.0252***	0.0167

Number of	(0.0024)	(0.0019)	(0.0026)	(0.0047)	(0.0025)	(0.0037)	(0.0078)	(0.0079)	(0.0065)	(0.0113)
Marital status	0.0044*	-0.0007	0.0022	0.0101**	-0.0013	0.0014	-0.0001	0.0006	0.0033	-0.0002
	(0.0024)	(0.0014)	(0.0046)	(0.0049)	(0.0020)	(0.0015)	(0.0004)	(0.0014)	(0.0034)	(0.0005)
Specification	0.0061	0.0017	0.0366	0.0086	0.0027	-0.0150	0.0062	0.0269	-0.0419	0.0130
Error	(0.0054)	(0.0057)	(0.0364)	(0.0156)	(0.0098)	(0.0102)	(0.0056)	(0.0363)	(0.0290)	(0.0102)
Mother's	-0.0031	0.0106	-0.0105	-0.0018	0.0060	0.0049	-0.0103	-0.0219*	-0.0010	-0.0106
education	(0.0057)	(0.0065)	(0.0093)	(0.0104)	(0.0084)	(0.0105)	(0.0075)	(0.0132)	(0.0176)	(0.0102)
Province	-0.0268	-0.0009	0.0091	0.0166	0.0029	-0.0269	-0.0059	0.0105	-0.0430	-0.0076
	(0.0290)	(0.0053)	(0.0153)	(0.0305)	(0.0093)	(0.0260)	(0.0051)	(0.0172)	(0.0314)	(0.0090)
Place of	-0.0036	-0.0003	-0.0014	0.0007	-0.0032	0.0127**	0.0006	-0.0042	-0.0064	0.0066**
residence	(0.0034)	(0.0007)	(0.0028)	(0.0026)	(0.0038)	(0.0063)	(0.0007)	(0.0033)	(0.0052)	(0.0033)
Mother's age	0.0123	0.0015	-0.0022	0.0323	0.0045	-0.0072	0.0012	0.0037	0.0077	0.0065
	(0.0138)	(0.0147)	(0.0194)	(0.0263)	(0.0184)	(0.0168)	(0.0090)	(0.0182)	(0.0317)	(0.0143)
Number of	-0.0013	0.0165***	0.0465***	-0.0097	0.0290***	0.0083*	0.0055	0.0240	0.0206	0.0073
children	(0.0026)	(0.0051)	(0.0150)	(0.0122)	(0.0102)	(0.0043)	(0.0040)	(0.0273)	(0.0164)	(0.0064)
Marital status	0.0101	-0.0083	0.0383	0.0112	-0.0126	0.0122	0.0142*	-0.0487**	0.0186	0.0224**
	(0.0078)	(0.0081)	(0.0239)	(0.0113)	(0.0118)	(0.0126)	(0.0076)	(0.0215)	(0.0177)	(0.0105)
Constant	0.0185	-0.0173	-0.0433	-0.0408	-0.0238	-0.0189	0.0009	0.0635**	-0.0384	-0.0116
	(0.0372)	(0.0188)	(0.0314)	(0.0468)	(0.0257)	(0.0397)	(0.0137)	(0.0316)	(0.0552)	(0.0192)

	Unexplained/Structural component									
Total unexplained	0.0510*** (0.0134)	0.1046*** (0.0096)	0.0952* (0.0518)	0.0500** (0.0233)	0.1273*** (0.0118)	0.2082*** (0.0216)	0.2854*** (0.0257)	0.2160*** (0.0684)	0.3062*** (0.0386)	0.3506*** (0.0414)
Pure unexplained	0.0211 (0.0248)	0.0914*** (0.0124)	0.1110*** (0.0357)	0.0945* (0.0486)	0.1081*** (0.0201)	0.1593*** (0.0277)	0.2623*** (0.0142)	0.2096*** (0.0469)	0.2158*** (0.0422)	0.3255*** (0.0174)
Mother's education	0.0304*** (0.0110)	0.0007 (0.0086)	0.0144 (0.0115)	0.0176 (0.0122)	-0.0007 (0.0101)	-0.0046 (0.0208)	-0.0026 (0.0093)	-0.0197 (0.0165)	-0.0475*** (0.0166)	-0.0391*** (0.0114)
Province	-0.0065 (0.0053)	0.0086 (0.0058)	0.0261 (0.0188)	0.0245 (0.0218)	0.0181* (0.0107)	-0.0000 (0.0075)	0.0382*** (0.0102)	0.0365 (0.0249)	-0.0045 (0.0133)	0.0807*** (0.0136)
Place of residence	0.0038** (0.0018)	0.0004 (0.0011)	-0.0051 (0.0039)	-0.0148** (0.0061)	-0.0019 (0.0049)	-0.0083** (0.0034)	0.0000 (0.0014)	-0.0001 (0.0043)	0.0135 (0.0107)	-0.0091* (0.0051)
Mother's age	-0.0166 (0.0172)	-0.0004 (0.0278)	0.0408 (0.0258)	-0.0342 (0.0329)	0.0122 (0.0398)	0.0105 (0.0212)	-0.0066 (0.0138)	-0.0093 (0.0249)	-0.0157 (0.0388)	-0.0149 (0.0171)
Number of children	0.0104* (0.0058)	-0.0277** (0.0118)	-0.0663*** (0.0183)	0.0174 (0.0178)	-0.0592*** (0.0209)	-0.0056 (0.0088)	-0.0042 (0.0063)	-0.0350 (0.0347)	-0.0252 (0.0242)	-0.0146 (0.0096)
Marital status	-0.0123 (0.0100)	0.0088 (0.0093)	-0.0430 (0.0289)	-0.0185 (0.0155)	0.0096 (0.0126)	-0.0017 (0.0159)	-0.0039 (0.0095)	0.0687*** (0.0261)	-0.0051 (0.0246)	-0.0053 (0.0115)
Constant	0.0118 (0.0369)	0.1010*** (0.0238)	0.1442*** (0.0405)	0.1026** (0.0469)	0.1298*** (0.0304)	0.1690*** (0.0482)	0.2414*** (0.0209)	0.1686*** (0.0441)	0.3003*** (0.0582)	0.3278*** (0.0255)

Reweighting error	0.0299	0.0132	-0.0158	-0.0445	0.0193	0.0489**	0.0232	0.0064	0.0904**	0.0251
	(0.0231)	(0.0106)	(0.0293)	(0.0458)	(0.0180)	(0.0212)	(0.0197)	(0.0341)	(0.0371)	(0.0340)
Mother's education	0.0183***	-0.0006	-0.0047	0.0271**	-0.0033	0.0186**	0.0081	-0.0122	0.0235	0.0054
	(0.0063)	(0.0067)	(0.0140)	(0.0132)	(0.0088)	(0.0089)	(0.0104)	(0.0307)	(0.0180)	(0.0139)
Province	0.0034	-0.0020	0.0085	-0.0756*	-0.0004	0.0132	-0.0056	0.0120	0.0445	-0.0045
	(0.0215)	(0.0050)	(0.0182)	(0.0422)	(0.0060)	(0.0166)	(0.0220)	(0.0180)	(0.0303)	(0.0337)
Place of residence	0.0125***	0.0006	-0.0001	0.0092*	0.0002	0.0024	0.0029	-0.0001	0.0005	0.0016
	(0.0040)	(0.0009)	(0.0016)	(0.0049)	(0.0009)	(0.0058)	(0.0025)	(0.0033)	(0.0060)	(0.0034)
Mother's age	-0.0001	-0.0033	-0.0350	0.0044	-0.0096	-0.0018	-0.0010	-0.0078	0.0006	-0.0015
	(0.0027)	(0.0182)	(0.0247)	(0.0073)	(0.0310)	(0.0028)	(0.0016)	(0.0120)	(0.0087)	(0.0025)
Number of children	-0.0025	0.0154	0.0151	-0.0053	0.0284	0.0162***	0.0193**	0.0168	0.0177*	0.0254*
	(0.0026)	(0.0113)	(0.0100)	(0.0060)	(0.0199)	(0.0052)	(0.0096)	(0.0135)	(0.0107)	(0.0149)
Marital status	-0.0017	0.0031**	0.0003	-0.0043	0.0039*	0.0002	-0.0005	-0.0023	0.0036	-0.0012
	(0.0013)	(0.0014)	(0.0034)	(0.0043)	(0.0024)	(0.0015)	(0.0007)	(0.0067)	(0.0072)	(0.0011)
Observations	20,783	20,783	20,783	12,104	16,677	20,783	20,783	20,783	12,104	16,677

*Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Table A8: Robustness check for aggregate decomposition of the mean using Recentered Influence Functions (RIFs) when controlling for socioeconomic, demographic and supply-side factors

	ANC by a skilled Provider		**Delivery by a skilled provider**	
	Top 40 - Bottom 20	***Top 40 - Bottom 40***	***Top 40 - Bottom 20***	***Top 40 - Bottom 40***
Non-poor	0.7949***	0.7949***	0.8516***	0.8516***
	(0.0062)	(0.0063)	(0.0070)	(0.0070)
Counterfactual	0.7399***	0.6335***	0.5678***	0.4642***
	(0.0232)	(0.0298)	(0.0454)	(0.0355)
Poor	0.5702***	0.6207***	0.3113***	0.3958***
	(0.0076)	(0.0052)	(0.0128)	(0.0097)
Difference	0.2247***	0.1742***	0.5404***	0.4558***
	(0.0099)	(0.0082)	(0.0148)	(0.0119)
Compositional	0.1697***	0.0129	0.2565***	0.0684*
	(0.0238)	(0.0302)	(0.0457)	(0.0360)
Structural	0.0550**	0.1614***	0.2839***	0.3874***
	(0.0237)	(0.0299)	(0.0457)	(0.0363)
Observations	12,104	16,677	12,104	16,677

*Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Table A9: Detailed decomposition of the contribution of the compositional effect to the total mean difference in utilisation of maternal health care between the poor and non-poor when controlling for socioeconomic, demographic and supply-side factors

	ANC by a skilled provider					***Delivery by a skilled provider***				
	Top 80– Bottom 20	***Top 60 – Bottom 40***	***Top 40 – Bottom 60***	***Top 40 - Bottom 20***	***Top 40 - Bottom 40***	***Top 80– Bottom 20***	***Top 60 – Bottom 40***	***Top 40 – Bottom 60***	***Top 40 - Bottom 20***	***Top 40 - Bottom 40***
	Explained/compositional component									
Total Explained	0.1176***	0.0207	0.0529	0.1697***	0.0129	0.1829***	0.0859***	0.1368**	0.2565***	0.0684*
	(0.0121)	(0.0194)	(0.0389)	(0.0238)	(0.0302)	(0.0215)	(0.0243)	(0.0614)	(0.0457)	(0.0360)
Pure explained	0.1122***	0.0129	0.0157	0.1639***	-0.0062	0.1860***	0.0796***	0.1412**	0.2687***	0.0575*
	(0.0122)	(0.0186)	(0.0437)	(0.0214)	(0.0316)	(0.0212)	(0.0236)	(0.0658)	(0.0360)	(0.0344)
Mother's education	0.0577***	0.0496***	0.0492***	0.0800***	0.0610***	0.1043***	0.0885***	0.1085***	0.1483***	0.1111***
	(0.0089)	(0.0109)	(0.0090)	(0.0139)	(0.0162)	(0.0145)	(0.0145)	(0.0191)	(0.0232)	(0.0206)
Province	0.0194***	-0.0734***	-0.0907**	0.0238**	-0.1165***	0.0387***	-0.0714***	-0.0605	0.0435**	-0.1340***
	(0.0069)	(0.0226)	(0.0424)	(0.0102)	(0.0352)	(0.0131)	(0.0254)	(0.0578)	(0.0220)	(0.0349)
Place of residence	0.0108	0.0049	0.0079	0.0239*	0.0066	0.0010	0.0178	0.0314**	0.0023	0.0240
	(0.0067)	(0.0086)	(0.0073)	(0.0143)	(0.0114)	(0.0096)	(0.0120)	(0.0126)	(0.0207)	(0.0157)
Mother's age	0.0005	-0.0079	0.0021	0.0016	-0.0112	0.0009	-0.0001	0.0005	0.0004	-0.0001
	(0.0030)	(0.0086)	(0.0066)	(0.0056)	(0.0132)	(0.0013)	(0.0013)	(0.0017)	(0.0026)	(0.0019)
	-0.0016	0.0003	0.0023	-0.0035	0.0004	0.0115***	0.0137*	0.0237***	0.0237***	0.0172

Number of	(0.0021)	(0.0021)	(0.0025)	(0.0044)	(0.0030)	(0.0035)	(0.0082)	(0.0077)	(0.0066)	(0.0127)
Marital	0.0035	-0.0016	0.0014	0.0083*	-0.0030	0.0013	0.0000	0.0003	0.0027	-0.0002
	(0.0022)	(0.0015)	(0.0028)	(0.0045)	(0.0022)	(0.0013)	(0.0003)	(0.0009)	(0.0028)	(0.0005)
Distance	0.0022	0.0013	0.0007	0.0027	0.0017	-0.0171	-0.0097	-0.0047	-0.0205	-0.0121
	(0.0070)	(0.0041)	(0.0031)	(0.0084)	(0.0051)	(0.0114)	(0.0064)	(0.0043)	(0.0137)	(0.0077)
Facility size	0.0028	0.0047	0.0025	0.0031	0.0046	0.0124**	0.0132***	0.0109**	0.0266**	0.0174***
	(0.0022)	(0.0029)	(0.0016)	(0.0043)	(0.0039)	(0.0057)	(0.0043)	(0.0045)	(0.0108)	(0.0061)
Alternative	0.0067	0.0257	0.0319**	0.0104	0.0386	-0.0055	-0.0006	0.0069	-0.0090	-0.0009
supply	(0.0066)	(0.0170)	(0.0129)	(0.0107)	(0.0270)	(0.0094)	(0.0088)	(0.0084)	(0.0162)	(0.0138)
Distance & place of residence	0.0101	0.0093*	0.0083*	0.0135	0.0117*	0.0385***	0.0281***	0.0242***	0.0507***	0.0352***
	(0.0081)	(0.0056)	(0.0045)	(0.0107)	(0.0068)	(0.0136)	(0.0093)	(0.0073)	(0.0176)	(0.0112)
Specification	0.0054	0.0078	0.0372**	0.0058	0.0191**	-0.0031	0.0063	-0.0044	-0.0122	0.0109
Error	(0.0054)	(0.0052)	(0.0182)	(0.0173)	(0.0091)	(0.0100)	(0.0047)	(0.0243)	(0.0344)	(0.0078)
Mother's	-0.0008	0.0103	-0.0169*	-0.0027	0.0091	0.0018	-0.0100	-0.0102	-0.0052	-0.0125
education	(0.0062)	(0.0085)	(0.0093)	(0.0113)	(0.0120)	(0.0119)	(0.0073)	(0.0110)	(0.0203)	(0.0106)
Province	-0.0313	0.0006	0.0146	-0.0158	-0.0157	-0.0223	0.0014	-0.0006	-0.0427	0.0047
	(0.0270)	(0.0136)	(0.0153)	(0.0305)	(0.0312)	(0.0245)	(0.0062)	(0.0156)	(0.0328)	(0.0136)
Place of	-0.0120**	-0.0005	-0.0072*	0.0027	-0.0068	0.0065	0.0008	0.0070	-0.0045	0.0097**
residence	(0.0053)	(0.0010)	(0.0044)	(0.0037)	(0.0058)	(0.0084)	(0.0010)	(0.0044)	(0.0060)	(0.0047)

Mother's age	0.0078	0.0017	0.0045	0.0281	-0.0015	-0.0056	-0.0024	0.0019	0.0074	0.0019
	(0.0103)	(0.0138)	(0.0176)	(0.0198)	(0.0228)	(0.0158)	(0.0088)	(0.0157)	(0.0262)	(0.0142)
Number of children	-0.0002	0.0227**	0.0407***	-0.0088	0.0407*	0.0045	0.0059	0.0161	0.0015	0.0075
	(0.0024)	(0.0093)	(0.0134)	(0.0131)	(0.0208)	(0.0039)	(0.0039)	(0.0246)	(0.0147)	(0.0066)
Marital	0.0115	-0.0120	0.0204	0.0117	-0.0207	0.0144	0.0125	-0.0421**	0.0214	0.0198*
	(0.0077)	(0.0098)	(0.0171)	(0.0107)	(0.0143)	(0.0118)	(0.0079)	(0.0172)	(0.0155)	(0.0104)
Distance	-0.0223*	-0.0141*	0.0116	-0.0240	-0.0156*	-0.0138	0.0033	-0.0121	-0.0105	-0.0017
	(0.0120)	(0.0073)	(0.0112)	(0.0155)	(0.0091)	(0.0179)	(0.0089)	(0.0114)	(0.0208)	(0.0098)
Facility size	0.0177*	0.0030	-0.0089	0.0281*	-0.0036	-0.0144	0.0044	0.0388**	-0.0254	-0.0005
	(0.0102)	(0.0142)	(0.0080)	(0.0156)	(0.0241)	(0.0267)	(0.0120)	(0.0170)	(0.0374)	(0.0157)
Alternative supply	-0.0091	0.0207	0.0304	-0.0149	0.0984	0.0105	-0.0109	-0.0802**	0.0178	-0.0165
	(0.0107)	(0.0323)	(0.0390)	(0.0184)	(0.0700)	(0.0189)	(0.0137)	(0.0325)	(0.0376)	(0.0243)
Distance & place of residence	0.0182*	0.0035	-0.0095	0.0171*	0.0006	0.0027	-0.0021	0.0034	-0.0005	0.0014
	(0.0096)	(0.0050)	(0.0064)	(0.0091)	(0.0056)	(0.0145)	(0.0055)	(0.0047)	(0.0107)	(0.0045)
Constant	0.0258	-0.0281	-0.0425	-0.0157	-0.0657	0.0126	0.0033	0.0737	0.0286	-0.0030
	(0.0345)	(0.0449)	(0.0409)	(0.0459)	(0.0701)	(0.0458)	(0.0209)	(0.0453)	(0.0669)	(0.0285)
	Unexplained/structural component									
Total unexplained	0.0501***	0.1229***	0.0996**	0.0550**	0.1614***	0.1997***	0.2937***	0.2583***	0.2839***	0.3874***
	(0.0127)	(0.0198)	(0.0387)	(0.0237)	(0.0299)	(0.0224)	(0.0248)	(0.0619)	(0.0457)	(0.0363)

Pure	0.0012	0.0655***	0.0853***	0.0090	0.0580**	0.1457***	0.2535***	0.2384***	0.1839***	0.3147***
unexplained	(0.0312)	(0.0133)	(0.0307)	(0.0602)	(0.0236)	(0.0323)	(0.0156)	(0.0470)	(0.0555)	(0.0196)
Mother's	0.0317***	0.0057	0.0241**	0.0254**	0.0053	0.0020	0.0012	-0.0281**	-0.0417**	-0.0327***
education	(0.0113)	(0.0081)	(0.0110)	(0.0122)	(0.0109)	(0.0206)	(0.0095)	(0.0136)	(0.0168)	(0.0119)
Province	-0.0042	0.0186**	0.0311	-0.0125	0.0507***	0.0044	0.0340***	0.0504**	-0.0039	0.0719***
	(0.0051)	(0.0080)	(0.0224)	(0.0221)	(0.0177)	(0.0078)	(0.0098)	(0.0237)	(0.0147)	(0.0155)
Place of	0.0050**	0.0012	0.0050	-0.0209***	0.0041	-0.0087**	-0.0002	-0.0072	0.0201	-0.0062
residence	(0.0025)	(0.0014)	(0.0061)	(0.0075)	(0.0062)	(0.0041)	(0.0018)	(0.0062)	(0.0123)	(0.0064)
Mother's age	-0.0108	-0.0149	0.0227	-0.0284	-0.0191	0.0093	-0.0030	-0.0086	-0.0143	-0.0100
	(0.0135)	(0.0390)	(0.0326)	(0.0252)	(0.0582)	(0.0205)	(0.0134)	(0.0224)	(0.0332)	(0.0172)
Number of	0.0078	-0.0359**	-0.0635***	0.0163	-0.0751***	-0.0007	-0.0059	-0.0270	-0.0003	-0.0155
children	(0.0062)	(0.0142)	(0.0185)	(0.0211)	(0.0262)	(0.0093)	(0.0066)	(0.0324)	(0.0228)	(0.0103)
Marital	-0.0135	0.0113	-0.0247	-0.0183	0.0155	-0.0032	-0.0029	0.0606***	-0.0061	-0.0031
	(0.0098)	(0.0106)	(0.0203)	(0.0136)	(0.0138)	(0.0152)	(0.0099)	(0.0210)	(0.0203)	(0.0114)
Distance	0.0190	0.0130	-0.0133	0.0208	0.0153	0.0014	-0.0120	0.0087	0.0001	-0.0073
	(0.0142)	(0.0105)	(0.0126)	(0.0154)	(0.0120)	(0.0239)	(0.0138)	(0.0122)	(0.0257)	(0.0133)
Facility size	0.0526***	0.0607***	0.0222*	0.0392*	0.0620**	0.0919*	0.0618**	-0.0563**	0.0994**	0.0614**
	(0.0199)	(0.0211)	(0.0127)	(0.0229)	(0.0284)	(0.0500)	(0.0271)	(0.0234)	(0.0423)	(0.0260)
	0.0010	-0.0364	-0.0696	0.0014	-0.1093**	0.0174	0.0402***	0.1076***	0.0249	0.0483**

Alternative	(0.0285)	(0.0274)	(0.0429)	(0.0495)	(0.0481)	(0.0319)	(0.0154)	(0.0388)	(0.0605)	(0.0221)
Distance & place of residence interaction	-0.0101	0.0021	0.0110	-0.0100	0.0023	0.0104	0.0124	0.0076	0.0144	0.0118*
	(0.0102)	(0.0072)	(0.0067)	(0.0078)	(0.0070)	(0.0174)	(0.0088)	(0.0060)	(0.0121)	(0.0068)
Constant	-0.0773*	0.0402	0.1402***	-0.0039	0.1063	0.0214	0.1278***	0.1308**	0.0914	0.1960***
	(0.0397)	(0.0518)	(0.0525)	(0.0486)	(0.0760)	(0.0694)	(0.0389)	(0.0554)	(0.0754)	(0.0423)
Reweighting error	0.0489*	0.0574**	0.0143	0.0460	0.1034**	0.0541**	0.0402**	0.0200	0.0999**	0.0728**
	(0.0284)	(0.0256)	(0.0217)	(0.0570)	(0.0445)	(0.0254)	(0.0179)	(0.0294)	(0.0501)	(0.0293)
Mother's education	0.0177***	0.0013	0.0057	0.0264**	0.0001	0.0189**	0.0095	0.0053	0.0277	0.0125
	(0.0059)	(0.0084)	(0.0067)	(0.0120)	(0.0135)	(0.0091)	(0.0110)	(0.0191)	(0.0186)	(0.0158)
Province	0.0134	0.0199	0.0051	0.0017	0.0473	0.0113	0.0058	0.0087	0.0484	0.0287
	(0.0208)	(0.0144)	(0.0108)	(0.0436)	(0.0289)	(0.0182)	(0.0200)	(0.0127)	(0.0362)	(0.0289)
Place of residence	0.0162***	-0.0000	-0.0003	0.0162**	0.0005	-0.0038	0.0020	0.0015	-0.0048	0.0004
	(0.0058)	(0.0007)	(0.0007)	(0.0070)	(0.0013)	(0.0080)	(0.0018)	(0.0024)	(0.0068)	(0.0022)
Mother's age	-0.0013	0.0165	-0.0193	0.0033	0.0373	-0.0008	-0.0007	-0.0048	0.0025	-0.0012
	(0.0028)	(0.0378)	(0.0242)	(0.0081)	(0.0764)	(0.0029)	(0.0016)	(0.0082)	(0.0087)	(0.0026)
Number of children	-0.0019	0.0166	0.0179*	-0.0061	0.0320	0.0154***	0.0184*	0.0168	0.0118	0.0240
	(0.0033)	(0.0168)	(0.0107)	(0.0082)	(0.0323)	(0.0055)	(0.0103)	(0.0139)	(0.0094)	(0.0159)
Marital	-0.0011	0.0045**	-0.0002	-0.0034	0.0071**	0.0003	-0.0003	-0.0007	0.0030	-0.0010

	(0.0011)	(0.0019)	(0.0020)	(0.0033)	(0.0034)	(0.0013)	(0.0006)	(0.0041)	(0.0051)	(0.0011)
Distance	0.0018	0.0000	-0.0001	0.0026	-0.0008	-0.0002	0.0000	0.0003	-0.0001	0.0005
	(0.0014)	(0.0010)	(0.0009)	(0.0025)	(0.0018)	(0.0012)	(0.0008)	(0.0010)	(0.0018)	(0.0010)
Facility size	0.0021	0.0054	0.0026	0.0079	0.0103	0.0087	0.0042	-0.0022	0.0060	0.0066
	(0.0017)	(0.0033)	(0.0024)	(0.0078)	(0.0076)	(0.0068)	(0.0036)	(0.0062)	(0.0194)	(0.0067)
Alternative supply	0.0037	-0.0070	0.0020	0.0009	-0.0307	0.0006	0.0005	-0.0051	0.0028	0.0024
	(0.0171)	(0.0149)	(0.0125)	(0.0329)	(0.0414)	(0.0104)	(0.0017)	(0.0082)	(0.0219)	(0.0045)
Distance & place of residence interaction	-0.0018	0.0001	0.0010	-0.0033	0.0000	0.0036	0.0008	0.0002	0.0024	-0.0002
	(0.0021)	(0.0007)	(0.0013)	(0.0028)	(0.0009)	(0.0030)	(0.0011)	(0.0006)	(0.0028)	(0.0010)
Observations	20,783	20,783	20,783	12,104	16,677	20,783	20,783	20,783	12,104	16,677

*Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Table A10: Quantile decomposition of the total mean difference in utilisation of delivery by a skilled provider before and after the start of the FMC program across the asset wealth quantiles

VARIABLES	***Quantile 5***	***Quantile 10***	***Quantile 15***	***Quantile 20***	***Quantile 25***	***Quantile 30***	***Quantile 35***	***Quantile 40***	***Quantile 45***	***Quantile 50***
After FMC	0.2290***	0.3073***	0.4284***	0.5018***	0.5289***	0.5341***	0.5670***	0.5750***	0.6104***	0.5956***
	(0.0137)	(0.0248)	(0.0082)	(0.0291)	(0.0055)	(0.0066)	(0.0048)	(0.0099)	(0.0070)	(0.0365)
Counterfactual	0.2065***	0.3123***	0.3198***	0.4094***	0.4713***	0.5055***	0.5552***	0.5600***	0.5867***	0.6129***
	(0.0085)	(0.0157)	(0.0081)	(0.0149)	(0.0099)	(0.0102)	(0.0062)	(0.0065)	(0.0064)	(0.0112)
Before FMC	0.2086***	0.3146***	0.3218***	0.4125***	0.4735***	0.5073***	0.5560***	0.5610***	0.5873***	0.6132***
	(0.0087)	(0.0117)	(0.0086)	(0.0143)	(0.0095)	(0.0098)	(0.0054)	(0.0064)	(0.0060)	(0.0116)
Difference	0.0204	-0.0073	0.1066***	0.0893***	0.0554***	0.0268***	0.0110*	0.0140	0.0231***	-0.0176
	(0.0174)	(0.0252)	(0.0112)	(0.0263)	(0.0086)	(0.0098)	(0.0066)	(0.0102)	(0.0070)	(0.0390)
Compositional	-0.0021	-0.0023	-0.0020	-0.0031	-0.0022	-0.0018	-0.0008	-0.0011	-0.0006	-0.0003
	(0.0092)	(0.0118)	(0.0066)	(0.0095)	(0.0066)	(0.0073)	(0.0042)	(0.0065)	(0.0046)	(0.0148)
Structural	0.0224	-0.0050	0.1086***	0.0924***	0.0576***	0.0286***	0.0118*	0.0150	0.0237***	-0.0173
	(0.0170)	(0.0259)	(0.0111)	(0.0248)	(0.0080)	(0.0088)	(0.0069)	(0.0097)	(0.0053)	(0.0400)
Observations	10,449	10,449	10,449	10,449	10,449	10,449	10,449	10,449	10,449	10,449

*Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

VARIABLES	***Quantile 55***	***Quantile 60***	***Quantile 65***	***Quantile 70***	***Quantile 75***	***Quantile 80***	***Quantile 85***	***Quantile 90***	***Quantile 95***
After FMC	0.7027***	0.7694***	0.8282***	0.8572***	0.8941***	0.9441***	0.9549***	0.9805***	0.9740***
	(0.0080)	(0.0251)	(0.0106)	(0.0039)	(0.0097)	(0.0123)	(0.0048)	(0.0043)	(0.0023)
Counterfactual	0.6345***	0.7218***	0.7492***	0.7872***	0.8440***	0.9126***	0.9371***	0.9540***	0.9826***
	(0.0163)	(0.0136)	(0.0069)	(0.0178)	(0.0122)	(0.0084)	(0.0054)	(0.0077)	(0.0047)
Before FMC	0.6341***	0.7212***	0.7493***	0.7870***	0.8431***	0.9119***	0.9366***	0.9536***	0.9822***
	(0.0163)	(0.0128)	(0.0068)	(0.0182)	(0.0132)	(0.0084)	(0.0056)	(0.0084)	(0.0050)
Difference	0.0686***	0.0482*	0.0789***	0.0702***	0.0510***	0.0323**	0.0182**	0.0269***	-0.0083
	(0.0159)	(0.0250)	(0.0113)	(0.0180)	(0.0151)	(0.0133)	(0.0075)	(0.0085)	(0.0057)
Compositional	0.0004	0.0006	-0.0001	0.0003	0.0008	0.0007	0.0004	0.0004	0.0003
	(0.0153)	(0.0136)	(0.0084)	(0.0177)	(0.0115)	(0.0073)	(0.0056)	(0.0063)	(0.0028)
Structural	0.0682***	0.0476**	0.0790***	0.0700***	0.0502***	0.0316***	0.0178**	0.0265***	-0.0086
	(0.0136)	(0.0198)	(0.0100)	(0.0165)	(0.0112)	(0.0110)	(0.0077)	(0.0066)	(0.0052)
Observations	10,449	10,449	10,449	10,449	10,449	10,449	10,449	10,449	10,449

*Bootstrapped standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Table A11: Means for the poor and non-poor at the 20th, 40th and 60th asset index percentiles

	Overall	Bottom 80	20-top	Bottom 60	40-top	Bottom 40	60-top
Variable		**poor**	**non-poor**	**poor**	**non-poor**	**poor**	**non-poor**
Individual-level (Mother's) characteristics							
Observations	**14820**	**3518**	**11302**	**6726**	**8094**	**9664**	**5156**
Mother's Education							
No education	0.0974	0.3226	0.0513	0.1884	0.0426	0.1573	0.0241
Primary	0.5441	0.6041	0.5318	0.6600	0.4743	0.6531	0.4109
Secondary	0.2615	0.0676	0.3012	0.1377	0.3361	0.1687	0.3751
Higher	0.0969	0.0057	0.1156	0.0138	0.1470	0.0209	0.1899
Region of residence							
Nairobi	0.1154	-	0.1390	0.0017	0.1839	0.0040	0.2515
Central	0.1051	0.0149	0.1236	0.0541	0.1358	0.0618	0.1580
Coast	0.1014	0.1475	0.0919	0.1028	0.1005	0.1052	0.0967
Eastern	0.1271	0.1420	0.1241	0.1436	0.1172	0.1569	0.0907
Nyanza	0.1377	0.1146	0.1425	0.1501	0.1303	0.1723	0.0955
Rift Valley	0.2767	0.3786	0.2558	0.3305	0.2443	0.3142	0.2308
Western	0.1108	0.1293	0.1070	0.1775	0.0705	0.1467	0.0668
North Eastern	0.0258	0.0731	0.0161	0.0396	0.0175	0.0389	0.0098
Mother's age at child's birth							
15-19 years	0.1075	0.1045	0.1082	0.1156	0.1027	0.1186	0.0940
20-29 years	0.5740	0.5300	0.5829	0.5326	0.5988	0.5340	0.6228
30-39 years	0.2787	0.3090	0.2725	0.2974	0.2674	0.2975	0.2557
40-49 years	0.0398	0.0566	0.0364	0.0543	0.0311	0.0498	0.0276
Parity							
Low Parity	0.6524	0.4579	0.6922	0.4970	0.7460	0.5283	0.8040
High Parity	0.3476	0.5421	0.3078	0.5030	0.2540	0.4717	0.1960
Marital Status							

Not Married/Not living together	0.1849	0.1736	0.1872	0.1765	0.1899	0.1833	0.1868
Married or living together	0.8151	0.8264	0.8128	0.8235	0.8101	0.8167	0.8132
Cluster level characteristics							
Observations	**1581**	**309**	**1272**	**647**	**934**	**940**	**641**
Place of residence							
Urban	0.4381	0.0618	0.5012	0.0942	0.6152	0.1693	0.6953
Rural	0.5619	0.9382	0.4988	0.9058	0.3848	0.8307	0.3047
Health facilities offering antenatal care							
Distance	4.3552	6.9339	3.9233	6.1505	3.4307	5.6127	3.1524
Size							
Level 2	0.5920	0.6711	0.5788	0.6597	0.5572	0.6496	0.5370
Level 3	0.2560	0.2553	0.2561	0.2266	0.2712	0.2207	0.2898
Level 4	0.1310	0.0736	0.1407	0.1127	0.1405	0.1224	0.1393
Level 5	0.0209	-	0.0244	0.0010	0.0312	0.0074	0.0339
Alternative supply	7.8289	1.8743	8.8261	2.2261	10.7138	2.8726	12.5695
Health facilities offering maternity services							
Distance	5.6119	8.6837	5.0974	7.3854	4.6987	6.8437	4.4336
Size							
Level 2	0.3805	0.5450	0.3529	0.5177	0.3098	0.5029	0.2634
Level 3	0.3637	0.3401	0.3676	0.3200	0.3862	0.3138	0.4114
Level 4	0.2114	0.1149	0.2275	0.1596	0.2380	0.1675	0.2533
Level 5	0.0335	-	0.0392	0.0027	0.0494	0.0129	0.0533
Level 6	0.0109	-	0.0128	-	0.0166	0.0029	0.0186
Alternative supply	3.2244	1.0946	3.5811	1.3977	4.1650	1.6052	4.7731