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TITOLO TESI

Reproduction and maternal health care among young women in Kenya: geographic and socio-economic determinants

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Abstract

Many inequalities exist in Kenya at different levels, including wealth, literacy, and place of residence, and all these inequalities are exacerbated when some other barriers decrease the possibility of receiving adequate care during pregnancy and delivery. Indeed, many factors influence the propensity of young women to seek appropriate maternal healthcare, and they need to be considered when analyzing these women's reproductive behavior.

This study aimed to contribute to the analysis concerning Kenyan young women's determinants on maternal healthcare-seeking behavior for the 5 years preceding the 2008/9 Kenya Demographic and Health Survey.

The specific objectives were to: investigate the individual and contextual variables (social, economic, cultural, community-oriented) that may explain maternal healthcare habits; measure the individual, household and community effect on maternal healthcare attitudes in young women; assess the link between young women's characteristics, such as literacy, wealth status and place of residence, and the use of facilities for maternal healthcare; find a relationship between young women's behavior and the community where they live (such as the impact of education in the community on their propensity to seek reproductive healthcare); examine how the role of the local presence of healthcare facilities influences reproductive behavior, and if the specificity of services offered by healthcare facilities, including the services addressed specifically to youths, affects their inclination to use healthcare facilities, and measure the geographic differences that influence the propensity to seek appropriate maternal healthcare.

The analysis of factors associated with maternal healthcare-seeking behavior for young women in Kenya was investigated using multilevel models applied to the 2008/9 Kenya Demographic and Health Survey data. We performed three major analyses, which concerned the individual and contextual determinants influencing antenatal care (discussed in Part 6), delivery care (Part 7), and postnatal care (Part 8). Our results show that there is a significant variation in antenatal, delivery and postnatal care between communities, even if the majority of variability is explained by individual characteristics.

The analysis based on timing of antenatal care visits and on the frequency of the visits used two-level linear regression models, while the analysis concerning the probability of receiving at least one visit was based on a multilevel logistic model. The results showed that the timing of antenatal care visits, as well as the frequency of visits for young women in Kenya, are associated with a range of socio-economic and demographic factors, as well as contextual factors. The analysis concerning young women's healthcare facility delivery attitudes has shown that the communities where women live, the environment where they grow up, the distance from healthcare facilities in general, as well as the distance from specific services such as Comprehensive Emergency Obstetric Care (CEMOC), all have an influence on place of delivery. This also means that the quality of the healthcare facility and the services offered affect the propensity to deliver in a hospital. Correct postnatal care behavior is highly dependent on the place of delivery, and women who delivered at home are also those who generally do not receive postnatal care. However, the presence of healthcare facilities in the community might increase the probability of accessing postnatal care also for those young girls who delivered at home. Therefore, the group of women who has never received any postnatal care needs to be better investigated, with more appropriate instruments.

There are, in fact, differences at the women's level on the probability of receiving antenatal care and delivering in a healthcare facility instead of at home: older age at first intercourse, utilization of modern methods of family planning, higher level of education of the mother, having attended antenatal care visits, especially if performed by a trained provider, and having heard information on family planning from media sources increase the propensity to proper reproductive healthcare behavior. Moreover, community factors and availability of healthcare facilities on the territory are also crucial in influencing young women's behavior. Therefore, policies addressed to youth's reproductive health should also consider geographic inequalities and different types of barriers in access to healthcare facilities.

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Part 1 - General Introduction

> *"Protecting the health of mother and baby requires good antenatal care, skilled attendants, a safe place to give birth, access to emergency obstetric care* (UNFPA, 2002)."

Maternal health and improving health conditions for women and children have always been a priority for development and poverty reduction. The fifth Millennium Development Goal, *"Improving Maternal Health,"* targets the reduction of three quarters of the maternal mortality rate and the achievement of *"universal access to reproductive health"* by 2015. Within this framework, providing appropriate prenatal care and a safe delivery environment is a priority. Adequate presence of health facilities and equitable access to services addressed to women's needs are key factors in protecting maternal health during pregnancy and childbirth. Specific types of care received by women during pregnancy, during childbirth, and immediately after childbirth are critical for the survival and well being of mother and child. Prenatal care reduces risks during pregnancy, and the presence of a qualified assistant during childbirth and delivery ensures a positive outcome.

The coverage of prenatal treatment is almost universal in Kenya, but differences are still persistent, especially among urban and rural areas, in the levels of education of women and the levels of household welfare. Literature on Kenyan women's reproductive behavior highlights that the use of contraception and childbirth-related behaviors are strongly influenced by context variables, which differ at spatial, social, economic and community levels (Stephenson *et al*., 2006). Indeed, it is widely recognized that fertility regulation contributes to improve women's health by reducing the number of pregnancies and associated risks, giving women more control over their lives. However, despite the fact that Kenya has shown a reduction of fertility rates since the 1980's, entering in the fertility transition and reducing by almost 50 per cent its total fertility rate, progress in maternal and reproductive health care has been slow, especially for some vulnerable groups of women.

Despite an increased number of healthcare facilities and services for maternal healthcare in the country, the percentage of women who follow the recommended behavior for reproductive healthcare (for example, a certain number of visits during pregnancy) delivery percentages in a healthcare facility and percentages for postnatal care are still not encouraging, especially

among disadvantaged women. Moreover, there is no evidence that maternal mortality and morbidity have declined at the levels claimed by MDGs. The reported increase in maternal mortality in Kenya over the last ten years (National Coordinating Agency for Population and Development, 2010) is an indication of the poor quantity and quality of maternal and reproductive healthcare. The pregnancy-related complications have an adverse impact on both the mother and the newborn, leading to the perpetuation of disadvantaged situations, especially in cases of high vulnerability of the mothers.

1.1 Rationale for the Study

1.1.1 Reproductive health behavior among young women in Kenya

Several studies in the developed and developing world have recognized that younger pregnant women experience reproductive life differently from older pregnant women and have different maternal and child-health outcomes. Many scholars have found a strong connection between childbearing at an early age with increased pregnancy complications, higher maternal and infant mortality, lower social mobility and occupational possibilities for the young mother and child. Moreover, pregnancies at an early age are also associated with high fertility. (Sai, 1975; Gyepi-Garbrah, 1985). Many studies have been conducted in Kenya concerning the social, health and economic problems relating to early pregnancy. (Gachuhi, 1980; Njogu, 1980; Gyepi-Garbrah, 1985).

Young girls are more likely to face such complications during pregnancy and delivery as preterm delivery, low birth weight, neonatal mortality and late spontaneous or induced abortions. This disparity has been attributed to the teenagers' physiological immaturity, the lower use of prenatal and delivery care services, a lower socioeconomic status, and higher rates of unintended pregnancy. (Jolly, 2000; Abou-Zahr and Wardlaw, 2003; Magadi *et al*., 2007; Birungi *et al*., 2011).

In Kenya risks associated with pre- and postnatal healthcare are higher for teenagers than for older women, and this result has been linked to psychological and social immaturity in young girls who become pregnant, as well as the lack of or the difficult accessibility to adequate healthcare services. (U.S. Department of Commerce, 1996; NAS, 1996; UN, 1989; Liskin et al., 1985; Chike-Obi, 1993).

In Kenya, appropriate facilities and services for women are not always available, and access to them is not guaranteed. In addition, the lack of healthcare facilities, and the facilities' lack

of appropriate services is more difficult for young women, partly because healthcare facilities do not always meet their specific needs.

In different parts of the same country, certain aspects of society have to be considered in order to make national programs more effective. According to Marcela Villarreal (1998), it is very difficult to translate the needs of young adolescents into effective operational programs, since complexity and differentiation within groups determined by age, place of origin and culture is sometimes overlooked. Moreover, many barriers prevent young women from accessing healthcare facilities, such example long distances, the costs of services and the treatment they receive. Given their very young age, the young women generally feel uncomfortable talking about sensitive topics, especially if they are unmarried. This outlines in general terms the condition of disadvantage and inequality in reproductive healthcare access (Gage, 1998).

Khasian (1985) highlights that in Kenya, more than one third of young pregnant women have not received any antenatal care, and that 28 percent had their first visit in a hospital during or after the eighth month of pregnancy. Zabin and Kiragu, citing the research work of Omunga (1989), emphasize that in Kenya, among young unmarried women, 90 percent visited antenatal care facilities only during the last three months of pregnancy, and not very often. Kenya is one of the African countries where teenage pregnancy has always been particularly widespread, despite the decline in fertility shown from the late 1970's to the late 1990's (Kelley, Nobbe, 1990). The 2003 Kenyan Demographic and Health Survey shows stagnation of fertility decline compared to the previous period, with a 4.9 children per woman TFR for the years 2000-2003. Moreover, the existing social and economic disparities create a difference in access for these women to healthcare facilities.

A report from the DHS in 2003 shows, among other information, that about half of the uneducated adolescents in the country (46 percent) have at least one pregnancy, while among those with secondary education only 10 percent have had at least one pregnancy. Teenagers from poorer families are more at risk of having at least one child (29 percent) compared to peers from richer families. Regional differences show that this phenomenon is strongly linked to the territory and the context in which a couple lives. In the Nyanza, North Eastern, and Coast provinces, the phenomenon is more widespread than in other regions. These regions are also those with the highest rates of illiteracy, especially among women (Kyalo Ndeng'e, 2004) and are the least economically developed in the country.

Many scholars state that, among the variables directly affecting adolescent fertility, the early age at first intercourse is often associated with an increased risk of unprotected sex and multiple partners, which together increase the risk of contracting infectious and sexually

transmitted diseases (Hersh *et al*., 1998; Hindin and Fatusi, 2009). Another relevant factor influencing early pregnancy is the entry in a union at a young age. However, in recent years the pattern of premarital childbearing has preoccupied policy makers, because often pregnant women who are not in a union are also those who are less wealthy and less likely to receive maternal healthcare. As reported by Mahy and Gupta (2002), "for most countries in sub-Saharan Africa, the majority of childbearing occurs in union, but in both Côte d'Ivoire and Kenya about half of first births among women under age 18 occurred out of union."

The main consequences of increased teenage premarital sexual activity are the spread of sexually transmitted diseases, high rates of abortion (due to the need to hide the pregnancy), and socio-economic effects, such as withdrawal from schools. Moreover, given the high degree of vulnerability in this age group, often young girls are not aware of the necessity for correct antenatal and delivery care, and are disadvantaged in accessing these services (Loxton *et al*., 2007).

1.1.2 The Research Problem

This research aims to study the access to maternal healthcare services of this particularly vulnerable group of young women (aged 15-25 years old) in Kenya. There are no universally accepted definitions for 'adolescence' and 'youth'. The age group can vary greatly depending on different societies and cultures. The biological beginning of adolescence is often associated with the start of puberty and, for some cultures, ends when one marries. Since in many societies the age at marriage is very young, the adolescent period tends to be brief, and especially so in rural areas of developing countries. At an international level, however, the World Health Organization, through the establishment of age limits, has set up a common definition for 'adolescence' and 'youth'. The earlier phase of adolescence ranges from 10 to 14 years of age, while a second phase ranges from 15 to 19 years of age. Therefore, adolescence ranges from 10 to 20 years of age.

The concept of youth is overlapping, consisting of late adolescence and early adulthood. Most refer to youth as the age group between 15-24, while distinguishing between the early (15-19) and late (20-24) phases. Kesterton (2010) defines young people as those aged 10-24 years and this group combines adolescents (aged 10-19 years) and youths (aged 15-24 years). Youth, as such, is also a transitional stage in human development, though it shades across the line between adolescence and adulthood (Gyepi-Garbrah, 1985). For the purposes of this study,

'adolescence' (also called teenage), when specified, refers to the early phase (15-19 years). Where not explicitly specified, it is used interchangeably with youths (also called young mothers, women or girls) and encompasses the age group between 15-25 in order to include all girls aged 24.

Many inequalities exist in Kenya, at different levels, including wealth, literacy, and place of residence, and all these inequalities are exacerbated when some other barriers decrease the possibility of receiving adequate care during pregnancy and delivery.

Kenya faced crucial changes brought on by its rapid urban growth, estimated at 6 percent annually (UN-HABITAT, 2008). The Kenyan Human Development Index has slowly declined since the beginning of the 1990's, bringing a widening of the gaps in wealth between rich and poor groups of the population (UNDP, 2005).

The Kenyan Ministry of Health launched many programs to improve people's health since the country's independence in 1963, leading to some decline in maternal and child mortality up to the early 1990's (WHO, 2007). Most of these strategies considered social and environmental factors as influencing the health of the population at a local level.

As asserted by several scholars, 'Integrated interventions that support community action through participation and empowerment have been shown to reduce health risks, improve health outcomes, and promote better quality of life' (Mercado *et al*., 2007; Muchukuri and Grenier, 2009). However, in order to universalize access to maternal healthcare for all women it is necessary to consider many different aspects.

Young women indeed have to face numerous obstacles for access to maternal healthcare, and pre-existing disparities create a vicious cycle of poverty and need (Taffa *et al*., 2003; The World Bank, 2007). When examining maternal healthcare, the focus is mainly on negative outcomes of pregnancy and on physical immaturity leading to pregnancy complications. Diversities between young women and adults are rarely taken into account in the analysis, despite the differences in behaviors shown by the higher number of births correlated with the increasing age of the mother, and therefore by the confidence a mother acquires with several deliveries. Furthermore, the availability of these services does not always lead to an increased access for young women to healthcare facilities.

Previous studies on young Kenyans' reproductive behaviors using the data for 1990-1999, as well as data leading up to 2003, have considered general healthcare facilities in order to assess whether their presence could influence an increased use by young women (Magadi *et al*., 2000; Stephenson *et al*., 2006; Magadi *et al*., 2006). This study also aims at assessing to what

extent specific services for each stage of maternal healthcare, and services addressed to youth, influence said access.

Disparities among young women in Kenya are not only at an individual level, such as level of literacy. Given the influence of the community on their behavior, as well as the different availability of resources in each area, many inequalities are observed at a territorial level (Magadi *et al*., 2000; Magadi *et al*., 2006; Family Health International, 2006).

Moreover, young women's feelings toward proper healthcare facilities and skilled attendants contrast, and the role of traditional birth attendants in taking care of maternal health of the community is still highly debated (Gage, 1998). Indeed, many factors influence the propensity of young women to seek appropriate maternal healthcare and need to be considered when analyzing their reproductive behavior.

1.2   Research Objectives

This study aims to contribute to the analysis concerning Kenyan teenagers' and young women's determinants on maternal healthcare-seeking behaviors for the 5 years preceding the 2008/9 Kenya Demographic and Health Survey. It also aims to consider the influence of the community (where young women grow up, and also of the availability of general and specific healthcare facilities in the community areas) and of the individual background of women on young women's propensity to seek antenatal, delivery and postnatal care. By using a multilevel modeling analysis, the study aims at:

1. Investigating the individual and contextual variables (social, economic, cultural, community-oriented) that may explain maternal healthcare habits;

2. Measuring the individual, household and community effect on maternal healthcare attitudes in young women;

3. Assessing the link between young women's characteristics, such as literacy, wealth status and place of residence, and the use of facilities for maternal health care;

4. Finding a relationship between young women's behavior and the community where they live, as well as the impact of education in the community on their propensity to seek reproductive healthcare;

5. Examining how the role of the local presence of healthcare facilities influences reproductive behavior, and if the specificity of services offered by healthcare facilities, including the services addressed specifically to youths, affect their inclination to use healthcare facilities;

6. Measuring the geographic differences that influence the propensity to seek appropriate maternal healthcare.

We expect that the results will help to assess the role of the community in reproductive healthcare, and the impact of availability of healthcare services on use by young women. Indeed, an investigation of factors associated with maternal health care utilization by young women is necessary for an improved understanding of the factors hindering maternal healthcare for the development of appropriate intervention programs.

The pathways in which individual and contextual factors operate in influencing appropriate maternal health care by young women are crucial; dynamics to be understood and used in order to improve the targeting of safe motherhood programs of intervention, and to better approach services for youths in the country.

1.3 An outline of the thesis

This study intends to frame the issue of young women's reproductive healthcare in Kenya by looking at several factors, such as the different contexts where a young woman grows up, and the barriers in access to healthcare, given the geographic and social inequalities existing in Kenya. Furthermore, by developing a statistical model, the study aims at assessing the individual and contextual determinants of young women's reproductive health behavior. After introducing the population dynamics of Kenya, some indications on maternal healthcare in the Country are presented to frame the topic. Maternal healthcare, maternal mortality, health inequalities and political initiatives in reproductive care in Kenya are discussed in order to show the background of the phenomenon in analysis.

In Part 3 of this dissertation, the group of analysis considered in this study (young women) is framed from a socio-economic and demographic point of view, in order to show the theoretical determinants influencing young women's healthcare. In Part 4, the methodology adopted by this work to test the hypothesis of the study is introduced, followed by Part 5, which describes data and methods used. Parts 6, 7 and 8 are the core analysis of the study, aiming at assessing the factors influencing the three stages of reproductive healthcare: antenatal care, delivery and postnatal care, and discussing the results. Part 9 shows conclusions of the work and recommendation for policies and further analysis.

Part 2 - Framework of research: context of the study and literature review

2.1 Population dynamics of Kenya: linkages between socioeconomic factors and demographic change

Kenyan population structure and demographic trends are interesting case studies, and their dynamics are taken as a reference in all countries in Sub-Saharan Africa. Given the extremely rapid population growth, with rates ranging from 3.37% and 3.78% from the mid-60's to late-90's, Kenya experienced a shift from 6 million people in the 1950's to 23 million in late 1980's. Although reporting a slight decline in rates of population growth from the 80's onwards, population growth continued to climb up to reach 30 million in 1999, and then to 33.7 in 2003, 36.5 million in 2006, up to now with a population that stands around 40 million of people, where nearly 43% are under the age of 14. Figures 2.1 and 2.2 show the rise of population from 1960 up to 2010 and the growth rates, in percentage, of population for the same period.

Fig. 2.1 Population of Kenya, total (in millions)

Fig. 2.2 Population growth rates in Kenya (annual %)
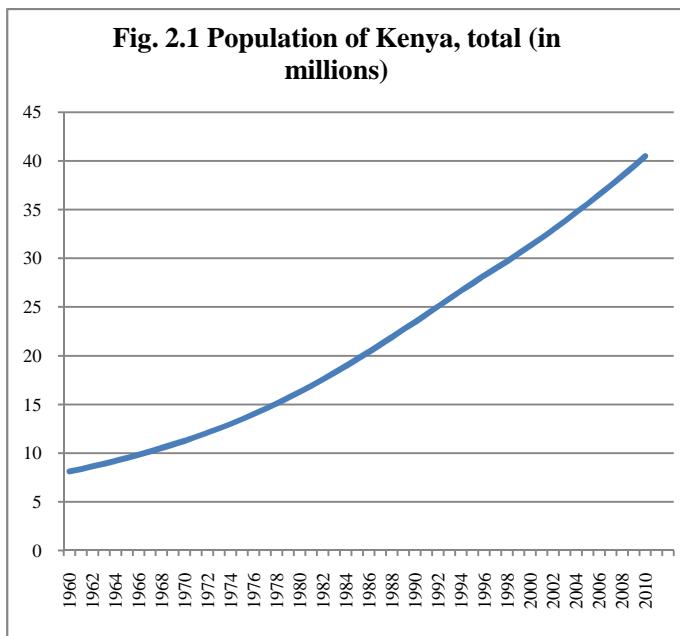
Source: elaboration on World Bank metadata

The massive growth Kenya has experienced since the mid-twentieth century is the result of typical trends in fertility and mortality for a sub-Saharan Country: high rates of fertility and beginning of decline in mortality rates. These facts are closely correlated with the trends in historical, economic and social events occurring in the country. Between 1950 and 1973 the

country experienced a considerable decline in mortality, with the Central province leading this decline with a reduction of 70% in mortality. Between 1973 and 1984 mortality rates continued their fall and a particularly rapid decline can be seen in neonatal and infant mortality rates (Figure 2.3). The decline in mortality rates is correlated, in the literature, with the increase in women's education and adult literacy. The study held by Brass and Jolly (1993) points to a crucial relationship between levels of education, and women and children's district of residence. In districts with higher education levels and widespread adult literacy, even children born to mothers with lower education levels had lower risk of death in childhood. Therefore, from about 1962 a rapid population growth can be noticed and annual growth rate stands at approximately 3.35%. From 1975 to 1979, a peak of population growth occurred following the sharp drop in mortality rates.

Fig. 2.3 Mortality rate in Kenya, under-5 (per 1,000)
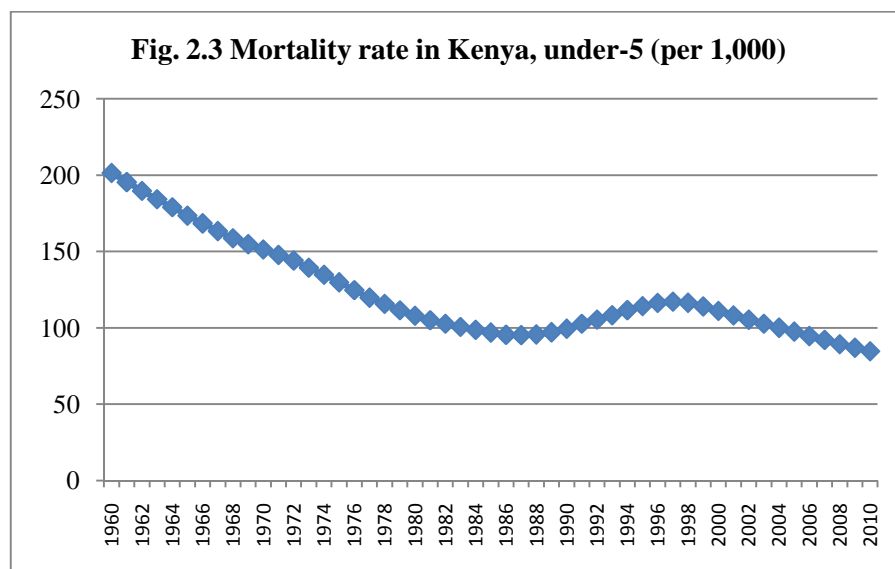
Source: elaboration on World Bank metadata

As a result of fertility and mortality trends in recent years (high rates of fertility and declining mortality) Kenya now has a large young population: almost 44% of the population is under 15 years of age and only 4% of the population is over 65. In order to frame the topic it is also useful to consider the socio-economic and political framework. With its independence in 1963, the country achieved the end of civil war and overcame a difficult economic situation, which also resulted in extensive damage to the already existing inadequate infrastructure. The 1960's and 1970's were thus characterized by an economic recovery that led to a boom in economic gain and a fairly stable fiscal and monetary policy, although the balance between revenue and economic boom in population growth was precarious. The country also

implemented several social and economic programs in recent years, such as the Land Reform and Free Health and Education Policy. These ambitious programs, linked to a market-oriented strategy for the development of the Country (openness to foreign investment, agriculture-related exports, and attraction of capital) were often hard to implement and did not allow an egalitarian redistribution to local populations (Kelley and Nobbe, 1990). For example, the Land Reform realized between 1962 and 1972 created a dual system of land tenure, resulting in the creation of wide disparities and disputes concerning the ownership of the land, mainly at the expense of small landowners. However, the country attracted investment from the West and from international donors; Nairobi became the region's economic and financial centre for East Africa. The rapid population growth that the country experienced in this period had repercussions on the economic status of the country. Giving an increased pressure of population on land and other natural resources, per capita agricultural outputs decrease and rural-urban migration increases. Since the mid-1980's, however, after the beginning of the decline in fertility rates, a stall on population growth is noted. The decline of population growth is the result of the efforts carried out by the National Population Policy for Sustainable Development, and other important family planning policies implemented by the Ministry of Health, aimed at containing the spread of family planning and contraceptive methods. The 1980's were also the years in which the massive rapid economic growth achieved by the country's market-oriented development, with the introduction of structural adjustment policies, had an impact on society by creating imbalances in growth rates and causing an expansion in the poverty gap. Economic growth also suffered a period of stagnation due to the poor redistribution of wealth, the collapse of coffee prices, the rise of oil prices, the expansion of corruption, patrimonialism, internal political imbalance and the loss of international credibility of the Kenyan ruling class. It led to a decrease in monetary and fiscal control, contributing to the instability of the country at an international level.

In this socio-economic framework the decline of fertility rates began. The slowing of rates of population growth that occurred from the early 1980's was a consequence of the decline in fertility rates in that period. Kenya became a case study and reference country for Sub-Saharan Africa in relation to this phenomenon. Indeed, the decline in fertility rates is recognized as the beginning of the so-called demographic transition, which happens when both mortality rates and fertility rates drop, leading to a population reduction. Among these determinants affecting the decline in fertility, some public policies launched by the Government since Kenyan independence should be considered; achieving universal primary school through free primary education, along with massive investment in public health and

infrastructures, such as transport and communication, as well as public health improvements, had repercussions on the reproductive behaviours of women. With the introduction of free primary education in 1971, the growth in enrolment rates in primary school between 1975 and 1990 at a rate of 4.4% was significant for the country. The spread of enrolment at school was reported all over the country, albeit the fact that the Coast and Western regions reported lower rates, especially among girls. The numbers of primary schools and teachers during these years had a massive increase. Having the possibility to attend school also means being exposed to new and modern ideas, and this exposure naturally contributed to the increase in the use of contraception in these years. As shown in Table 2.1, the knowledge of any method of contraception (even modern methods) became almost universal among women, registering major growth between the 5 years preceding the 1984 KCPS Survey and those preceding the 1989 KDHS Survey. Concerning the contraceptive prevalence (Fig. 2.4) measured by the percentage of women aged 15-49 using any method of contraception; the higher increase is registered from the end of 1970's to the end of 1990's.

Tab. 2.1 Trends in contraceptive knowledge						
Percentage of all women 15-49 who know specific contraceptive methods, Kenya, 1984-2008/ 09						
Method	1984 KCPS	1989 KDHS	1993 KHDS	1998 KDHS	2003 KDHS	2008-09 KDHS
Any method	81.0	90.0	95.6	96.8	94.6	94.6
Any modern method	79.7	88.4	95.2	96.3	94.4	94.5
Female sterilisation	55.0	68.2	81.1	81.8	73.9	66.8
Male sterilisation	18.1	19.8	41.3	47.7	47.2	38.1
Pill	72.7	84.4	91.9	92.6	89.5	87.9
IUD	55.2	62.0	73.3	72.0	67.0	61.1
Injectables	58.9	76.3	87.6	89.7	88.9	88.5
Implants	U	U	U	48.7	63.7	67.2
Male condom	41.5a	53.4a	83.4a	91.5a	90.6	89.2
Any traditional method	U	54.8	71.9	72.6	70.0	68.5
Rhythm	51.0	50.7	64.2	68.8	64.7	61.5
Withdrawal	24.0	16.8	29.5	36.9	41.3	47.6
Other/folk methods	U	5.1	9.3	8.1	9.3	6.8
Number of women	6,581	7,150	7,540	7,881	8,195	8,444
U = No information a= The question did not specify male condom. Note: Data from the first four sources omit the North Eastern province and several other Northern districts. Sources: CBS, 1984; NCPD and IRD, 1989; NCPD,CBS, and MI 1994; NCPD,CBS, and MI, 1999; CBS, MOH, and ORC Macro, 2004.						

Fig. 2.4 Contraceptive prevalence
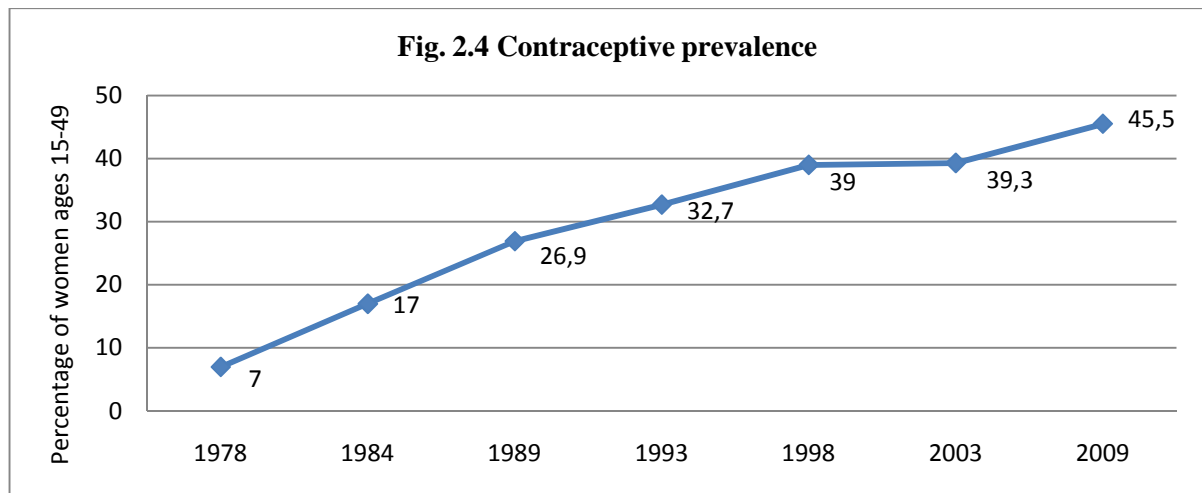
Moreover, the willingness to continue studying and to be employed in modern sectors led to a delay in births, and entering the modern job market. Since 1969, public health sector has also shown big improvements in the number of facilities and skilled personnel. Since the end of the 1980's, vaccination campaigns, programs for child health and nutrition and for prenatal care are widespread. The population, as a consequence, started to require more and more of these services, allowing the spread of a modern conception of healthcare. In 1985-86, the National Family Planning Program launched by the Ministry of Health in the seventies was operational and showed its first results. Also, the Family Planning Association for Kenya, aimed at enlarging the diffusion of family planning and community-based contraceptive distribution, was launched. Consequently, there was a rise in life expectancy at birth and a reduction in family sizes.

Moreover, transportation and communication diffusion and improvements lead to a decrease in the isolation of rural areas, and increased the circulation of people and ideas. These efforts were not fruitless, and actually leaded the Country (beginning in the late 1970's) in the so-called fertility transition. Fig. 2.5 shows the trend of total fertility rates from 1960 to the present. The Total Fertility Rate (TFR) is defined as the average number of children a woman would have if she went through her entire reproductive period, from 15 to 49 years, reproducing at her prevailing age-specific fertility rates (ASFRs). This rate also expresses the number of children per woman in a given period of time.

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Fig. 2.5 Total Fertility rate in Kenya, total (births per woman)
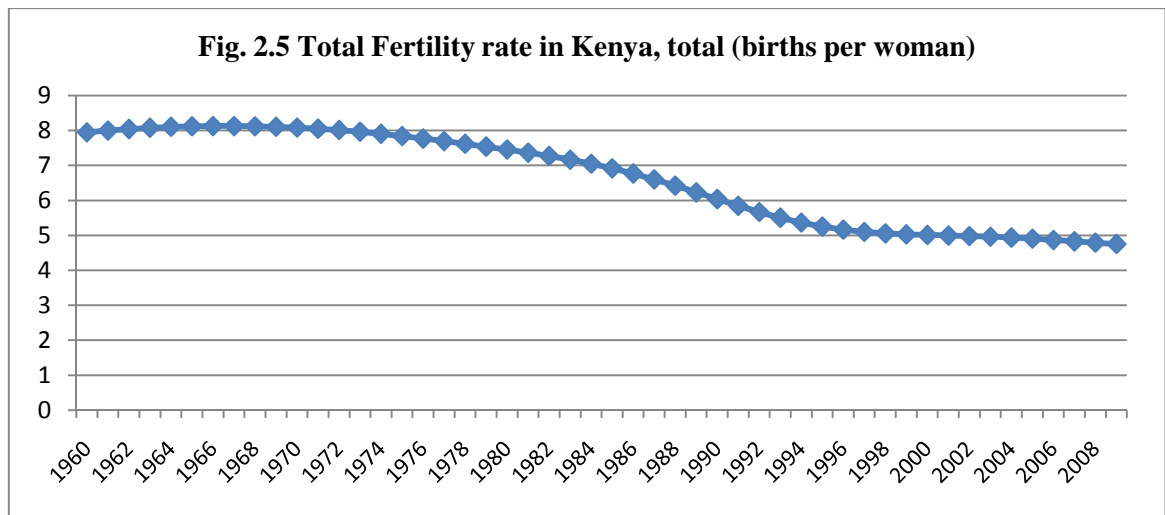
Source: elaboration on World Bank metadata

It is assumed that 15 to 49 year-old women (fertile period) are all living. Looking at the pattern of TFT in Kenya, we can see how the demographic situation of the country has had a major breakthrough in fertility: starting with a TFT equal to 5.3 children per woman in the 1950's, Kenya has a rate that stands between 6 and 7 children in the 1970's, up to an index of 8.1 in the late 1970's. The reduction of TFT started around the 1980's, with a rate of approximately 4 children per woman.

The analysis carried out by BC Kelley and C.E. Nobbe: "Kenya at the Demographic Turning Point? - World Bank Discussion Paper" in 1990, found that there is a correlation between the decline in mortality rates in Kenya and the decline in fertility that occurred during that period. However, mortality decline was not the only leading factor in determining the change in disruptive behavior on fertility. Even the socio-economic factors described above have certainly contributed to a reduction in the willingness of women to have large numbers of children. The ambition to continue their studies and to enter the modern job market, as well as the cost of raising children after the reintroduction of school fees implemented in 1989, are all factors determining a change in women's reproductive life. Kelley and Nobbe (1990) argue that the leading causes of this change in fertility are numerous and have to be explored in the events that occurred during the 1980's. They list, among other factors, the policies implemented by the government for limiting births, aiming at reducing the boom in population growth, such as the introduction of family planning services, the lack of prosperity in the agricultural sector (resulting from the drought of 1984) together with imbalances created by the introduction of agriculture and market-oriented structural adjustment policies. Also, the decline in infant mortality, and the increase in costs for the education of children are crucial factors.

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Decline in fertility is accompanied by significant demographic phenomena such as the rising age at first marriage, and the increase in use of contraceptive methods (KDHS data show that 90% of women know at least one method of contraception, see Tab 2.1 and Fig. 2.4). Since 1967, the Government of Kenya has implemented certain policies to reduce fertility, and has been put great effort into curbing the phenomenon of high fertility rates. In addition to specific policies to reduce fertility, other factors have contributed to the reduction of fertility in the country. In the 1980's, policies were also implemented to improve the healthcare system, and due to these policies a higher proportion of the population was able to receive medical treatment, and was better informed about family planning programs.

The decline in infant mortality also affected some choices in fertility: given the rise in children's survival, the number of children born per couple is influenced by survival and cost of child rearing. Women's education had a great influence on increasing the age at marriage, and hence in the reduction in births. Among women with no schooling, a growth in TFT was initially detected, followed by a slight decline; but among those with secondary education, there was a more significant decline. Therefore, the existence of an inverse relationship between education and TFT emerges.

In the cities, of course, the reduction was more substantial: in Nairobi, in fact, TFT decreased from 7 for the period 1983-85 to 4.2 from 1986 to 1988, down to 2.6 in 1995. In Eastern, Western and Rift Valley provinces, however, the TFT increased slightly, between 1986 and 1989. Unlike other provinces, in these provinces the decline began in the 1990's. Then, together with the Nyanza Province, where the phenomenon was registered to a greater extent, between 1995 and 2000, the TFT of these provinces showed a reverse in its trend. A most significant decline in the TFT for all age groups is recorded between 1989 and 1993. The age groups 25-29 and 30-34 are those who have suffered a more rapid reduction in fertility. The decline began in the late 1970's and continues throughout the 1980's, until 1998 when the trend grows again. Since the mid-1990's widespread epidemics of HIV/AIDS and the deterioration of health services has meant that levels of mortality have risen. Infant mortality grew and this pattern led to the reintroduction of the phenomenon of replacement by households. After a few years it certainly contributed to a return to the increase of the TFT. Although the relationship between declining mortality, especially among children, growth and fertility rates is still not well explained in the literature, it is certainly true that some changes to the social, economic and historical country can justify the stall in the fertility transition in Kenya, which was the leading country among African countries. From the 1998 KDHS it is

shown that the trend of fertility decline had a stall and, indeed, since 2003 we see a slight upward trend: the TFT from 4.7 in the late 1990's goes to 4.9 in the period from 2000 to 2003. (Bongaarts, 2006). The increase is apparently insignificant, however, shows how fertility levels was influenced by a slight change of direction of some influential factors. The increase of TFT occurred in all provinces except Central province, and has also covered the younger age classes, for whom the largest stall in the use of contraception was noticed. Nyanza and Rift Valley provinces reported, however, the greatest growth rates (10-12%). Moreover, this growth occurred among less educated women, which form the group that is less likely to use contraceptive methods, and who perceived a higher risk for HIV/AIDS contraction. For those women having secondary or higher education level the decline in TFT did not stall. Among women with no education, but almost universally in all provinces and all age groups, the past pattern of reduction of desirability of children has a reverse in its trend. Indeed, the demographic dynamics related to the stall in fertility decline refers to changes in patterns of desirability of having more children and in the use of contraception.

"The stall or reversal of the fertility decline is seen throughout the country but is particularly evident among the least educated women while those with a secondary or higher education still show a modest decline in childbearing. The stall in contraceptive prevalence is seen mainly among younger women and among those with less education" (Westoff and Cross, 2006). One explanation could be related to the epidemic of HIV/AIDS that has led to a consequent rise in infant mortality, and that fact that women who have experienced the death of a young child are more likely to want another child. "There is a clear association between wanting more children and having experienced the loss of a child under five in the past five years," say Westoff and Cross, concluding their analysis on stall of fertility decline in Kenya. As also asserted by the authors, "Concerns about HIV/AIDS would seem relevant in the abstract but are difficult to connect unambiguously," therefore, additional analysis is needed on this topic in order to find a better explanation of the phenomenon. Beyond the individual characteristics, there are certainly some social and economic determinants that contribute to explain the emerging pattern of fertility in Kenya. The 1990's are still characterized by a stop in economic growth and by the negative effects of agriculture and industry consequent to structural adjustment policies. Furthermore, several events resulting from political upheavals (such as the closure of the flow of international aid and post-election conflicts in 1992) were focusing the world's attention on the human rights violations towards the society's lower classes.

Likewise, the 2002 elections greatly upset the country, a country that for all of the 1990's experienced periods of rampant corruption, crime, conflict between different populations and groups of power, and between political parties. Because of that, the expansion of tourism, the country's largest source of income, slowed. The political instability was followed by some clashes in the early 2000's, and then by the 2007 election. At the same time, subsequent to the famine of 2006, the country found itself dealing with great economic and social difficulties.

From a demographic standpoint, the 2008/9 KDHS data show how the TFT again slightly increased, even though this trend is not valid for adolescents and young people interviewed in 2008/9 (Munguti and Buluma, 2010). For young women (aged 15-29) a shorter interval between births has also been highlighted, compared to data from previous years, with the shortest median birth interval observed for young women (aged 15-19) of only 23 months. A larger proportion of children born less than 24 months after the previous birth are born to younger women, aged 15-19, (61 percent) relative to other age groups. The decrease of the TFT is related to a revival in the use of contraception, probably due to the fact that the women want fewer children, and a further reduction in infant mortality rates. The new decrease in fertility rates occurs more in urban areas and among more educated women (Munguti and Buluma, 2010).

"The disparities in fertility among rural and urban women could be attributed to the significant role played by education in population growth. When literacy of women improves, fertility rates tend to decrease. Similarly, fertility rates tend to be lower where women have access to decent jobs, good health care, and family planning resources—which are more available in urban areas than in rural ones" (Munguti and Buluma, 2010). The great differentials existing in the country in relation to access and use of healthcare facilities and education is also reflected in access to family planning programs and contraception. Since family planning is mainly aimed at married women, there is little attention paid to young unmarried women, who are often forced to seek illegal abortions.

'*Le informazioni più recenti mostrano che negli ultimi anni il divario tra il numero desiderato di figli e la fecondità reale si è notevolmente attenuato. Restano ancora grandi difficoltà in una parte delle donne nel raggiungere la dimensione familiare voluta, situazioni queste derivanti da una non efficace erogazione dei servizi di pianificazione familiare e da una non sufficiente informazione in materia di contraccettivi*' (Bussini, 2006).

2.2 Reproductive health care in Kenya and utilization of healthcare facilities

2.2.1 A brief introduction on maternal health care and its relevance to maternal mortality

> *"The health care that a mother receives during pregnancy, at the time of delivery, and soon after delivery is important for the survival and well-being of both the mother and her child."* (Obonyo *et al*., 2010)

Improving maternal and child health in Kenya would require greater efforts towards providing appropriate antenatal, delivery and postnatal care to all mothers, including those in remote rural areas who do not have easy access to modern healthcare (WHO, 2011). Maternal healthcare and the relevant topic of antenatal, postnatal and deliver care are framed within the broader goal of reducing maternal mortality. Since 1985, in all developing countries, maternal mortality (and women's health in general) has received more attention than it had previously been given by international organizations. The launch of the Safe Motherhood Initiative in the late 1980's brought heightened attention to maternal mortality. A series of national and regional Safe Motherhood meetings, to raise awareness among policy makers, followed the conference. The International Conference on Population and Development (ICPD) held at the beginning of the 1990's broadened the focus to reproductive health and, more recently, to reproductive rights (Germain 2000). Since the establishment of the Safe Motherhood Program, the key programmatic priorities from the Initiative's first decade were to reduce maternal mortality and morbidity and to lessen the barriers (economic, legal, social, and cultural) that women face in accessing high-quality maternal healthcare. One of the actions of the initiative aims at promoting women's empowerment in order to create the conditions for giving them a choice. Maternal deaths are rooted in women's powerlessness and their unequal access to employment, finances, education, basic healthcare, and other resources. These realities set the stage for poor maternal health even before a woman becomes pregnant, and can worsen her health when pregnancy and childbearing begin. The improvement of maternal health represents a key development priority also among the Millennium Development Goals (MDGs). Indeed, the Fifth MDG (MDG5) "*Improving maternal health*" mainly aims at:

a) Reducing the maternal mortality ratio by three quarters, between 1990 and 2015, and

b) Achieving universal access to reproductive health by 2015.

In addition, the MDG5 emphasizes the importance of reproductive health and quality of life from adolescence through to adulthood (MDG5, 2010). Protecting the health of mother and baby requires good antenatal care, skilled attendants, a safe place to give birth, and access to emergency obstetric care (UNFPA, 2002).

The major contributing factors to poor maternal and perinatal health in Kenya includes poor maternal healthcare, as well as pregnancy and childbirth complications. The major objective of antenatal care during pregnancy is to identify and treat problems such as anemia and infection. It is during an antenatal care visit that screening for complications occurs and advice is given on a range of issues, including place of delivery and referral. Even though almost all of the births in Kenya (95%) receive at least some antenatal care, more than half (55%) of all births take place at home under the assistance of a Traditional Birth Attendant (TBA), a relative, a friend or no one at all (KDHS 2003 and 2008/9). The fact that the majority of women in Kenya do not seek professional assistance from medical personnel during childbirth is an issue of great concern, since the risk of complications and death greatly increases under these circumstances.

Moreover, the well being of mothers and children is recognised to be significantly influenced by the health, knowledge and the context of where girls grow up. Sexual and reproductive behaviour is not only determined by the availability and possibility of proper health facilities for antenatal care and delivery, but also by the women's backgrounds, personal, familiar and communal histories and experiences. Analysing sexual and reproductive spheres of life, the concept (category) of "choice" the women make for their own health and life path always needs to be contextualized and deeply understood in its environment (Bledsoe and Cohen, 1993).

Indeed, many aspects can influence maternal healthcare, and they have to be considered while addressing policies geared towards women. Thaddeus and Maine (1994) examine how many factors can cause delays in reaching adequate care and thus contribute to complications during pregnancy and negative outcomes. They specify three consecutive time periods (phases) during which delays can occur. These are: the delay in deciding to seek medical care on the part of the individual or family, the delay in reaching a healthcare facility, and the delay in

receiving adequate care. Inadequate assistance during pregnancy and delivery can be a result of all three phases of delay, or of any one phase.

Following Thaddeus and Maine's theory, and focusing on Fig. 2.6, it is shown how both "technical factors" (the availability and quality of transports and roads, distance and accessibility to health facilities) and "cultural factors" (traditions, habits, negotiation power within the relationships) can determine delays in seeking maternal healthcare and in accessing health facilities.

Fig. 2.6 The three delays model of maternal mortality
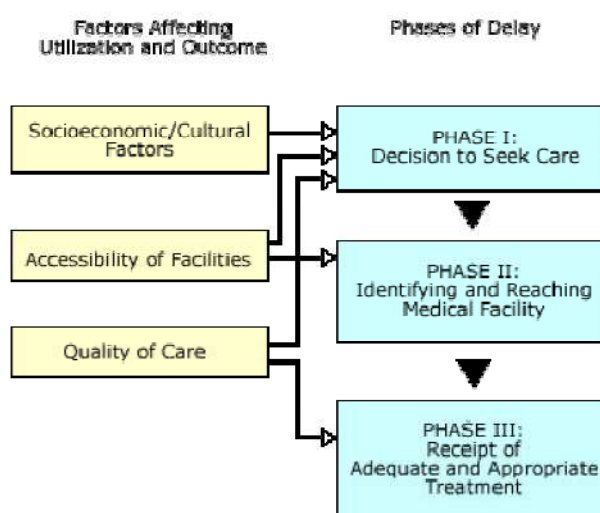
source: UNFPA 2005, after Thaddeus and Maine 1994, in Molesworth 2005

In the following paragraphs there is a general overview on maternal healthcare and the distribution of the health facilities in Kenya.

Professor Mati asserts, "Up to 75 percent of all maternal deaths can be averted if women received timely and appropriate medical care. We have the knowledge of the causes of these deaths and how they can be prevented; we know what works and what does not work. It is now generally accepted that lack of skilled assistance during childbirth is the most important determinant of maternal mortality. What, in my view, is lacking is the commitment, at all levels, to act; to make the reduction of maternal mortality a high priority; and to reflect this in resource allocations to health services, especially for reproductive health care" (Mati, 2010).

The topic of maternal healthcare is also present in the human rights discourse and in the gender equality framework. As assessed by Hunt and Bueno de Mosquita, Human Rights Center, in their work for UNFPA on the reduction of maternal mortality and human rights, maternal mortality is "one of the most serious human rights issues that we face today" (Hunt, Bueno de Mosquita, 2007). Many spheres of an individual are considered by the right of health, from the biological aspects to the resources he holds. "It is not a right to be healthy, it is a right to a variety of services, facilities, goods and conditions that promote and protect the highest attainable standard of health." (Hunt, Bueno de Mosquita, 2007). Indeed, other aspects, as the possibility to access information and the challenges a women can meet when accessing all the services for improving maternal healthcare are considered as a fundamental right. Therefore, as highlighted in Hunt and Bueno de Mosquita report, human rights treaties as the International Covenant on Economic, Social and Cultural Rights, which recognize the complexity of the situation, should stress on comprehensive interventions aiming at promoting access and improving maternal healthcare. The promotion and protection of the right to health requires actions that lead to a sustained reduction in maternal mortality. Women living in poverty and in rural areas, and women belonging to ethnic minorities or indigenous populations, are among those particularly at risk. Complications from pregnancy and childbirth are the leading cause of death for 15-19 year old women and adolescent girls in developing countries. Therefore, they conclude that marginalized women, such as women living in poverty and ethnic minority and indigenous women, are more vulnerable to poor access to care. (Hunt, Bueno de Mosquita, 2007)

Despite Kenya's efforts to commit to the goals of the MDG 5, and various other national and international commitments, statistics show that access to maternal healthcare for all women, and for adolescents, is still far from the achievement of the goals. Maternal mortality is still high, especially in rural areas where access to health services is still a challenge.

2.2.2 Trends of maternal healthcare- and pregnancy-related causes in the context of rising maternal deaths in Kenya.

Kenya faces enormous health challenges, including accessibility and availability. Expectant mothers, particularly in rural areas, have to trek long distances in search of healthcare services. The cost of the services in the healthcare centers is also prohibiting, considering the poverty level of most Kenyans. Since more than 50% of the population lives under the poverty line (CIA World Factbook, 2000) the proportion of food expenditure for the family of this group is estimated to be around 70-80% of the household income, and the remaining percentage is shared among the remaining needs, such as health, education, and housing. As reported in the graph below, pregnancy-direct causes of maternal death make up 80% of the total cause of mortality in all Sub-Saharan Africa, with haemorrhage and sepsis as the leading factors of maternal death.

Fig. 2.7 Pregnancy-direct causes of maternal mortality in Sub-Saharan Africa
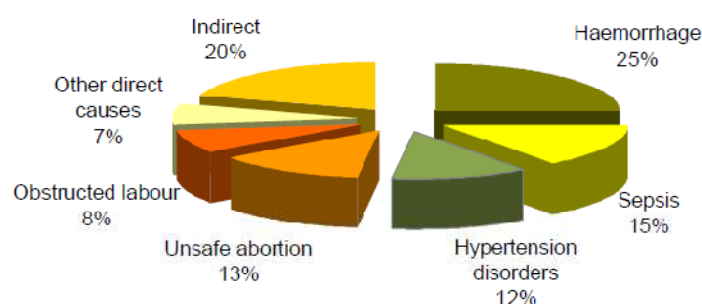
Source: UNFPA, June 2010

Despite recent estimates that indicate a significant drop worldwide in the number of women dying from pregnancy-related causes, maternal mortality in Kenya has remained unacceptably high, at 488 maternal deaths per 100,000 live births (with some regions reporting MMRs of 1,000/100,000 live births) in 2008/9, an increase from 414 in 2003, and 590 in 1998 (UNDP and Government of Kenya, 2010). Most maternal deaths are due to causes directly related to pregnancy and childbirth, such as unsafe abortions and obstetric complications (severe bleeding, infection, hypertensive disorders, and obstructed labour). Other deaths are due to causes such as malaria, diabetes, hepatitis, and anaemia, which are aggravated by pregnancy (UNDP, 2011).

There are wide maternal mortality differentials in Kenya, with Nyanza province recording the highest mortality rate, followed by Western, and Coast provinces. Central province seems to have one of the lowest maternal mortality risks in Kenya. Main causes of death in these provinces are: postpartum hemorrhage (24%), infection (15%), unsafe abortion (13%), eclampsia (12%), and obstructed labor (8%). For every woman who dies, approximately 20 more women suffer some type of injury from pregnancy or childbirth that can have a profound effect on their lives and that of their families. More than 15% of women in Kenya suffer life-threatening complications due to pregnancy (WHO, 2005).

A matter of great concern when the topic of maternal mortality is raised is, of course, the presence of a skilled attendant at birth. Indeed, it is recognized that there is a correlation between the presence of a skilled attendant at birth and the reduction of the rate in maternal deaths. This is due to the competence of these professionals when facing complications that require urgent medical attention. The term "skilled attendants" refers to doctors, clinical officers, nurses and midwives, who have been trained to manage normal deliveries, recognize complications and refer women to a more advanced level of care. From the most updated datasets on maternal health care (KDHS 2008/9), it is shown that skilled personnel help only 44% of Kenyan births. In fact, 28% of women deliver at home, assisted by traditional birth attendants, 21% by untrained relatives or friends, and 7% with no assistance from anyone (KNBS and ICF Macro, 2010). Traditional birth attendants (TBAs) are not legally recognized as having the necessary skills in order to manage and prevent pregnancy-related complications. Also, it is revealed that they still practise traditional ways of managing births, even though they are technically prepared to perform modern techniques (Kamal, 1998).

"Despite the tremendous resources invested in training Traditional Birth Attendants over the past two decades, scientific evidence from around the world has shown that training TBAs has not reduced maternal mortality. Any improvement observed when TBA training programmes have been introduced was because of the associated supervision and referral systems, and because of the quality of essential obstetric services available at first referral level" (MOH and Population Council, 2003).

In this broad picture, most of the time women still do prefer to be assisted by TBAs, also because they are highly regarded in their communities. Many different reasons drive women to prefer the TBA's assistance to that of more qualified professionals.

Most of the time women have little choice in place of delivery, because of lack of transport and long distances to healthcare facilities. "The problem is particularly common in arid and semi-arid lands, where health facilities are poorly equipped and are far from homes with no passable road or transport available" (UNFPA, 2010). Other women report having been badly treated in the past by nurses and midwives who were hard on them in the healthcare facilities, and so they prefer not to repeat that experience (Ahlberg, 1991). Some women (21%) do not think it is necessary to deliver in a healthcare facility (KNBS and ICF Macro, 2010). Thus, women's healthcare-seeking behavior in Kenya is restricted not only by socioeconomic barriers and a lack of high quality healthcare facilities, but also by cultural norms that limit women's roles in making decisions regarding healthcare and impede their freedom to use the available services.

Related to the topic of skilled attendants at birth, a focus on the access and capability of emergency obstetric care, indispensable to counter pregnancy and delivery complications, is needed. Emergency obstetric care and comprehensive healthcare services are mostly localized in urban areas, so they are not easily useable by the majority of women living in rural areas. Also, even when women are able to reach a healthcare facility, the services provided are not always comprehensive and adequate to face emergencies or to easily respond to their needs.

Considering what emerges from analysis on birth data from KDHS 2008-09 for the whole country, even if the rate of women having at least one antenatal visit in a facility during pregnancy is high (although not universal), the percentage of deliveries at home is more than 57% for all women, 51% for teenagers and 55% for young women. Moreover, the proportion of women who receive the 4 recommended visits for antenatal care is not generally widespread. The percentage of births assisted by traditional birth attendants is between 46-52% for the three age groups. This "represents a slight improvement in the proportion of births occurring at a health facility, from 40 percent in 2003 to 43 percent in 2008-09" (KNBS and ICF Macro, 2010).

In fact, the proportion of women making the recommended number of antenatal care visits (4 and above) declined from 64% in 1993 to 52% in 2003 and to 47% in 2008/9, while the proportion receiving skilled care during delivery declined from 45% in 1998 to 42% in 2003. Skilled attendant presence at birth increased to 44% in 2008/9 (UNDP, 2011).

Hospital-based data indicates that about 20% of pregnant women in Kenya develop complications during pregnancy, while another 20% develop complications during childbirth. The complications, which are direct causes of maternal deaths, include haemorrhage, sepsis,

and hypertensive diseases in pregnancy and abortion, all of which constitute obstetric emergencies. Lack of an efficient system which is not able to provide transports for emergencies as well as facilities capable to solve problems immediately are significant factors increasing maternal morbidity and mortality (Magadi *et al*., 2003; Graham *et al*., 2006). Other predisposing factors to maternal morbidity and mortality include anaemia, malnutrition, malaria and HIV, among others. Moreover, one of the most relevant and urgent area in reproductive health today is the risk created by unsafe-induced abortion.

Safe motherhood initiatives have continued to highlight the contribution of unsafe abortion to the persistent high rates of maternal morbidity and mortality in sub-Saharan Africa. In Kenya, unsafe-induced abortion is responsible for one-third of maternal deaths (Graham *et al*., 2006). Under the current Kenyan law, abortion is permitted only for the preservation of a woman's life (Population Division, 2007). Because of this legal restriction, many women with unwanted pregnancies resort to clandestine unsafe abortions, risking complications for themselves and for the baby (Rogo *et al*., 1996, Guttmacher Institute, 2008).

Moreover, KDHS data highlights that the percentage of women who have a visit after delivery is even less than the percentage of women who deliver in a healthcare facility. Postnatal care, especially the period comprehending the 48 hours post delivery, are crucial for women's healthcare, since many complications can arise. Only 42% of women receive postnatal checkups within two days of delivery, and more than half of women who give birth do not seek postnatal care (KNBS and ICF Macro, 2010). "The mothers mostly affected are those in the lowest wealth quintile, those with low levels of education and those in remote areas like North Eastern Province where 79% of women do not receive postnatal care" (UNFPA, 2010). There is also evidence of correlation between traditional practices, such as female genital cutting, generally performed on young girls under the age of 10, and higher risks of complications in childbirth and maternal death. The so-called "female circumcision" still involves 27% of women in the country, and it is mainly performed among the Somali, Kisii and Masai tribes (UNICEF, 2008). For the mothers' wellbeing it is not only crucial to increase services to such areas, but also to consider the background and the socio-cultural context involved in order to increase the real usage of postnatal care services as well as antenatal care (Villarreal, 1998).

In Kenya, healthcare programs are not accessible to all. Many of these programs do not meet the poor population needs, who are impeded by several barriers, as economic barriers and

sometimes cultural barriers, in accessing healthcare facilities. Therefore, their condition of vulnerability rises.

Moreover, health has become a major issue among the youth of the country. Apart from the traditional health-related issues such as malaria, tuberculosis and the more conservative sexually transmitted diseases, the exponential spread of HIV/AIDS and drug-abuse have become a major concern. The greatest health impact in the youth population is observed in reproductive health. Some related problems and side effects include teenage pregnancies and abortion (Ministry of Home Affairs, Heritage and Sports, 2002). Not least, health inequalities can be caused by other factors, such as the distribution of the healthcare facilities over the territory, and the wealth status of a household. A description of the origin and influence of health inequalities will help to understand the status of reproductive healthcare in Kenya.

2.2.3. Health Facilities structure and focus on maternal health care services

'Increasing access to appropriately skilled and timely care is key to reducing the toll of maternal and neonatal deaths. Failures occur at household and community level, through poverty, gender bias and lack of awareness of the needs of pregnant women. They occur at service delivery level through lack of accessible, well functioning, staffed and resourced facilities, and at policy and systems level through poor planning, management and supervision, and lack of political commitment. Attention also needs to be given to cost effective ways of measuring and monitoring maternal mortality and morbidity.' (Institute of Development Studies, 2012, Maternal, newborn and child health).

Kenya's healthcare infrastructure presents a hierarchical-pyramidal organization structure, with Kenyatta National Hospital at its apex. It includes the national teaching hospitals, provincial hospitals, district and sub-district hospitals, health centers, and dispensaries, as well as a multitude of other operators within the private, non-governmental, and traditional/informal sectors. The Ministry of Health (MOH) runs the Kenyan health system from the top down, but because of the post-election turmoil of 2007, the MOH has been

divided into two sister Ministries: the Ministry of Medical Services, and the Ministry of Public Health and Sanitation. One of the main consequences of this separation has been identified by scholars as leading to disorganization and incompetence in both planning and implementation processes, "in addition to the obvious inefficiency that has accompanied the maintenance and daily operations of two separate institutions in the place of one" (Turin, 2010). Moreover, as highlighted by Wamai, "The only reason for the split was the power-sharing which caused the government to double the ministerial portfolios. This has brought inevitable politicization beyond healthcare policy to service provision. Duplication and competition for resources, control, and influence may slow reforms, weaken management functions, and affect morale among senior planners and managers at the provincial and district levels who may be torn between allegiances as the departments are reorganized into parallel management structures. The ministries will also have to share a common budget which has not increased correspondingly" (Wamai, 2009). The mandate for supervision, formulation of policies, establishment and enforcement of standards, and mobilization of resources for healthcare rests with the Ministry of Health (MOH, 1999).

The health system management is then decentralized in order to better administrate at local level. As has already been assessed in previous chapters, provinces and districts vary in geographical size and population, as well as overall health and socio-economic indicators. Health facilities are allocated provincially, with the most high-level services accessible in the major cities or only at the national level (Turin, 2010) and, for example, the districts are responsible for delivering healthcare services and implementing health programs. "Visiting these different facilities, stark disparities are apparent both vertically, between the different levels of care, and also horizontally, from facility to facility in different regions" (Turin, 2010).

Table 2.2 shows the structure and distribution of the healthcare system by facility type and ownership per population, as well as the number of hospital beds and cots for each provincial region.

Table 2.2 Demographic and Health System by Region in Kenya (2006)

Types of facilities	Province/ control	Nairobi	Central	Coast	Eastern	North Eastern	Nyanza	Rift	Western Valley	Kenya
Hospitals	GOK	5	8	9	15	4	13	21	10	85
	Miss/NGO	7	15	2	16		9	15	10	74
	Private	11	10	10	4		13	19	1	68
Sub district hosp.	GOK		8	7	14	6	20	13	5	73
Nursing home	Private	27	26	23	26	3	35	24	27	191
Health centers	GOK	23	51	32	70	8	72	138	65	459
	Miss/NGO	50	5	2	11		48	40	16	172
	Private	3	3	1	2		7	5		21
Dispensaries	GOK	18	222	152	302	63	183	489	74	1,503
	Miss/NGO	26	98	55	117	1	45	184	20	546
	Private	57	8	9	16		12	84	17	203
Clinics	Private	141	487	294	301	61	79	211	160	1734
FACILITIES GRAND TOTAL		**368**	**941**	**596**	**894**	**146**	**536**	**1,243**	**405**	**5,129**
Population (000s) (2003)/health facility	Number	2,563	3,909	2,801	5,103	1,187	4,804	7,902	3,853	32,122
	N. per pop	6,965	4,194	4,7	5,708	8,13	8,963	6,357	9,512	6,263
Total hospital beds and coats (2002)	Number	4,891	8,191	7,687	7,412	1,707	11,922	12,39	6,457	60,657
	N. per 100,000	190	209	274	145	144	248	157	168	189

Sources: Health Management Information system, 2006 (Ministry of Health, 2007); NHSSP-II (Ministry of Health, 2005); population data from the Household Health Expenditure and Utilization Survey, 2003.

As table 2.2 shows, the distribution of healthcare facilities across the Kenyan provinces is unequal. In fact, Central province is the best equipped, having about twice the number of facilities per-population, compared to the less furnished provinces (Nyanza and Western). Conversely, Nyanza has a higher number of hospital beds and cots per 100,000 people than Central. While Northeastern and Eastern provinces have the lowest proportion of hospital beds and cots per 100,000 people, Coast has the highest (144, 145 and 274, respectively). Because of their relatively small geographical dimensions, Nairobi and Central Province have the shortest distance to a healthcare facility.

Fig. 2.8 shows a map of Kenya representing the average distances in kilometers between sampling units of the Kenya Demographic and Health Survey, which define the locations where interviews to women have been done, and the healthcare facilities, geo-referenced by the Kenya Medical Research Institute (KEMRI). The data has been elaborated in order to measure the average distance, by province, between the Primary Sampling Units (representing the communities of women interviewed) and the healthcare facilities of each province. The green spots visualize, by size, the average distances: North Eastern province is the worst-off in terms of distance, with an average of 62,5 km to reach a healthcare facility, far exceeding all the other provinces. Central and Nairobi provinces have, conversely, the smallest distances, on average, between PSUs and healthcare facilities.

Fig. 2.8 Average distances in km between primary sampling units and health facilities, and road distribution in Kenya (elaboration on 2008/9 KDHS)
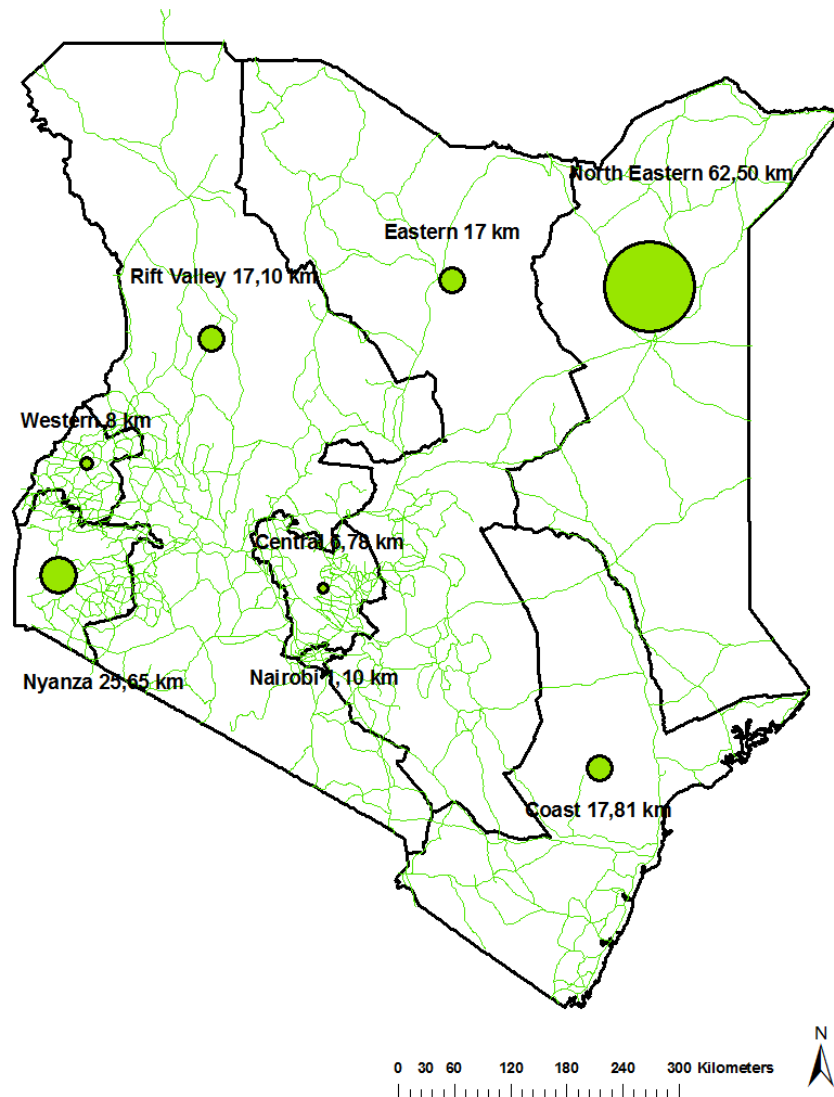
In every aspect, Central province and Nairobi result as the best performing in health and social-economic indicators, according to the 2003 Kenya Household Health Expenditure and Utilization Survey (MoH, 2003; Wamai, 2004). Specifically they present high levels for life expectancy, literacy rate, income, contraception use, sanitation coverage, immunization coverage, and attended deliveries. The Central province also has the lowest infant mortality rate, and under 5 mortality rate trends (more than three times lower than Nyanza province).

Concerning the availability and distribution of maternal healthcare services, trends of availability of services among provinces for antenatal care (ANC), postnatal care (PNC) and delivery reflect the general pattern of the country. While Nyanza and Western provinces have the highest number of services for maternal healthcare, Central, Coast and Nairobi provinces present the highest quality of those services, measured by the availability of specific services, necessary supplies, equipment, and conditions for infection control. Kenya Service Provisional Assessment for 2010, designed to provide national and sub-national information on the availability and quality of services from a representative sample of 703 healthcare facilities, reported some data on antenatal care, postnatal care and delivery healthcare. Currently, 74% of all facilities offer ANC (compared with 79% in 2004), 59% offer PNC (compared with 35% in 2004), and 69% provide a tetanus toxoid (TT) vaccine (compared with 84% in 2004). Moreover, 56% of facilities offer all three services (compared with 33% in 2004). At the provincial level, 94% of facilities in the Nyanza and Western provinces offer ANC services, compared with, at the other extreme, 56% of facilities in Central province, and 69% in North Eastern province. The 2010 KSPA also assessed whether facilities have the necessary supplies, equipment, and conditions for infection control and for conducting client examinations in the ANC service area. Healthcare facilities in Central (70%) and Coast (75%) provinces have all of the requirements for infection control. Among the provinces, even if Nyanza and Western offer a higher proportion of ANC services in their facilities, Nairobi, Central, and Coast provinces are more likely to have the essential equipment and supplies for antenatal care, hence, they provide a better quality of service (NCAPD, MoH, CBS, 2010).

Antenatal care attendance by Kenyan women is almost universally widespread, however the rate of delivery in a healthcare facility is still low. Only 43% of live births in the five years preceding the 2008-09 KDHS took place in a healthcare facility (KNBS and ICF Macro, 2010). Mothers in Nairobi and Central provinces were most likely to deliver in a healthcare facility, while mothers in North Eastern and Western provinces were most likely to deliver at

home with a non-skilled attendant. Urban women and those with secondary school education and above were most likely to deliver in a healthcare facility (KNBS and ICF Macro, 2010).

Availability of transportation during maternity emergencies is crucial to the welfare of both mother and newborn. One way to improve outcomes during such emergencies is to provide rapid transport to a facility where the appropriate services are available. Without a facility-supported emergency transportation system, the expectant mother and her family are forced to find their own means of transport during an emergency. Even when an ANC facility does not offer delivery services, it is desirable to have emergency transport available. For many home deliveries, the facility where a woman receives ANC may be the nearest healthcare facility where help can be sought in an emergency.

Overall, approximately half (49%) of all facilities have transportation support for maternity emergencies. Hospitals (88%), maternity facilities (78%), and health centres (77%) are much more likely than other facility types to have such a system. Among the provinces, facilities in Nyanza province are most likely to have such support. Nearly half of the facilities participate in schemes to offset the costs of transport. Facilities in North Eastern province (15%) are much less likely than other facilities to have an ambulance, but are likely to have access to a vehicle based at another facility (94%) (KNBS and ICF Macro, 2010).

The 2010 KSPA also examined the availability of Emergency Obstetric Care (EmOC) services among healthcare facilities that provide delivery services. Basic Emergency Obstetric Care includes the following signal functions:

1) Parenteral antibiotics,

2) Parenteral oxytocic drugs,

3) Parenteral anticonvulsants for pregnancy induced hypertension,

4) Manual removal of placenta,

5) Removal of retained products (e.g.: vacuum aspiration),

6) Assisted vaginal delivery (e.g.: vacuum extraction, forceps).

This kind of service is available in 36% of all healthcare facilities in the country, with an unequal distribution among the provinces. Considerably lower is the proportion of health facilities with Comprehensive Emergency Obstetric care, around 5% on total healthcare

facilities, (elaborations from Kenya Health Facility List, Ministry of Health, 2010). CoEmOC services, along with the first 6 signal functions listed above, also provide the following two services:

7) Cesarean delivery,

8) Blood transfusion.

Because level 1 and level 2 facilities (dispensaries and clinics) are not expected to provide CEmOC services, they are excluded from the KSPA analysis. Overall, only 3% of delivery facilities had performed all six basic signal functions during the three months preceding the survey. Assisted vaginal delivery, which is one of the most important practices needed during pregnancy complications, is rarely performed. In Kenya, assisted vaginal deliveries are performed primarily by medical officers and obstetricians/gynecologists, and, to a small extent, clinical officers. Only 5% of the facilities, most commonly hospitals (13%), had performed an assisted vaginal delivery at least once during the three months preceding the survey (compared with 7% in 2004). Looking at the distribution by province, Nairobi province seems have the highest percentage of general supplies for delivery, but is not the richest in common complications supplies. Central province has 40% of the facilities with all essential supplies, and among them more than 80% provides supplies for complications. Rift Valley, Eastern and North Eastern provinces are the least furnished for delivery care.

Concerning guidelines for postnatal care (PNC) best practices, WHO and other organizations call for the dyad to stay under observation by a skilled attendant for 24 to 48 hours, and, after discharge, to have a visit within 48 hours after delivery, for early diagnosis and management of postpartum complications. Targeted PNC includes check-ups up to one year after childbirth. The proportion of facilities offering PNC increased from one-third of all facilities in 2004 to six of every ten facilities in 2010 (KNBS and ICF Macro, 2010). The survey also reports the capacity of healthcare facilities to test PNC clients' blood for anemia, urine for protein, and urine for glucose, to determine blood group, and to diagnose and treat syphilis. There are wide variations in the capacity of the facilities to conduct these tests, with hospitals, maternity facilities, and private and FBO facilities more likely to conduct these tests than other facility types, or facilities managed by government and NGOs. Only 4% of all facilities have the capacity to do blood grouping, and these facilities are also most likely to be found in Nairobi and Central provinces (KNBS and ICF Macro, 2010).

While availability of healthcare facilities does not guarantee utilization (Reerink and Sauerborn, 1996), utilization is an important indicator of health status, health-seeking behavior, and cost and quality of services. In particular, cost remains a great impediment to utilization, although improvements in quality may offset cost barriers (Haddad and Fournier, 1995; MoH, 2005). The 2003 Kenya Household Health Expenditure and Utilization Survey shows that overall utilization of healthcare services by people reporting being ill was 77.2%, meaning that 22.8% did not seek healthcare services (MoH, 2003). The national utilization rate was 1.92 visits per person annually, with females having a higher utilization rate than men (2.1 and 1.7, respectively). Furthermore, more urban dwellers reported being ill than rural dwellers (19.5% compared to 16.9%) and were more likely to utilize healthcare services (81.5% compared to 75.9%). This is despite the fact that average cost for outpatient utilization in urban areas is twice that of rural areas. Nevertheless, cost remains a barrier, as those who reported being ill but never sought treatment cited healthcare costs (44%) and distance to a healthcare facility (18%) as the main barriers to utilization. Utilization varies greatly across the provinces: Northeastern province has the lowest utilization rate, with 63.4% of those who reported being ill never seeking treatment, whereas Nairobi had the highest rate (90.6%) (MoH, 2003).

Another huge barrier for utilization of antenatal care services, especially for young girls, which is the group considered in the analysis of this work, concerns the availability of services addressed to this specific age group. Major attention has been given from the Division of Reproductive Health of the Ministry of Health, and from the Adolescent Reproductive Behavior Division, to this sensitive age group, especially since the year 2000. With the introduction of several policies, such as the Adolescent and Reproductive Health and Development policy in 2003, and the Policy Plan of Action in 2005, the topic of adolescent and youth reproductive behavior rose in the international agenda, and an increase in services specifically addressed to youth was registered. Designated youth-friendly services (YFS) are meant to help young people overcome barriers in access to healthcare, including HIV/AIDS services. Ideally, YFS involve young people in all aspects of program planning, operations, and evaluation. The services should include culturally competent workers who are members of the intended clientele and sensitive to youth culture, ethnic cultures, and issues of gender, sexual orientation, and HIV status. YFS also should provide outreach services for homeless youth and tailored support groups for substance users and teen parents. The services usually have convenient locations and flexible hours, including walk-in hours, to improve accessibility to youth. Percentages of health facilities offering these kinds of services are still

very low in all the eight provinces, ranging from 1,3% of facilities with YFS in North Eastern province to 12,5% in Eastern province (elaboration from MOH Health Facility List). The differences in services offered by the health facilities in the 8 Regions also reflect the different availability and accessibility by women. These differences are also present on a smaller territorial scale, where urban/rural and inter-district disparities influence maternal healthcare accessibility. Ziraba *et al.*, in their study on emergency obstetric care in Nairobi slums, highlight that services offered in the research territory were not optimal and *"it sheds light to the often forgotten sub-population of the urban poor who like the rural folks encounter barriers in accessing obstetric care"*.

In summary, there are wide differences among provinces concerning the availability of healthcare facilities and services for maternal healthcare offered. These differences in distribution and availability reflect, on the one hand, the general wealth-level of each province, with the availability of a high level of quality of services offered and the accessibility to these services; on the other hand, there is clearly a strong connection between rates of births and presence of facilities in the territory. Nevertheless, as already discussed, availability does not always mean accessibility and real use of the services. These aspects have to be better analyzed in order to emphasize the determinants of use of these services for maternal healthcare, and to assess the right policies in order to increase their usage.

2.2.4 Health geography: health inequalities and multidimensional poverty index

Access to healthcare varies widely throughout the country, and is determined by numerous factors. In particular, major divides exist between rural and urban communities, and between the moneyed elite and the poorer masses. In Kenya, the poorer masses (those living below the national poverty line) constitute approximately 52% of the population (UNDP, 2009). Considering this challenging health landscape, utilization of healthcare services is a key factor in improving health outcomes for Kenyans, in both the short- and long-term. Currently, the level of and access to care varies by region, with the most facilities per person located in Central province, and the least located in the border provinces of Western Valley and Nyanza, which are the provinces with the highest population density after Nairobi. According to recent data, the healthcare utilization rate in Kenya is approximately 77% for those who are sick,

meaning that a large percentage of the population does not seek care despite illness (Wamai, 2009).

What did contribute to the spread of inequalities among the different regions and areas of the Country? Edward W. Soja, in his PhD dissertation on the *Geography of Modernization in Kenya* (1967), and with the publication of many other works during his career about the spatial change in developing countries and political organization of space, discusses his approach (revised over time) on the geography of development. During and after colonialism, and with independence, the existing system of social and spatial relations was reinforced and elaborated to incorporate most of the population into the colonial political economy and thus more directly into the international economic system. This process of dependent development brought with it many beneficial side effects, such as improved health and nutrition, modern educational facilities, better farming techniques, and easier transportation and communication. But the distribution of these services primarily served the interests of British and other colonial powers, rather than the local population demand and development potential. This selective distribution of the more beneficial accompaniments to colonialism is the most crucial aspect of the underdevelopment process through the creation of inequalities. During colonialism, the service distribution and the infrastructure development were favored in the most non-African populated areas of the Country, such as Nairobi, Mombasa and in the administrative centres of the colonial government, in the so called "white highlands". The African population was largely left to the care and attention of missionaries.

Since independence, the state has tried to remove regional disparities and to promote the spread of services and infrastructural expansion. However, policies and objectives of the government clashed with the realities of geography, and implemented programs did not always lead to concrete results. Areas farthest from Nairobi, or from provincial administrative centres, and those less economically active, have more difficulty in implementing development programs. And many times difficulties in physical connection and bureaucracy hindered their realization. In Kenya, the initiative for development is not left only to the government. Even local communities have worked, since independence, to implement services in each territory, such as constructing health centres, hospitals, schools, and wells. But at the same time, the efforts of local communities has helped to maintain regional disparities, since only more organized, economically advanced communities managed to meet the demand for these services. It was in the districts where education levels were higher that communities invested in education. In areas with high production potential, (that is, areas that

are rich in water) projects for collection and distribution were implemented, rather than in marginal areas, where water is scarce. However, it is important to stress that the existence of a service is not sufficient to measure the degree of satisfaction of the needs of the population, services also need to be available, accessible and of quality (Aidos, 1990). Today, colonial heritage still influences the inequalities in the country at an economic, social and healthcare level. What the major barriers to accessible healthcare services and maternal healthcare are, and how inequality is distributed, is analyzed below.

The two most significant barriers to entry in the Kenyan health system are the cost of care, and the availability of suitable care within a reasonable distance (geographic barriers) (Turin, 2010). According to NHSSP II, "the physical [health] infrastructure in some regions of the country has a coverage of one facility per 50-200 km," making the availability of healthcare resources to those who are sick virtually non-existent in certain cases (MOH, 2005). It is important to note, however, that distance from a healthcare center can also be a subjective measurement, and the availability of a service does not always imply accessibility. While some citizens might be 15 km from a well-equipped hospital on a tarmac road, many others might indeed be only 4 km from a health facility, but it may be a limited facility (such as a dispensary) with few resources, no doctors, and accessibility only by foot or bicycle. In this scenario, it is easy to see why someone might make the journey once, and then never again, considering the barriers involved. This reality may also help explain the fact that 22.8% of those who were sick did not seek medical care, according to the 2003 Kenya Household Health Expenditure and Utilization Survey (KHHEUS) (MOH, 2003).

Access to a well-equipped health facility may actually be more important than the cost of services in determining whether an individual seeks care, in certain cases. Wamai writes, "despite the fact that average cost for outpatient utilization in urban areas was twice that of rural areas," urban residents sought health services 81.5% of the time when they were ill, versus only 75.9% for residents of rural areas (Wamai, 2009). In 2008, there were 6,190 healthcare facilities in Kenya, the equivalent of 16 facilities per 100,000 people, or 11 facilities per 1,000 km^2 (Ministry of Public Health and Sanitation, 2008). On a regional level, Rift Valley and Western Province have the least number of hospital beds per 100,000 people, with only 13.6 and 15.4 beds respectively. The highest number of beds is found in Nyanza province, with 30.3 beds per 100,000 people (Muga *et al*., 2005). In Northeastern province, there are only 16.1 beds per 100,000 people, and this region also has the lowest healthcare utilization rate, at only 63.4% (Wamai, 2009).

Another major issue affecting access to care is the uneven distribution of healthcare workers between urban and rural areas. In order for an individual to access healthcare services, they must have both physical access to a healthcare facility, and the health facility must also be able to provide adequate service. The 2005/2006 Kenya National Health Accounts (KNHA) notes the top two "key challenges to achieving better health status in Kenya" as "inequitable access to health services," and "shortages of qualified health workers with appropriate skills" (MOH, 2009). According to the 2008 figures, there were only 728 medical doctors (MDs) working in the Kenyan health system, with only 477 employed in the public sector (Ministry of Public Health and Sanitation, 2008). With little incentive provided, well-qualified healthcare workers rarely choose to work in rural healthcare facilities when they can enjoy a higher standard of living and additional employment opportunities by remaining in the urban hubs, particularly Nairobi and Mombasa. The result is that rural health facilities suffer from chronic human resource shortages, in terms of both the numbers and qualifications of healthcare workers.

Figs. 2.9 and 2.10 are two maps representing the distribution of primary sampling units (PSUs, in red) collected by the Kenya Development and Health Survey 2003 and 2008/9, which are a sample of the country's population connected to the women's sample of data. The black crosses on the left map represent all the healthcare facilities existing in the country, without distinguishing between types and services offered. On the right map, represented by red crosses, are shown only the healthcare facilities offering at least a Caesarean section service (therefore, only those with a high level of specialization in maternal healthcare). The health facilities are, of course, visibly distributed following the population density (represented by the concentration of PSUs). However, some disparities among the territories are highlighted and appear clearly. For example, the arid and semi-arid areas (North Eastern, northern part of Rift Valley and Eastern Regions) as well as the internal areas of the Coast Region have less availability of healthcare facilities at a reachable distance, especially when we consider specific health facilities for maternity.

Fig 2.9 Primary sampling units and health facilities in Kenya, 2008/9 KDHS, KEMRI 2008
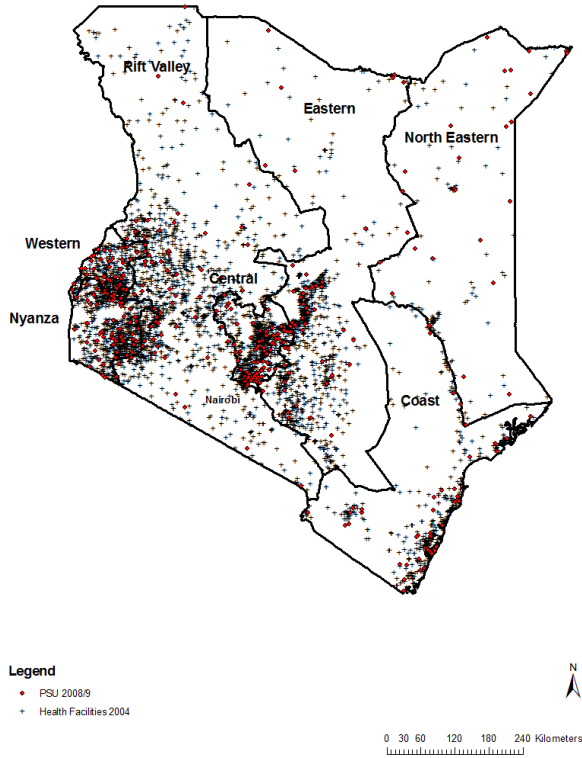
Fig. 2.10 Primary sampling units and health facilities with at least caesarean section service in Kenya, 2003 KDHS, KEMRI 2004
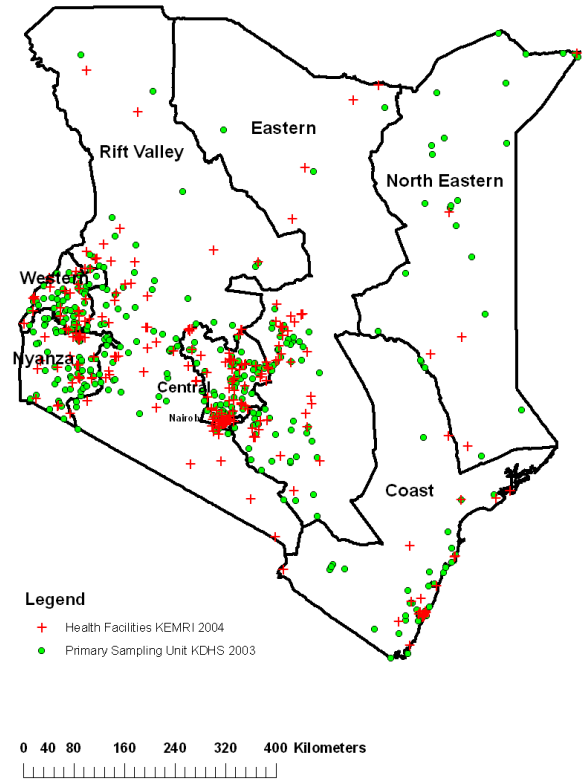
As it is documented by KEMRI (Kenya Medical Research Institute) Welcome Trust Research Program, which provides the list of healthcare facilities for 2005 and 2008, several of the large, sparsely populated areas in the northern part of the country had 100,000 or more people living outside of the 5 km radius from a public healthcare facility, accounting for 80% of the population in some of these areas. Fig. 2.11, below, shows the number of people in 2008 that were outside the 5 km radius from public health services.

Fig. 2.11 Number of people in 2008 that were outside the
5 km benchmark to public health services
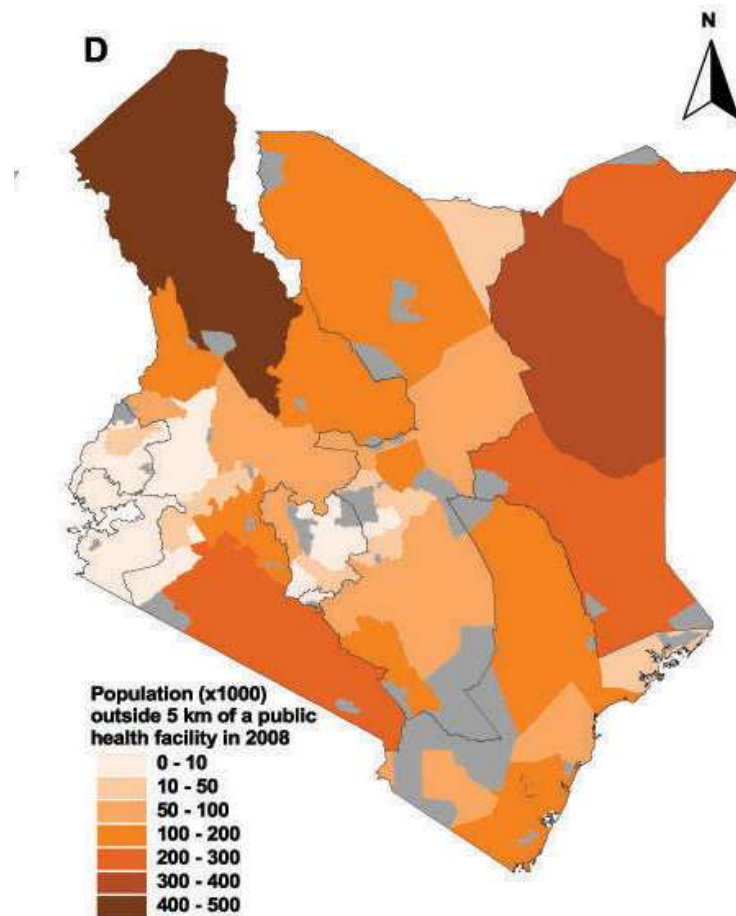
Subsequently, we can analyze how wealth influences health inequalities, also having a look at some measures of poverty related to healthcare. Health indicators and health services data suggests that in Kenya the diffusion of maternal healthcare is not homogeneous, since many disparities exist between provinces and districts. The context of health-seeking behavior in the country therefore reflects great diversity. The vast difference in access and use of healthcare facilities during pregnancy, delivery and postnatal care, as well as the different quality level of healthcare facilities and the distances to reach a service, bring vast disparities in maternal healthcare indicators and maternal mortality rates. "These reproductive health indicators exist in an environment of low literacy, constrained female autonomy, inadequate quality of and access to health services." (Stephenson, *et al.,* 2002)

Health care decisions are often made by the head of the family, or in a context where women prefer to hide a certain situation, which the husband would not agree with. The mother-in-law or another senior family member often makes healthcare decisions, and the low status of a

young married woman makes it difficult for her to challenge or partake in any decisions concerning healthcare (Griffiths et al., 2001). In many other cases the women are totally alone, facing health difficulties for themselves or for the children.

As it is reported in the last World Health Statistics for 2011, prepared by the World Health Organization, in most of the surveys, the global reporting of health indicators focuses on national averages. However, data on the distribution of health and healthcare services within countries and between population subgroups is equally important. Such data helps to identify health inequities (unfair and avoidable differences in health and health service provision) that arise, for example, from socioeconomic factors (such as the level of education, occupation and household wealth or income), from geographical location, and from ethnicity and gender. For disaggregation by household wealth, the total population is classified into wealth quintiles based on relative differences in household wealth within the country, rather than on an absolute wealth criterion. The data presented refers to ratios and differences between the most-advantaged and least-advantaged groups. However, these measures do not reflect the situation across all population groups (such as groups falling into the middle of wealth or education distributions) (WHO, 2011).

The next two following tables report some indicators constituting two of the achievements of Millennium Development Goals divided by various contextual categories for the most updated data for Kenya. The percentage of births attended by skilled health personnel widely varies between 75% in urban areas and 37% in rural areas. Large-scale differences are also present among wealth quintiles and the educational level of mothers. Between the lowest and the highest quintile the difference is 61%, and between the lowest and highest educational level of the mother it is equal to 54%.

Tab. 2.3 MDG 5 - Births attended by skilled health personnel (%)		
Place of residence	**Wealth quintile**	**Educational Level of Mother[1]**
Rural 37%	Lowest 21%	Lowest 20%
Urban 75%	Highest 82%	Highest 73%
Ratio Urban-Rural 2.0	Ratio Highest-Lowest 3.9	Ratio Highest-Lowest 3.7
Difference Urban-Rural 38	Difference Highest-Lowest 61	Difference Highest-Lowest 54

Sources: data are derived from Kenya Demographic and Health Surveys (KDHS) 2008/9[2]. The DHS figures were extracted using STAT compiler software (www.measuredhs.com/ – accessed 8 January 2010; updated 10 January 2011). For some countries and some of the indicators, there were differences in the figures obtained from the country reports and from STATcompiler. In these cases, following discussions with staff from the MEASURE DHS implementation group (ICF MACRO), data from the country reports were used. Further information regarding the source of individual country data can be obtained on request from WHO. Figures in the "difference" columns may be affected by rounding.

An under-five mortality rate presents important disparities among different background of the women. The rate is particularly high in both urban and rural areas. The highest differences are shown among the lowest and the highest wealth quintiles, and among educational levels of the mother.

Tab. 2.4 MDG 4 - Under-five mortality rate (probability of dying by age 5 per 1000 live births)		
Place of residence	**Wealth quintile**	**Educational Level of Mother[3]**
Rural 86	Lowest 98	Lowest 86
Urban 75	Highest 69	Highest 59%
Ratio Urban-Rural 1.1	Ratio Highest-Lowest 1.4	Ratio Highest-Lowest 1.5
Difference Urban-Rural 11	Difference Highest-Lowest 29	Difference Highest-Lowest 27

Sources: unless otherwise stated, data are derived from Demographic and Health Surveys (DHS) conducted since 2000. The DHS figures were extracted using STAT compiler software (www.measuredhs.com/ – accessed 8 January 2010; updated 10 January 2011). For some countries and some of the indicators, there were differences in the figures obtained from the country reports and from STAT compiler. In these cases, following discussions with staff from the MEASURE DHS implementation group (ICF MACRO), data from the country reports were used. Further information regarding the source of individual country data can be obtained on request from WHO. Figures in the "difference" columns may be affected by rounding.

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[1] Lowest educational level achieved by mother is "no education"; highest level is "secondary or higher". (WHO 2011)

[2] Data derived from Kenya Demographic and Health Surveys relate to births occurring in the five years preceding the survey. Data derived from Multiple Indicator Cluster Survey relate to births occurring in the two years preceding the survey.

[3] Ibid.

In the broad context of the measures of poverty, the wealth index is widely used as a measure of wellbeing at the household level. The DHS Wealth Index is widely employed to examine health, population, nutrition, education, and other indicators of societal well being according to economic status. The Wealth Index has been adopted for general use in DHS reports, and in UNICEF'S Multiple Indicator Cluster Survey (MICS) reports, as well as for AIDS Indicator Surveys (AIS) and Malaria Indicator Surveys (MIS). The general methodology used to calculate the Wealth Index is given in Filmer and Pritchett (2001) (Rutstein and Macro Inc., 2008). The Index, however, has been criticized as being too urban in its construction, and not able to distinguish the extremely poor from other not-so-poor households.

In order to better assess the condition of poverty in the household, and following the several improvements of the measures techniques which do not assess poverty as a merely economic condition, a new index for developing countries, developed by the Oxford Department of International Development in the frame of the Oxford Poverty & Human Development Initiative (OPHI) is considered in this work. The index is named the Multidimensional Poverty Index (MPI) and presents some innovations from the Human Development Index (UNDP, 1990). Even if it is composed of ten indicators corresponding to same three dimensions as the Human Development Index: education, health and standard of living, the perspective of the MPI is to measure deprivation of the household. This tool could be used to target the poorest, track the Millennium Development Goals, and design policies that directly address the interlocking deprivations poor people experience (Alkire and Santos, 2010).

As explained in the several reports provided by the Oxford Poverty & Human Development Initiative (OPHI), the Multidimensional Poverty Index (MPI) identifies multiple deprivations at the individual level in health, education and standard of living. It uses micro data from household surveys, and, unlike the Inequality adjusted Human Development Index, all the indicators needed to construct the measure must come from the same survey. Each person in a given household is classified as poor or non-poor depending on the number of deprivations his or her household experiences. These data are then aggregated into the national measure of poverty. As shown in the scheme below, the health thresholds are: having at least one household member who is malnourished, and having had one or more children die. The education thresholds are: having no household member who has completed five years of schooling, and having at least one school-age child (up to grade 8) who is not attending school. The standard of living thresholds relate to not having electricity, not having access to clean drinking water, not having access to adequate sanitation, using "dirty" cooking fuel

(dung, wood or charcoal), having a home with a dirt floor, and owning no car, truck or similar motorized vehicle, and owning at most one of these assets: bicycle, motorcycle, radio, refrigerator, telephone or television.
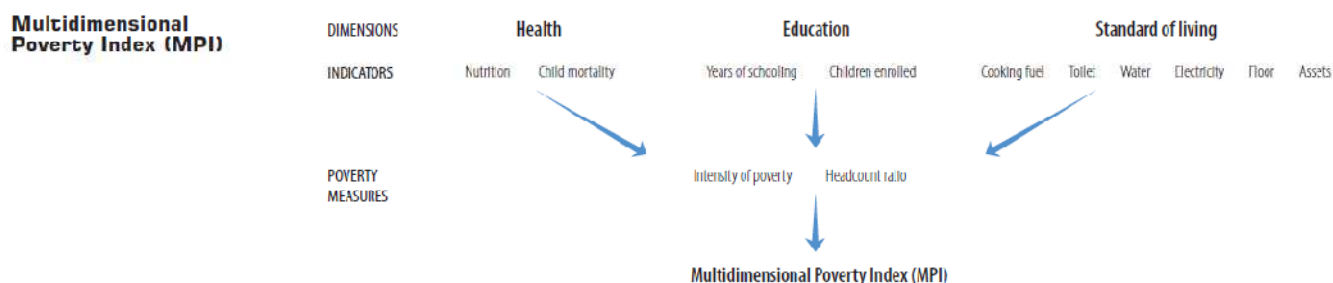
Source: Oxford Poverty & Human Development Initiative (OPHI)

As reported in the technical notes, to identify the multi-dimensional poor, the deprivation scores for each household are summed to obtain the household deprivation. A cut-off of 3, which is the equivalent of one-third of the indicators, is used to distinguish between the poor and non-poor. If c is 3 or greater, that household (and everyone in it) is multi-dimensionally poor. Households with a deprivation count between 2 and 3 are vulnerable to, or at risk of becoming multi-dimensionally poor. The MPI value is the product of two measures: the multi-dimensional headcount ratio and the intensity (or breadth) of poverty. The headcount ratio, *H*, is the proportion of the population, which is multi-dimensionally poor:

$$H = \frac{q}{n}$$

Where *q* is the number of people who are multi-dimensionally poor and *n* is the total population. The intensity of poverty, *A*, reflects the proportion of the weighted component indicators, *d*, in which, on average, poor people are deprived. For poor households only, the deprivation scores are summed and divided by the total number of indicators and by the total number of poor persons:

$$A = \frac{\sum_1^q c}{qd}$$

Where *c* is the total number of weighted deprivations the poor experience and *d* is the total number of component indicators considered.

The MPI varies between a range of 0 and 1, where 0 is multi-dimensionally not deprived and 1 is multi-dimensionally deprived. The general MPI for Kenya was 0.302 in 2003 and an improvement of the country's conditions in 2008/9 is shown, given a decrease of the index up to 0.229. Compared with the other Sub-Saharan African Countries, Kenya results to be multi-dimensionally poorer than nine countries: South Africa, Ghana, Sao Tome and Principe, Lesotho, Gabon, Zimbabwe, Swaziland, Namibia, and the Democratic Republic of Congo. The percentage of MPI Poor (H) in the Country is 47.8% and the average intensity of deprivation is 48% (OPHI Country Briefing, 2011). The MPI can be broken down to see directly how much each indicator contributes to multi-dimensional poverty.

Figure 2.12 shows the composition of the MPI using a pie chart. Each piece of the pie represents the percentage contribution of each indicator to the overall MPI of the country: the larger the slice of the pie chart, the bigger the weighted contribution of the indicator to overall poverty. From the pie it emerges that living standards give the heaviest contribution in the index composition, while the health factor of the index represents the 30% of MPI in the country for 2008/9 data of demographic and health surveys.

Fig. 2.12 Contribution of indicators to the MPI, Kenya 2008/9, KDHS 2008/9.
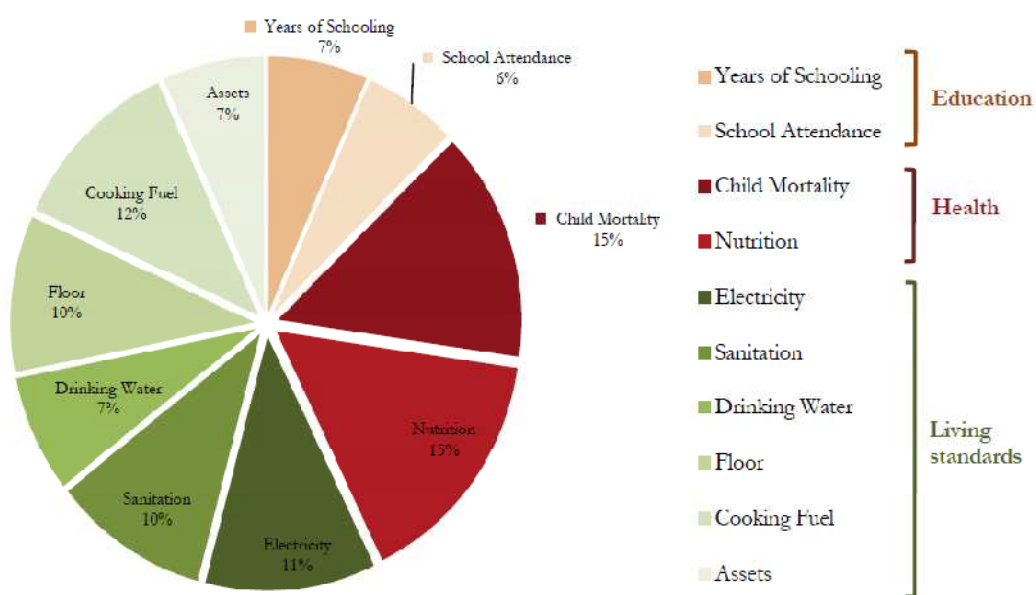
The MPI can be deconstructed by different population subgroups, and then broken down by dimension, to show how the composition of poverty differs between different regions or groups. Analyzing KDHS 2008/9, the general distribution of Multi-dimensional Poverty Index by Regions in Kenya (Graph 2.1), a clear difference in poverty distribution among regions emerges. Nairobi, Central and Coast regions appear to be the wealthiest, while the others have the major percentage of multi-dimensionally poor households. Of relevance are also the percentages of households at risk of poverty, where the major concerns are Central, Nyanza and Western Regions.

Graph 2.1 Provinces by Multidimensional Poverty Index levels, KDHS 2008/9
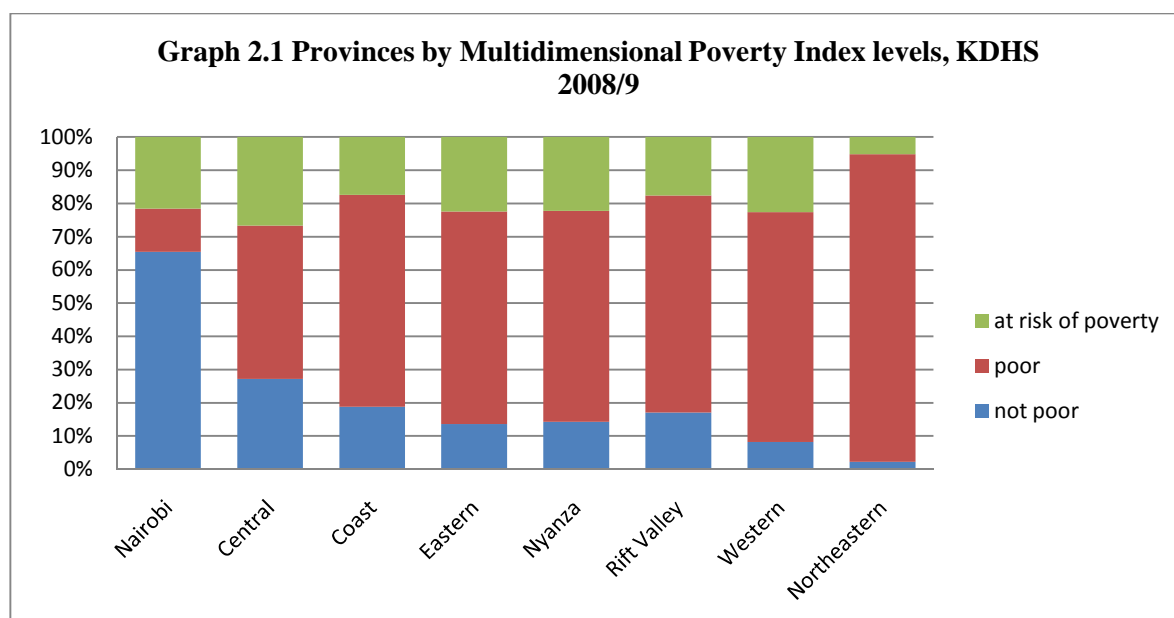
Considering the distribution of the MPI in Kenya, and looking at the decomposition of the index by the eight regions for 2003, North Eastern, Nyanza and Rift Valley are the most multi-dimensionally poor regions. For almost all the regions, excluding Nairobi, more than 50% of the share of poverty seems to be characterized by standards of living (in particular by sanitation, cooking fuel and electricity, not shown data), immediately followed by health component of the index. Conversely, health represents the heaviest problem in Nairobi.

Tab. 2.5 Kenya provinces by Multidimensional Poverty Index, total and decomposed, 2003 KDHS.

Province	MPI value	MPI rank	Percent contribution of deprivations in…		
			Education	Health	Standard of living
Nairobi	0.049	1	27,60%	36,70%	35,70%
Central	0.181	2	7,90%	23,10%	69%
Coast	0.338	5	9,60%	28,80%	61,70%
Eastern	0.297	3	20,80%	26,80%	52,40%
Nyanza	0.360	7	8,30%	29,20%	62,60%
Rift Valley	0.351	6	17,30%	24,90%	57,80%
Western	0.317	4	11,70%	26,20%	62,10%
North Eastern	0.676	8	20,80%	26,80%	52,40%
Kenya	**0.302**		**14,50%**	**26,20%**	**59,30%**

Source: Alkire and Santos, 2010; KDHS 2003

Looking at the distribution of the MPI among the ethnic groups in Kenya in the following table for the 2003 index, the most deprived groups are Somali, Masai and Turkana, while Kikuyu, the biggest group in the country, is among the less deprived. Less deprived groups generally report positive patterns of education and health, while the most deprived groups are those whose share of education and health more heavily influence the MPI (data not shown).

Tab. 2.6 Kenya main ethnic groups by Multidimensional Poverty Index, total and decomposed, 2003 KDHS.

Ethnicity	MPI Value	MPI Rank	Percent contribution of deprivation in ….		
			Education	Health	Standard of living
Embu	0.141	1	5,6%	15,50%	78,90%
Kikuyu	0.167	2	5,80%	28,50%	65,60%
Taita/Taveta	0.205	3	5,80%	29,50%	64,70%
Meru	0.241	4	14,1%	27,70%	58,10%
Luhya	0.284	5	7,80%	30,90%	61,30%
Kamba	0.304	6	7,20%	31,10%	61,70%
Other	0.313	7	14,30%	34,40%	51,30%
Kisii	0.315	8	4,90%	25,50%	69,60%
Luo	0.333	9	8,40%	35,70%	55,90%
Kalenjin	0.369	10	9%	29,60%	61,40%
Mijikenda/Swahili	0.417	11	19,60%	29,10%	51,40%
Kuria	0.508	12	16,60%	31%	52,40%
Somali	0.594	13	33%	22,40%	44,60%
Masai	0.599	14	28,20%	22%	49,80%
Turkana	0.654	15	30,60%	23,80%	45,60%
Kenya	**0.316**		**13,10%**	**29%**	**57,90%**

Source: Alkire and Santos, 2010; KDHS 2003

Focusing on maternal health dimensions and their correlates with the MPI, and looking at the household MPI distribution by place of delivery for 2008/9 (KDHS 2008/9), there is a difference between multidimensional poor household behavior and not-poor household behavior, where 63% of women in poor households deliverers at home, and 36% in a healthcare facility. On the other hand, among the not multi-dimensional poor households, 78% of women give birth in a healthcare facility, and 22% at home. Women at risk of poverty tend to deliver mostly in healthcare facilities, although more than 30% of them delivered their last birth at home.

Graph 2.2 Place of delivery by Multidimensional Poverty Index levels, KDHS 2008/9
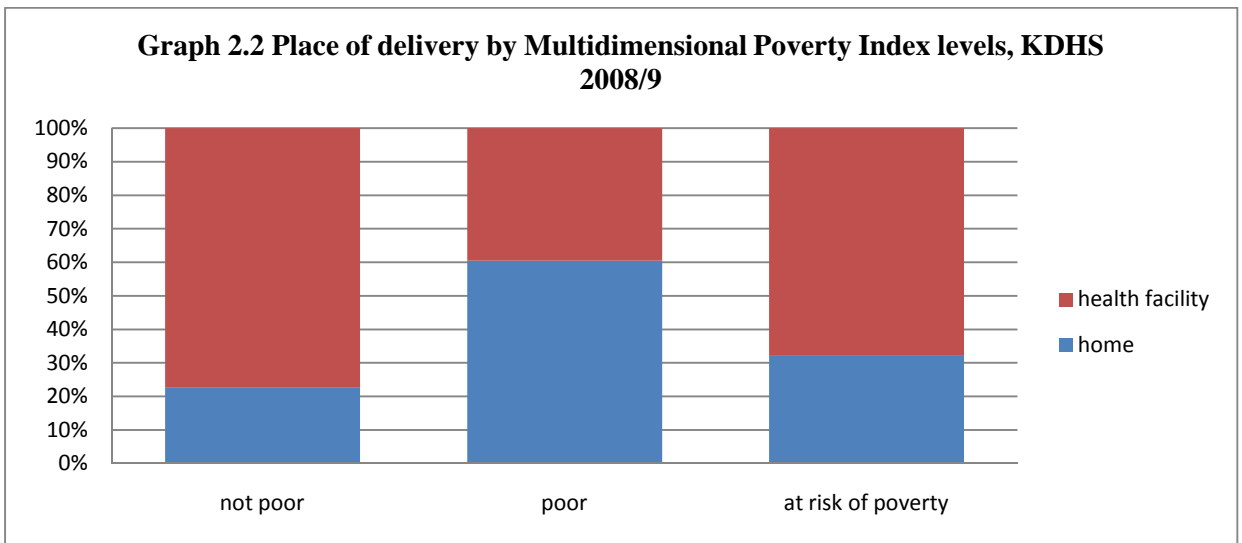
Looking at the number of visits for antenatal care distribution by multi-dimensional poverty index classes, although poor women, as predicted, have less visits than not-poor women, there is still a tendency for more than 70% to have at least one visit. Conversely, more than 60% among the not multi-dimensionally poor have more than 7 visits.

Graph 2.3 Number of visits for antenatal care by MPI levels, KDHS 2008/9
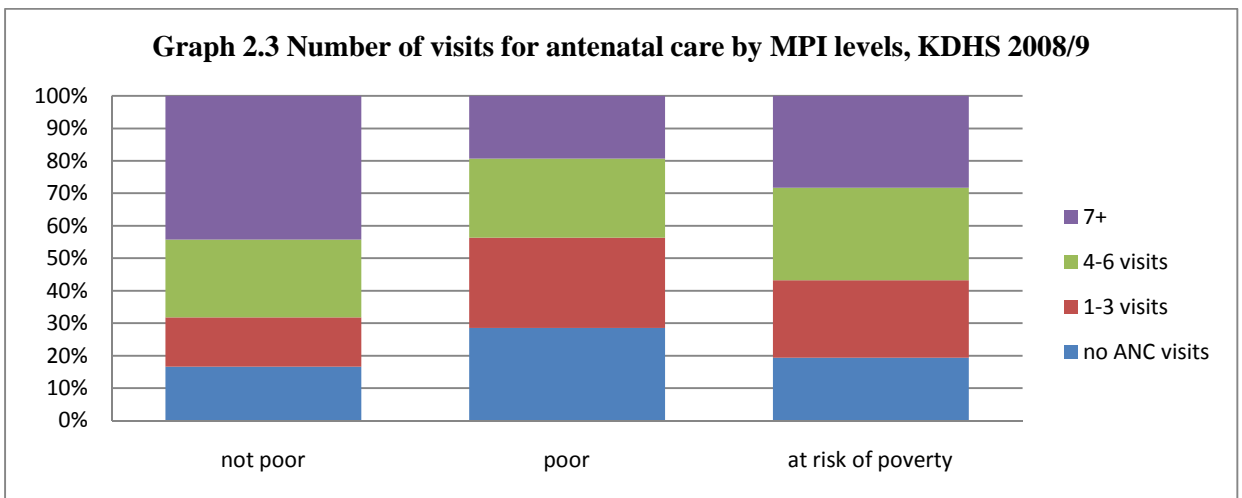
Investigating postnatal-care distribution among multi-dimensional poverty index classes, 52% of all women have never had any post-natal visits for their last birth in the five years before the survey, while 48% had postnatal care visits. Almost 60% of those who are multi-dimensionally poor have never had any postnatal visits, while among the not-poor, 70% had visits.

Graph 2.4 Visits for postnatal care by MPI levels, KDHS 2008/9
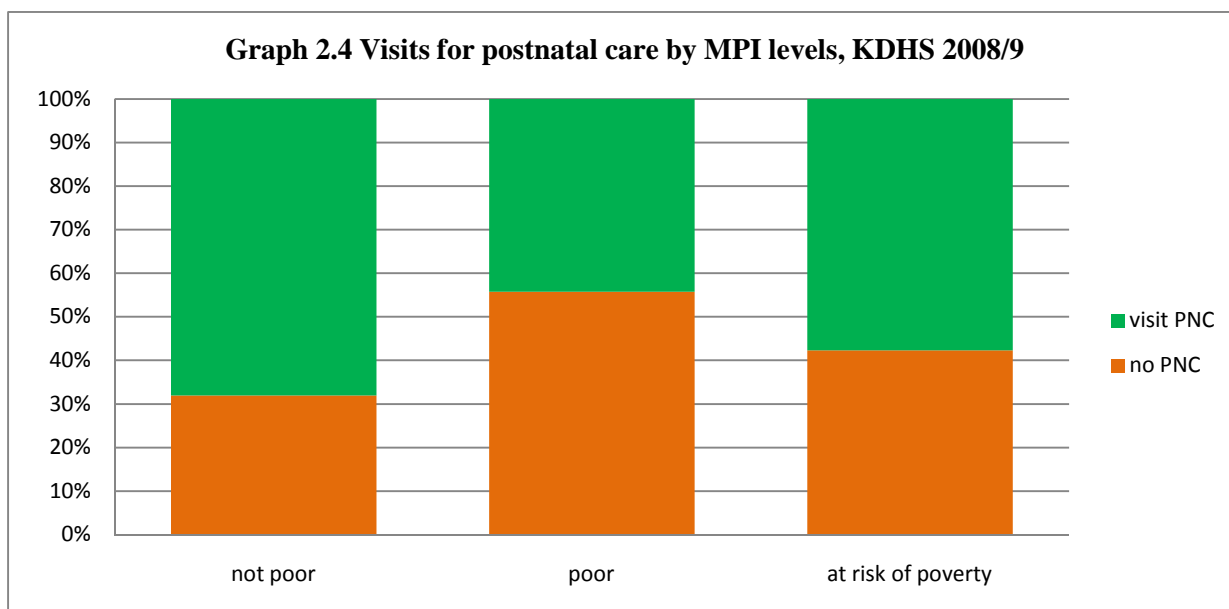
In conclusion, it is possible to state that inequalities both cause and perpetuate health disparities in the country. Many are the barriers to accessible healthcare services and maternal healthcare, including wealth status and geography, which also imply difficulty in reaching the facilities. Transport is therefore an important element that contributes towards reaching the fifth millennium development goal in order to reduce maternal mortality by 75% by 2015. Following a Health Seeking Behavior Model borrowed from public health studies, epidemiologists and medical geographers assert that barriers to healthcare seeking are grouped into 4 categories:

- Availability: refers to the geographic distribution of health facilities, pharmaceutical products;
- Accessibility: includes transport, roads, etc;
- Affordability: includes treatment costs for the individual, household or family. A distinction is made between direct, indirect and opportunity costs;
- Acceptability: relates to cultural and social distance. This mainly refers to the characteristics of the health providers – health workers' behavior, gender aspects (non-acceptance of being treated by the opposite sex, in particular women who refuse to be seen by male nurses/doctors), excessive bureaucracy, etc. (Good, 1987; Hausmann *et al.*, 1993).

Something that is often underestimated by maternal healthcare programs in sub-Saharan Africa is the "acceptability" component, and especially the cultural and social distance between women's traditions and the "medicalization" of health services offered. Some focus has to be put on the great differences between groups of people living in the same country, especially among minorities. The problem of barriers to healthcare for minorities also has to be considered, and generalizations should not be made (Scheppers *et al*., 2006). Policies and programs for access to maternal healthcare will be analyzed in order to better understand their strengths and weaknesses in achieving their targets. Women's mobility in times of obstetric emergency may be further limited by social restrictions on their movement (Oxaal and Baden, 1996). For example, in some countries when obstetric complications arise women must ask their husband's permission to seek care.

After considering how geographic disparities influence health and how this trend has developed until now, contributing to the current situation, this work will consider many other individual and community determinants to the utilization of health facilities for maternal healthcare. As previously discussed, availability and possibility to reach a healthcare facility does not automatically imply the women's access and utilization.

2.3   Policies and priorities for reproductive health care: focus on strategies for youth

In the first period after independence, and for almost 30 years, Kenya improved in almost all its health indicators. For instance, from 1960 to 1990 life expectancy rose from 43 to 62 years, infant mortality dropped during this period from 122 to 63 and under-five mortality declined from 204 to 93 per 1000 live births (Ministry of Public Health and Sanitation and Ministry of Medial Services, 2010). However, starting from the 1990's, most indicators showed a descending trend. The main causes for this worsening of health indicators were, among others, the AIDS epidemic (Rees, 2008) and the manifestation of resistant malaria (Mwai, 2009). Moreover, strong inequity between the poor and the rich, and rapid population growth are underlying factors driving negative health trends (Demery and Gaddis; 2009).

Whereas the Kenyan health budget had risen in absolute terms until 2005 (World Bank, 2007), the healthcare services for the majority of the rural and urban poor deteriorated. As a response to the health deterioration in the country, the Ministry of Health implemented some

measures based on a comprehensive "Health Policy Framework" (1994). Two National Health Sector Strategic Plans (HSSP I: 1999-2004, HSSP II: 2009-2010) were approved, the latter building the cornerstone of the Kenyan Healthcare Reform which included, among the other interventions, the reduction of user fees (Flessa *et al*., 2011). In Kenya, however, health programs are not accessible to all. Many of these programs fail the poor who are often pressed by their needs and are vulnerable to impoverishment. Moreover, besides the economic barrier, mainly cultural barriers hinder the access to health programs as well as to health facilities for using healthcare services (Alan Guttmacher Institute, 1995; Moya, 2002).

Following the Health Seeking Behavior Model borrowed from public health studies and presented at the end of previous chapter, it is asserted that barriers to healthcare seeking are grouped in 4 categories: availability, accessibility, affordability and acceptability.

As already said, what maternal healthcare programs often forget is the "acceptability" component, and especially the cultural and social distance between women's traditions and modern practices of health services offered (UNFPA, 2007). More focus needs to be put on the differences between groups of people living in the same country, especially minorities. The problem of barriers to healthcare for minorities also needs to be considered, and generalizations should not be made (Scheppers et al., 2006). Assuming the vulnerability of youths, such as their lack of access to a healthcare facility, and the barriers they can encounter in accessing maternal healthcare, the government of Kenya recognized the necessity of this particular group and decided to implement specific polices addressed to them. Several are the barriers encountered when talking about youths, starting from physical and economic ones. For example, youths may have little or no money to pay for services, lack of transportation or lack of knowledge of how to use services, and as well, health workers may hold judgmental attitudes toward adolescent sexual activity (Alan Guttmacher Institute, 1995).

The lack of awareness on the importance of maternal healthcare, and the lack of knowledge and information also constitute a barrier in accessibility to health services. Gradually, public health policies and programs have centered on the sexual and reproductive health needs of adolescents and youths. This is done as an answer to the awareness that adolescents represent large segments of developing countries' populations, that reproductive health outcomes of adolescents are often negative and lead to more complications, and that services for adults are not adequate to satisfy their needs. Not all the programs, however, present solutions for sexual and reproductive health services, where, clearly, adolescents have differing needs from older

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women; in general, the youth population discussed consists of unmarried, sexually active adolescents (Erulkar, 2004). The 1994 International Conference on Population and development (ICPD) identified the adolescents as a distinct target group in need of *ad hoc* reproductive health programs and services (Villareal, 1998).

It has been only since the year 2000, and especially with the introduction of the 5th goal of the Millennium Development Goals, that international agencies and the Government of Kenya concretely identified teenage reproductive healthcare and premarital births as a target to assess, and started to address specific policies providing sexual and reproductive health services specifically targeted to adolescents, recognizing their delicate situation. The majority of these programs involves education and makes use of youth centers, peers, media and schools in order to arrive at the target group. In the context of the various policies introduced in the country aiming at reducing maternal mortality, the needs of youths started to be considered. After a backward slide in maternal mortality rates in country, the National Reproductive Health Strategy (NRHS) 1997-2010 and its revision for 2009-2015, the MDGs implementation, and the Maternal and Newborn Health (MNH) Road Map launched in 2010 were aimed at creating a new vision for maternal healthcare services. According to Road Map analysis, the slow progress in the attainment of maternal and newborn health targets in Kenya can be attributed to limited availability, poor accessibility and low utilization of skilled birth attendants during pregnancy, childbirth and the postnatal period; low basic emergency obstetric and newborn care coverage; poor involvement of communities in maternal and newborn care; and limited national commitment of resources for maternal and newborn health. In this framework, to guide the provision of adolescent reproductive health services in Kenya, the Division of Reproductive Health (DRH) of the Kenyan Ministry of Health (MOH) developed and actuated the Adolescent and Reproductive Health and Development (ARH&D) Policy in 2003, and the Policy Plan of Action (2005) as an implementation tool, which outlines how the key priorities in Adolescent Health would be addressed. The DRH has also developed national guidelines for the provision of Youth-Friendly Services (YFS) in 2005 to direct the provision of reproductive health services to young people. By exploring the crucial areas for adolescent and youth necessities, and their social, economic, cultural and demographic background, the policy aims at contributing to the spread of the quality of life and wellbeing of this particular social group. The National Guidelines for Provision of Youth-Friendly Services (YFS) in Kenya are in line with the adolescent reproductive health and development Plan of Action, which recognizes special approaches to implementing the ARH&D policy, and defining the role of the health sector in solving reproductive health

problems for young people. As reported by the guidelines, "the recently published Kenya Demographic and Health Survey (KDHS) report indicates that half of all new HIV infections occur among young people aged 15-24 years. Worse still, girls are twice as likely to be infected as boys the same age. The survey also revealed that by age 19, almost half of adolescents have begun childbearing and among all pregnant women, 23 percent are adolescents. In addition, teenagers from poor households are more likely to have begun childbearing and, more than half of the adolescent deliver at home. The recently launched Kenya Service Provision Assessment (KSPA) 2004 indicate that only 12 percent of our facilities are able to provide youth friendly services" (MoH, 2005). Aiming at improving youth health, and dealing with all the issues the adolescents and youth face, (such as lack of reproductive health knowledge and information, malnutrition, school drop-outs, female genital cutting, early and unprotected sex, early forced marriage, unsafe abortion practices, and sexual abuse, among others) the guidelines plan to launch these Youth-Friendly Services and to increase the number of services specifically addressed to youths offered in the existing health facilities. (Senderowitz, 1999).

In the context of the guideline plan for Kenya, the World Health Organization describes Youth-Friendly Services (YFS) as "services that are accessible, acceptable and appropriate for adolescents. They are in the right place at the right price (free where necessary) and delivered in the right style to be acceptable to young people. They are effective, safe and affordable. They meet the individual needs of young people who return when they need to and recommend these services to friends" (MoH, 2005). Promoting and creating new youth-friendly services is always a crucial and controversial issue, which many times can bring challenges to policy-making. This happens because providing reproductive health services to young people is a sensitive public issue, since the topic is not only about healthcare but also about cultural behaviors not always generally shared and recognized, such as premarital sex or abortion. This implies that providers and staff members are not always encouraging about supplying these services to youths, and therefore they have to be effectively trained and should respect clients' privacy and confidentiality. Also, making the reproductive health services youth-friendly implies additional training, staff time and costs. For example, young people from Ghana and Kenya (in dialogue with the Planned Parenthood Association of Ghana and the Family Planning Association of Kenya) described an 'ideal' service as one equipped with resources such as telephone hotlines, with personnel who are youth friendly, in a location that is central and neither difficult nor expensive to reach, and with services that are subsidized or free, or at least clearly priced. In addition, young people felt that the layout of

the centre should accommodate physically challenged young people and that the counseling room should not just be a curtained area, but a separate room to guarantee confidentiality and privacy.[4] "The young people also felt that it was necessary to ask young people in the community what types of services they wanted from the clinic or centre where the services are provided." (IPPF, 2008).

In order for a service to be recognized and categorized as "youth-friendly" it has to meet some requirements. These include: convenient hours and special times set aside, convenient location, adequate and separate space, sufficient privacy, and comfortable and secure surroundings. The national guidelines for youth-friendly service provision sets up three different models, through which reproductive health services can be made accessible and available to the adolescents, reflecting the common models used in Kenya which include: a clinic-based model, a youth centre model, and a school-based peer youth program. In all cases each model must put in place a strong and effective referral system for services not available at the facility. The three models proposed for youth friendly services with recommended essential service package are listed in the table below, taken from the Ministry of Health report on the proposed guidelines:

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[4] Information based on a research activity conducted with young people from Ghana and Kenya, described in Explore, IPPF 2008.

YOUTH-CENTRE BASED MODEL (RECOMMENDED ESSENTIAL SERVICE PACKAGE)	CLINIC BASED MODEL (RECOMMENDED ESSENTIAL SERVICE PACKAGE)	SCHOOL BASED MODEL (RECOMMENDED ESSENTIAL SERVICE PACKAGE

1. Counseling Services on
  * Sexuality
  * Growing up
  * Relationships
  * Pregnancy,
  * Abstinence
  * Unsafe abortion and abortion Prevention
  * STIs and HIV/AIDS
  * Substance and Drug abuse
  * Contraception
  * Careers
  * Rape prevention
  * Nutrition
  * Male involvement in RH
  * Parenting
  * Ante and post natal care
  * Skilled attendance
2. Screening and treatment of exually transmitted infections
3. Voluntary Counseling and Testing (VCT)
4. Provision of information and Education on Reproductive Health.
5. Availability of IEC, audio/visual Materials.
6. Ante and post natal care
7. Comprehensive post rape care (see Annex)
8. Provision of contraceptives
9. Promoting community based and school based outreach activities
10. Recreational facilities (In and Outdoor) where possible.
Linkage to school based and Clinic based model
 	
Refer where necessary
	1. Counseling services on
	  * Sexuality
	  * Growing up
	  * Relationships
	  * Prevention of pregnancy,
	  * Abstinence, consequence of unsafe abortion
	  * STIs and HIV/AIDS
	  * Substance and Drug abuse
	  * Contraception
	  * Careers
	  * Rape Prevention
	  * Unsafe abortion and abortion Prevention
	  * Nutrition
	  * Male involvement in RH
	  * Parenting
	  * Ante and post natal care
	  * Skilled attendance
	2. Provision of information and Education on Reproductive health
	3. Training in livelihood and life skills
	4. Availability of IEC, audio/visual Materials
	5. Promoting community Based/School Based outreach IEC activities Working with peer youth educators
	6. Provision of contraceptives
	7. Recreation facilities (In and Out door games)
	8. Screening and treatment of STDs, HIV/AIDS (Where possible)
	9. Voluntary counseling and testing VCT
	10. Curative services for minor illnesses including ante and postnatal care
	11. Comprehensive post rape care (see Annex)
	Linkage to school based and Youth center based model
	
	Refer where necessary
		1. Life skill training on
		  * Goal setting
		  * Decision making
		  * Negotiation
		  * Moral values
		  * Assertiveness
		  * Communication skills
		2. Counseling Services on
		  * Sexuality
		  * Growing up
		  * Relationships
		  * Abstinence
		  * Pregnancy, Abortion and their Prevention
		  * STIs and HIV/AIDS
		  * VCT
		  * Substance and Drug abuse
		  * Contraception
		  * Careers
		  * Self esteem Nutrition
		  * Male involvement in RH
		  * Parenting
		  * Ante and post natal care
		  * Skilled attendance
		3. School health talks
		  * Personal hygiene
		  * Sexuality and growing up
		  * Reproductive Health
		  * STD-Prevention
		  * HIV-AIDS Prevention
		  * Rape Prevention
		  * Communication skills
		4. Post rape care (see Annex)
		Linkage to clinic based and Youth center based model
		Refer for management.
		5. Refer for treatment and management

Therefore, in order to actualize the youth friendly services and to increase the knowledge and access of youth to the services, the guidelines present some crucial elements. These include, first of all, the youth participation and group discussion establishment, with the aim of facilitating the involvement of the same age group. As a second requisite to implementation is the construction of a connection, when the youth center has inadequate or no clinical services, with the nearest health facility, where young people can ask and obtain services not available at the centre, and where psychological aspects and problems are considered (especially when young girls are subjected to some types of examinations). Also, it is necessary to consider that all the services should be offered at affordable fees and with flexible arrangements; the widest possible available range of individual youth health needs should all be met in the same site, taking into account the lack of money that youths usually experience. Also, in order to ensure good attendance in the clinic, youths should receive services within the shortest amount of time possible.

The guidelines also offer educational materials and advertising to advice and encourage youths on critical issues in sexual and reproductive health, since the role of education and information for youths' sexual growth is widely recognized (Westoff and Bankole, 1997). As it has been demonstrated, the community has a strong impact on individual decisions and behaviors (Stephenson et al., 2006), and this is particularly true when we talk about adolescents and youths, where the context and the environment influence their choices (Interagency Youth Working Group, 2007). "Is also well known that community plays an important role in supporting and advising the youth. Any youth friendly services established without the support of the community is likely to fail. The community, which includes parents, teachers, local opinion leaders, and civic and religious leaders, are key gatekeepers. They are all interested in knowing what services are being provided to their young people. Their involvement in planning and establishing such services will help in mobilizing support and ensuring the long-term sustainability of such services. The role of the family must be acknowledged in the provision of services" (MoH, 2005).

Finally, where possible, youth-friendly services must be taken to the meeting places where young people gather, such as schools or worksites, in order to facilitate the access to facilities and the feelings of trust and privacy. In fact, confidentiality and privacy are elements that motivate youths to attend a health facility, because at that age they need to be reassured and to trust the person they are going to meet and the site where they are located (Senderowitz, 1997). These services should then try to cultivate and sustain the trust of youths, so that they can access healthcare and related services in an environment free of prejudice, betrayal and fear of being heard or seen by others (Erulkar, 2004).

Not many analyses on monitoring and evaluating the implementation of policies for youths, as well as the realization of youth-friendly services have been announced. However, issues emerge from the study of this policy and from a conversation held with Dr. Aisha Mohamed, Program Manager of the Adolescent Sexual Reproductive Health Division of Reproductive Health, for the Kenyan Ministry of Health, who released an interview in April 2011. Looking at the distribution of the services implemented, as released by the Ministry of Health's 'Health Facilities List' and reported in the map below, it is shown how certain dynamics of inequalities persist in the territory. The communities living in semi-arid areas, such as the North Eastern province and the northern part of Eastern and Rift Valley provinces, show a considerable scarcity of these services. These are exactly the areas with the lowest level of education and the highest levels of poverty (KDHS, 2008/9).

Fig 2.13 Primary sampling units and services addressed to youth,
2008/9 KDHS, MoH, KEMRI
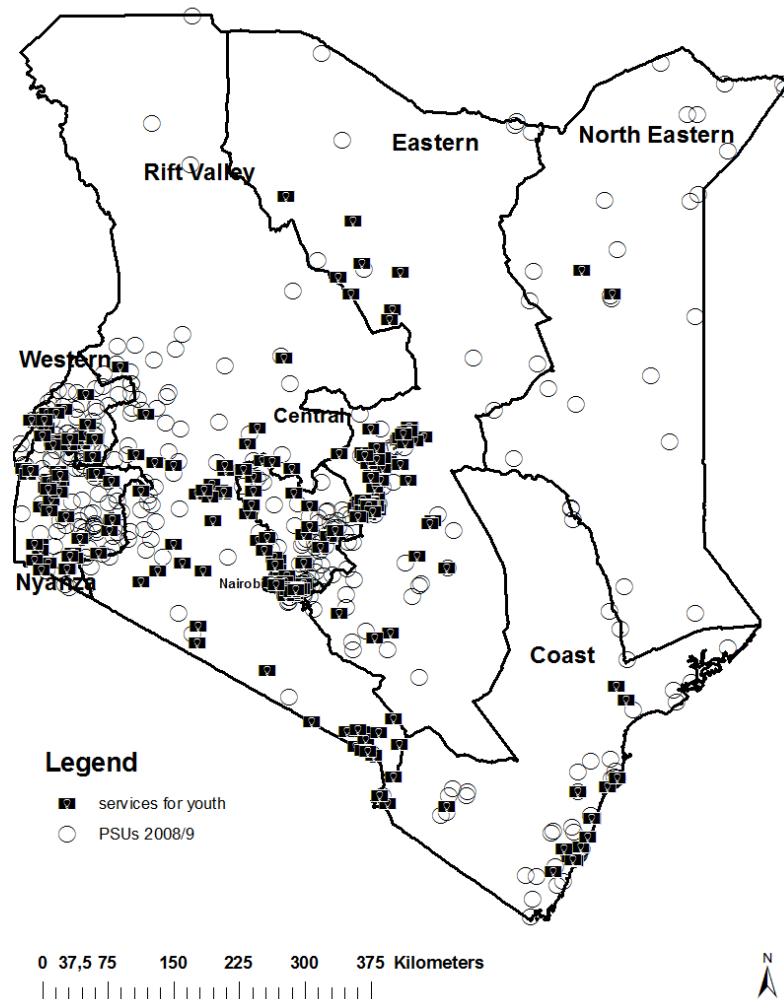
The cycle of poverty is, therefore, continually re-fed, since physical barriers are perpetuated. According to Dr. Mohamed, when passing from the development of the Policy to the implementation on the field, many difficulties can emerge, especially when we talk about adolescents and youths.

"Youth is the main priority on maternal health issue but funding are still not enough and what we can do is not adequate to reach all the goals. Health facilities are also an issue: they are not many, not well located, not well equipped, is not always possible to find a doctors available. Furthermore, what we can say after so many years of work on that is that also the attitude of the community matters in individual choices. The most representative case is the low utilization of maternal shelters we built for pregnant women, especially for the poorest. If you have a look at the maternal shelters in North Eastern region, many of them are locked because of the very scarce utilization. This is actually the region with the highest maternal mortality ratios. Because of the role of women in the family and because of the community

behaviors during pregnancy and delivery they do not go to the shelters. Women are so important in the house, they do everything, housework and child-care. She cannot leave the house for an entire month also because the community would not approve it and would not help the family when the mother is not there."

Consequently, especially in the villages where it is difficult to reach young people, some cultural barriers and community influences are maintained.

"It is very difficult to be closer to adolescents, not so much in the cities but very much in the villages where people is close and strictly tied to traditions and is sceptical. Sex is a taboo in the villages and in people close the eyes when we campaign for family planning and we aim for its diffusion. Talking about culture and tradition infecting sex behaviour we cannot forget the FGM (female genital mutilation). Now the parliament passed a Bill and this practice is now illegal, it's a crime, but before it was still accepted from the government since it's considered a traditional practice. But what's the bounder of tradition?"

Indeed, the community plays a crucial role, and its influence on youth is recognized by policies, which base their intervention on community participation (Chege and Askew, 1997; Interagency Youth Working Group, 2007; Biddlecom *et al.*, 2009; Kesterton and Cabral de Mello, 2010). There is a certain tradition of community-based programs in the country, aimed at increasing family planning and maternal healthcare knowledge and diffusion through community-based distributors, especially in rural areas where there is a lack of coverage of services. Moreover, a few studies have been employed in order to assess the role of community-based distributors in providing information and services (Chege and Askew, 1997; Ensor and Cooper, 2004). As highlighted by Chege and Askew (1997), "the youth remain an under-served group for CBD programs, in terms of both information on sexuality and contraception and provision of services."

Especially in poorly served areas, traditional birth attendants play a fundamental role in the community's reproductive healthcare. In some cases, women prefer traditional birth attendants, since they feel closer to them and that they can trust them more. (Kamal, 1998) Having recognized the important contribution of the TBAs in the provision of maternal healthcare, particularly in the rural areas, the Government of Kenya, in collaboration with the World Health Organization (WHO), developed a National Curriculum for Traditional Birth Attendants in 1990/91, following the recommendations of the First International Conference on Safe Motherhood held in 1987 in Nairobi. Training programs encouraged TBAs to conduct ANC and to improve intra-partum and postpartum practices, in order to lower maternal mortality, and a curriculum for TBAs was developed. The aim of the curriculum was to train

TBAs in antenatal care, hygienic and safe deliveries, and postnatal care, using the available appropriate technologies at the community level. Impact evaluation studies of the TBA training program in the pilot areas have indicated that the program is making a positive impact on maternal and child healthcare (WHO and Ministry of Health, 1996; Sibley and Sipe, 2006). However, despite the increase in TBA training programs, maternal mortality did not decrease, and policy makers focusing on one single indicator, such as the ultimate reduction of mortality rates, assumed that practical difficulties, such as poor literacy and lack of scientific knowledge, were preventing TBAs from effectively lowering the MMR (Kruske and Barclay 2004). By 1997, senior policy makers decided to shift priorities to the provision of 'skilled birth attendants' (SBA). The definition of SBA excluded TBAs, and this resulted in the subsequent withdrawal of funding for TBA training and the exclusion of TBAs in policies and programs worldwide (Kruske and Barclay 2004). Especially in the last decade, evidence from recent KDHS shows an increase in the maternal mortality rates in the country, leading to an ever-larger spread between real rates and MDG5 desired achievements (530 maternal deaths per 100 000 live births is the 2008 maternal mortality ratio for Kenya, rising from 380 per 100 000 live births in 1990).

"What we saw after the period of the policy for training and equipment of TBAs was that the maternal death increased so we couldn't allow anymore them to operate. Now the policy is that deliveries should be done in health facilities. They can escort the mothers to the health facilities but they cannot make deliveries. Kenya does not recognize TBAs as professional practitioner after the maternal mortality increase. Community midwifes and nurses (most of the times retired) instead are accepted and are skilled for deliveries." Dr. Mohamed, 2011.

However, studies on the influence of the presence of TBAs on youth reproductive health care are not available, and their feelings towards these figures are not homogeneous. On the one hand, young people feel threatened by these figures, since they are close to their families and they may judge them. On the other hand, TBAs are sometimes their only contact with healthcare. Moreover, as reported by the conversation with the Family Planning Association of Kenya (IPPF, 2008) young girls find some healthcare providers to be rude and judgmental. Consequently, many aspects can create barriers to proper reproductive healthcare: young people have prejudices when seeking healthcare and, as highlighted by Dr. Mohamed, many providers are incompetent: *"talking about the health facilities system and the quality of the services offered a big problem of the country is the workers bias (not very well trained workers in the HF)."*

Part 3 - Focus on the target group of analysis: the youth

3.1 Focus on youth: why adolescents and youth are a special group

"Children born to very young mothers are normally predisposed to higher risks of illness and death due to the limited exposure of the mothers to reproductive health services. Adolescent mothers are also more likely to experience complications during pregnancy and are less likely to be prepared to deal with them, which often leads to maternal deaths. Because of their early entry into child bearing, the mothers are denied the opportunity to pursue basic and advanced academic goals. This eventually affects their welfare and social status and hence limits access to many reproductive health programs" (Kiragu et al., 1998).

This section aims at framing the characteristics and context of the young girls in Kenya, and their evolution during history. Young people can be defined as those aged 10-24 years, and this group combines adolescents (aged 10-19 years) and youths (aged 15-24 years) (Kesterton, 2010). However, as will also be discussed in this section, the concept of "adolescence" is itself a cultural construct diverging across situations and contexts, and in many parts of the 'developing world' it is a controversial notion (Villareal, 1998). Moreover, a second aim of this section is to introduce the diffusion of programs targeting youth as a means to improve reproductive healthcare among that age group, the role of communities in influencing young girls' behaviour, and how these programs include communities in their strategies.

The youth group in Kenya, especially in reference to girls, is increasingly considered by policies and programs as a target group, since it is recognized as extremely vulnerable and at the bottom of the society hierarchy (Government of Kenya, 2002). The gender discourse, from a very long time, dominates the political agenda of every international organization, government and non-governmental organization, identifying women as being at major risk of poverty, disparities and exclusion (Hoogeveen, 2005; United Nations, 2008). The youth situation also has to be framed within the country's general situation; Kenya faces rapid and massive expansion of its population at a growth rate that stands around 3% yearly (population rose from 8 million in 1960, to 16 million in 1980, 31 million in 2000 to 40,5 million in 2010, The World Bank Data 2012). Also, an important transformation of rural areas and a new urban-rural relationship, as well as the migration flows to urban areas with consequent spread

of urbanization (the percentage of urban population rose from 7,4% in 1960 to 22% in 2010[5], with only 27% of the urban population having access to improved sanitation facilities in 2008, almost the same percentage as 1995[6]) contributed to the vulnerability of youths. About 43% of the population is under the age of 15 (World Bank, 2010) and 37% of the population is aged between 15 and 24 (Government of Kenya, 2002). Differing from the previously cited definition of young people (Kesterton, 2010), the Kenyan National Youth Policy (2002) defines a Kenyan youth as one aged between 15 and 30 years: "This takes into account the physical, psychological, cultural, social, biological and political aspects, which explain the Kenyan youth situation. The youth in Kenya account for about 32% of the population, or 9.1 million. Of these, 51.7% are female youth. These form 60% of the total labor force. Despite this, opportunities are very scarce to absorb them in the job market. These young people are a potential resource for growth and social development if gainfully and productively engaged" (Haji, 2007)[7]. Consequently, Kenya faces the formidable challenge of providing its youth with opportunities for a safe, healthy, and economically productive future.

In comparison to older women's experience when having children, younger women, and especially adolescents, can face major risks of complication during pregnancy and delivery. The consequences of adolescent childbearing have been widely studied in the literature, and include higher risks of pregnancy complications and maternal mortality, increased rates of infant mortality and malnutrition, higher overall parity and more closely spaced births (Lion *et al.*, 2009). Older women also experience many of these reproductive health problems, but these problems are often exacerbated in adolescents. Age-related habits (for example, female circumcision and early marriage) and age-related vulnerability (as in economic pressures and male dominion) represent the most important causes of different degrees of reproductive health problems (Zabin and Kiragu, 1998). Young women are more likely to suffer pregnancy-related complications that cause danger to their lives or lead to infertility. Younger, unmarried women more often consider late, unsafe abortions as an alternative to carrying a pregnancy to term (Bankole *et al.*, 1998).

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[5] Urban population (% of total). Urban population refers to people living in urban areas as defined by national statistical offices. It is calculated using World Bank population estimates and urban ratios from the United Nations World Urbanization Prospects. United Nations, World Urbanization Prospects. Catalog Sources World Development Indicators, World Bank Database, 2012 http://data.worldbank.org/country/kenya

[6] Improved sanitation facilities, urban (per cent of urban population with access). Access to improved sanitation facilities refers to the percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained World Health Organization and United Nations Children's Fund, Joint Measurement Programme (JMP) (http://www.wssinfo.org/). Catalog Sources World Development Indicators, World Bank Database, 2012
http://data.worldbank.org/country/kenya

[7] For an overview concerning Adolescence in traditional Kenya see Gyepi-Garbrah, B., 1985, Adolescent Fertility In Kenya, The Pathfinder Fund.

In some societies, in fact, "young unmarried mothers are commonly ostracized for having a child" since "early childbearing disrupts education." Therefore "they particularly want to postpone their first birth" (Bankole *et al*., 1998). Both in urban and rural areas and particularly when looking at schoolgirls, having a baby during the period of education usually means having to abandon school and not having the opportunity for any more education. In rural areas of Kenya, early marriage accounts for 12% of dropouts (17% in urban areas). Before free primary education was introduced during 1970's, costs were a major constraint throughout the Country, accounting for 30% of dropouts in rural areas and 34% in urban areas (Avenstrup, 2004). However, the growing literature on early pregnancy and school dropouts asserts that, despite the introduction of free primary education, many other factors discourage girls to attend school (Mensch, 1999).

Also, in some groups, having a baby out of wedlock is often a source of great shame for the family, and leads to the stigmatization of the young girl by her community (Bledsoe and Cohen, 1993; Kiragu and Zabin, 1995; Gage, 1998). Young girls are also scared to go to a health facility for a visit, because many times nurses tend to mistreat them and refuse to provide services because they are unmarried. It results in a feeling of shame for the girl and for her family as well, and it underlines the condition of disadvantage and inequality in reproductive healthcare access (Gage, 1998).

In last few decades, the issue of adolescent pregnancy has been increasingly perceived as a problem (WHO, 2007). The health consequences of early fertility have drawn the attention of researcher as well as policy makers, both in developed and 'developing' countries (Makinson, 1985; Gage, 1998; Ocholla-Ayayo *et al*., 1993; Singh, 1998; UNICEF, 2009; Villarreal, 1998; Zabin and Kiragu, 1998). Therefore, given the important role youth holds at the international level, existing programs addressed to youths, already introduced in the previous chapter, and their implementation and repercussion on society are discussed. Although there is still a lack of focus in these programs on the differences of adolescent reproduction among cultures, the policies of the last twenty years have seen a rise of interest in the needs of a vulnerable group as adolescents. According to Kiragu *et al*. (1998), adolescent reproductive health has, over the years of his work, become an even greater priority at policy level. Through the analysis of teenage fertility, politicians and administrators can address their intervention to this very vulnerable special group. Facility services addressed to youths, presented in previous sections of this work, focus on provider and facility characteristics, and stress the necessity of ensuring privacy by a specially trained provider, to allow friendly ways of approaching the young

patient, and to be gentle when talking about some sensitive topics (Erulkar, 2005). However, these programs do not often consider the conditions preceding the actual access to the health facility. Indeed, there are many factors limiting young women's abilities to benefit from such services, starting with the physical possibility of reaching the facility, as well as the family and community view on such services (Ochako *et al*., 2011). For example, from a study conducted in October 1989 in the rural South Nyanza district in Nyanza province of Kenya, aimed at assessing the factors leading to delivery in a formal healthcare facility, "the variable having the highest influence on delivery location was distance to nearest maternity bed. The greater the distance to a health facility with maternity beds, the less likely women would deliver at a health facility. A 1 km increase in an average household's distance from the nearest maternity bed would reduce the probability of choosing the formal sector by 3.4%" (Hodgkin, 1996).

Certainly, the availability of this resource for youths does not always correspond to accessibility, at least not for all young women in the country (Haile, 2000). Most of the time, policies addressed to youths are conceived and built by evaluating the individual and rational ability of access, while often, access itself is not a choice. Erulkar, in *Examining the Gender Dimensions of Popular Adolescent Programming Concepts: What Do They Offer Adolescent Girls and Boys?* (2002), asserts that there is a lack of evaluation analysis of the effectiveness of programs implementing youth-friendly services, and their impact on adolescents. The Population Council evaluated the function and effectiveness of some centers targeting youths in Kenya and in three other African countries. The researchers' aim was to assess the centers' associated costs, and to understand community perceptions of the centers through a retrospective Analysis of Service Statistics held between 1993 and 1996. Major results regarding the Kenyan situation concerned the low coverage of centers, and the inadequacy in reaching a significant proportion of the country's youth. The stigmatization by communities and by the youths themselves is also a crucial factor, since being associated with these centers means being recognized as sexually active. Also, the judgmental and not always confidential behavior of healthcare providers often scares and inhibits girls in accessing the centers, especially the unmarried girls who are often stigmatized for having premarital sex (Erulkar, 2002).

As reported in a quantitative study held by Erulkar (2005), most of the reproductive health programs implemented have focused on "giving reproductive health information to young people or on increasing parents' and teachers' capacities to convey such information," instead

of improving youth access to facilities. This is mostly due to the cultural and political barriers concerning this sensitive topic (Erulkar, 2005). Qualitative research has suggested, as Erulkar confirms, that Kenyan young people's ideas on what encourages them to access a facility are extremely heterogeneous, reflecting the wide range of characteristics of youths in the country. Some of them desire services at a distance from their communities, while others prefer services closer to their home. Youth in the urban areas prefer education from peers, while those in the rural areas prefer to get information from people older than themselves (Erulkar, 2005). However, Erulkar stresses the necessity to implement more quantitative studies in order to classify the preferences of these youths. Aimed at testing the impact of community-based interventions to reach unmarried youths aged 10 to 24 years, Erulkar conducted a study in Kenya and Zimbabwe. Results showed that many aspects generally considered crucial for youth-friendliness are not as important to Kenyan adolescents. "Youth-only facilities, a hallmark of youth centres, do not rate highly in the service preferences of adolescents, yet considerable investment has gone into this model. Similarly, the involvement of peer educators or the involvement of youth in running programs does not seem to be as high a priority as is commonly thought" (Erulkar, 2005). On the contrary, long waiting times, long distances to clinics, inadequate provider-client interactions, and insufficient time spent for consultation were raised as being the major problems, therefore, they should be considered in order to improve youth accessibility to facilities.

Erulkar *et al.* also published a case-control study in 2004, reporting the behavior change evaluation of a Reproductive Health Program. The research aimed at measuring behavioral changes associated with a culturally consistent reproductive health program for young people in Kenya. The study was carried out in Nyeri District, where the Family Planning Association of Kenya implemented the Nyeri Youth Health Project, a community-based project for young people, during a period when the atmosphere in Kenya was not favorable to supplying young people with reproductive health education and services. The study concluded that; "interventions that adapt to indigenous traditions can be both acceptable to communities and associated with significant changes in young people's behavior (Erulkar et al., 2004)[8].

Despite the fact that some evaluation on the effectiveness of programs targeting youth has been made, the literature analyzing the community impact on youth access to health facilities and, in general, on their reproductive health behavior, is still lacking (Kesterton, 2010).

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[8] For a deeper description of youth friendly services and analysis of Nyeri Youth Health Project and research see the chapter on Policies and Programmes

"There is a great need for more rigorous evaluation of programmes in this area. In particular, further evaluation of individual components within a multi-component approach is needed to elucidate the most effective interventions" (Kesterton, 2010). However, there is some evidence highlighting the strong impact of community on women's behavior, but still very little concerning youths. Again, Kesterton highlights that there is wide concern; "in following recommendation about mobilizing communities to generate demand and community support, and in recognition of the failure of approaches focusing solely on improving youth SRH service provision (quality, availability, acceptability, accessibility) or the supply side" (Kesterton, 2010; WHO, 2006).

The interagency Youth Working Group in Youth Lens report on reproductive health and HIV/AIDS asserts: "Increasingly, youth projects are now turning to a more holistic approach that involves community members. [...] Clinics now sponsor outreach activities in surrounding neighborhoods to generate demand among high-risk youth. Schools without structured sex education programs welcome community-based peer educators to fill the gap. Faith institutions are training parents and ministers to talk to youth about sexuality and HIV prevention." The article raises the question concerning the real impact of community in youth programs and the correct way to evaluate it. A review of an intervention employed in Nepal in 2006 by Engender Health and the International Center for Research on Women (ICRW) showed that "knowledge and use of services by young women increased more in the community involvement arms for maternal health, infertility, family planning, and reproductive tract infections. Impact was greatest when issues related to traditional community beliefs" (Pande *et al*., 2006). In western Kenya, the involvement of community in the Frontiers program, supervised by the Population Council, where religious leaders, parents, and community leaders were involved in discussion about youths needs, was recognized as crucial in "assuring that the interventions could be undertaken and continued on a large scale" (Interagency Youth Working Group, 2007).

In Kenya, as reported by the evaluation made by the Frontiers Program, the acceptance in the community to create a supportive environment for youth reproductive health is quite high. Also, "communication of youth with their parents increased significantly in some sites" even if the "impact of the intervention still remains unclear" (Kesterton, 2010).

In the work of A. Biddlecom *et al*. (2009), on the role of parents in adolescent sexual activity and contraceptive use in four African Countries (Burkina Faso, Ghana, Malawi and Uganda), it emerges that parents play important roles in the lives of adolescents. Unmarried adolescents

reported moderate to high levels of parental monitoring and low levels of parent-child communication on sexual matters. In all countries, adolescent males who reported low monitoring had an elevated risk of sexual activity in the preceding year, as did their female counterparts in three of the countries. Concerning community involvement and the impact on decisions of using health facilities for delivering, Stephenson *et al*., (2006) reported interesting results, showing that "the community in which women live may shape their decision on whether to give birth in a health facility through several different pathways; […] female autonomy, availability of health facilities, prevailing fertility preferences and the extent of the community's economic development may all play a role. This new information can be used to design interventions to increase women's use of facilities" (Stephenson, 2006).

What does 'community' mean in an extremely complex context such as Kenya, and what is its role and influence in society and in youth education today? The concept of community, especially in a very differentiated country like Kenya, is hard to identify. The community in Kenya has changed its definition and identity with historical transformation, and therefore changed its role. (Ahlberg, 1991). Consequently, in order to implement inclusive policies, it is not only necessary to assess the impact of community on youth behavior and the willingness of youth health reproductive programs involving communities to understand the complexity of youth groups in the Country and reach all of them, but also to recognize the role of community in this context. Only by understanding the value of the community in each context is it possible to tailor an effective program involving parents and communities, in order to increase reproductive healthcare for youths. Certainly, having a more inclusive and influencing community may help: "building a stronger community may help sustain an intervention and build long-term investment in better health outcomes" (Interagency Youth Working Group, 2007).

The youth maternal healthcare and reproduction dynamics and patterns have to be approached by looking at the context of massive population growth, urban-rural transformation and migration, and socio-economic mutations, since the complexity of society hinders the view of a clear pattern of change. There is a wide array of literature which frames the reproductive and social behaviors of adolescents and youths as they are today in Kenya, as a consequence of the community's loss of control, and the transmission of the so-called traditional values to younger generations due to the intervention of colonial administrations. Beth M. Ahlberg (1991), in her book on the impact of government policies and reproductive behavior in Kenya, shows how current patterns in reproduction and fertility are the heritage of colonization ages

first, and post-colonial family planning policies second. Socio-political dynamics from the past modified both the individual sphere of sexuality (included the women's role and control in sexual life) and the community's influence on reproduction, with a clear modification, and most of the time loss, of habits and values holding reproduction control in the communities. Ahlberg claims that; "the problem of high birth rates may derive not so much from cultural values and attitudes favoring high fertility, but rather from the breakdown of cultural systems which previously regulated and controlled sexuality and reproduction." Resource scarcity, the colonial and neo-colonial structures as a strong social transforming force, and a new political system are all factors which affect group structure, especially that of women. One of the central functions of women groups in the past was the control of sex and reproduction. From Ahlberg's point of view, colonialism and the modernization process eroded the "control and regulating systems" existing in the pre-colonial era, which were able to create a social and reproductive order, ensuring birth spacing, women's control over fertility, and control of the youth through the transmission of values and attitudes to be taken in pre-marital age. Ahlberg continues by saying that with the introduction of the Western family structure, and of new habits in sex and reproduction, the social system where women played a central role in controlling and regulating sex and reproduction has changed. In the pre-colonial fertility model, among the Kikuyu, for example, there were specific social mechanisms, including beliefs and practices (for example, long post-partum sexual abstinence), taboos, prohibitions, social sanctions and collective pressures commonly used to regulate sexuality and to avoid conception and childbirth under certain circumstances. Historical, political and socio-economic transformations have occurred in the country since colonialism, including the colonial settlements and land expropriations, the Mau Mau war for freedom followed by independence, with the advent of a unique party and then its openness to a multi-party system, corruption, inefficiency, and patrimonialism leading to massive social transformation.

However, the concept of traditional values, as well as the parallelism between tradition and modernization, does not have to be seen as a univocal and direct flow, since even in pre-colonial societies, values and precepts were modified following the transformation of the society. Even in pre-colonial ages, the society mutated and was influenced by war and migrations. Just as it does today, the modernization by one side leads to a weakness in traditional practices imposed on the other side, with a consequent need for adaptation by societies, where most of the time, tradition and modernity live side by side. Therefore, in order to understand behavior and the role of communities on the education of young girls, especially concerning sexuality and maternity, a look at the general context and the mutation

factors is crucial. There is the need to keep in mind the context of Kenya's rapid transformation when analyzing the complex issue of sexuality, with the advent of international programs, the medicalization of practices, the introduction of new values by churches, as well as the new population patterns, the rise of proportion of young age classes, and the demographic dynamics of mortality and fertility during history. As well, teenage sexuality, as a result, is considered a part of these broad transformations of society, with an increase in teenage pregnancies, higher rates of abortions and related complications, as well as transmitted diseases. Abortions, prostitution, school dropouts and so-called "sugar daddies," (slang term for a man who offers money or gifts to a younger person in return for companionship or sexual favors) occur in large proportions today in Kenya. More than 40% of births in Kenya are unplanned; among adolescents aged 15–19, 47% are unplanned. Each year, an estimated 316,560 abortions (both spontaneous and induced) occur in Kenya; that is 46 abortions for every 1,000 women of reproductive age.

Adolescents most frequently cite the stigma of childbirth outside of marriage, the inability to support a child and the possibility of having to quit school as reasons for having an abortion (Guttmacher Institute, 2008). Moreover, studies from Cameroon, Kenya, Nigeria, and South Africa find that young women exchange sex to get funds to cover education-related expenses and to gain connections in social networks (Barker and Rich, 1992; Kaufman *et al.*, 2001; Meekers and Calves, 1997; Mensch *et al.*, 2001). Nzyuko *et al*. (1997) conducted a study of young women and men aged 15–19 in Kenya, suggesting that factors such as: older age, not being in school, not living with relatives, families not owning cattle and land, belonging to a larger family, not getting along well with parents, and scarcity of adequate food or clothing all put young women at a higher risk of engaging in transactional sex. All these facts are symptoms of the extreme vulnerability of the young girls, of the necessity to survive in new contexts of life, as in the "urban jungle", and of the unmet need access to resources. Just as the community has to be understood within its context, so do adolescents and youths, especially in Kenya, specifically the context of where young women grow up. This is a necessary prerequisite, we believe, in order to realize successful intervention programs.

3.2 Maternal health care among youth in Kenya: trends and characteristics

As widely discussed in the introduction of this study and in the previous chapter concerning youth as a special group, the youth age group is quite varied, and its internal dynamics can be very different. As already expressed in paragraph 3.1, about 43% of the Kenyan population is under the age of 15 (World Bank, 2010), and 37% of the population is between 15 and 24 (Government of Kenya, 2002), rising from a mere 18% in 1969 (Gyepi-Garbrah, B., 1985). Generally, education levels in the country have improved for all groups since the 1960's due to the post-independence Government Expansion program. Educational levels among the 15-25 age group has also faced a rapid growth since late 1960's, when only 18% of female and 37% of male adolescents aged 15-24 had ever been to school. Ten years later, these figures increased to 70% for females and 85% for males (Gyepi-Garbrah, B., 1985), also reporting a consistent increase of males and females reaching secondary and higher education, until reaching a rate of almost 35% of young males and females in 2008/9 having secondary or higher education. Literacy rates for young females passed from 80,7% in 2000 to 93,5% in 2009, while for males the rates rose from 79,8% to 91,8% in 2009, showing an inverted pattern in the ratio of young literate females to males compared to the past relation.

The increase in educational attainment lead to a rise in the age of marriage in the country: the average age at marriage in mid-60's was around 18,4 years, and in 10 years it rose to an average age of 20 years (Gyepi-Garbrah, B., 1985). Data from Kenya Demographic and Health surveys from 1989 to 2008/9, however, shows a relative stagnation in average age at marriage for women aged 25-49 years, which stands between 18,1 years in 1989 and 20 years in 2008/9 (KDHS, 1989-2008/9). Together with the education spread in the country, contraceptive diffusion, knowledge, and use are considered highly correlated with the reduction in fertility experienced in the last 20 years (Ainsworth *et al*., 1995). The use of family planning methods has had a rapid escalation since the mid 1980's, when only 10% of married women used a modern method of birth control. This percentage passed to 18% in 1989 and then rose to 27% in 1993, and to 32% in 1998. From 1998 to 2003 there was, however, a stall at around 33% in the use of such methods, while in data from the 2008/9 KDHS revealed that almost 53% of all fertile women use a modern method of contraception.

As regards the use of all contraceptive methods, the percentage rises from 17% in the 1980's to 58% in 2008/9. Data from the 2008/9 KDHS shows that 95% of women aged between 15 and 49 and 97% of men aged 15 to 54 who are sexually active, married or unmarried, knows at least one contraceptive method. Concerning the condom use by the youth population, the

rates are still very low, despite a substantial increase from 14% in 1998 to almost 40% in girls aged 15-25 (World Bank, 2012). Moreover, the migration of a young and productive labor force from rural to urban centres has increased over the years, and it is considered to have a negative impact on agricultural production, and is responsible for the increase in food scarcity and poverty of young people who move to the cities (Odhiambo, 2006).

During the period of adolescence, when girls are between 10 and 19 years of age, they experience their first childbirth, and have an increasing risk of pregnancy complications or physical and psychological immaturity. It is shown that during the youth period, the exposure of girls to social and economic vulnerability leads to health insecurity (Zabin and Kiragu, 1998). The previously described demographic trends experienced by Kenya in the last decades brought youths to become the fastest growing segment of the population, which contributes to the highest fertility. With the fertility transition experienced by the Country since the early 1980's (Cross *et al.*, 1991; Bongaarts, 2006; Westoff, 2006), trends in fertility rates declined for all age groups (Table 3.1). The percentage of girls aged 15-19 years who had children or were pregnant at the time of the survey ranked at 25,4% in 1998, then decreased in the 2000's and rose again in 2003, where it stood at 23%; in 2008 it fell again to 17% (KDHS 1989; 2008/9). However, the age groups between 15-19 and 20-24 show a lower reduction compared to the other age groups, the most significant decline in fertility rates being experienced by the highest age groups.

Tab. 3.1 Age-specific fertility rates (per 1.000 women) and total fertility rates from Kenyan selected surveys and censuses: 1977-78 KFS; 1989 KDHS; 1993 KDHS; 1998 KDHS; 1999 Population and Housing Census; 2003 KDHS and 2008/9 KDHS.

Age group	1977-78 KFS[1] 1975-78	1989 KDHS 1984-89	1993 KDHS 1990-93	1998 KDHS 1995-98	1999 Census	2003 KDHS 2000-03[1]	2003 KDHS 2000-03	2008/9 KDHS 2005-08	% change 1989-2008/9
15-19	168	152	110	111	142	114	114	103	-32.0
20-24	342	314	257	248	254	241	243	238	-24.2
25-29	357	303	241	218	236	227	231	216	-28.7
30-34	293	255	197	188	185	193	196	175	-31.3
35-39	239	183	154	109	127	119	123	118	-35.5
40-44	145	99	70	51	56	55	55	50	-49.4
45-49	59	35	50	16	7	15	15	12	-65.7
TFR	8.1	6.7	5.4	4.7	5.0	4.8	4.9	4.6	-31.3

Sources: Kenya Demographic and Health Surveys (KDHS) and Population and Housing Census.
Note: Rates refer to the three-year period preceding the surveys. except for the 1989 KDHS. which uses a five-year period. and the 1999 census. which uses a period that varies with the age groups used to make the correction. 1: Excludes the northern part of the country. Sources: Opiyo, 2004.

Despite the fertility reduction, the state of reproductive healthcare and services utilization in the country is still far from universal diffusion. Teenagers and youth age groups do not seem to differ consistently from the other age groups, in health facility use of delivery and in

supervision by skilled attendants for antenatal care (Tab. 3.2). However, it is important to highlight how parity is strongly correlated with utilization of services for reproduction, where, for higher parities, the risk of seeking healthcare decreases. Therefore, the figures for home deliveries and unskilled antenatal care for adolescents and youths raise the greatest concern, especially for those girls who are experiencing their first childbirth, and who should receive proper assistance during pregnancy, delivery and after delivery.

Tab. 3.2 Antenatal care coverage and place of delivery for Kenyan women aged 15-29 by age groups; 2008/9 KDHS.

	Percentages of women who received, for their last birth, antenatal care from:				Percentage of women by place of delivery of last birth:		
Age groups	no one or TBA	skilled attendant	Total	Age groups	home	health facility	Total
15-19	12.5	87.5	255	15-19	49.2	50.8	254
20-24	7.2	92.8	1090	20-24	51.5	48.5	1093
25-29	6.5	93.5	1071	25-29	50.4	49.6	1078
30-34	6.7	93.3	792	30-34	50.9	49.1	798
35-39	11.6	88.4	457	35-39	60.3	39.7	458
40-44	13.7	86.3	211	40-44	64.1	35.9	217
45-49	23.3	76.7	90	45-49	67.7	32.3	93
Total	8.5	91.5	3966	Total	53.0	47.0	3991

Focusing on girls aged 15-25; the trends for reproductive healthcare-seeking behavior in the 5 years preceding the 1989 Kenya Demographic and Health Survey are shown in Tables 3.3 and 3.4.

Except for a slight decline in the number of births assisted by doctors, and a consequent increase in the number assisted by traditional birth attendants, the pattern of assistance at deliveries has not changed significantly from 1989 to 1993. Data for all women aged 15-49 shows a shift away from doctors (28% in 1998 versus 19% in 2003), towards nurses and midwives (64% in 1998 versus 71% in 2003), for antenatal care coverage from trained assistants.

Tab. 3.3 Trends of health facility deliveries and skilled assistance at antenatal care
in Kenya for young women.

	Percentage of women aged 15-25 who		
Year of KDHS survey	**Delivered last birth in a health facility**	**Received antenatal care for last birth by a skilled attendant[9]**	**Total number of women aged 15-25**
2008/9	48.6	92.1	1578
2003	48.1	88.3	1667
1998	52.2	91.7*	1592
1993	52.3	93.6	1553
1989	56.6**	78.9	1606

Source: elaboration on weighted data from KDHS, 1989; KDHS, 1993; KDHS, 1998; KDHS, 2003;
KDHS, 2008/9; all data are related to last births held in the 5 years preceding each survey;
* related to last births held in the 3 years preceding the survey; North Eastern Province excluded.
** the elaboration of the variable concerning place of delivery for 1989 KDHS is slightly different from the other
KDHS

Postnatal care for the mother is an unexplored field of research, and was not even
considered a real issue until the end of the 1900s, partly as a reaction to the increase in
maternal mortality ratios. As shown in Table 3.4 and in Figure 3.1, taken from the 2003
KDHS report on Maternal Health, among home births for girls aged 15-25, as well as
for all women, postnatal care is almost nonexistent.

Tab. 3.4 Trends of skilled assistance at postnatal care in Kenya for young women.

Year of KDHS Survey	**Percentage of women aged 15-25 years who delivered at home and received postnatal care by a skilled attendant for last birth**	
2008/9***	9.1	801
2003****	9.4	849
1998	nd	-
1993	nd	-
1989	nd	-

Source: elaboration on weighted data from KDHS, 2003; KDHS, 2008/9; data related to last births held in the 5
years preceding each survey;
**calculated on women who delivered at home to allow a comparison with 2003 KDHS data;
***If she received PNC by a skilled attendant. Question made only to women whose last birth was delivered
outside a health facility since t is assumed that deliveries in any health facility will entail a postnatal check before
mother is discharged.

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[9] Professional skilled attendants are doctors, nurses and midwifes.

Fig. 3.1 Postnatal care among home births in Kenya, 2003 KDHS
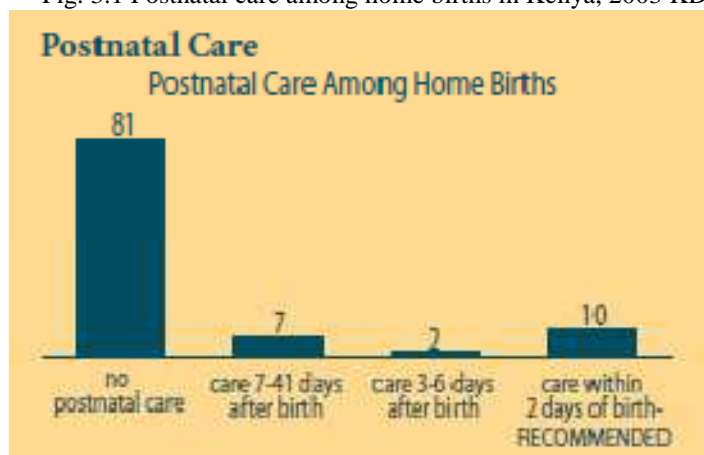
Looking at the characteristics of young women by maternal health behavior (Tab.3.5), there is not a wide difference between adolescents and young women in place of delivery and postnatal care, while there is more aptitude to receive antenatal care in proper timing by girls aged 20-25. Women living in urban areas have a higher propensity to formal maternal healthcare, as do women from Nairobi and Central province, compared to other provinces. Women with the highest levels of education are consistently more inclined to seek formal healthcare, especially concerning delivery and postnatal care. The percentages of women who receive proper healthcare from trained attendants also grow according to highest wealth index.

Tab. 3.5 Percentage of Kenyan young girls aged 15-25 years who delivered their last birth in a health facility, received antenatal care in the first 3 months of pregnancy and received first postnatal care by a skilled attendant (professional provider) by background characteristics, 2008/9 KDHS

Background characteristics	% delivered in a health facility	% received ANC in the first 3 months	% who received PNC by a skilled attendant (all deliveries)	Total girls aged 15-25 years, 2008/9 KDHS
Mother's age				
15-19	50.7	7.8	36.3	256
20-25	48.2	15.3	37.4	1323
Residence				
Urban	67.5	17.2	52.0	361
Rural	43.0	13.1	32.7	1217
Province				
Nairobi	84.2	15.6	68.4	95
Central	81.0	19.0	52.9	136
Coast	49.3	16.6	33.8	145
Eastern	59.8	9.3	45.1	204
Nyanza	49.0	14.0	30.9	350

Rift Valley	33.6	14.4	34.6	437
Western	32.7	13.5	25.1	171
Northeastern	20.5	7.5	17.5	40
Education				
No education	20.1	17.7	17.8	163
Incomplete primary	35.6	12.4	24.8	517
Complete primary	54.1	13.5	41.3	526
Secondary +	72.0	15.7	57.0	370
Wealth Index				
Poorest	26.6	11.9	20.9	335
Poorer	35.5	9.6	27.3	293
Middle	49.1	10.0	37.7	281
Richer	54.1	17.1	43.1	341
Richest	76.8	20.4	55.8	328
Total	**767**	**222**	**587**	**1578**

Part 4 - From theory to model

This study, aimed at finding the determinants for reproductive healthcare in young women in Kenya, intends to give a contribution to the goals of the vast literature, mainly belonging to social statistics, which recently started to bring attention to the influence of the context on health-related behavior. These scholars also aim to assess the extent to which health-related behavior is homogenous within communities (Magadi, 1999).

It is assumed that using a statistical approach to study this topic implies a number of choices. First, the choice of using statistical data, and in particular a sample dataset, can raise issues on the reliability of the data, especially the data from developing countries.[10] Second, the necessary summarization of the phenomenon required by statistical analysis necessarily implies that we cannot study some of the more complex and variable realities of the phenomenon. Third, the consideration of some factors, such as 'explication' variables of reproductive behavior of young women instead of some others, which is mainly conditioned by the availability of data. Fourth, the definition of notions and the terminology used in the study cannot always catch all the aspects of the reality. For example, when 'married and unmarried women' are cited, there is no distinction between traditional types of marriage and

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[10] On limitation of data see part 5.

modern types of marriage, since the sources of the data do not differentiate the information from when it is asked and when it is recorded.

There is awareness that all these choices certainly reduce the magnitude of the phenomenon in analysis. However, one aim of statistical modeling is precisely the reduction of the phenomena, in order to provide a better understanding of certain patterns and in order to provide clear evidence for policy making and policy implementation.

Part 5 - Data and Methods

A general description of the topic of maternal healthcare and reproductive behavior, as well as the usage of health facilities by women in Kenya, was made in this work in order to frame the research problem. Several academic journals and books have been consulted for the composition of the work, both specific statistical and demographic journals, as well as African socio-political science and historic journals. Also, data, reports and analysis from international organizations have been a major source. The first part of this work aimed at framing the research problem from a broader and multi-disciplinary point of view, and in order to do so, a wide-ranging study of the literature was undertaken. Moreover, the study was enriched by many interviews done during a period of fieldwork in both urban and rural areas. During one month of living in Kenya, I had the possibility to see the reality of young women in rural and urban areas and their communities, as well as to visit each level of healthcare facility existing in the country, and to interview some healthcare providers. Despite the fact that the interviews cannot be systematized to give a complete vision of the phenomenon examined in the whole country, they can describe small bits of reality, and can surely provide much information in order to better interpret the results of the study itself. Indeed, a demographic and social-statistical approach was chosen, aiming at testing the research hypothesis of the work. Therefore, a specific, socio-demographic literature was mostly used as reference for the second part of this dissertation.

The first section of this chapter provides a description of the data sets, as well as some indication of their limitation. The second section describes the statistical methods applied.

5.1 The Data

The data used to develop this research project is basically of three types:

1. The 2008/9 Kenya Demographic and Health Survey (KDHS)[11], which collects individual data for each woman and household, concerning women's reproductive life and socio-economic and demographic information for women between 15 and 49, as well as household composition and possession. Specifically, the survey collects data on the following: fertility levels, marriage, sexual activity, fertility preferences, awareness and use of family planning methods, breastfeeding practices, nutritional status of women and young children, childhood and maternal mortality, maternal and child health, malaria and use of mosquito nets, domestic violence, awareness and behavior regarding HIV/AIDS and other sexually transmitted infections (STIs), and HIV prevalence among adults. From this database almost all the variables on reproductive behavior, family and reproductive background and individual characteristics of young women of Kenya (aged 15-25 years) were derived. This survey used a stratified multistage cluster sample design to collect nationally representative samples of women of reproductive age (15–45 years). Questionnaires were conducted with all eligible women in each sampled household; data on fertility, family planning, and healthcare seeking during pregnancy were collected, in addition to demographic and socio-economic data. (Full descriptions of the study designs can be found at the Measure DHS Web site at http://www.measuredhs.com).

The sample for the country represents all women of reproductive age covered in the national survey that had given birth in the past 5 years. In addition, the data set collected Global Positioning System locators for each of the primary sampling units (PSUs, 400 cluster) included in the samples.[12] GIS data allow to georeference and locate interviewed women for primary sample unit. The primary sampling units (or clusters) are data collection points derived by the national master frame, which is used to build a representative sample.[13] Having the possibility to group women (and their characteristics) into primary sampling units allowed the construction of some 'community' variables, especially those concerning the characteristics of groups of women living in the same area. Some community factors were taken from the Demographic and Health Survey data; this entailed averaging individual data

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[11] Kenya National Bureau of Statistics (KNBS) and ICF Macro. 2010. Kenya Demographic and Health Survey 2008-09. Calverton, Maryland: KNBS and ICF Macro.

[12] Montana L, Spencer J. Incorporating Geographic Information Into MEASURE Surveys: A Field Guide to GPS Data Collection. Calverton, Md: Macro International; 2001.

[13] For more information concerning the sample design see par. 1.8 of Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2010, Kenya Demographic and Health Survey 2008-09. Calverton, Maryland: KNBS and ICF Macro.

to the PSU level (the PSU denotes the community in this analysis), thus producing derived community level factors.

2. A second approach was used to obtain community data. Data on healthcare facilities in the country, provided by the 2010 Kenya Service Provision Assessment Survey (KSPA 2010) were used to build healthcare facility characteristics variables. They were then located in several ranges of distance from the community (PSUs), allowing enrichment to the analysis of information on the quality of healthcare facilities at a certain distance from each community. The KSPA was conducted on a representative sample of 440 health facilities across the country, and covered all levels of services from clinics to hospitals, from public to private and non-profit facilities. KSPA was conducted through healthcare providers and client interviews. It also includes supplier-customer consultation observations, in order to collect information about the quality of service provided. The topics covered in the survey were: infrastructure and resource services, child health, family planning, maternal health services and services for infectious diseases. Specifically, given the research question of this work, information concerning quality of services for antenatal care, delivery care and postnatal care were employed in the models in order to assess their influence as community characteristics on young women's reproductive behavior.

In order to allow a comparison between the community level variables from the two samples, 2008/9 KDHS and 2010 KSPA, and in order to consider the representativeness of each healthcare facility in its territory, the variables concerning healthcare facility characteristics and quality of services offered were weighted using the sample weights. Using a weight for each facility meant that each healthcare facility sampled also represents all the other existing healthcare facilities, taking into account the real distribution of the HF. This assumption implies that all the healthcare facilities represented by the sampled one have the same characteristics. Therefore, by extension, the distance from each PSU to each sampled healthcare facility is also assumed to be the same for the represented health facilities.

3. The last two data sources used for the creation of community variables were two complete lists of Kenyan healthcare facilities. The Kenya Medical Research Institute (KEMRI) Welcome Trust Research Program provides a complete list of healthcare facilities, divided by types of facility. This list provides geographic information about Kenyan Health Facilities for 2005, allowing geo-referencing on the territory and the confrontation with the position of PSUs. This list has also been merged with a second complete list, the Kenya Health Facility List, from the Kenya Ministry of Health

(http://www.kenyahealthfacilities.net/)[14], which gives details about services offered by each healthcare facility. Given all this information, some other community variables concerning the services offered by healthcare facilities were included in the models.

5.2 Limitations of data

"Much has been written about the lack of reliable data on maternal healthcare, and the use of health facilities for maternal healthcare in developing countries" (Graham, *et al.* 2006).

Major obstacles hindering the amelioration of public health services especially in developing countries are considered to be the "weak routine information systems, inadequate vital registration, and reliance on periodic household and individual surveys as the main sources for population-based data." (Save the Children 2001; Abou Zahr 2003; Godlee *et al*., 2004 in Graham, *et al.* 2006). Moreover, reliability on the responses of women on sensitive topics such as reproduction and utilization of contraceptive methods is also an issue concern, especially in situations where the independence of the responses by women can be doubtful. These weaknesses also affect the monitoring of progress toward the MDGs. Initiatives for improved health surveillance is thus urgently needed (CMH 2002); "It is impossible to determine whether many of the patterns apparently observed, especially at a cause-specific level, are real or are artifacts of the measurement process" (Graham *et al*., 2006).

In order to better understand maternal healthcare and the utilization of healthcare facilities, many aspects are not considered in this study, sometimes due to lack of data, and sometimes due to some choices in analysis. For example, there is no information in KDHS concerning the postnatal complications of women and their urgency to seek medical care. Moreover, there is a lack of information concerning the timing necessary to reach a healthcare facility for each woman, and information of distance from healthcare facilities at PSU level only is considered. Also, the complete list of healthcare facilities provided by the Ministry of Health did not provide geographic locations, so not every service offered by healthcare facility could be tested, only the specific services for maternal healthcare considered fundamental.

The relatively small sample size given by the choice to focus on the age group from 15-25 years of age did not allow the specification of multilevel models for all groups, in the models divided by groups of regions. Indeed, in order to test the hypothesis of this study, the age

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[14] For further information see the Master Facility List - Implementation Guide on
http://www.kenyahealthfacilities.net/

group 15-25 was chosen and defined as 'young girls'. Because of number scarcity, however, it was not possible to divide this age group between teenagers and young girls. Moreover, in order to better understand the propensity of younger teenagers to seek maternal healthcare, it would be indispensable to design specific surveys addressed to younger girls, starting at least from the age of 10.

As well, all the multilevel models employed in this analysis consider two levels: the individual level and the primary sampling unit level. In order to better understand how the context influences reproductive healthcare, the district level would have been an appropriate level to consider. However, given the sample design of KDHS, district variable could not be used in the analysis since it is not representative.[15] Moreover, even data at province level was not employable in this analysis as a third level, since there would have been too few units. There are 8 provinces (or regions) in Kenya, and a multilevel modeling theory requires, as a number of units at last level, at least 10 or 20 units, and at least two intra-cluster units; e.g.: first level units in second level (Rabe-Hesketh and Skrondal, 2012).

The bias created by the not self-weighting samples of KDHS and KSPA is minimized by the introduction in the models of variables used in sampling designs, such as place of residence and province (Madise *et al*., 1999).

5.3 Statistical Methods

The statistical models used in this study include a multilevel linear model and multilevel logistic models. Most of the data analyzed in this study is hierarchical in nature; hence the multilevel models are used to take into account the data structure. Also, in the case of the determinants of the late initiation of antenatal care for young women, the description of the phenomenon was also developed by a multiple correspondence analysis. Moreover, one of the objectives of this study is to establish the contextual determinants of usage of healthcare facilities during pregnancy, delivery and the postnatal period. Therefore, in this study, the context is also considered as the geographic background where a young girl (unit of analysis) has grown, as, for example, the availability of certain kinds of healthcare services. In order to take into account the geographic aspect, some procedures available in ArcGis software (ESRI) were employed in order to create contextual variables using, as data sources, the 2010 KSPA and the Country Lists of Health Facilities provided by the Ministry of Health. These models and the procedures are described in the following section.

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[15] For more information concerning the sample design see par. 1.8 of Kenya National Bureau of Statistics (KNBS) and ICF Macro, 2010; Kenya Demographic and Health Survey 2008-09. Calverton, Maryland: KNBS and ICF Macro.

5.3.1 Multilevel Models

To test the research project hypotheses, statistical modeling is used. Using multilevel models (given the hierarchic structure of the data), the influence of individual, household and community variables on young women's reproductive behavior is estimated. Many kinds of data, such as the 2008/9 Demographic and Health Survey, have a hierarchical or clustered structure. For instance, children born to the same mother tend to be more alike in both physical and genetic characteristics. Similarly, women living in the same locality are likely to exhibit relatively similar behavior, since they share the same values and are likely to experience similar conditions relating to the availability and accessibility of healthcare services within the community. To ignore this relationship among the various units grouped at different levels risks overlooking the importance of group effects, and may render many of the traditional statistical analysis techniques used for studying data relationships invalid. Therefore, the population structure, as in the case of this study, is composed by women grouped in communities, and is seen as an effective instrument for explanation of the phenomenon studied in itself (Goldstein, 1999).

5.3.2 Multilevel linear models

A simple single-level regression model is expressed as:

$$y_i = \beta_0 + \beta_1 \, x_i + e_i$$

Where: y is the response variable; subscript i refers to the ith unit; β_0 is the intercept; β_1 is the slope of the regression line; x is the explanatory variable; and e_i is the residual for the ith unit.

If the level 1 units are nested within level 2 units, as in the case of the first model employed in this study analyzing the risk of a young women of a late initiation of antenatal care where level 1 units are the 15-25 years old women nested in communities which are the second level, we can describe simultaneously the relationships for several level e units, j, as:

$$y_{ij} = \beta_{0j} + \beta_{1j} \, x_{ij} + e_{ij}$$

Whenever an item has an ij subscript it varies between level 1 units within a level 2 unit, and where an item has a j subscript only, it varies across level 2 units but has the same value for all level 1 units within a level 2 unit.

This is called random intercept model, where only the intercepts and not the slopes are allowed to vary randomly at level 2 and it is specified as follows:

$$\beta_{0j} = \beta_0 + u_j$$

than

$$y_{ij} = \beta_0 + \beta_1 x_{ij} + (u_j + e_{ij})$$

Where:

$$\text{var}(u_j) = \sigma_u^2, \quad \text{var}(e_{ij}) = \sigma_e^2$$

In the case of random intercept model, the total variance is divided in two units, corresponding to the levels employed in the model. Doing so, the correlation existing between the level 1 unit clustered in the same level 2 unit is considered and, therefore, is corrected. In this way it is possible to establish what part of variability between women is given by the community and what part is given by the women themselves. This can be measured by the Intra class correlation Coefficient (ICC) which is an indication of the correlation of the observation of women belonging to the same community or, in other words, it is an indication of the dependency of the women within the communities. The ICC is defined as the variance between communities divided by the total variance, where the total variance is the summation of the variance between communities and the variance within communities.

$$\rho = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_e^2}$$

Where:

ρ measures the degree of homogeneity within level 2 units;

σ_u^2 is the total variance at level 2;

σ_e^2 is the total variance at level 1.

Hence, the smaller the variance within communities, the greater the ICC because it means that women belonging to the same community have very similar characteristics so their correlation is high. Therefore, when the within group variance is minimized the between group variance is maximized and the ICC is greatest. (Goldstein, 1999).

"In a multilevel analysis a correction is made for communities which means that the information provided by a women belonging to the same community does not five 100 per cent new information but less. The magnitude of the new information provided by each individual women depends on the magnitude of the intra class correlation coefficient (ICC). The higher the ICC the less new information provided by a women belonging to the same community." (Twisk, 2006).

In the case of many covariates in the model the equation can be expressed in matrix notation as following:

$$y_{ij} = X'_{ij}\beta + Z'_{ij}u_j + e_{ij}$$

Where:

y_{ij} is the response for the ith level 1 unit in the jth level 2 unit;

X'_{ij} is the matrix of covariates corresponding to the ith level 1 unit in the jth level 2 unit;

β is the associated vector of fixed parameter estimates;

Z'_{ij} is a matrix of covariates (usually a subset of X'_{ij}) the effects of which vary randomly at level 2;

u_j is a vector of level 2 random effects;

e_{ij} is the random effect associated with the level 1 units.

The multilevel linear regression models are used in the analysis of late antenatal care visits presented in Chapter 6.

5.3.3 Multilevel logistic model

The models developed in Chapter 7 and Chapter 8 assume that the response variable is dichotomous, since the aim of the second and third models is to describe factors associated

with the risk for a young Kenyan women to delivery in a health facility and the risk of being visited by a professional health care after delivery. As in many other cases concerning social statistics, in these two cases we deal with categorical responses, and multilevel logistic regression models are therefore employed.

The 2 level random intercept logistic model is of the form:

$$logit\ (\pi_{ij})\ =\ X'_{ij}\beta\ +\ u_j \qquad\qquad\qquad u_j \sim N\ (0,\ \sigma_u^2)$$

Where:

π_{ij} is the probability of an event occurring for the ith level 1 unit in the jth level 2 unit;

X'_{ij} is the matrix of fixed (observed) covariates corresponding to the ith level 1 unit in the jth level 2 unit;

β is the associated vector of parameter estimates for the effects of fixed covariates;

u_j is the vector of level 2 random effect, which represents unobserved level 2 characteristics.

The multilevel analysis are developed using MLwiN software (Multilevel Modeling for Windows).

Concerning the estimation procedures, the methods employed by MLwiN are used: the iterative generalized least squares (IGLS) estimation and the restricted iterative generalized least squares (RIGLS). The IGLS estimation may produce biased estimates especially when the sample size is small while the RIGLS estimation is unbiased (Goldstein, 1999).[16]

The estimation procedure for categorical response models in multilevel analysis is based on two approximation to be done as linearization of the equation (Twisk, 2006).

There is the possibility to choose between the first order approximation, which is simplest and more robust type of linearization, and a second order approximation, which is more accurate in estimates. Moreover, for the prediction of the probability (π_{ij}) in a multilevel logistic model, as in the case of model 7 and model 8 of this study, it is more suitable to use the predictive quasi likelihood – PQL, which is more accurate than the marginal quasi likelihood – MQL estimation type. Following the indication of Twisk (2006) and Hox (2010) for the correct procedure of estimation for multilevel logistic model in this study a second order approximation with the predictive quasi likelihood – PQL approximation are employed.

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[16] For more details about estimation procedure and multilevel modeling methods see Goldstein, 1999; Snijders and Bosker, 1999; Twisk, 2006; Hox, 2010.

Significance tests used in the linear multilevel models are based on Wald test (Z statistics where $Z \sim N$ (0,1))for hypothesis testing separately for each parameter and on likelihood ratio test. Still following Twisk (2006) wald tests are performed to test the significance of coefficients of multilevel logistic models. In this study the results are presented by odds ratios and confidence interval at 95 per cent of probability or 90 per cent where necessary.[17]

5.4 Geographical Methods

All the maps included in this work, unless those having different references, have been created using ArcGis 9 (Gis by ESRI)[18].

Analyses of proximity have been mostly employed in order to calculate and create all the variables concerning distances between PSUs and health facilities, and through multiple buffer rings, the count of healthcare facilities in a certain range of distance from each PSU was possible. Network Analyst tools and Spatial Analyst tools have also been employed as a preparatory analysis for this study, even if only a few results are shown in this dissertation. Network Analyst has been employed in order to create the road network of Kenya, and some exercises were performed using the Spatial Analyst (in particular Euclidean Distance and Kernel density) in order to understand what could be the best path from communities to healthcare facilities, or which could be the best place to locate a new healthcare facility. While these experiments did not fit the aim of this work, they could, of course, result as new areas of analysis in the future.

5.5 Multiple Correspondence Analysis

Chapter 6 aims at investigating the factors associated with late antenatal care for young women in Kenya. The aspects to consider when describing what is considered good practice of antenatal care, starting from the guidelines of the WHO, together with the services offered by the healthcare facilities are many, and the behaviors are widely differentiated. In order to better understand the pattern of this phenomenon among young girls, in the focus of this study, a method of reduction of data has been employed and applied on the sample. Given the

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[17] For details concerning general statistic methodology see Cicchitelli, 2008.
[18] For every information and details on ArcGis 9 methods employed see the tutorials on http://www.esri.com/software/arcgis/index.html and http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?TopicName=welcome

many variables observed and their power of explanation in various dimension of the phenomenon investigated, a multidimensional technique was used, able to synthesize the information deduced from the entire data matrix.

A Multiple Correspondence Analysis (MCA) was conducted, with the aim of identifying the underlying factors to the data structure. It was, therefore, possible to summarize the intertwining relationships of "interdependence" between the variables in a restricted number of variables (factors of the MCA).

Correspondence analysis is an investigative technique which intends to describe and synthesize a matrix of data (cases by variables) reducing this matrix to a fewer number of latent factors which express the combinations between variables. MCA elaborates a new table where Chi^2 measures the distance and analyze the relations between rows and columns.

The results give information that allow to explore the structure of categorical variables included in the table. The main aim of this reduction procedure is to find few new variables able to reproduce the major part of variance possible of the original variables with a reduced number of factors expressing the combination of the initial modalities of the variables. The variance in the case of MCA is called 'inertia', which is a measure of dispersion.

Correspondence analysis also aims at representing the interrelationships of categories of row and column variables on a two dimensional map. So, once the factors are individuated, the modalities of variables or the cases can be represented on a two dimensional map using the factor coordinates.

Considering the position of points relative to the axes and the distances between the points, the structure of relationships between variables (or modalities) and between such factors can be deduced. The higher the distance of the point from the origin, the higher its contribution to the formation of the axis; and the greater the proximity between two variables (or modalities), the greater their interdependence (Di Franco, 2011). "It can be thought of as trying to plot a cloud of data points (the cloud having height, width, thickness) on a single plane to give a reasonable summary of the relationships and variation within them." (Phillips, 1995). The final goal of correspondence analysis is to find theoretical interpretations for the extracted dimensions. Consequently, women with the same behavior in antenatal care will be represented closer on the two-dimensional scheme. Multiple correspondence analysis (MCA) may be considered to be an extension of simple correspondence analysis to more than two variables.[19]

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[19] For a comprehensive description of this method, computational details, and its applications refer to Greenacre (1984), Benzecri (1992), Greenacre (1993), Di Franco (2011).

Part 6 - Factors influencing antenatal care among youth in Kenya

'Antenatal care should be redirected to giving health education to women, their families and communities on the signs of obstetric complications and how quickly these can lead to death, and making contingency plans with women to access emergency care if required.' (Berer and Ravindran, 1999)

6.1 Contextual effect on antenatal care and determinants of a safe behaviour during pregnancy

Regular antenatal care is not only crucial in order to prevent maternal complications and to decrease adverse birth outcomes, but it is also necessary in order to establish confidence between the woman and her healthcare provider. In developing countries like Kenya, antenatal care coverage is not yet universally widespread, especially when estimating the proportion of women who have the recommended number of visits with the right timing in order to have a safe pregnancy (minimum of 4 antenatal visits commencing in the first trimester)[20].

Moreover, given the huge disparities by which Kenya is characterized, not all women can access healthcare: "Kenya is characterized by huge internal differences, and many women endure a lifetime of poor health as a direct consequence of societal, cultural, political, and economic factors." (Magadi *et al*., 2003) However, in general, the proportion of women having at least one visit is quite high. Therefore, the challenge for policy makers is to recognize the different necessities of each group and to direct their goals in several directions. They must first of all address their interventions to increasing access for all, especially for marginalized women, such as young women, and especially those living in remote rural areas or in very poor conditions. Secondly they should focus on improving the quality of services, making the services more attractive and comfortable, especially for addressing the special

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[20] The antenatal period presents opportunities for reaching pregnant women with interventions that may be vital to their health and wellbeing and that of their infants. WHO recommends a minimum of four antenatal visits commencing in the first trimester based on a review of the effectiveness of different models of antenatal care. WHO guidelines are specific on the content of antenatal care visits, which should include: blood pressure measurement; urine testing for bacteriuria & proteinuria; blood testing to detect syphilis & severe anemia; and weight/height measurement (optional) http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/effective_antenatal_care.pdf

needs of young girls, in order to individualize health promotion messages and to allow a broader view of healthcare.

Given the broad disparities in availability of and access to antenatal care, there is the necessity to conduct a deeper analysis for the understanding of factors influencing the utilization of antenatal care, and leading to safe and correct reproductive behavior. Additionally, as is affirmed in many studies (Magadi *et al*., 2000; Kravdal, 2002; Ngom *et al*., 2003; Clements *et al*., 2004; Stephenson *et al*., 2006; van Eijk *et al*., 2006; Ochako *et al*., 2011) it is crucial to include community factors and spatial variations in the examination of antenatal care. Moreover, despite the fact that all these works aim at assessing the contribution of individual and community factors on health behavior, unexplained aspects still emerge. Concerning young women's utilization of antenatal care, aimed at finding contextual determinants of access and utilization of health services, the results of the investigations are still partial, since they only focus on restricted geographic areas or on particular issues. (Ngom *et al*., 2003; Magadi, 2004; Birungi *et al*., 2011) Therefore, in order to contribute to the assessment of determinants for safe reproductive behavior during pregnancy, this work also aims to measure how certain types of services impact upon the real access of young women to antenatal care services.

Examining some relevant factors influencing the propensity to seek antenatal care by Kenyan women, Gage (1998) highlights how the increasing pattern of unwanted births, despite the decrease of total fertility rates occurring in Kenya since early 1980's, negatively influences reproductive behavior and leads to an under-utilization of healthcare facilities for maternal healthcare. Gage also asserts that the "lack of prenatal care is documented as a major reason why adolescents have a poorer health outcomes than older women." (Gage, 1998) Moreover, in contemporary Kenya, one of the reason considered among the causes for unwanted births in adolescents is the "unsanctioned circumstance" of childbirth (such as premarital pregnancy) which means disapproval from the woman's family, community and school, and consequently leads to a lower propensity to seek antenatal care. Marital status, indeed, is reported as influent in the timing of seeking prenatal care, where unmarried women are more likely than married women to delay prenatal care (Le Grand and Mbacké, 1993). A premarital birth, especially if it is unwanted, is negatively correlated with early initiation of antenatal care (Gage, 1998).

Media exposure in Kenya, especially radio and newspaper, influences women's and men's knowledge and use of contraceptives and reproductive healthcare. (Westoff and Bankole, 1997) As Westoff and Bankole suggest, the exposure to media information for unmarried Kenyan women aged 15-24 varies considerably among place of residence, and the effect of family planning information heard on the radio is positive on knowledge about contraception, but negative on the desired number of children.

The study held in rural areas of western Kenya by van Eijk *et al.*, 2006 aimed at assessing the provision and use of antenatal services and delivery care among women, in order to determine whether women were receiving appropriate care. The results revealed that "services provided by the various ANCs were not optimal, with a low coverage of intermittent preventive treatment with sulfadoxine-pyrimethamine, and supplementation of iron and folic acid." Moreover, despite the fact that 9 out of 10 women and at least one antenatal care visit, only two-thirds of them went for ANC during the first trimester, and only 50% had the 4 recommended visits during the whole pregnancy period. The study also stresses the relevance given by women to the information and advice received during visits, where the main topics discussed were pregnancy care and newborn health. Unfortunately what is also highlighted is the lack of supplies and coverage of these additional services, recognized to be fundamental for maternal healthcare and for correct behavior during pregnancy; "Few women attended a health talk (14%), and other essential topics such as place of delivery, making an individual birth plan, family planning, malaria, and HIV/AIDS prevention received little attention. Late attendance was associated with a perceived lack of services at the ANC." (van Eijk *et al.*, 2006) In a very different situation, however, women from three private clinics (Marie Stopes Clinics) for maternal health in Nairobi were interviewed in a survey held by University of Southampton.[21]

Only women with at least primary and, most of the time, secondary education, aged at least 20 years old, and with a middling to high wealth status, were observed to access the clinics. These women declared that the main reasons to choose Marie Stopes Clinics concerned quality of services offered, confidentiality and anonymity.

Some relationships between antenatal healthcare behavior and contextual characteristics, such as distance from a health facility, may result as easy to understand; however, some studies highlight the fact that not all women with the same characteristics choose to go to the closest health facility, and this is due to other barriers and beliefs that still need to be measured and

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[21] University of Southampton, Characteristics of Users of Reproductive Health Services in Kenya: Who Are We Serving?, Opportunities and Choices Factsheet 28, University of Southampton, Southampton, 2 pp.

investigated. (Magadi, 2000) This variation between women's behaviors might also depend from the different approaches used by these facilities in offering ANC services, especially those addressed to young girls.

6.2 Trends and dynamics concerning ANC in Kenya

Antenatal care coverage in Kenya has a wide diffusion in the country, and today it is almost universal. The World Health Statistics 2011 (WHO, 2011), mostly taken from KDHS data, asserts that 92% of women had at least one visit during pregnancy. In any case, the pattern of ANC visits during the last twenty years has up and down spikes. Rising from a percentage of 77% in 1990, the percentage of women who had at least one ANC visit showed rapid growth in 2000, when it hit around 92%. A decrease, however, was reported in 2003, with 88%. (Statcompiler-ICF Macro, 2011, measures DHS, CBS *et al.*, 2004) Almost all pregnant women, also, receive ANC from medical personnel and skilled attendants. Among all women surveyed in 2008/9, 91.7% received ANC from a doctor (29%) or other healthcare professional (63%), while in 2003 the percentage was 88%. Moreover, since 2003, there has been a shift away from the use of nurses and midwives (from 70% in 2003 down to 63% in 2008/9) to the use of doctors (from 18% in 2003 up to 29% in 2008/9). However, in 1993, the percentage of antenatal visits held by doctor or skilled personnel was 94.7%, indicating an important decrease from 1993 to 2003. Despite the wide diffusion of antenatal care in the country, there is concern regarding the frequency and timing of these visits. The number and timing of antenatal care visits is considered to be important in preventing adverse pregnancy outcomes: "Antenatal care is more beneficial in preventing adverse pregnancy outcomes when it is sought early in the pregnancy and is continued through delivery. Early detection of problems in pregnancy leads to more timely referrals in the case of women in high-risk categories or with complications; this is particularly true in Kenya, where three-quarters of the population lives in rural areas and where physical barriers pose a challenge to health care delivery?" (Obonyo *et al.*, 2010)

Based on the WHO and health professional's recommendations for antenatal care coverage[22], antenatal care visits must be made monthly for the first 7 months, fortnightly in the 8th month,

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[22] The antenatal period presents opportunities for reaching pregnant women with interventions that may be vital to their health and wellbeing and that of their infants. WHO recommends a minimum of four antenatal visits commencing in the first trimester based on a review of the effectiveness of different models of antenatal care. WHO guidelines are specific on the content of antenatal care visits, which should include:

and then weekly until birth. If the first visit is made during the third month of pregnancy, this schedule translates to a total of about 12 or 13 visits. "A woman without complications should have at least four antenatal care visits, the first of which should take place during the first trimester." (Obonyo *et al*., 2010) Among women who had their most recent birth in the last 5 years preceding the KDHS survey, the percentage of women who had at least 4 visits during pregnancy rose from 29% in 1990 to 43% in 2009, however, during these 20 years, the proportion of women who had only one ANC visit rose from 2.6% to 5% in 2009.

Comparing trends since the 2003 KDHS, the analysis shows a continuing decline in the proportion of women who make four or more antenatal visits, from 52% in 2003 to 47% in 2008-09. Certainly, in order to receive 4 antenatal visits and in order to have them be effective, it is necessary to commence seeing a skilled attendant as early as possible, possibly during the first three months of pregnancy. Analyzing 2008/9 data for timing of antenatal care, the median number of months of pregnancy at first visit is 5.7, a figure not far from the 1990's data, when the median month for the first antenatal visit was 5.9. Most women do not receive antenatal care early on in the pregnancy, and only 15% of women obtain antenatal care in the first trimester of pregnancy. More than 40% of pregnant women in 5 years preceding the 2009 DHS had a first antenatal care visit at sixth months or above, and around 48% had the visit at sixth months and above or did not have any antenatal visit at all. (Stat compiler-ICF Macro, 2011; Obonyo *et al*., 2010)

Within the country, however, there are huge disparities in distribution of coverage and usage of ANC services. The distribution of antenatal care coverage by background characteristics for Kenyan women surveyed in 2008/9 for their last birth is reported in Table 6.1. There are marked regional variations in antenatal care coverage, with over one-quarter of women in North Eastern province not getting any antenatal care at all. Women in Western and Nyanza provinces have low use of doctors for antenatal care compared with their use of nurses, while for Coast and Central provinces the reverse is true. Among places of residence, even if the percentage of women receiving ANC from a skilled provider is not very different between urban and rural areas (96% in urban and 90% in rural), wide disparities subsist among healthcare providers. In urban areas, 41% of women had a visit from a doctor and 55% from a nurse or midwife, while in rural areas only 26% were seen by doctors and 64% by nurses or midwives. Mother's age at birth is not statistically correlated with ANC provision for women aged 15-49 in the KDHS survey (Obonyo *et al*., 2010), and the pattern of distribution by age

groups mostly depends on birth order number, since the higher the parity, the lower the propensity to seek antenatal care.

A positive relation is registered when looking at the percentage of women receiving antenatal care from a skilled provider, along with the mother's education level. When considering antenatal care coverage by wealth index quintile, if we exclude the two extreme quintiles (lowest and highest), which consistently deviate from the middle quintiles in percentage of women who received care from skilled personnel, almost 93% of women from the middle quintile of wealth received ANC from a doctor, nurse or midwife. However, from a study conducted in 2003 by Magadi *et al.* reporting the urban poor utilization of antenatal care compared to the rural areas' utilization, it is highlighted that in Kenya, among the urban poor less, than 10% of the women receive antenatal care in the first trimester by a skilled attendant. "While sources of modern antenatal care are physically much closer to most members of urban population than to most of their rural counterparts and the former can better afford to use them…" there is no significant difference between urban poor and rural women in using antenatal care at early stage. (Magadi, 2003) In Kenya, there is also a large inequality in the early initiation of antenatal care between the urban poor and the other-urban people, where the percentage of women starting ANC in the first trimester among urban poor is 6.9%, while among other-urban it is 20%. (Magadi, 2003)

Tab 6.1 Percent distribution of women age 15-49 who had a live birth in the five years preceding the survey, by antenatal care provider during pregnancy, for the most recent birth and by percentage receiving antenatal care from a skilled provider[1] for the most recent birth, according to background characteristics, Kenya 2008-09

Background characteristics	Doctor	Nurse/ midwife	CHW	TBA	Other	No one	Missing	Total	Percentage receiving ANC from a skilled provider	Number of women
Mother's age at birth										
<20	29.9	58.7	0.6	1.0	0.0	9.9	0.0	100	88.5	564
20-34	29.0	64.3	0.1	0.7	0.0	5.7	0.1	100	93.3	2,883
35-49	27.2	57.5	0.2	1.1	0.7	13.3	0.0	100	84.7	526
Birth order										
1	33.8	58.7	0.4	0.5	0.0	6.7	0.0	100	92.4	847
2 to 3	32.5	61.3	0.2	1.1	0.0	4.8	0.1	100	93.7	1,531
4 to 5	26.8	66.9	0.0	0.3	0.1	5.9	0.0	100	93.7	829
6+	18.6	64.9	0.2	1.2	0.5	14.4	0.2	100	83.5	766
Residence										
Urban	40.5	55.3	0.6	0.6	0.0	3.0	0.0	100	95.8	823
Rural	25.9	64.5	0.1	0.9	0.1	8.4	0.1	100	90.3	3,15
Province										

Nairobi	38.3	58.1	0.2	0.1	0.0	3.3	0.0	100	96.4	269
Central	58.0	34.7	1.1	0.0	0.0	6.0	0.2	100	92.7	371
Coast	49.4	45.1	0.0	0.2	0.0	5.3	0.1	100	94.5	330
Eastern	25.4	68.1	0.0	0.0	0.5	6.1	0.0	100	93.4	630
Nyanza	20.5	73.2	0.0	1.2	0.0	5.2	0.0	100	93.6	733
Rift Valley	25.9	62.5	0.3	0.9	0.1	10.2	0.1	100	88.4	1,103
Western	15.6	75.9	0.0	2.8	0.0	5.6	0.2	100	91.5	442
North Eastern	3.5	66.0	0.3	0.2	0.0	28.9	1.0	100	69.5	97
Mother's education										
No Education	21.0	51.4	0.2	1.5	0.9	24.7	0.4	100	72.4	441
Primary incomplete	24.7	66.0	0.1	1.3	0.0	7.8	0.1	100	90.7	1,262
Primary complete	29.9	65.2	0.4	0.2	0.0	4.2	0.1	100	95.0	1,225
Secondary+	36.1	60.2	0.1	0.7	0.0	3.0	0.0	100	96.3	1,045
Wealth quintile										
Lowest	19.9	63.7	0.0	1.0	0.5	14.6	0.3	100	83.6	843
Second	23.3	69.5	0.4	1.5	0.0	5.2	0.1	100	92.7	764
Middle	28.6	64.6	0.0	0.9	0.0	5.9	0.0	100	93.2	742
Fourth	33.2	59.5	0.5	0.4	0.0	6.4	0.0	100	92.7	765
Highest	39.2	56.4	0.1	0.3	0.0	4.0	0.0	100	95.6	859
Total	**28.9**	**62.6**	**0.2**	**0.8**	**0.1**	**7.3**	**0.1**	**100**	**91.5**	**3,973**

Note: If more than one source of antenatal care was mentioned, only the provider with the highest qualifications is considered in
this tabulation.
[1]Skilled provider includes doctor, nurse, or midwife.
Source: KDHS, 2008/9

"The general content of antenatal care includes preventive, curative and educational components. The first visit usually includes blood tests (for hemoglobin levels, malaria parasites, HIV virus, etc.), reproductive and obstetric history, height measurements, in addition to the routine checks on blood pressure and urine. The preventive services, usually given at particular stages during pregnancy, include tetanus toxoid injections (given to mothers to prevent neonatal tetanus, which previously was a major cause of infant mortality), iron/folate tablets, and some vitamin supplements for improved maternal and perinatal health. In addition to these services, antenatal care is expected to provide health education on a variety of issues relating to maternal and child health." (Magadi, 1999) If the diffusion of health facilities offering antenatal care is wide, these same healthcare facilities do not have the same spread of services offering counseling and supplies to improve antenatal care services, in order to provide a better quality of care. The maps below show the distribution of the primary sampling unit from KDHS 2008/9, identifying women's community sampling; red

crosses indicate the location of all types of health facilities in the country. The gray areas represent the diffusion of antenatal care facilities offering essential supplies for antenatal care from the Kenya Service Provision Assessment 2010 (Fig. 6.1), and of antenatal care facilities with all items for quality counseling, from KSPA 2010 (Fig. 6.2). The dimensions of the areas are proportional to the diffusion of the service offered, since the data reported is derived from a weighted sample. In Fig. 6.1, essential supplies for ANC can range from 0,1 to 5,5 health facilities offering that service, while in Fig. 6.2, services for counseling range from 0,1 to 11. Antenatal care facilities with all essential supplies for basic ANC include the availability of iron and folic acid, tetanus toxoid vaccine, blood pressure apparatus and a foetoscope. ANC facilities with all items for quality counseling also provide visual aids for health education, guidelines on pregnancy and delivery healthcare, and a client card/record of each visit.

Fig. 6.1 PSUs and ANC facilities with essential supplies for ANC, Kenya DHS 2008/9, KSPA, 2010
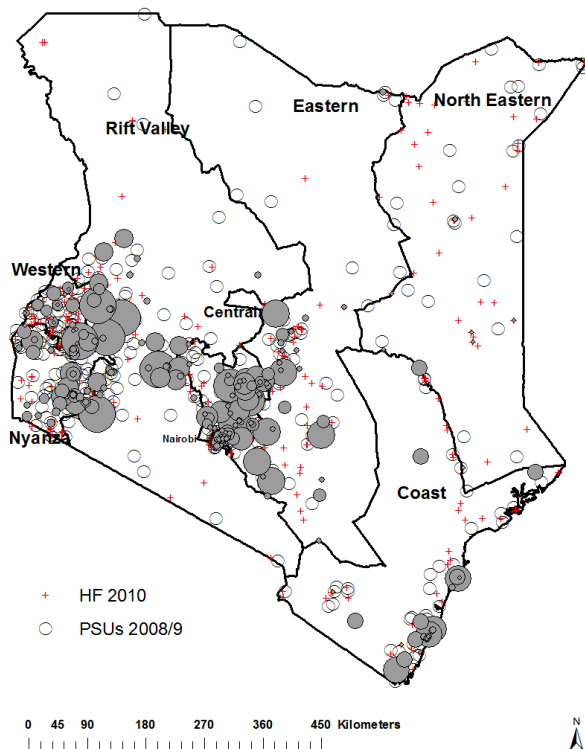
Fig. 6.2 PSUs and ANC facilities with counselling services for ANC, Kenya DHS 2008/9, KSPA, 2010
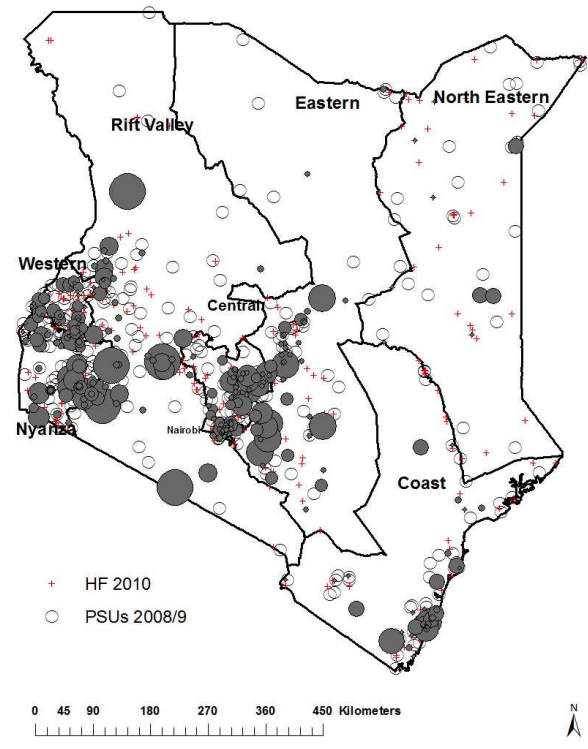
The available studies on antenatal care in Kenya suggest that services relating to healthcare education on breastfeeding and lactation are often inadequate. (Askew, *et al.*, 2004; Askew and Humphres, 2007) Today, international organizations and the government of Kenya talk about providing a package of antenatal care. "It is now emphasized that ANC should include individual birth plans, education on danger signs, complication readiness, family planning

counseling, prevention of mother-to-child transmission (PMTCT) of HIV, nutrition, and skilled and timely interventions to avoid adverse maternal and neonatal outcomes. This forms the basis of Focused Antenatal Care (FANC), in which a minimum of four quality visits are recommended." (Musili *et al.*, 2011)

Many women are used to getting visits from Traditional Birth Attendants. The TBA's role and impact on women's health and pregnancy outcomes is still controversial (Izugbara *et al.*, 2009), since, on the one hand, they are not recognized as having professional skills, while on the other hand, they are much closer to women from a physical point of view, as well as an empathic one. These are the main reasons, together with cost, for why TBAs are preferred. However, it is widely recognized that TBAs are lacking in many types of professional training, and do not have all the supplies needed in order to make proper visits, nor do they have a proper level of hygiene or quality for performing antenatal care and, even less so, for deliveries. Yet, it is also true that many times they refer pregnant women facing complications to hospitals. For example, in the case of a young woman during her first pregnancy, the referral to a hospital is compulsory, and is essential for the woman and her child. Midwives operating in very critical areas, such as the Nairobi slums, also report HIV/AIDS as a major problem, especially for young women, interfering with safe pregnancy and a positive outcome (from an interview with Mrs. Margareth, a TBA living and operating in the Kibera East Slum; Birungi, 2011).

Map 6.3 reports, using gray areas, the distribution of TBAs in the catchment area of each healthcare facility, sampled by the 2010 Service Provisional Assessment for Kenya. The dimensions of the areas are proportional to the diffusion of the traditional birth attendants, since the data reported is derived from a weighted sample. The TBAs diffusion can range from 0,1 to 28 healthcare facilities offering that service. Reporting this kind of information together with the information concerning a woman being referred to hospital by TBAs working with each facility, the survey aims to assess the role of attendants in the communities and their relationship to the proper healthcare facilities, given the large proportion of pregnant women utilizing TBAs. North Eastern region and the northern part of Rift Valley, which are less furnished with hospitals and clinics, present a certain number of active TBAs. Central region and Nairobi have no TBAs, while a large number of midwives and community health workers operates in these regions (maps in App. 6).

Fig. 6.3 PSUs and health facilities and traditional birth
attendant presence in catchment area,
Kenya DHS 2008/9, KSPA, 2010
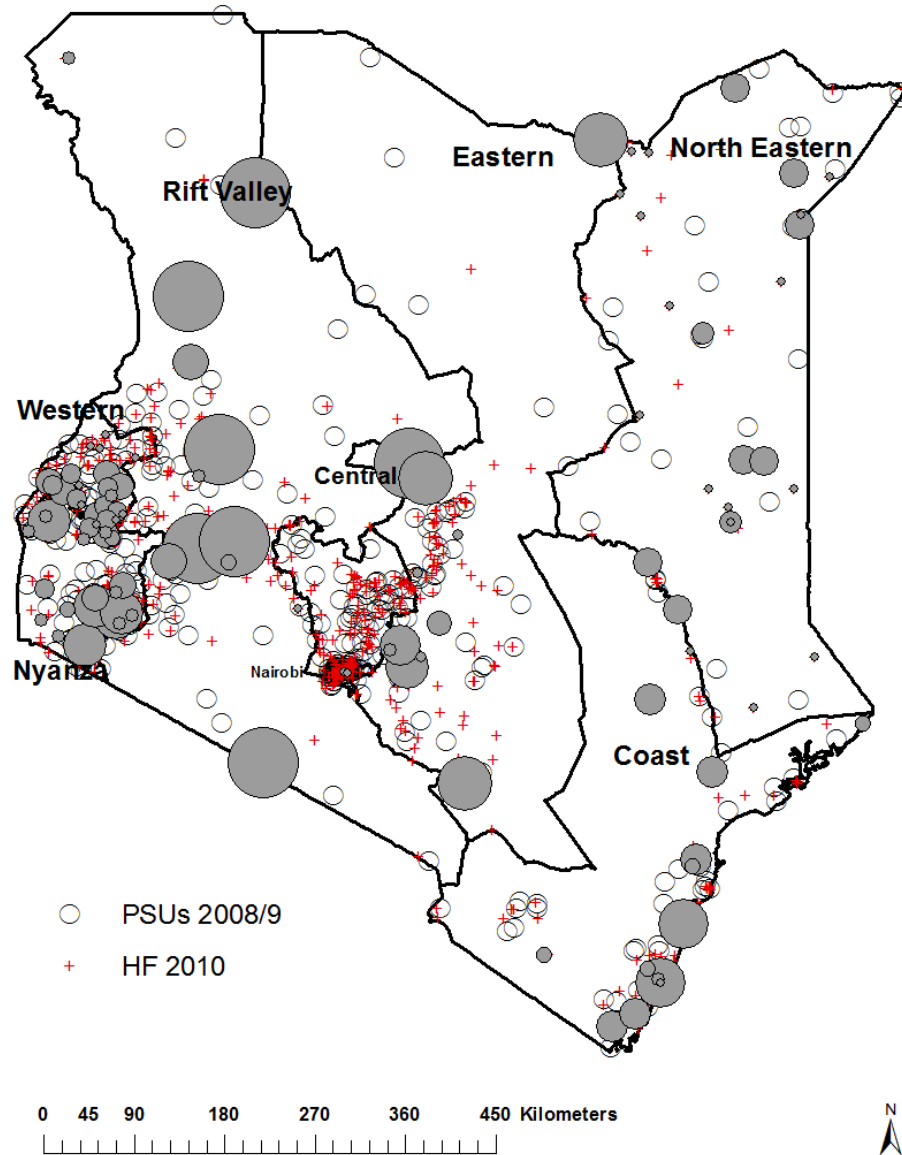
Concerning youth access and usage of antenatal care by background characteristics in Kenya, in order to describe patterns of antenatal care coverage in the country, results from a multiple correspondence analysis, applied using 2008/9 KDHS, are reported here. Given the high number of variables and modalities contributing to describe the antenatal care behavior, as an additional way of describing the phenomenon in analysis a multiple correspondence analysis has been employed. The aim of this procedure, as discussed in the 'Data and Methods' Chapter of this study, is to synthesize the information of the matrix of data into a smaller

number of factors deriving from the structure of the data. In this way it is possible to discover, through the extraction of factors, the interdependences existing between the variables and the modalities, and to give a better understanding of the phenomenon in analysis.

In Multiple Correspondence Analysis (MCA) it is possible to distinguish between active variables, which contribute to the formation of factors, and illustrative variables, which help to interpret factors and to discover legacies within them, given their position on the factorial axes. The following table shows the list of active variables, with modalities, and the supplementary variables inserted in the procedure.

Tab. 6.2 Active variables of multiple correspondence analysis for young girls in Kenya, KDHS 2008/9
Assistance at pregnancy (yes; no)
Place of antenatal care: home
Place of antenatal care: government structure
Place of antenatal care: private structure
antenatal visits (1 visit; 2-4 visits; 5-10 visits; 11+; no visits)
Month of first visit (at less than 4 months; 4-6 month; 7+; no visits)
Pregnancy visit: weighed (yes; no)
Pregnancy visit: Height (yes; no)
Pregnancy visit: blood pressure (yes; no)
Pregnancy visit: urine sample (yes; no)
Pregnancy visit: blood sample (yes; no)
Pregnancy visit: told about complications (yes; no)
Tetanus toxoid injections before birth (yes; no)
Info about AIDS during pregnancy (yes; no)
Took something for malaria during pregnancy (yes; no)
Took iron tablets or syrup during pregnancy (yes; no)
Illustrative variables
Region (Nairobi, Central, Coast, Eastern, Rift Valley, Nyanza, Western, North Eastern)
Type of place of residence (Rural, Urban)
Multidimensional poverty index (multidimensionally poor, not poor, at risk of poverty)

In this Multiple Correspondence Analysis, run in SPSS, the first two factors explain 11.5% of total variability, the first factor reproduces 8.6% of total variability, and the second factor reproduces 2.9%. So, with the first two factors it is possible to describe 11.5% of variability

from the sample of young women (without revaluation)[23]. Each variable accounts for a different weight to the composition of each factor. Some variables give a large contribution and some others only a small contribution. In order to understand the meaning of the factors, the variables which most contribute to their formation are considered. Despite the fact that the variability resulting from this procedure is extremely low, the results shown attempt to contribute to the description of the antenatal care phenomenon.

The first factor represents a major discriminatory measure for variables: 'had assistance at pregnancy,' 'number of antenatal care visits,' and 'timing of first antenatal care visit,' so it describes the propensity towards an assisted pregnancy, to correct health-seeking behavior, and also to access to healthcare facilities and pregnancy services.

The second axis is mostly constructed by the 'number of antenatal care visits' and 'timing of first antenatal care visit,' as well as by some additional information received during visits: 'told about pregnancy complications', 'information about AIDS during pregnancy' and 'place of antenatal care: governmental hospital or private clinic'. The first axis represents the general access to antenatal care, while the second axis is more related to specific services offered, mostly concerning counseling on additional information about pregnancy. By analyzing the contribution to the constitution of each factor, it is possible to evaluate which modalities are better represented on the axes. The joint plot of category points represents the graph containing all the modalities of the variables analyzed, and it is possible to create trajectories to interpret this data. The two dimensions allow us to interpret the variables in terms of the distances between them. Women who gave the same answer to the survey and who had the same behavior during pregnancy are located closer on the graph, since they obtained the same scores in the factors. At the same time, the modalities of variables belonging to the same women are adjacent.

On the first axis (Dimension 1) all the modalities concerning the antenatal care behavior and the guidelines for a correct pregnancy care are represented, such as high number of visits during pregnancy, with the first visit held at fewer than 4 months. These women are also women who have access to private structures for visits, and who can be visited by doctors, and who also received much information on pregnancy-related complications, and obtained complete visits, including blood and urine exams, blood pressure measurements, height and weight, and drugs for positive birth outcomes. On Dimension 1, mostly between -1 and 1, are

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[23] Benzécri, J.P.,1979, Sur le calcul des taux d'inértie dans l'analyse d'un questionnaire. Cahiers de l'Analyse des Données, IV(3): pp. 377-379.

also associated various explicative variables concerning place of living, regions and wealth status (multidimensional poverty index) of young women reporting correct antenatal care behavior. They mostly live in urban areas, especially in Nairobi and Central provinces, and are not multi-dimensionally poor.

Continuing on the positive side of Dimension 1, all the categories related to women who do not take any antenatal care visit neither assistance during pregnancy and which, consequently, do not receive any additional information neither exam and support for a safe pregnancy are shown. Still on this axis, it is valuable to note how even other regions considered less wealthy and developed comparing to Nairobi and Central, are located not far from the leading two. Coast, Nyanza and Western provinces, concerning the access to general antenatal care and the behavior of young women, are in the cloud of those who had visits in healthcare facilities, but are closer to categories related to government structure and farther from all the additional services offered for antenatal care.

On the second axis, representing all the additional services supporting quality of antenatal care, such as information about complications and exams or drugs dispensation, the positive availability of those services are mostly represented on the negative side of the diagram in Nairobi, Central, Eastern and Coast regions, where in general, young women have the suggested number of antenatal visits and at the right time, especially in private structures. Of concern is the cloud located on the extreme positive first dimension, which represents all young women not having any antenatal care visits, and which consequently do not receive any medication or suggestions for a safe pregnancy. Less extreme are those groups being assisted by TBAs, parents, or friends at home.

Fig. 6.4 Multiple correspondence analysis for antenatal care behaviour of young girls in Kenya-Join plot of category points
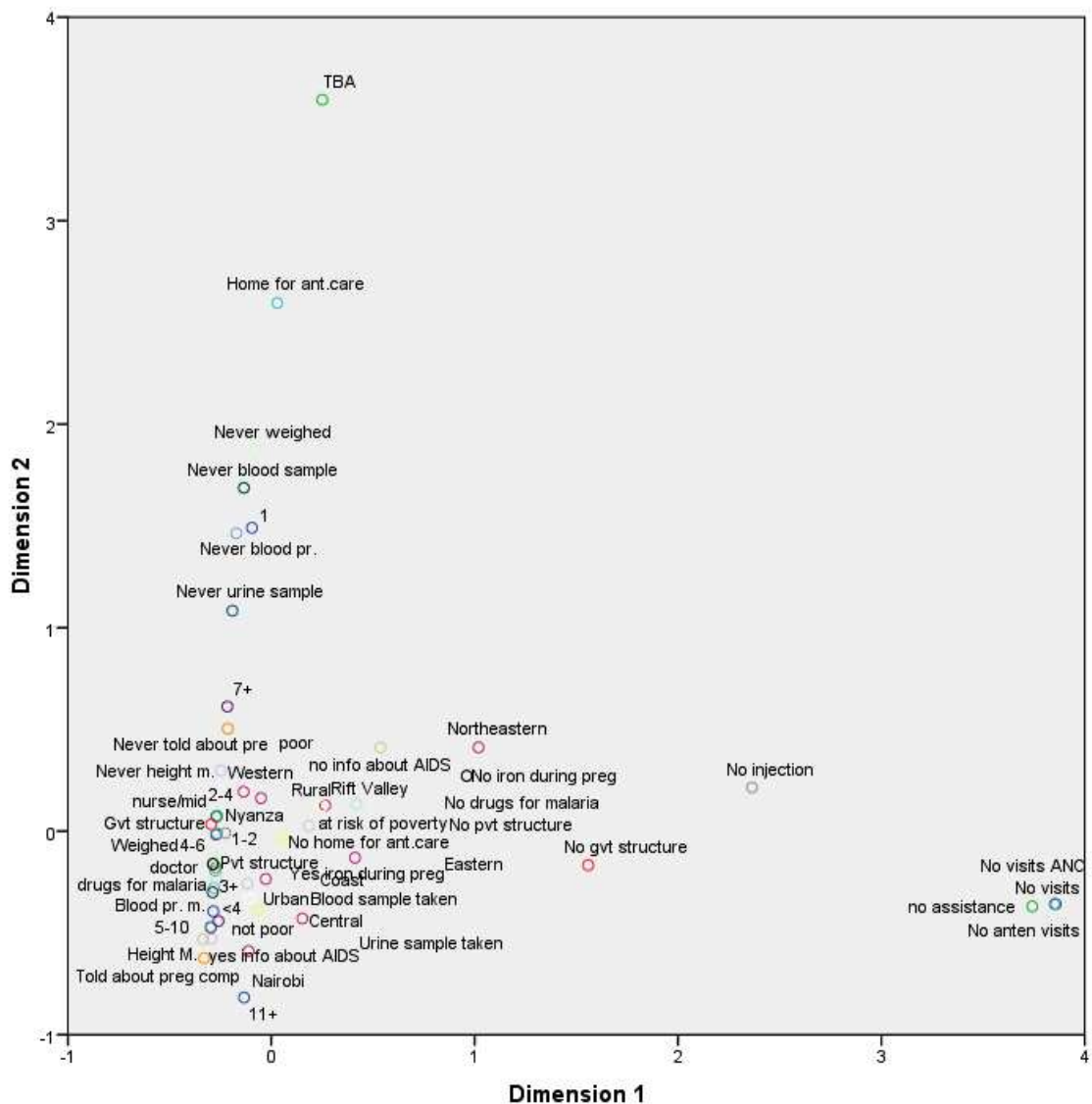
Variable Principal Normalization.

- ◯ antenatal visits
- ◯ Assistance at pregnancy
- ◯ Info about AIDS during pregnancy
- ◯ Month of first visit
- ◯ multidimensional poverty index 3 classes
- ◯ Place of ant.care:gvt structure
- ◯ Place of ant.care:home
- ◯ Place of ant.care:Pvt structure
- ◯ Preg:blood pr.
- ◯ Preg:blood s.

- ◯ Preg:complications
- ◯ Preg:Height
- ◯ Preg:urine s.
- ◯ Preg:weighed
- ◯ Region
- ◯ Tetanus injections before birth
- ◯ Took iron tablets or syrup during pregnancy
- ◯ Took something for malaria during pregnancy
- ◯ Type of place of residence

6.3 Multilevel modeling and summary of factors influencing late initiation of antenatal care among young women in Kenya

In order to contribute to the study of the phenomenon in question for young girls, results from the 2-level linear model of timing of first antenatal care visits are reported. It models the risk for a young woman (15-25 years old) in delaying access to, or never attending, antenatal care services for her last pregnancy (held in the 5 years preceding the 2008/9 KDHS Survey). The dependent variable is a continuous variable, measuring the month the girl had her first visit. It is centered on the mean number of visits 5. The girls who did not have any visits are also included in the analysis, and the category 'no visit' is recoded as being the tenth month of the first visit, since it is assumed that the time of the first visit is the time of delivery. Obviously, the higher the month of the first visit, the worse the behavior of young girls with respect to antenatal care.

Two levels are employed in the model: the first level is the mother's level, while the second level is the Primary Sampling Unit (PSU) level as a proxy of the community. A multilevel modeling technique was employed to account for the hierarchical structure of the data, and to facilitate the estimation of women and the community-level influences on delaying antenatal care visits. The sample size for women 15-25 at their last birth (in the 5 years preceding the survey) is of 1661 women, while the Primary Sampling Unit is 376. The model is developed using Multilevel Model for windows (Mlwin) software.

Before reporting the results of each model, the individual and community variables used for modeling are listed. Several variables have been tested before arriving at the complete model with all the variables. The first step was to test the significance of the two levels considered in the model: women as the first level and Primary Sampling Unit as the second level, in order to assess the necessity for modeling for both levels, and for estimating the two variances. Since the model results in a significant second level of variance, it means that part of the variability for timing of antenatal care depends on the community where a woman lives and grows up, and not just from the individual characteristics of the woman herself. All the variables employed at the second level have been created at PSU-level using different datasets, as described in the table below. The table includes the description of the construction of each individual and community variable with the source datasets. Not all of them are used in the final models, since some of them have been tested and then removed because they are not significant. Nevertheless, their description is included.

Tab. 6.3 Individual, Household and Community variables (Primary Sampling Unit) for Modeling of timing of the first Antenatal care visit in Kenya (last birth from a women aged 15-25), 2008/9 KDHS	
Individual and household Variables	
Age of mother at birth	Continuous variable calculated on the self-reported age of respondent and the age of the birth (KDHS, 2008/9). Used in the 15-49 aged model as a discrete variable: age 15-25 at birth, age 26+ at birth.
Age at first intercourse	Self-reported age of respondent. Binary response variable on age at first intercourse: at less than 16 (or 17) years or at more than 16 (or 17) years (V525, KDHS, 2008/9)
Place of residence	Current place of residence: urban or rural (V025, KDHS, 2008/9)
Parity	Self reported number of children ever born. The variable has been used as continuous or as categorical (less than 3 children, 3 children or more). (V201, KDHS, 2008/9).
Religion	Self reported membership to one religious group: Roman Catholic, Protestant/other Christian, Muslim, no religion, other. The variable has been divided by 3 main groups: any Christian, Muslim, no religion or other (V130, KDHS, 2008/9).
Province	The variable reports the *de facto* region (or province-interchangeable) of residence. Kenya has 8 regions or provinces: Nairobi, Central, Coast, Eastern, Western, Nyanza, Rift Valley, Northern. (V024, KDHS, 2008/9).
Education of the mother	Number of years of education of the mother calculated by two variables: education in single years - recoded using the highest education level attended - educational achievement. Education in single years is divided by classes following the levels of education (no education, between 1 and 7 years of education, 7 or more). Educational achievement recodes the education of the respondent into the following categories: none, incomplete primary, complete primary, incomplete secondary, complete secondary, higher education. This has been recorded in new classes: no education, primary (non completed and completed), secondary (non completed and completed), higher. (V133 from V106 and V149, KDHS, 2008/9).
Multidimensional Poverty Index	The index, at household level, is used in the model as a continuous variable and also as a binary variable (not multidimensionally poor, multidimensionally poor) or as three categorical variable (divided by 3 groups: not poor, poor, at risk of poverty following the UNDP cut-off points). It is constructed following the UNDP indication and using the KDHS 2008/9 variables. Technical notes about the Index are reported in Par. 2.2.4 'Health inequalities, health geography and the multidimensional poverty index'.
Wealth Index [24]	The wealth index is a composite measure of a household's

	cumulative living standard. The wealth index is calculated using easy-to-collect data on a household's ownership of selected assets, such as televisions and bicycles; materials used for housing construction; and types of water access and sanitation facilities. Generated with a statistical procedure known as principal components analysis, the wealth index places individual households on a continuous scale of relative wealth. DHS separates all interviewed households into five wealth quintiles to compare the influence of wealth on various population, health and nutrition indicators. The wealth index is presented in the DHS Final Reports and survey datasets as a background characteristic. In this study it is employed with the usual categories using quintiles (richest, richer, middle, poorer, poorest) or divided by 3 categories (rich, middle, poor) where central groups are aggregated. (V190, KDHS, 2008/9)
Media influence about family planning	The variable reports whether women has heard about family planning from any of the following sources in the last few months preceding the survey: radio, TV, newspapers. The variable is used as discrete (if she does heard or not). (V384A, V384B, V384C, KDHS, 2008/9)
Family planning usage	Ever use of a modern or traditional method is classified into modern, and traditional methods as follows: modern methods are pill, IUD, injections, diaphragm/foam/jelly, condom, female sterilization, male sterilization and Norplant. Traditional methods are periodic abstinence (rhythm), withdrawal, and abstinence, and any other country specific methods. If a respondent uses both a traditional method and a modern method then the modern method takes priority and she is coded as knowing a modern method. In this study the variable is employed as binary, using modern method or not using or using traditional method (V302, KDHS 2008/9).
Ethnic groups	Country specific ethnic group. The major ethnic groups in Kenya are: Kikuyu, Embu, Kalenjin, Kamba, Kisii, Meru, Luhya, Luo, Masai, Mijikenda, Swahili, Somali, Taita-Taveta. (V131, KDHS, 2008/9).
Type of wedding	Arranged or chosen husband (arranged, chosen, no husband) (S616A KDHS 2008/9)
Relationship of ages with first partner	Relationship of ages with first partner (older, younger, about the same age) (S616B KDHS 2008/9)
Partner 10+ years older	If partner more or less than 10 years older (more than 10 years older; less than 10 years older) (S616C KDHS 2008/9)
Money for sex	If the in interviewed in the past 12 months was given or received money/gifts for sex (yes or not). From variable S640A KDHS 2008/9
Knowledge of family planning	Knowledge of any method is classified into modern, traditional and folkloric methods as follows: modern methods are pill, IUD, injections, diaphragm, condom, female sterilization, male sterilization, implants, female condom, foam/jelly and lactational

RUTSTEIN, S.O., Macro International Inc. Calverton, 2008, The DHS Wealth Index: Approaches for Rural and Urban Areas (English), Working Paper, October 2008, Macro International Inc. Calverton, Maryland, USA.

	amenorrhea. Traditional methods are periodic abstinence (rhythm), withdrawal, and abstinence. Folkloric methods are the category "other". If a respondent knows both a traditional method and a modern method then the modern method takes priority and she is coded as knowing a modern method. Similarly, if a woman knows a traditional method and a folkloric method, the traditional method takes priority. In this study the variable is used as categorical: does not know any method of contraception, know only traditional methods, knows also modern methods. (V301, KDHS 2008/9)
Place for family planning	Source of any method of contraception is formed from a combination of responses. For current users of modern methods, it is the source of that method. For women who are not currently using any method, it is a source from which they know they can obtain family planning methods, if they know any source. From variable V379, KDHS 2008/9
How often have talked with partner about FP	The question concerns the communication with partner about family planning in the last year and it is asked to women who do not use contraception. The categories used in this study are: never talked with partner about FP, once a year, often, using contraception. From variable S720B, KDHS 2008/9
Marital Status	Current marital status of the respondent. It is recoded as married (married and living together) and not married (never married, widowed, divorced, not living together) (V501, KDHS 2008/9)
Acceptability of media advertisement about condom	It is asked to women if for husband/partner it is acceptable to advertise condoms at the radio. From variable S648A, KDHS 2008/9
Age of women	Current age in completed years is calculated from the century month code of the date of birth of the respondent (V011) and the century month code of the date of interview (V008). Variable V012, KDHS 2008/9
Employment of women	Whether the respondent works at home or away from home. It is categorized in 'not working', 'working at home', 'working outside home'. From variable V721, KDHS 2008/9
Community Variables	
Community Multidimensional poverty index	Mean score by PSU of the UNDP multidimensional poverty index divided by 3 groups: not poor, poor, at risk of poverty following the UNDP cut-off points. See the individual level variable 'Multidimensional Poverty Index' in this table. (Elaboration from 2008/9 KDHS data)
Community level of female education	Proportion of women in the PSUs with at least secondary education. The variable is divided by quartiles or is employed as a binary variable (less than 25% of women in the PSUs has secondary or higher education and 25 or more). (Elaboration from 2008/9 KDHS data)
Community level of fecundity	Mean number of children born in the PSUs. The variable is divided by two classes: has up to 3 children; has more than 3 children. (Elaboration from 2008/9 KDHS data)
Community median age at	Median age at marriage in the PSUs (Elaboration from 2008/9

marriage for female	KDHS data)
Community main religion	Whether at least 70 per cent of population is Christian, Muslim or mix/no religion. (Elaboration from 2008/9 KDHS data)
Community distance to the health facilities	Distance from each PSU to the closest HF (KEMRI list, elaborated using ArcGis Software). The variable is used as a continuous variable and as a categorical variable (less than 5km of distance from the PSU and the closest HF, between 5 and 15km, more than 50km).
Youth services availability in the community	Availability of health facilities offering services addressed to youth[25] in different range of kilometers from each PSU (5km, 10km, 15km, 30km). The variable has been created merging the Health Facility List provided by the Ministry of Health (last update at 14th February 2012) containing the indication for some services provided by each facility, and the geographic indication provided by KEMRI list. Elaboration using ArcGis software. The variable is used in the model as continuous or as binary (availability of the service in the range or not availability).
Partner approval of family planning in the PSU	Proportion of men in the PSU who approves families using FP (if less or more than 20% approves). From variable S720A, KDHS 2008/9
Partner education level in the PSU	Proportion of men in the PSU with at least secondary education. From variable V701, KDHS 2008/9
Community availability of antenatal care services	The variable measures the availability of health facilities offering antenatal care services in a range of 5km, 15km, 30km from the PSUs. It has been elaborated using ArcGis software. It has been weighted.[26] From variable Q400 (SPA 2010)
Community availability of antenatal care services with all items for quality counseling	The variable measures the availability of antenatal care with all items for quality counseling in a range of 5km, 15km, 30km from the PSUs. It has been elaborated using ArcGis software after having been weighted. (From SPA 2010, variables used: Q431$4 Visual aids for health education; Q431$1: guidelines; Q426: client card/record)
Community availability of antenatal care services with all essential supplies for basic ANC	The variable measures the availability of antenatal care with all essential supplies for basic ANC in a range of 5km, 15km, 30km from the PSUs. It has been elaborated using ArcGis software after having been weighted. (From SPA 2010, variables A430$12 A430$13 Iron and folic acid; Q411 tetanus toxoid vaccine; Q408$2 blood pressure apparatus; A430$1 foetoscope)
Presence of traditional birth attendant in the community	The variable assesses the presence of traditional birth attendant in catchment area of each health facility. The variable has been elaborated in ArcGis and it measures the distance from each

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[25] "YFS are services that are provided in a manner that recognizes the special information and service needs of young people. Characteristics of YFS include:

- Provider training in YFS in RH issues and communication (at least one staff Nurse, Clinical officer, Medical Doctor)
- Friendliness in attitude – being respectful and non-judgmental, Confidentiality and privacy
- Service provision environment – comfortable and non-threatening, Convenience in time and location
- Affordability of services
- Community involvement / support, Participation of the Youth

Stratify into:
- **Integrated Services:** Services to the youth offered alongside other services
- **Stand-alone Services**: Separate building (Youth Centre) with provision of OPD services Comprehensive RH package and should have recreational facilities e.g. games etc" (MoH, 2005 National Guidelines for Provision of Youth- friendly Services(YFS) in Kenya).

[26] For the weighting procedure and rationale see the chapter on Data and Methods

	primary sampling unit to each facility with traditional birth attendant in catchment area. The new variable has been then employed as a binary variable concerning the presence of TBAs in a range of 5Km from PSUs. It has been weighted. From SPA 2010, Q431A

The results for the multilevel model for delay of antenatal care visits for the last birth of a young woman in Kenya are reported here. Looking at individual level variables, and firstly at the women's demographic status, parity, marital status and age of women are all determinants for timing of antenatal care: in relation to parity, the visits tend to start later for higher parities. Married women tend to anticipate antenatal care visits, in relation to non-married or women without a partner. And on average an older women have her first visit 0.05 months later for each additional year of age.

Place of residence and province where young women live do not seem to be correlated with the timing of antenatal care when other variables are introduced in the model as a control. This can mean that all the usual variability in antenatal care behavior between urban/rural areas and among provinces, which is widely verified in the literature, is, in this case, controlled by other variables, such as women's education, religion and distance from healthcare facilities. In a model having only place of residence and province as independent variables, women living in rural areas significantly differ from those in urban areas, as do women living in North Eastern province, starting later the first antenatal check (See Model Appendix 6.1.1). When controlling for other individual variables, such as place for family planning, wealth index, marital status, parity, and partners' approval of family planning, both variables indicating place of residence lose significance, even when maintaining the expected sign of the estimate (Model Appendix 6.1.2). Adding the mother's education to the sign of estimate of the category for North Eastern province, and comparing it to Central province, it reverses and becomes significant when adding all the other individual and contextual variables, such as knowledge of contraception and distances from generic and specific healthcare facilities (Models Appendix 6.1.3 and 6.1.4). Introducing all women and community variables, only residence in Coast Province and North Eastern Province has influence on the timing of antenatal care, but not in the expected way. In fact, the model shows that on average women living in Coast or North Eastern provinces tend to initiate earlier antenatal care compared to women living in Central Province, which is the most developed and wealthy province. A possible explanation for this result could be that women from North Eastern and Coast provinces, when correcting for all the other independent

variables, (which means all the characteristics being the same for all women) would access antenatal care earlier. However, this explication is not supported by the literature or by evidence.

The timing of antenatal care visit also varies significantly between the different knowledge on family planning. Women who have knowledge of modern methods on average start antenatal care earlier than those who do not have any knowledge. Concerning the influence of family planning on the timing of antenatal care, knowledge of modern methods increases the propensity to access antenatal care services earlier. Exposure to media, acceptability of programs talking about family planning, and discussion with one's partner about this topic are also crucial factors influencing timing of antenatal care. On average, women who use to talk with partner about family planning tend to start antenatal care earlier in pregnancy comparing to those who never talk about the topic. Moreover, the employment of women also plays a crucial role in the timing of antenatal care. Working outside home can be indeed seen as a proxy of the degree of freedom and independence of women, and well as a degree of openness toward life issues: on average women working outside home have their first antenatal check 0,18 months earlier comparing to women who do not work or work at home.

Considering community variables that determine timing of antenatal care for young women, the average level of education and main religion practiced in the community influences the access to antenatal care. Women living in communities where a high percentage of women have at least a primary education receive the first ANC visit at an average of 0.7 months before women living in communities, where most are uneducated (parameter estimate not shown). Women living in a community where the main religion is Muslim receive the first visit at an average of 0.4 months later, compared to women living in communities of Christian religion (parameter estimate not shown). Moreover, looking at the availability and accessibility to general healthcare facilities and to specific antenatal care services in the community, it is shown that having a healthcare facility at more than 5 kilometers from the community negatively influences the propensity of young women to access antenatal care early. Women living in places where a general health facility is even more distant, at (more than 15 kilometers from their community), start antenatal care later in pregnancy than those living closer.

In places where a traditional birth attendant operates on the community territory and is in contact with neighboring healthcare facilities, they function as a reference, and their presence increases the young women's propensity to initiate antenatal care visits at the right time.

Furthermore, women having facilities with specific antenatal care services and counseling for pregnancy at a distance of less than 15 kilometers comparing to those who have these services farer, start antenatal care earlier, on average 0,5 months earlier. Counseling and additional information on pregnancy are crucial aspects that healthcare facilities need to improve in order to attract young women to seek maternal healthcare. Considering the low and unequal diffusion of counseling services over the vast territory of Kenya, and given the results of this study, it is important for policies to focus on the introduction of such services, addressing youth needs and facilitating accessibility.

Model 6.1 Multilevel modeling for the timing of antenatal care of a young women in Kenya (births from women aged 15-25)			
	Parameter Estimate	CI+ 95%	CI- 95%
Fixed Part			
cons	-2,443	**0,126**	**0,060**
Parity	0,060	1,178	0,957
How often have talked with partner about FP (never)			
Once	-0,764	**0,835**	**0,260**
Often	-0,802	**0,807**	**0,249**
use FP	-0,911	**0,740**	**0,219**
Wealth Index (poor)			
mean	-0,192	1,082	0,630
not poor	-0,427	**0,989**	**0,431**
Marital status (not married)			
married	-0,381	**0,878**	**0,532**
Mother's education (no educ)			
1-7 years	-0,101	1,327	0,616
7+	-0,239	**1,000**	**0,562***
Acceptable to advertise condoms at radio (no)			
yes	-0,414	**0,853**	**0,512**
Place of residence (urban)			
Rural	0,025	1,456	0,722
Knowledge of contraception (no methods)			
only traditional methods	3,213	**422,910**	**1,461**
modern methods	-0,771	**0,712**	**0,301**
Province (Central)			
Nairobi	-0,414	1,195	0,366
Coast	-0,678	**0,900**	**0,286**
Eastern	-0,203	1,353	0,492
Nyanza	-0,124	1,400	0,557
Rift Valley	-0,287	1,213	0,464
Western	-0,407	1,112	0,398

Northeastern	-1,165	**0,704**	**0,138**
Age of women	-0,055	**0,990**	**0,905**
Employment (not working)			
works at home	0,089	1,394	0,857
works outside home	-0,184	**1,000**	**0,681***
Heard FP on radio last month (no)			
yes	-0,152	1,057	0,698
Mean level of educ in PSU (no educ)			
primary	-0,676	**0,935**	**0,279**
secondary+	-0,514	**1,000**	**0,326***
Main religion in PSU (any christian)			
Muslim	0,507	**2,560**	**1,00***
mix or no religion	0,359	2,279	0,900
Distance to closest HF (less than 5Km)			
less than 15km	0,606	**2,894**	**1,161**
15+	1,342	**7,614**	**1,923**
If ANC counselling (15Km)			
15-30Km	0,463	**2,417**	**1,045**
more than 30km	-0,182	1,161	0,599
Presence of a TBA in PSU (at less than 10Km)			
at more than 10Km	0,052	**1,362**	**0,999***
Random Part			
Level: PSU			
Community level variability (S.E.)		0,022	(0,005)
Level: CASEID			
Women level variability (S.E.)		0,209	(0,008)
-2*loglikelihood:		6.856.975	
Units: PSU	376		
Units: Women	1661		

*statistical significance at 90% (-p<0.1)

The Primary Sampling Unit-level variation and the women-level variation are both reduced by the addition of contextual and individual factors in the complete model presented, against the 'only constant model' (not shown), but they are still significant. It means that there is still some variation to be explained by other factors, both at the individual and community level. This implies that even after controlling for observable community factors relating to availability and accessibility of services, and to community general behavior, there still exist unexplained community factors that have a significant effect on the timing of antenatal care.

Such factors could range from quality of care and affordability of services at the existing facilities, to cultural values and practices within specific communities.

The cluster effect accounts for only 9.5% of the total unexplained variation in timing for antenatal care; therefore, the intra-class correlation (not shown) indicates that there is some homogeneity among young women within the same community in timing for antenatal care. In other words, 9.5% of the variation in timing for antenatal care can be attributed to the community. Nevertheless the vast majority of the variability of the phenomenon is explained by the woman's variability and by her background characteristics.

Since the timing of antenatal care is strictly correlated to the number of visits a woman can have during pregnancy, some tests have been performed in order to assess the determinants influencing the number of visits during pregnancy for young girls aged 15-25 in Kenya. Still using a linear two-level model, the results for frequency of antenatal visits are presented in Model 6.2. All women between 15-25 years old during their last pregnancy have been included in the analysis, as well as women who did not attend any visit (zero visits) Preliminary analysis showed that the number of antenatal care visits during a pregnancy ranged from 0 to 18 visits, with a mean of 4,33 and a median of 3.

Model 6.2 Multilevel modeling for the frequency of antenatal health care visits during pregnancy of a young women in Kenya (births from women aged 15-25)			
	Parameter Estimate	CI+ 95%	CI- 95%
Fixed Part			
cons	-1,861	**0,652**	**0,037**
Parity	0,140	**0,965**	**0,784**
How often have talked with partner about FP (never)			
once	0,955	**4,660**	**1,449**
often	0,875	**4,319**	**1,332**
use FP	0,768	**3,695**	**1,257**
Marital status (not married)			
married	0,369	**1,848**	**1,132**
Mother's education (no educ)			
1-7 years	0,300	1,970	0,925
7+	0,367	**2,010**	**1,036***
Acceptable to advertise condoms at radio (no)			
yes	0,487	**2,100**	**1,261**
Place of residence (urban)			
Rural	-0,044	1,333	0,687
Knowledge of contraception (no methods)			
only traditional m	-2,271	1,669	0,006
modern methods	0,378	**2,097**	**1,015***

Province (Central)			
Nairobi	1,176	**5,667**	**1,854**
Coast	0,505	**2,623**	**1,046***
Eastern	0,153	1,898	0,715
Nyanza	-0,123	1,377	0,568
Rift Valley	0,013	1,622	0,633
Western	-0,095	1,481	0,558
Northeastern	0,952	**5,652**	**1,188**
Age of women	0,104	**1,161**	**1,061**
Employment (not working)			
works at home	0,132	1,458	0,893
works outside home	0,355	**1,811**	**1,123**
Has heard about family planning from TV (no)			
yes	0,252	**1,606**	**1,031**
Wealth Index (poor)			
mean	0,005	1,338	0,755
not poor	0,308	**1,844**	**1,004**
Presence of a community health worker in the PSU in range of 5km (no)			
yes	0,255	**1,658**	**1,004**
Mean level of educ in PSU (no educ)			
primary	0,869	**4,717**	**1,206**
secondary+	0,931	**5,018**	**1,283**
Main religion in PSU (any christian)			
muslim	-0,388	1,103	0,417
mix or no religion	-0,121	1,374	0,571
Distance to closest HF (less than 5Km)			
less than 15km	-0,381	**0,978**	**0,477***
15+	-0,949	**0,741**	**0,202**
If ANC counselling in the community (15Km)			
15-30Km	-0,620	**0,798**	**0,363**
more than 30km	-0,058	1,289	0,691
Presence of a TBA in PSU (at less than 10Km)			
at more than 10Km	-0,281	**0,961**	**0,593**
Random Part			
Level: PSU	0,209	0,074	
Community level variability (S.E.)			
Level: CASEID			
Women level variability (S.E.)	3,447	0,133	
-2*loglikelihood:	6.851.491		
Units: PSU	376		
Units: Women	1660		

*statistical significance at 90% (-p<0.1)

The results, presented in Model 6.2, mostly confirm the tendency of behavior of women highlighted in Model 6.1 on timing of antenatal care, and it adds some interesting information on the factors associated with the frequency of antenatal care visits. Parity in this case results to be statistically significant, showing a decrease in the number of visits for every additional child born. All the variables concerning family planning knowledge, usage and acceptability, perform in the same way as Model 6.1; women living in families with a major acceptance of family planning attend, on average, significantly more visits than those who never discuss on family planning. Concerning community variables referred to the healthcare facilities existing in the primary sampling unit, the presence of many types of specific services (services for counseling and community health workers in the area) as well as the closeness to generic healthcare facilities, shows a consistent influence on the number of visits had. Concerning the random variability, only 5% of the variation in timing for antenatal care can be attributed to the community. Nevertheless the vast majority of variability of the phenomenon is explained by the woman's variability and by her background characteristics.

In general, the phenomenon of the number of visits is easily explicable by individual and community variables, compared to the timing of first access to healthcare facilities. Therefore, the variables inserted in the model are more than adequate for the complexity of the event. However, both the models confirm the presence of some individual and community factors influencing the timing of first visits for antenatal care and the number of visits.

Despite the fact that the results show homogeneity in women-level characteristics in explaining antenatal care behavior it might be of interest to assess the differences between the groups of women who performed at least one visit versus those who never had any visit during pregnancy. Also, given the results of correspondence analysis showing how women who never attended any visit, together with those who delivered at home, highly differ from the average, it can be useful to analyze the two groups separately. A logistic two-level model has been employed, aimed at assessing the probability of a young woman to have at least one antenatal care visit, against the risk of not having any visit.

Model 6.3 Logistic Multilevel modeling for risk of attending at least one antenatal care visit of a young women in Kenya (births from women aged 15-25)			
	odds	CI+ 95%	CI- 95%
Fixed Part			
cons	0,065	**0,899**	**0,005**
Parity	0,993	1,220	0,808
Wealth Index (poor)			

mean	1,610	**2,457**	**1,054***
not poor	2,759	**7,338**	**1,038**
Marital status (not married)			
married	2,672	**4,484**	**1,593**
Mother's education (no educ)			
1-7 years	2,181	**4,239**	**1,123**
7+	3,607	**7,582**	**1,716**
Acceptable to advertise condoms at radio (no)			
yes	1,728	**2,728**	**1,095**
Place of residence (urban)			
Rural	0,762	1,665	0,349
Province (North Eastern)			
Nairobi	1,435	8,845	0,233
Coast	1,870	5,243	0,667
Eastern	0,612	1,802	0,208
Nyanza	0,892	3,285	0,242
Rift Valley	0,656	2,248	0,192
Western	2,358	10,647	0,522
Central	0,281	1,117	0,071
Age of women	1,008	1,105	0,919
Employment (not working)			
works at home	1,381	2,396	0,796
works outside home	1,835	**3,233**	**1,041**
If ANC with all essential supplies for basic ANC (15Km)			
15-30Km	0,377	**0,768**	**0,185**
more than 30km	1,040	2,001	0,540
Presence of a Community health worker in the community (at more than 2 km from PSU)			
In a range of 2 km	1,895	**3,332**	**1,077**
Distance to closest HF (less than 5Km)			
less than 15km	0,526	**0,961**	**0,288***
15+	0,323	**0,833**	**0,125**
Main religion in PSU (any christian)			
muslim	0,715	1,929	0,265
mix or no religion	0,476	1,113	0,210
Mean level of educ in PSU (no educ)			
primary	1,650	5,329	0,511
secondary+	2,117	7,465	0,600
How often have talked with partner about FP (never)			
once	3,235	**9,046**	**1,157***
often	5,233	**21,044**	**1,301**
we use FP	2,718	**6,295**	**1,174***
Random Part			
Level: PSU	0,482	(0,236)	

Community level variability (S.E.)			
Level: CASEID	1	0	
Women level variability (S.E.)			
Units: PSU	376		
Units: Women	1661		

*statistical significance at 90% (-p<0.1)

What is shown from the results of Model 6.3 is that, for the most part, individual-level factors strongly influence the probability of having at least one visit, as do some community characteristics concerning the presence of healthcare services in the area. At the individual level, together with family planning knowledge, usage and acceptability factors already emerging from previous analysis, the mother's level of education strongly determines the access to at least one antenatal care visit.

The wealth index also assumes a crucial role in determining the propensity to have at least one visit: for the highest level of wealth index, compared to the lowest, the probability of having at least one visit is more than double. There is no evidence of the influence of the place of residence or of province of residence on the event of antenatal care visits; however, there is a strong effect of community presence and closeness of healthcare facilities and community health workers on having at least one antenatal care visit. Different from previous analysis for antenatal care behavior concerning the timing of access to ANC and the number of visits performed, the presence of healthcare services offering counseling about ANC does not result to be statistically significant in explaining this event, while the presence of services offering all essential supplies for antenatal care influences the attendance of at least one visit. As already discussed before, antenatal care practice is almost universally spread in the country (only 7% of 15-25 year-old women did not receive any antenatal care visit for their last birth), therefore the group of those women who never had any visit is probably the most disadvantaged group, living very far from any type of healthcare facility, and which primarily seeks first aid in case of emergency, instead of more specific services or counseling.

6.4 Discussion on antenatal care

The analysis of antenatal care has shown that the timing of antenatal care visits in Kenya is associated with a range of socio-economic and demographic factors, as well as with contextual factors. However, these determinants do not explain all the variations in the timing of use of such healthcare facilities, since significant unexplained variations exist between

women and communities. A statistically significant variance might represent important factors omitted from the models, either because they could not be quantified in a large survey or were absent from the data set, or a significant variance might reflect the poor measurement of some factors thought to influence the timing of first access to ANC services. The results suggest that membership to a particular community explains part of the variation in the use of antenatal services among women. After taking into account many covariates, there are differences at the women-level in the initiation of antenatal care. Moreover, the vast majority in the variability of the phenomenon is explained by women's variability and by background characteristics.

The importance of the environment where a young girl grows up is demonstrated by a number of significant variables. It is common knowledge that a high level of education in the community can positively influence young girls usage of antenatal care. In the case of this study, where the young women's propensity to seek early antenatal care is analyzed, the level of education of the community is even more important than the individual level of education in influencing proper antenatal care. Moreover, several studies have demonstrated a link between religious affiliation and maternal health-seeking behavior (Khasakhala, A. and Ndavi, P.; 2007). In Muslim communities, women are less likely to initiate antenatal care early on in the pregnancy. This is mainly due to the lower level of education of Muslim women, as well as higher parities, less availability of services, and lack of independence in healthcare decisions (Tawiah, E.O., 2007). In North Eastern Province, for example, where there is a prevalence of the Muslim population, many miles often separate villagers from the nearest health clinic, and only an estimated 40% of the population has access to healthcare services. After accounting for levels of education and parities, as well as for place of residence and wealth index in communities where the main religion is Muslim, women in these communities tend to access antenatal care later in the pregnancy.

This study confirms the importance of access to healthcare services, and demonstrates how the proximity to healthcare facilities, as well as to specific services for antenatal care, is crucial in anticipating the timing of access to antenatal care. Counseling activity, as a service to support the quality of antenatal care, is demonstrated to be important in accessing antenatal care for young women. This might be supported by the fact that, especially for young girls who need special attention, the component of trust in and acceptability of providers is fundamental when receiving healthcare service. However, when analyzing the difference between young women who never had access to antenatal care in pregnancy and those who

perform at least one visit, essential supplies for antenatal care seem to be more important than counseling services.

Moreover, the presence of a traditional birth attendant on the territory, linked to the health facilities and who can refer the patients to the hospitals, is also considered a fundamental factor in facilitating access to proper antenatal care services. The results suggest that these workers may have a positive influence on young women in initiating antenatal care early on in the pregnancy as well as in performing more visits.

Among the socio-economic factors considered, employment of women and wealth status play a crucial role in influencing in time antenatal care behaviors. The wealth index, measuring the socio-economic status of the household through household amenities and possessions, is particularly important, influencing the timing of antenatal care visits. Whether or not the correlation between high wealth status and proper antenatal care is easily understandable, since the vast majority of healthcare services are accessible under user fees, the relation between an employment out of the home, and the higher propensity to seek antenatal care in time, can raise different interpretations. Working out of the home can be equal to receiving a salary and, consequently, to greater independence in making decisions in personal healthcare. Moreover, working in a different environment from home can allow contact with more knowledge on healthcare, and an increase in the sharing of experiences with others. These women are more likely to have greater knowledge about pregnancy and childbirth, due to freedom of movement outside the household. They also tend to seek information on the services available for pregnancy care during work. Higher socio-economic status, together with the empowerment of women, is crucial in order to enable them to access maternal services.

Family planning knowledge, and the influence of the media broadcasts on family planning are also fundamental determinants, acting positively on early access to antenatal care. Also, the acceptability on the part of the husbands towards family planning, and his openness on the topic, also increase the possibilities of the girls to seek proper access to antenatal care.

With respect to demographic factors, higher parities have always been correlated to less use of maternity services, and this study confirms this association. After controlling for parities, younger women result to accessing antenatal care later than older women.

As previously discussed in this chapter, antenatal care is almost universally diffused in the country, even though differences in timing and frequency subsist. The unexplained variability emerging from the results of this study can be associated with individual and contextual factors not considered in the model, that can be related to traditional health ways-of-life, or to

a lack of awareness of the need for antenatal care during pregnancy, as well as to the impossibility of access to healthcare facilities for monetary reasons or other kind of barriers not measured by the source of data. Despite the fact that the majority of variability in the timing of antenatal care is explained by individual characteristics, some of the heterogeneity between communities is attributable to factors included in the models, such as the distance to the healthcare facilities, and the presence of specific services for antenatal care, which create a link with the young women.

Part 7. Individual and contextual factors of place of delivery for a young women in Kenya

> *'About 53 million women in the South give birth at home annually, most of the time by traditional birth attendants (TBAs), most of whom are not able to recognize, manage and prevent pregnancy-related complications.' (WHO 1997; Sibley et al. 2004).*

7.1 Why place of delivery is an important issue

Proper delivery care is important for both maternal and perinatal health, especially when childbirth complications arise. It is convenient that mothers deliver their babies in a healthcare facility, since suitable medical skills and hygienic conditions can decrease the risk of complications and infections which may cause death or serious illness to either the mother or the baby. Delivery within a healthcare facility or with a skilled attendant is much less common than antenatal care in Kenya, among all women and also among young women. Even though almost all women in the country use healthcare facilities for antenatal care and have many visits during pregnancy, the vast majority of them deliver at home, and not in a healthcare facility (Obonyo *et al*., 2010). Furthermore, the KDHS data shows a significant improvement in antenatal care attendance in Kenya over the last twenty years, while almost no improvements have been observed in delivery care. In the 2008/9 DHS survey the percentage of women who had antenatal care from a trained medical provider for their most recent birth was 92%, rising from 88% in 2003 and from 77% in 1989. However, the percentage of women who delivered at home since 1993 ranges around 55-56% (Obonyo *et al*., 2010). Anna M van Eijk *et al*., studying the use of antenatal services and delivery care among women in rural western Kenya, found that "despite the fact that 90% of the women reported attending antenatal care, fewer than 2 in 10 gave birth in a health facility. This is lower than the national estimate of 40% for Kenya and 39% for Nyanza Province".

Delivering in a healthcare facility can also help in emergency obstetric care, where available, in postpartum emergencies, and in newborn care, while delivering at home with a traditional birth attendant is not always a guarantee of the same treatment. The TBA's role, however, is a controversial issue in maternal healthcare studies, since they are not as skilled and prepared as nurses but, at the same time, are much closer to mothers and more flexible (Izugbara *et al*., 2009). Two thirds of Kenya's maternal deaths are attributed to postpartum hemorrhage (severe loss of blood during or after labor), sepsis (bacterial infection in the blood), eclampsia

(hypertension during pregnancy) or a ruptured uterus: all conditions that traditional birth attendants are unable to deal with. On the other hand, TBAs are still strongly recognized as being very close to women, because of their acceptability and availability, and thanks to the sensitivity of their services to the cultural, economic and personal needs of the families, households and communities.

Concerning the topic of this research, the utilization of maternal healthcare for deliveries by young women in the country reflects the general trend of all women's utilization, where between 55 and 71% of births in the last five years preceding the survey have been delivered at home. However, it is widely recognized in the literature from previous studies on Kenya and other African countries (Magadi *et al.*, 2006), that despite bivariate analysis, little variation in maternal health care by age is shown; after controlling for the effect of background factors in multivariate analysis, teenagers have poorer maternal healthcare than older women with similar background characteristics. Parity of births, also, has to be considered as an important factor influencing the risk of delivering at home, since there is a natural propensity not to deliver in healthcare facilities that rises with the number of children had at birth.

Moreover, there is evidence that pregnancies in teenagers and young women have major risks of outcome complications for either the mother and the child, especially when the girls' background and context of where they live is not protective towards them. The study done by Magadi *et al.*, for example, shows how Kenya is one of the countries with highest premarital teenage births in the African continent. The proportion of premarital teenage births is almost 36%. Marital status, as already discussed, is a controversial factor in teen life in Kenya, given the wide differences among status and way of living between girls in rural and urban areas; most of the time, giving birth out of wedlock is symptom of insecurity and instability both in urban and rural areas, and having children out of wedlock may influence the utilization of maternal healthcare services.

In order to better understand how being a young woman in Kenya impacts on the propensity to delivering at home instead of giving birth in a healthcare facility, and how young women are influenced by background and contextual factors, some preliminary analysis has been conducted. Preliminary analysis of the data includes an examination of the distribution of last birth and healthcare facility deliveries, as well as a bivariate analysis of the place of delivery with each of the explanatory variables.

7.2 Aim, Data and Methods

Considering the literature analyzed above, and the resulting determinants influencing home delivery, the aim of this work is to investigate the factors and determinants of place of delivery for Kenyan young women (aged 15-25). In order to assess factors and determinants of place of delivery for Kenyan young women, the KDHS data for 2008-09 has been analyzed. Individual, community and geographic factors are included in this study, and their influence on place of delivery is tested.

Still much has to be explored concerning the factors associated with teenage and youth reproductive behavior, especially in recognizing them as a particular group to focus on. In particular, given the role of community and context influencing the life of youths, it is important to assess whether community factors have a strategic role on maternal healthcare behavior. Since the vast literature on maternal healthcare has mostly focused on individual factors leading to delivery at home, this work aims to give a contribution to the exploration of community factors influencing reproductive behavior of young women in Kenya. Also, this approach gives a contribution to the explanation of the homogeneity of behaviors within communities, giving an idea about the role of the context in explaining the phenomenon. The impact of availability for each community of specific services for reproductive behavior is also tested in the models, an aspect which has previously been ignored by researchers and was only recently introduced.

Individual data for each woman and household are employed in the model. These variables are proxy variables of young women's background; this data is provided by the 2008/9 Demographic and Health Survey for Kenya. The DHS collects socio-economic and demographic information for women between 15 and 49 years of age. The DHS also collects GIS (geographical information system) data, which allows us to locate interviewed women for a primary sample unit (399 person cluster). The "Children Recode (KR)" file from KDHS 2008-9 has one record for every child. The analysis is conducted considering all the births per woman occurring in the 5 years preceding the survey. It contains the information related to pregnancy, postnatal care, immunization and health. The unit of analysis (case) in this file is each child per woman born in the last 5 years (0-59 months). Data of births in this dataset are for births had from December 2003 to February 2009. The age group this work focuses on is 15-25 (also called young women) since this age group is statistically different from the over-25 age group for maternal healthcare behavior. Total births for 15-25 year old women are

2487. The dependent variable is a binary variable: delivery at home versus delivery in a healthcare facility.

Contextual variables are created at the primary sampling unit level. Some variables are recoded using DHS variables, and others are built using a geographic information system. Healthcare facilities' data is taken from two main sources. The Kenya Medical Research Institute (KEMRI) Welcome Trust Research Program provides a complete list of healthcare facilities, divided by type of facility. This list provides geographic information about Kenya Health Facilities for 2005. Geographical location is considered at the primary sampling unit level. This list has also been merged with the Kenya Health Facility List, Kenya Ministry of Health (http://www.kenyahealthfacilities.net/), which gives details about services offered by each healthcare facility. Geographic variables are created at PSU and district level, and used as contextual variables. Geographical analysis is performed with ArcGis 9.3 software, employing Spatial Analyst and multiple buffering tools. Some variables from the Kenya Service Provisional Assessment (2010), related to the availability of specific services for delivery care, have also been tested in the model.

To test the research project hypotheses, statistical modeling will be used. A first descriptive analysis, as well as a bivariate analysis of the place of delivery with each of the explanatory variables, will be made in order to represent the behavior of young Kenyan women, and to assess the factors associated with the phenomenon. Then, in order to frame the backgrounds of the young women, individual and contextual socio-economic characteristics will be used as determinants of young women's place of delivery behavior in the country, and to ascertain the existing territorial differences of the phenomenon. Using multivariate and multilevel models (given the hierarchic structure of the data), the influence of individual, household and community variables on young women's behavior will be estimated. The results of multilevel model on the probability of a young woman (aged 15-25) delivering in a healthcare facility will be reported in the following paragraphs. The dependent variable for the analysis is a binary variable, representing the decision of a mother to deliver in a healthcare facility or at home. The aim is to assess the relevance of the analysis for the age group (15-25); a multilevel model for all women surveyed (15-49), which controls for age groups, is also shown and commented on.

7.3 Characteristics and factors associated with place of delivery and the role of community

7.3.1 Women's characteristics and individual background by place of delivery

The literature concerning maternal healthcare and reproduction in Kenya highlights that the place of delivery (in an urban or rural area), as well as the region where a women lives, highly influences the possibility of delivering in a healthcare facility. After controlling for individual variables, concerning socio-economic and cultural background, which is widely recognized as factors influencing place of delivery, this work aims to assess to what extent the community plays a role in the reproductive behavior of young women. Since the risk of home delivery results quite high for young women, as does the risk of complications, the aim is to assess the leading factors of home delivery, in order to contribute to the research for those who address policies for adolescent and youth health-seeking behavior. Factors and determinants of maternal healthcare seeking behavior have been assessed in many studies. Demographic and individual factors, as determinants of institutional (health facilities) deliveries versus home deliveries, are many. Socio-economic factors have also been shown to be of greater importance in determining healthcare service utilization than demographic factors (Obermeyer, Potter 1991).

From an individual point of view, all women's background characteristics have to be considered: education is recognized as one of the most important factors influencing place of delivery. As Obermeyer states," increased education influences service use by increasing female decision making power, increasing awareness of health services, changing marriage patterns, and creating shifts in household dynamics" (1993). Place of residence, including urban-rural differences, also has an impact. Knowledge and use of family planning, wealth index, household living conditions, and occupational status are also very important in explaining this phenomenon. Furthermore, the cost of facilities, the perception of poor quality of care, and the abusive treatment that many women receive in a hospital setting are also barriers for seeking assistance (Izugbara *et al*., 2009); "Money was often mentioned as a support or lack of it as a barrier for delivery in modern health units. Other mentioned barriers were distance to health units, lack of transport, husband being away from home, having nobody to leave at home, labor starting at night or un-expectedly such that there is no time to go to health units and poor quality of care in the various delivery sites" (Amooti-Kaguna B, Nuwara F., 2000).

A descriptive analysis of the distribution of place of delivery among young women (aged 15-25) in Kenya for the 5 years preceding 2008-09 is presented in order to frame the phenomenon and to find the factors influencing place of delivery. All distribution of characteristics by health facilities' deliveries and significance are reported in Appendix 7. 2,487 births occurred between 2003 and 2008-09 (5 years before the 2008-09 Survey) by 15-25 year-old Kenyan women; more than half of them (55 per cent) took place at home. (Fig.1) Parity is generally recognized as having an influence on the place of delivery. Generally, at first birth, it is highly recommended being assisted by a skilled attendant in a healthcare facility instead of delivering at home (WHO, 2006). Women with fewer children tend to use healthcare facilities more often than women with more children. A similar pattern occurs with age at first intercourse, where women who experienced first intercourse at a very young age tend to deliver at home much more than women who experienced first intercourse at an older age.

Looking at women's behavior regarding antenatal care, it is possible to have an idea of the general trend of healthcare facility utilization for maternal healthcare by women. More than 80% of births from women who did not receive any antenatal care were not delivered in a healthcare facility.

Following the WHO recommendation for antenatal care during pregnancy, the number of antenatal visits held, and the timing of the first visit characteristics have been tested in this analysis. Among the women who experienced childbirth, for their last birth (data for ANC is recorded only for the last birth), and who had no visits, 18% of births were delivered in a healthcare facility. Among women who had fewer than 3 visits (less than the minimum recommended), 43% were delivered in a healthcare facility. The timing of the first visit also shows a similar pattern, since the earlier the women had their first visit, the higher the probability of delivering in a healthcare facility.

An important set of variables, which could have an influence on place of delivery, is the women's media exposure, in particular as a vehicle for family planning knowledge. There is evidence from a number of studies that individuals' exposure to mass media messages promoting family planning influences contraceptive behavior (Piotrow *et al.* 1990, Bankole *et al.* 1996, Westoff and Bankole 1997, Kincaid 2000). A number of models have emerged from different fields, identifying specific pathways to behavior change and offering insight into programs as they try to influence and change behavior. Several have been very influential in explaining the effects of mass media campaigns on fertility-related behavior (Gupta *et al.*,

2003). Effective news media relations have many benefits, complementing other communication efforts. What people read, see, or hear in news coverage can lend credibility to family planning, and help to make it a legitimate and familiar topic for public discussion. News coverage can inform people about family planning choices and help them ask providers the appropriate questions. Skill in media relations can help avoid or dispel rumors, respond to criticism, defuse controversy, and even turn adversity to advantage. News coverage is crucial to engaging policymakers' attention and earning opinion leaders' support. Also, because the news media pays distribution costs, helping journalists to cover family planning is a cost-effective way to communicate (Population Information Program, 1995).

7.3.2. Household multidimensional status and contextual variables by place of delivery

Recent studies have analyzed the factors leading women to deliver at home. These studies highlight the key role of community and context variables as fundamental determinants influencing the place of delivery (Stephenson *et al*., 2005). In recent years, there has been a growing recognition of the importance of contextual influences on health outcomes; in particular, several studies have found significant effects of community level factors on reproductive health outcomes. Taking into account the interactions between the individual and the community is a new means of studying the community's influence on health. Such studies relate individual health outcomes to the socio-economic characteristics of the community (for example, levels of economic development, general level of education, maternal healthcare behavior of the community) and the community's health infrastructure.

Preliminary analysis shows a correlation between place of delivery among young women in Kenya for the year 2008/9, and some contextual variables are considered in this analysis. Among the community variables, of great interest are the variables related to the services offered by the healthcare facilities existing on the territory. If the influence of individual variables such as education, place of residence, and use of family planning are already recognized as being fundamental factors leading to delivery in a health facility, the availability of certain services as well as the costs of these services have never been considered in previous works.

The Wealth Index levels show how the three lowest quintiles of the indicator are positively related to home delivery, and only the highest level (richest) is positively related to healthcare facility delivery. Since the Wealth Index is considered a poor proxy for measuring consumption expenditure and socio-economic position (Howe *et al.*, 2009), the Multidimensional Poverty Index designed by the UNDP has been built for every household of the KDHS dataset, and used in the models. Looking at the household MPI distribution by place of delivery, there is a clear difference between multi-dimensionally poor household behavior, and not-poor household behavior, where 63% of births from women of poor households were delivered at home, and 36% of these births were delivered in a healthcare facility. On the other hand, among the not multi-dimensionally poor households, 58% of deliveries were in a healthcare facility, and 42% were at home.

The relationship between the possession of a vehicle (mode of transportation) and the place of delivery is also tested. In general, among the households with no car, 43% of births from these households were delivered in a healthcare facility, while among households with a car, 64% of births were delivered in a healthcare facility. This might depend on the level of Wealth Index they are in, since the groups of women who have a car are in the middle, richer and richest Wealth Index levels.

Community behavior variables tested by place of delivery are employed, considering the context in which a young woman grows up. As already shown for a previous individual variable describing the parity pattern, the higher the average number of children born in a community, the higher the percentage of births delivered at home. In communities where the median age at marriage was over 17, the percentage of deliveries in a healthcare facility was much higher than in communities where the median age was less than 17. With an increase of the age at marriage, more women tend to deliver in a healthcare facility, while for women with an earlier age at marriage the most frequent place of delivery is home.

A significant correlation is also shown between the average number of years of education in the community, both for women and their partners, and the place of delivery; the higher the number of years of education, the higher the percentage of women who delivered in a healthcare facility. The same pattern is highlighted by the strong positive correlation between the numbers of women with secondary school education and higher in the community, and the percentage of healthcare facility deliveries.

Regarding the geographic distribution and availability of healthcare facilities on the territory, contextual characteristics are also considered. Distances from clusters to healthcare facilities

(different types) are also considered as a factor associated with place of delivery. These variables are tested with place of delivery, and result as statistically significant where, for greater distances, less women tend to deliver in a healthcare facility. The variables considered are: distance from the closest health facility (all types), distances from the closest maternal health facility or women's specific needs addressed, and counts of the number of health facilities (all types and specific services) in a radius of 5 Km, 10 Km, 15 Km and 30 Km. Among many other reasons, women may decide for home delivery over of going to a hospital because they do not have a mode of transportation, and the hospital is too far away (42% of all women who delivered at home, 44% of young women and 45% of teenagers who delivered at home).

Moreover, the availability of comprehensive emergency obstetric care services and of services addressed to youths in healthcare facilities 5 Km from the community is highly correlated to place of delivery. In communities where there is availability of CEMOC services and of youth services, almost 60% of births were delivered in a healthcare facility. Certainly, the availability of these services has a strong relationship to the wealth status of the province where they are established, and this kind of correlation will be considered and controlled in the models.

7.4 Multilevel modeling of all women (15-49) and of a young (15-25) women's decision to give birth in a Health Facility in Kenya.

In order to determine the individual and contextual determinants of the propensity of young women giving birth in a healthcare facility instead of at home, multilevel models are run on the probability for women (15-49), and for young women (15-25) to deliver in a healthcare facility. The dependent variable for the analysis is a binary variable, representing the decision of a mother to deliver her last birth in a healthcare facility or at home. Multilevel models for all women are first of all reported, in order to show the determinants of the probability of delivering in healthcare facilities, and to assess the necessity of focusing on young women's reproductive behavior. Through the introduction of an age group variable, which divides the sample between 15-25 year-old girls, and 25 and above, the differences in propensity of delivering in healthcare facilities is shown, and this justifies the following focus on young women. The tables below show the list of covariates used in the models and the results of the

multilevel logistic models of the decision to deliver last birth in a health facility in Kenya for all women (aged 15-49) and for young women (aged 15-25).

The multilevel regression models estimated variances in place of delivery between the mothers and between the communities. These variations represent the unexplained variation in the decision of the place of delivery that remains after accounting for the factors included in the models. A significant variance might represent factors that influenced the delivery in a healthcare facility that were omitted from the models, either because they could not be quantified in a large survey or were absent from the data set, or a significant variance might reflect the poor measurement of some factors thought to influence the choice to delivery in a healthcare facility. The two-level model employed in this chapter outlines the risk for a woman (aged 15-49) to deliver her last birth in a healthcare facility, compared to the probability of delivering at home. The sample size for women (aged 15-49) at last birth is of 4092 women, while the Primary Sampling Unit is 398. All models are estimated using 2nd order penalized quasi-likelihood, as recommended by the literature (see also, Twisk 2006) and are developed using Mlwin software.

Before reporting the results of each model, the individual and community variables used for modeling are listed. Several variables have been tested before arriving at the complete model with all the variables. The first step was to test the significance of the two levels considered in the model, women's level as the first level, and Primary Sampling Unit as the second level, in order to assess the necessity for modeling for both levels and for estimating two variances. Since the two-level model has a significant second level of variance, it means that part of the variability for delivering in a healthcare facility instead of at home depends on the community where a woman lives and grows up, and not just from the individual characteristics of the woman herself. All the variables employed at second level have been created at PSU level, using different datasets, as described in the table below. The table includes a description of the construction of each individual and community variable with the source datasets. Not all of them are used in the final models, since some of them have been tested and then removed because they are not significant. Nevertheless, their description is included.

7.4.1 Clustering structure

To determine whether is necessary to use a random effect analysis, a two-level null multilevel model has been employed, in Mlwin 2.24, level 1 being the 2487 mothers, and level 2 being the 376 women primary sampling unit. There are significant variations between the mothers' level and the PSU level - variability of the PSU level results to be significant (var. 1,030; S.E. 0,128) - implying the necessity of decomposing the total variability of the 'place of delivery' phenomenon into mothers'-level variability and PSU-level variability. In this way, it is possible to consider the hierarchical structure of the data, and to study the impact of community on women's behavior. On the contrary, even if considering all the births occurring in the 5 years preceding the 2008/9 KDHS from each women 15-25 years of age in this model, there is no significant variation between birth-level and mothers'-level, meaning an overlap of these two levels. Consequently, the mothers' level has been chosen as the first level of the model given.

7.4.2 Results and comments to multilevel modeling of giving birth in a health facility in Kenya (last birth from women aged 15-49 and all births in 5 years preceding the survey for girls aged 15-25)

The table includes the description of the construction of each individual and community variable with the source datasets. Not all of them are used in the final models, since some of them have been tested and then removed because not significant. Nevertheless, their description and source are reported.

Tab. 7.1 Individual, Household and Community variables (Primary Sampling Unit) for Modeling of giving birth in a Health Facility in Kenya (last birth from women aged 15-49; all births in 5 years before the survey from a women aged 15-25)	
Individual and household Variables	
Age of mother at birth	Continuous variable calculated on the self-reported age of respondent and the age of the birth (KDHS, 2008/9). Used in the 15-49 aged model as a discrete variable: age 15-25 at birth, age 26+ at birth.
Age at first intercourse	Self-reported age of respondent. Binary response variable on age at first intercourse: at less than 17 years or at more than 17 years (V525, KDHS, 2008/9)
Place of residence	Current place of residence: urban or rural (V025, KDHS, 2008/9)

Parity	Self reported number of children ever born. The variable has been used as continuous or as categorical (less than 3 children, 3 children or more). (V201, KDHS, 2008/9).
Religion	Self reported membership to one religious group: Roman Catholic, Protestant/other Christian, Muslim, no religion, other. The variable has been divided by 3 main groups: any Christian, Muslim, no religion or other (V130, KDHS, 2008/9).
Province	The variable reports the *de facto* region (or province-interchangeable) of residence. Kenya has 8 regions or provinces: Nairobi, Central, Coast, Eastern, Western, Nyanza, Rift Valley, Northern. (V024, KDHS, 2008/9).
Education of the mother	Number of years of education of the mother calculated by two variables: education in single years - recoded using the highest education level attended - educational achievement. Education in single years is divided by classes following the levels of education (no education, between 1 and 7 years of education, 7 or more). Educational achievement recodes the education of the respondent into the following categories: none, incomplete primary, complete primary, incomplete secondary, complete secondary, higher education. This has been recorded in new classes: no education, primary (non completed and completed), secondary (non completed and completed), higher. (V133 from V106 and V149, KDHS, 2008/9).
Antenatal Care	Number of visits for antenatal care held by the mother at her last pregnancy. Women who did not see anyone for antenatal care during the pregnancy are coded 0. The variable has been divided by 2 categories: if had any visit or no visits at all. And the type of person who gave prenatal care to the respondent prior to the birth. This question has multiple coding categories and each category is recorded separately in these variables. For this study the categories have been merged (M14; M2A-N, KDHS, 2008/9)
Multidimensional Poverty Index	The index, at household level, is used in the model as a continuous variable and also as a binary variable (not multidimensionally poor, multidimensionally poor) or as three categorical variable (divided by 3 groups: not poor, poor, at risk of poverty following the UNDP cut-off points). It is constructed following the UNDP indication and using the KDHS 2008/9 variables. Technical notes about the Index are reported in Par. 2.2.4 'Health inequalities, health geography and the multidimensional poverty index'.
Reason for delivering at home (HF cost too much)	Reason for not delivering in a health facility. The variable is divided by 3 categories: delivered at home because cost too much, delivered at home for other reasons, delivered in a health facility. (M65A, KDHS, 2008/9)
Media influence about family planning	The variable reports whether women has heard about family planning from any of the following sources in the last few months preceding the survey: radio, TV, newspapers. The variable is used as discrete (if she does heard or not). (V384A, V384B, V384C, KDHS, 2008/9)
Family planning usage	Ever use of a modern or traditional method is classified into modern, and traditional methods as follows: modern methods

	are pill, IUD, injections, diaphragm/foam/jelly, condom, female sterilization, male sterilization and Norplant. Traditional methods are periodic abstinence (rhythm), withdrawal, and abstinence, and any other country specific methods. If a respondent uses both a traditional method and a modern method then the modern method takes priority and she is coded as knowing a modern method. In this study the variable is employed as binary, using modern method or not using or using traditional method (V302, KDHS 2008/9).
Ethnic groups	Country specific ethnic group. The major ethnic groups in Kenya are: Kikuyu, Embu, Kalenjin, Kamba, Kisii, Meru, Luhya, Luo, Masai, Mijikenda, Swahili, Somali, Taita-Taveta. (V131, KDHS, 2008/9).
Type of wedding	Arranged or chosen husband (arranged, chosen, no husband) (S616A KDHS 2008/9)
Relationship of ages with first partner	Relationship of ages with first partner (older, younger, about the same age) (S616B KDHS 2008/9)
Partner 10+ years older	If partner more or less than 10 years older (more than 10 years older; less than 10 years older) (S616C KDHS 2008/9)
Money for sex	If the in interviewed in the past 12 months was given or received money/gifts for sex (yes or not). From variable S640A KDHS 2008/9
Wealth Index[27]	The wealth index is a composite measure of a household's cumulative living standard. The wealth index is calculated using easy-to-collect data on a household's ownership of selected assets, such as televisions and bicycles; materials used for housing construction; and types of water access and sanitation facilities. Generated with a statistical procedure known as principal components analysis, the wealth index places individual households on a continuous scale of relative wealth. DHS separates all interviewed households into five wealth quintiles to compare the influence of wealth on various population, health and nutrition indicators. The wealth index is presented in the DHS Final Reports and survey datasets as a background characteristic. In this study it is employed with the usual categories using quintiles (richest, richer, middle, poorer, poorest) or divided by 3 categories (rich, middle, poor) where central groups are aggregated. (V190, KDHS, 2008/9)
Marital Status	Current marital status of the respondent. It is recoded as married (married and living together) and not married (never married, widowed, divorced, not living together) (V501, KDHS 2008/9)
Community Variables	
Community Multidimensional	Mean score by PSU of the UNDP multidimensional poverty index

poverty index	divided by 3 groups: not poor, poor, at risk of poverty following the UNDP cut-off points. See the individual level variable 'Multidimensional Poverty Index' in this table. (Elaboration from 2008/9 KDHS data)
Community level of female education	Proportion of women in the PSUs with at least secondary education. The variable is divided by quartiles or is employed as a binary variable (less than 25% of women in the PSUs has secondary or higher education and 25 or more). (Elaboration from 2008/9 KDHS data)
Community level of fecundity	Mean number of children born in the PSUs. The variable is divided by two classes: has up to 3 children; has more than 3 children. (Elaboration from 2008/9 KDHS data)
Community median age at marriage for female	Median age at marriage in the PSUs (Elaboration from 2008/9 KDHS data)
Community distance to the health facilities	Distance from each PSU to the closest HF (KEMRI list, elaborated using ArcGis Software). The variable is used as a continuous variable and as a categorical variable (less than 5Km of distance from the PSU and the closest HF, between 5 and 15Km, more than 50Km).
Availability of CEMOC service in the community	Availability of health facilities offering Comprehensive Emergency Obstetric Care (CEMOC) services in different range of kilometers from each PSU. The variable has been created merging the Health Facility List provided by the Ministry of Health (last update at 14th February 2012) containing the indication for some services provided by each facility, and the geographic indication provided by KEMRI list. Elaboration by ArcGis software. The variable is used in the model as continuous or as dichotomous variable (availability of the service in the range or not availability).
Youth services availability in the community	Availability of health facilities offering services addressed to youth[28] in different range of kilometers from each PSU (5km, 10km, 15km, 30km). The variable has been created merging the Health Facility List provided by the Ministry of Health (last update at 14th February 2012) containing the indication for some services provided by each facility, and the geographic indication provided by KEMRI list. Elaboration using ArcGis software. The variable is used in the model as continuous or as binary (availability of the service in the range or not availability).
Partner approval of family planning in the PSU	Proportion of men in the PSU who approves families using FP (if less or more than 20% approves). From variable S720A, KDHS 2008/9
Partner education level in the	Proportion of men in the PSU with at least secondary education.

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[28] "YFS are services that are provided in a manner that recognizes the special information and service needs of young people. Characteristics of YFS include:
- Provider training in YFS in RH issues and communication (at least one staff Nurse, Clinical officer, Medical Doctor)
- Friendliness in attitude – being respectful and non-judgmental, Confidentiality and privacy
- Service provision environment – comfortable and non-threatening, Convenience in time and location
- Affordability of services
- Community involvement / support, Participation of the Youth

Stratify into:
- **Integrated Services:** Services to the youth offered alongside other services
- **Stand-alone Services**: Separate building (Youth Centre) with provision of OPD services Comprehensive RH package and should have recreational facilities e.g. games etc" (MoH, 2005 National Guidelines for Provision of Youth- friendly Services(YFS) in Kenya).

PSU	From variable V701, KDHS 2008/9	
Community presence of health facilities where the closest HF has fees for delivery	The variable measures the distance from closest HF with fees for delivery from PSU. Among the health facilities with delivery service, it counts if the service has fees or not. The variable has been elaborated by ArcGis software. It is used as a categorical variable (has fees for delivery, no fees for delivery, no delivery service). The variable has been weighted using SPA weight in order to allow the employment of variable from a sample. (variable Q509, KSPA, 2010).	
Presence of community health workers in the community	The variable assesses the presence of a community health worker in catchment area of each health facility. It has has been weighted using KSPA 2010 weights. The variable has been elaborated in ArcGis and measures the distance from each primary sampling unit to each facility with community health worker in catchment area. The new variable has been then employed as a binary variable concerning the presence of CHWs in a range of 5km from PSUs. From SPA 2010, variable Q432.	

The results from model 7.1 show the probability of women delivering their last birth in a healthcare facility versus delivering at home. The table reports the odds ratio of each variable and the confidence intervals, generally with a 95% confidence level (p-value <0.05) and, where necessary, with a 90% confidence level (p-value <0.1).

Model 7.1. Multilevel modeling of a women's decision to give birth in a Health Facility in Kenya (births from women aged 15-49).		
	Odds Ratio	C.I. 95%
Fixed Part		
Cons	82,187	**(252,669; 26,581)**
Region (Central)		
Nairobi	0,483	**(0,898; 0,259)**
Coast	0,400	**(0,640; 0,249)**
Eastern	0,672	**(0,968; 0,466)***
Nyanza	0,350	**(0,532; 0,230)**
Rift Valley	0,293	**(0,448; 0,191)**
Western	0,183	**(0,285; 0,118)**
Northeastern	0,528	**(0,917; 0,304)***
Place of residence (Urban)		
Rural	0,506	**(0,702; 0,364)**
Years of education of the mother (7+)		
no educ	0,356	**(0,491; 0,257)**
1-7 years	0,488	**(0,582; 0,409)**
Has at least 1 ANC visit during pregnancy (yes)		
no ANC visits	0,117	**(0,182; 0,075)**

MPI (not poor)		
Poor	0,676	**(0,820; 0,556)**
Parity	0,887	**(0,931; 0,844)**
Deliver at home because service cost too much (no)		
Yes	0,715	**(0,963; 0,532)***
deliver in a HF	0,932	(1,110; 0,782)
Age of mother at birth (less than 25 years)		
25+	1,369	**(1,675; 1,117)**
Distance of PSU from closest HF (less than 5 Km)		
15km	0,694	**(0,988; 0,488)***
15+	0,358	**(0,824; 0,155)**
Percentage of women with at least secondary school level per PSU (more than 75%)		
Less than 25%	0,301	**(0,574; 0,158)**
25-50%	0,370	**(0,691; 0,197)**
50-75%	0,462	**(0,876; 0,242)**
Mean number of children in the PSU (less than 3)		
3 or more than 3	0,762	**(0,957; 0,607)***
Has CEMOC service in a range of 15Km from PSU (no)		
Yes	1,385	**(1,816; 1,056)**
Hf with fees for delivery service in a range of 5Km from PSU (no fees)		
yes fees del	0,411	**(0,977; 0,173)**
no DEL service	0,342	**(0,790; 0,147)**
Random Part		
PSU level variability B (S.E.)		0,437(0,073)
Women variabilità		1
ICC	11,74%	
Units: PSU	398	
Units: Women	4092	

*statistical significance at 90% (-p<0.1)

The background socio-economic and cultural characteristics of the woman and her household appear to play a major role in delivery care. The education of the women also plays a leading role, showing a consistent and significant decrease in healthcare facility deliveries with decreasing levels of education. The average odds ratio of delivering in healthcare facilities for

women having up to 7 years of schooling is half the ration of the odds for women with more than 7 years of education. Compared with women with no education, women with 7 years and above have an average probability of delivering in health facilities that is almost 3 times higher. The socio-economic status of the household, measured by the Multidimensional Poverty Index (household possession, amenities and wealth dimensions), also plays a significant role in delivery care. A higher socio-economic status (not multi-dimensionally poor) is associated with a higher probability of delivering in healthcare facilities. As expected, healthcare facility deliveries are significantly more likely to take place in urban areas than in rural areas, with an average odds ratio that is half that of an urban area. Delivery care also varies significantly by region. All other regions are associated with significantly lower odds of healthcare facility deliveries than Central province. In particular, Western, Rift Valley and Nyanza provinces are considerably more likely to have home deliveries, compared to Central Province. One important association for the aim of this work is the one concerning the age of the mother at the birth of the child, and the utilization of healthcare facilities for delivery. After controlling for number of births (parity), women who gave birth at an older age, compared to the 15-25 age group, are more likely to deliver in healthcare facilities.

Another important element of reproductive behavior that appears to have a significant influence on delivery care is the cost of delivery service. Women for whom cost is a problem have significantly lower odds of health facility deliveries than women who do not care about the cost of services. Indeed, when considering the individual-level variable, where each women who delivered at home was asked if the fee for the service was the main cause for not delivering in a healthcare facility, we see that for those who answered "yes it was the cost the main reason I delivered at home," the probability of delivering in a healthcare facility decreased by 30%. The general healthcare behavior of women in reproductive matters also appears to influence delivery care. Women who have never had antenatal care during pregnancy are almost 90% less likely to deliver in a facility than those who have had at least one antenatal visit.

Also, community variables contribute to explain the phenomenon, and are determinants of the woman's behavior in terms of delivery. The community effect is likely to play a significant role in delivery care. The delivery care of women is influenced by the availability and accessibility of delivery care services within the community, as well as non-observable community factors. Thus, it is important that the analysis takes into account both observable and non-observable community effects on delivery care. The significant variables in the multilevel logistic regression analysis were selected by a forward selection procedure.

As reported in Model 7.1, all of the community variables are significant, and the community variability of Model 7.1 appears significantly reduced when compared to the community variability of the null model. Even if still significant, the second-level variability reduction demonstrates the explanatory power of the second-level variables employed in the model.

The community where a woman lives, the environment where she grows up, the distance from healthcare facilities in general, as well as the distance from specific services, such as Comprehensive Emergency Obstetric Care (CEMOC), has an influence on delivery. Living more than 5 Km away from the PSU to the closest healthcare facility decrease the probability of delivering in a healthcare facility, and living more than 15 Km away from the closest healthcare facility decreases the probability by 65%. Having facilities with CEMOC services in a range of 5 Km from the PSU increases the possibility of delivering in a healthcare facility by almost 40%. This also implies that the quality of the healthcare facility and the services offered matters in the decision to deliver in a hospital. The cost of the services for delivery is also very influent on place of delivery. In communities where all the facilities in the range of 5 Km have fees for delivery services, the probability of women delivering there decreases by 60%.

Moreover, community background also includes the average level of education of women, and the average number of children born in the community. In the primary sampling unit, where the proportion of women with secondary school or above is up to 25%, women are much less likely to deliver in a healthcare facility than for the PSU where 100% of women has a secondary school or higher level of education. In the community where the average number of births is greater than 3, odds for healthcare facility delivery is lower than for women living in communities where the average number is less than 3.

Concerning the variations in place of delivery between communities, a fairly large random variance is observed between communities. This implies that even after controlling for observable community factors relating to availability and accessibility of delivery services, and to general community behavior, there still exist unexplained community factors, which have a significant effect on place of delivery. Such factors could range from quality of care and affordability of services at the existing facilities, to cultural values and practices within specific communities. The women's characteristics assume a higher explanatory power on delivery behavior compared to the community characteristics, which explains 12% of total variability (ICC).

Since the 'all women' multilevel model for delivering in a healthcare facility highlights a significant difference among the 15-25, and 26 and above age groups of mothers at birth, where, specifically, 15-25 year old women have a greater risk of not delivering in a healthcare facility than older women, a model focused on the younger age group women is developed and presented.

Model 7.2. Multilevel modeling of a young women's decision to give birth in a Health Facility in Kenya (births from women aged 15-25).		
Response	odds ratio	C.I. 95%
Cons	13,681	**56,104; 3,336**
Type of wedding (own choice)		
Arranged	0,656	**0,894; 0,481**
No husband	0,949	1,333; 0,678
MPI (not poor)		
Poor	0,780	1,172 0,519
Region (Central)		
Nairobi	0,569	1,540; 0,210
Coast	0,180	**0,376; 0,086**
Eastern	0,481	**1,008; 0,230**
Nyanza	0,319	**0,617; 0,165**
Rift Valley	0,153	**0,314; 0,075**
Western	0,137	**0,275; 0,069**
Northeastern	0,315	**0,826; 0,120**
Place of Residence(Urban)		
Rural	0,468	**0,733; 0,299**
Age at first intercourse (17 and above)		
less than 17	0,685	**0,886; 0,530**
FP usage (not using)		
Using	1,581	**1,992; 1,254**
Media influence about FP (heard FP at radio)		
no heard FP radio	0,787	**0,966; 0,641***
Visit at pregnancy for ANC (doctor)		
nurse/mid	0,849	1,164; 0,619
TBA/no one	0,193	**0,328; 0,113**
PV	0,650	**0,918; 0,460**
Parity	0,731	**0,814; 0,657**
Age of mother at birth	1,058	**1,113; 1,005**
Level of education of the mother (no educ)		
Primary	1,206	1,770; 0,821
Secondary	1,028	1,636; 0,646
Higher	2,389	**5,795; 0,985**
Number of Hf with Fees for delivery service in	0,970	**0,994; 0,948**

a range of 5Km from PSU		
Youth services in a range of 5Km from PSU (no)		
Yes	1,370	**1,826; 0,029***
Percentage of women with at least second level per PSU (more than 25%)		
25%	0,669	**0,959; 0,466**
Has CEMOC service in a range of 5Km from PSU (yes)		
No	0,651	**0,951; 0,445**
Distance of PSU from closest HF (less than 5 Km)		
5-15Km	0,572	**1,031; 0,317**
15+	0,141	**0,458; 0,043**
Community health worker in PSU (at less than 5Km)		
at more than 5Km	0,780	1,045; 0,581
Random Part		
PSU level variability B (S.E.)		0,831 (0,135)
Women variabilità		1
ICC	20%	
Units: PSU	376	
Units: Women	2487	

*significance at 90% (-p<0.1)

The model is a two-level model with random intercept only. The covariates employed are at the individual level (first level) and at the primary sampling unit level (second level, which represents the community) since there is no significant variation between birth-level and women's'-level, given the small number of births per woman. Women's and primary sampling unit's variability are also controlled in the random part of the model. The models have been built at women's-level. Level 2 is the PSU level, since the correlation between women from the same community (hierarchical clustering) has to be taken into account. Estimates are elaborated using 2nd order PQL for nonlinear multilevel models.

In terms of individual variables, several factors are significantly associated with the propensity to deliver in a healthcare facility. Therefore, the community has an impact on the women's decision as well. The table modeling for the probability of delivering in a healthcare facility for a young women (aged 15-25), versus of the risk of delivering at home, shows how the place of residence of a woman is an essential determinant for place of delivery: living in a

rural area strongly decreases the risk of delivering in a healthcare facility. The province also plays an important role: except for Nairobi province, which is not significantly different from Central province, living in one of the other six provinces decreases the propensity of delivering in a healthcare facility.

For girls having less than 17 years of age at first sexual intercourse, the probability of delivering in a healthcare facility decreases by 35% compared to girls who had a first experience at 17 years or older.

Among young women aged 15-25 who already experienced a childbirth, those who generally use family planning are 3 times more likely to deliver in a healthcare facility than women who have never used any type of contraception.

Concerning the influence of mass media on young women's reproductive behavior, there is an impact of radio programs about family planning on the propensity to deliver in a health facility. In households where there is the possibility of listening to family planning programs on the radio, girls are 25% more likely to deliver in a healthcare facility.

Previous experience related to reproductive health behavior is also essential in determining the place of delivery. Having had a visit for antenatal care by a skilled professional attendant, such as a doctor, nurse or midwife raises the propensity to deliver in a healthcare facility by 80%. Moreover, for every one more year of age of the mother at birth, births are slightly more likely to be delivered in a healthcare facility than for younger women. Moreover, the higher the number of births per woman (parity) the lower the probability of delivering in a healthcare facility.

Despite the fact that marital status does not result to be a significant factor in the model, except, perhaps, for the extreme variability of situation at this age group, having had an arranged wedding (for those who are married) decreases the risk of delivering in a health facility.

Concluding with individual-level characteristics, the education of the mother also plays an important role in determining the probability of delivering in a healthcare facility. Employing the continuous variable of years of education of the mother, it is shown that for every one more year of education, the probability of delivering in a healthcare facility rises by 15%; consequently, the higher the level of education, the greater the probability of delivering in a healthcare facility.

Community characteristics have a strong effect on deliveries as well. Particularly, the distance from the community to the healthcare facility impacts on the decision of whether or not to deliver in a healthcare facility. Living more than 5 Km away from a healthcare facility reduces the probability of delivering there by 50%, and living more than 15 Km away from a healthcare facility decreases the probability by almost 90%.

Concerning specific services for delivery, the availability of comprehensive emergency obstetric care in a range of 5 Km from the community impacts on the women's reproductive behavior, increasing by more than 3 times the propensity to deliver in a healthcare facility. Moreover, in communities where all the healthcare facilities with delivery services in a range of 5 Km charge a delivery fee, women tend, in very slightly different proportions, to deliver at home.

Also, in the 15-25 age group Model, a variable concerning the availability of services addressed to youths was employed. Where there is access to this type of specific service in a range of 5 Km, there is a higher propensity for young girls to deliver in a healthcare facility.

Women in multi-dimensionally poor communities are less likely to deliver in a healthcare facility; even if the index is not significant, the sign expresses a negative correlation between poor MPI and delivering in a healthcare facility.

The mean level of education of the community confirms to be influent on individual behaviors. In more educated communities (where the proportion of women with secondary education and above is higher than 25%) women are more inclined to deliver in a healthcare facility.

The primary sampling unit level variation is reduced by the addition of contextual factors in the complete model presented, against the 'only constant model' (not shown) but it is still significant. It means that still there is some variation to be explained by other factors. A large random variance is observed between communities. This implies that even after controlling for observable community factors relating to availability and accessibility of delivery services and to community general behavior, there still exists unexplained community factors which have a significant effect on place of delivery. Such factors could range from quality of care and affordability of services at the existing facilities to cultural values and practices within specific communities.

Indeed, the cluster effect accounts for 20% of total unexplained variation in place of delivery, therefore, the intra-class correlation indicates that there is high homogeneity among young

women within the same community in delivery care behavior, even more than among 15-49 years women where the ICC was 12%. It means that 20 per cent of the variation in place of delivery can be attributed to the community.

Following the development classification made by Oucho (J.O. Oucho, 2007) for the 8 regions in Kenya, three different models were created, in order to show the determinants of health facility deliveries by economic and development levels. Also, through this group analysis, it is possible to demonstrate how different factors influence the delivery of young mothers in the three groups of regions, and to determine which has major or minor incidence on the phenomenon by development level. As reported by the author: "Regional development in Kenya may be classified into the four following categories, each one pretty elusive: 'High status' category: Includes Nairobi and the neighboring Central province. 'Medium status' category: Includes the Coast and parts of Eastern and Rift Valley provinces. 'Low and very low status' categories: Made up of two western Kenya provinces of Nyanza and Western and of North Eastern province" (J.O. Oucho, 2007). Low and very low status categories have been merged in this analysis.

Since this work aims to explain factors leading to access to healthcare facilities for delivering, and the phenomenon mostly occurs in the least developed provinces, and considering the insufficient sample of young women in Nairobi and Central provinces, which does not allow the implementation of a two level model for this group of provinces, the 'Medium status' and 'Low and Very Low status' groups are analyzed. Results for multilevel modeling of a young women's decision to give birth in a Health Facility in the three groups are reported in the following three tables.

In general it is noticed that the model fits the 'Low and very low status' group well. Therefore, the variables employed describe the phenomenon for the lower status provinces better than for the other provinces. This indication emerges from the high number of significant variables in model 7.3. Also, the variability at PSU level is reduced by the addition of contextual factors in model 7.3 against the 'only constant model', compared to the variability reduction of model 7.4 against the 'only constant model'. However the two models' variability is still significant. It means that there is still some variation to be explained by other unobserved and not-observable factors. Giving a broader view to the models, in all of them family planning usage and women's level of education are significant variables influencing delivery in a healthcare facility.

Starting with a discussion of the first model (Mod. 7.3) for the Nyanza, Western and North Eastern provinces group, the distance from the closest healthcare facility is particularly important in explaining behaviors in less wealth and mostly rural areas. However, the availability of particular services for maternal health, and services addressed to youths, does not seem to be relevant. This might be because for young women living in those areas, the most important factor in order to access a facility is the easy availability, whatever that is, instead of quality of service. And this is particularly true where the average distance from a village to a healthcare facility is more than 5 Km. Other contextual variables describing community behaviors' influence on place of delivery also results as particularly relevant in this group of provinces. The proportion of women in PSU with secondary and higher education has a positive effect on place of delivery: for every increase in proportional point of education in the PSU, there is an increase in the probability of delivering in a healthcare facility. Given this information, the community background of young women results as being particularly influent on place of delivery in terms of schooling, much more than for the other groups of provinces.

Other variables concerning individual habits are also of remarkable importance for the description of the analyzed phenomenon. Contraception use, type of marriage and relationship of ages with partners, are particularly influent in this area than in the others. This might be explained by the characteristics of this area, where a traditional lifestyle still persist in some places, and where, for example, the use of contraceptives is less spread out than in other areas, or the type of methods still ranges from very traditional to very modern. Also, especially in rural areas (the variable concerning urban/rural place of residence is significant only in this model indicating that in these provinces living in a rural area or in a urban area makes the difference) arranged marriages with much older men are more frequent that in other areas. Even the personnel for antenatal care assistance is a relevant factor here, much more than in other places, since there is still a strong differentiation between women who see a doctor and those who receive care from traditional birth attendants or from no one. On the other hand, between the other two groups of provinces, Medium status group and High status group, other aspects emerge as relevant in influencing the delivery in a healthcare facility instead of at home. In the Medium status group, among other variables, the availability of services for youths in a range of 5 Km from the community, and the access to mass media broadcasting family planning information (where all media types are available) are significantly related to the propensity of delivering in a healthcare facility. In a province of Medium status development, the basic access to a healthcare facility is almost assured, and the possibility of

access to them (also from an economic point of view) is much higher than in Low status provinces. Therefore, young girls tend to seek more specific services, geared towards being able to understand and address their specific needs. Also, a major proportion of the population has access to all kinds of media sources (radio, television, and newspaper), so their influence is widespread within the environment. At community level, the average number of children born in the community also has an influence. The higher is the number of children in the community, the lower the propensity to deliver in a healthcare facility.

Mod. 7.3 Multilevel modeling of a young women's decision to give birth in a Health Facility in Nyanza, Western and North Eastern Provinces (births from women aged 15-25).				Mod. 7.4 Multilevel modeling of a young women's decision to give birth in a Health Facility in Rift Valley, Eastern and Coast Provinces (births from women aged 15-25).			
	odds	ci+95	ci-95		odds	ci+95	ci-95
Fixed part				Fixed Part			
Place of Residence(Urban) +				**Place of Residence(Urban)**			
Rural	0,514	**0,911**	**0,289***	Rural	1,231	2,593	0,585
FP usage (using)				**FP usage (using)**			
not using	0,511	**0,735**	**0,354**	not using	0,766	**0,994**	**0,378**
Type of wedding (own choice) +				**Type of wedding (own choice)**			
Arranged	0,606	**0,927**	**0,395**	arranged	0,795	1,415	0,447
Visit at pregnancy for ANC (doctor)				**Visit at pregnancy for ANC (doctor)**			
nurse/mid	0,524	**0,938**	**0,291**	nurse/mid	1,179	1,84	0,756
TBA/no one	0,124	**0,314**	**0,049**	TBA/no one	0,244	**0,584**	**0,102**
PV	0,511	**0,938**	**0,277**	PV	0,777	1,259	0,48
Parity	0,932	1,073	0,81	**Parity**	0,742	**0,882**	**0,625**
Wealth Index (poor)				**Wealth Index (poor)**			
rich	2,248	**3,301**	**1,528**	rich	1,848	**2,866**	**1,191**
Media exposure on FP (NO media on FP)				**Media exposure on FP (NO media on FP) +**			
at least 1 media on FP	1,185	1,813	0,773	at least 1 media on FP	0,895	1,348	0,594
2 out of 3 media on FP	1,327	2,341	0,75	2 out of 3 media on FP	1,07	1,923	0,596
all media on FP	1,192	1,964	0,722	all media on FP	1,781	**3,059**	**1,037**
Women's education	1,165	**1,248**	**1,088**	**Women's education**	1,11	**1,181**	**1,042**
Relationship of ages with partner (older) +				**Relationship of ages with partner (older)**			
younger	0,855	5,568	0,13	younger	1,929	9,511	0,391
same age	1,763	**3,032**	**1,022**	same age	1,184	2,324	0,603
no partner	0,564	**0,952**	**0,334**	no partner	1,203	1,964	0,737
Age at first intercourse (less than 17)				**Age at first intercourse (less than 17)**			
17 or more than 17	1,204	1,782	0,812	17 or more than 17	1,027	1,532	0,689
Youth service in a range of 5Km (no)				**Youth service in a range of 5Km (no) +**			

yes	1,004	1,856	0,542	yes	2,517	**5,239**	**1,209**
Distance of PSU from closest HF (less than 5 Km)+				**Distance of PSU from closest HF (less than 5 Km)**			
more than 5Km	0,819	**0,938**	**0,714**	more than 5Km	0,48	1,236	0,186
Proportion of women in PSU with secondary educ or higher +	1,121	**1,219**	**1,03**	**Proportion of women in PSU with secondary educ or higher**	1,013	1,164	0,881
Mean number of children in PSU (less than 2)				**Mean number of children in PSU (less than 2) +**			
2 or more	0,575	1,306	0,252	2 or more	0,613	**0,993**	**0,377**
Cemoc service in a range of 5Km (no one)				**Cemoc service in a range of 5Km (no one)**			
yes	1,212	2,162	0,677	yes	0,783	1,453	0,423
Community health worker in PSU (less than 5Km)				**Community health worker in PSU (less than 5Km)**			
at more than 5Km	0,676	1,145	0,398	at more than 5Km	0,846	1,319	0,542
Random Part				**Random Part**			
PSU level variability B (S.E.)		0,767	(0,193)	PSU level variability B (S.E.)		1,105	(-0,25)
Women variability		1		Women variability		1	
ICC	18,90 %			ICC	25%		
Units: PSU	131			Units: PSU	157		
Units: Women	1130			Units: Women	1039		

+ significant variables crucial in each model demonstrating the differences in group of provinces in   determinant of place of delivery

*significance at 90% (-p<0.1)

7.5 Discussion on place of delivery

The aim of this chapter was to assess the leading factors of home deliveries in order to contribute to the research in addressing policies for adolescent and youth health-seeking behavior. The analysis also aimed at assessing to what extent the community plays a role in the reproductive behavior of young women. The analysis of individual and community factors influencing health facility deliveries of all women in Kenya demonstrates how, among other results, when controlling for parity, younger women have a much greater probability of home delivery than older women. The analysis concerning young women's health facility delivery attitudes has shown that the community where a woman lives, the environment where she

grows up, the distance from healthcare facilities in general, as well as the distance from specific services such as Comprehensive Emergency Obstetric Care (CEMOC), all have an influence on delivery decisions. This also means that the quality of the healthcare facility and the services offered matters greatly in the decision to deliver in a hospital.

Indeed, the community variability of the model appears significantly reduced compared to the community variability of the null model. Even though still significant, the second-level variability reduction demonstrates the explanatory power of the second-level variables employed in the model. Concerning the variations in place of delivery between communities, a fairly large random variance is observed between communities. This implies that even after controlling for observable community factors, relating to availability and accessibility of delivery services and to general community behavior, there still exist unexplained community factors that have a significant effect on place of delivery. Such factors could range from quality of care and affordability of services at the existing facilities, to cultural values and practices within specific communities.

The women's characteristics assume a higher explanatory power of delivery behavior, compared to the community characteristics, and the intra-class correlation indicates that there is a high homogeneity among young women within the same community in delivery care behavior. After taking into account many covariates, there are differences at the women's-level in the probability of delivering in a healthcare facility instead of at home. Older age at first intercourse, utilization of modern methods of family planning, a higher level of education of the mother, having attended antenatal care visits (especially if performed by a trained provider), and having heard information on family planning by media sources all increase the propensity to deliver in a healthcare facility. Moreover, the province of residence of a young girl particularly influences the probability of delivering in a healthcare facility. The results of the models performed by groups of provinces (grouped by development status), support the argument of widely differentiated conditions within the country, and of the necessity to build separate approaches in intervention for improving maternal healthcare.

For the 'Low and Very Low status' group of provinces (Nyanza, Western and North Eastern), the availability of particular services for maternal healthcare and services offering special attention to youths does seem to be relevant, while the presence of any type of health facility as close as possible plays a fundamental role in access to formal healthcare. Nyanza, Western and North Eastern provinces are, in fact, the provinces where there is still a higher proportion of home deliveries, of pregnancies often assisted by traditional birth attendants, of population living in rural areas with lower levels of education, and where family planning are less

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diffused, all conditions influencing home deliveries. Moreover, often there is a lack of basic services for healthcare that women can easily access.

Conversely, results from Rift Valley, Eastern and Coast Provinces model demonstrate how the presence of specific services addressed to youths strongly influences the young women's health facility delivery. Being 'Medium status' developed provinces, basic access to a healthcare facility is almost assured, and the possibility to access them (also from an economic point of view) is much higher than in 'Low status' provinces. Therefore, young girls tend to seek more specific services. Also, a major proportion of the population has access to all kinds of media sources (radio, television and newspaper) so their influence is widespread in the environment.

Part 8 - Factors associated with postnatal care among young women in Kenya

> *'There are some "crucial" moments when contact with the formal health system during the postpartum period by skilled attendants could be instrumental in identifying and responding to needs and complications after childbirth: the first few hours after birth, between three to seven days, and at six weeks.'*
> *(Lawn and Kerber 2006; Narayanan et.al, 2004).*

8.1 Postnatal care relevance in maternal health care, determinants of postnatal care and the role of community

Postnatal care for the mothers is the aspect most lacking in maternal healthcare in Kenya, both from the point of view of mothers seeking the visits after delivery, and also from the point of view of intervention and policies to strengthen the practice. Looking at the 2010 SPA interviews of women with children less than 2 years old, they report that "There was very little reference to postpartum and postnatal services, and it seemed that women are not aware of the importance of these services. In very limited circumstances individuals within the discussion groups referred to going to the health facility after a home delivery. Even then, this was often to take the baby for immunisation rather than specifically for the mothers own health." (KSPA, 2010; NCAPD *et al*., 2011) Indeed, data sources and literature concerning the postnatal care behaviors are much more focused on child care, including the timing of the visit for the newborn child, the vaccinations held in the facilities, and the suggestions concerning nutrition, than on the mother's wellbeing and check-ups. It is not clear whether this lack concerns the scarcity of interventions and stress by policies on the topic, or whether mothers are themselves less inclined to receive any kind of check after delivery. (MOH, Population Council and University of Nairobi, 2005) Clearly the two aspect are strictly related, and it is especially mothers who delivered at home that do not seek postnatal care: 81% of women delivering at home do not receive a postnatal check up, and only 12% of those women who do receive postnatal care are seen within six days of the birth. (KDHS 2003; CBS *et al*., 2004) During the last few years, the Population Council, within the context of the Frontiers in Reproductive Health Program, is focusing on the sensitive topic of the importance of postnatal care. In 2008, the Population Council published the report *Strengthening Postnatal Care Services Including Postpartum Family Planning in Kenya*, where it reported

the results of an experimental implementation of a postnatal care package into one hospital and four health centers in one district of the country, in order to test the efficacy of the package and the acceptability on the part of the mothers, and its impact on their health behavior (Mwangi and Warren, 2008). The postnatal care package was idealized following the new guidelines proposed by the Ministry of Health, which recommends having at least three assessments within the first six weeks after childbirth; "feasibility and acceptability of providing postnatal care at these times has not been evaluated, however, and most providers are not aware of this change in policy or how to implement it" (Mwangi and Warren, 2008). Therefore, despite the large amount of evidence concerning the importance of receiving postnatal care in order to reduce complications and risks (De Bernis *et al*., 2003; WHO, 2004, Hunt and Bueno de Mosquita, 2007), policies and interventions are still at an experimental level, and still require better assessment. Most deaths of mothers and newborns occur very soon after delivery; over 60% of maternal deaths occur in the first 48 hours after childbirth (WHO, 2005). Therefore, the attention on postnatal care has increased, and it is widely recognized at international level that women should receive the first postnatal care visit during the first 48 hours after delivery. Observing the timing prescribed by the Kenyan Ministry of Health would reduce the risk for postpartum complications, allowing a prompt diagnosis. (Mwangi and Warren, 2008) "PNC also provides an opportunity to counsel the new mother on family planning and HIV/AIDS, to teach her how to care for herself and her newborn during the postnatal period, to promote exclusive breastfeeding, and to assess the newborn for problems. Targeted PNC includes check-ups up to one year after childbirth. Other elements that support quality antenatal and postnatal care services include diagnostic capacity and medicines to treat common infections." (Godia *et al*., 2010)

There is, indeed, a correlation between receiving antenatal care, the place of delivery and postpartum and postnatal care. Women who receive antenatal care often plan a follow-up during the complete period of maternity, and many times are instructed on places to go or things to do in case of complications. However, this is not always the case. Many factors can contribute to the propensity to seek postnatal care, from individual and cultural factors to the availability of and accessibility to healthcare facilities. Among those factors, the community influence on maternal healthcare, as discussed in previous chapters, highlights the importance of including members of communities in the project aimed at increasing reliability and awareness on postnatal care. "Community linkages be strengthened to create awareness about the new postnatal consultations and services, including co-opting critical actors such as male partners and mothers in law, community leaders and health committees, community

midwives, and community health workers." (Mwangi and Warren, 2008) The main activities carried out by a community health worker (CHW) aim at contributing to disease prevention and improved use of healthcare services. By dedicating some time in public health activities within its community, the CHW is a king of link between people and healthcare facilities. Community health workers also play a role as promoters of health services and as teachers of basic information on healthcare. (KSPA, 2010-NCAPD *et al.*, 2011) This key role in the community is definitely important for every level of healthcare, but it may result as crucial when talking about young women, who often have less experience and are more vulnerable.

A matter of some debate is that of the role of community midwives, in providing reproductive healthcare and antenatal, delivery and postnatal care services. A program aiming at improving the professional skills of community midwives in reproductive healthcare was implemented by the Population Council's Frontiers in Reproductive Health (FRONTIERS) in four districts of Western Kenya. Some results by a study conducted by Mwangi and Warren (2008b) on the implementation of the program show how the number of women attending postnatal care after the training of community midwives considerably increased. Since postnatal care is "among the weakest of all reproductive and child health programs […] The utilization of skilled midwives visiting the homes during the first week after birth has been recommended as an opportunity to identify complications in the mother and baby during a period which culturally prevents women from leaving their homes during the first month after birth." (Mwangi and Warren, 2008b) Within the context of the 'Scaling-up' Program, for improving skills of midwives and also enabling them to perform deliveries at home, after the new rise of maternal mortality in the country shown by the data from the new survey for 2008/9, many doubts have been raised on community midwives (Mohamed, 2011). In fact, concerning young women and, in particular, teenagers (who are generally in their first pregnancy) there are two major aspects to consider: the physical immaturity and inappropriate or inadequate healthcare-seeking behavior, and the socioeconomic and political barriers that influence young women's access to healthcare services and information. (WHO, 2007)

8.2 Postnatal care: socio-demographic characteristics of young women and postnatal care services availability

Postnatal care is strictly correlated with the place where women deliver their children, and, as analyzed in previous chapters, the risk for young women of giving birth at home is high, and mostly affects vulnerable women. Therefore, the suggested practices for safe postnatal care are not often followed by certain groups of young women, leading to negative consequences

for the mother and the newborn. Among young women who delivered at home, only 3% received a postnatal care visit from a skilled attendant in the first 48 hours after delivery, while among women who delivered in a healthcare facility the percentage stands around 30%. In total, 33% of all young women aged 15-25, as revealed by the 2008/9 Demographic and Health Survey, received proper postnatal care in the suggested timing and from skilled attendants.

Analyzing the background characteristics of women who received proper postnatal care visits as first visit after their last birth, (see Appendix 8) the provinces with a higher percentage of women attending postnatal care in the first 48 hours after birth and who receive care by a skilled attendant are Nairobi, Central, and Eastern Provinces. Indeed, in urban areas, almost 50% of young women received proper postnatal care, while in rural areas only 29% received the proper care. Also, more educated women with less than 3 children, with a knowledge of family planning, and belonging to a wealth status generally attend proper postnatal care in a major proportion. In areas where the community has close-by healthcare facility services, the percentage of women who attend proper postnatal care is higher. When the distance from any kind of healthcare facility is less than 5 km, the percentage of women who have PNC is around 35%, compared to 21% where the healthcare facility is further than 5 km, and a mere 5% when the closest facility is more than 15 km away.

Some correlations are also noted between the availability of specific services and attending proper postnatal care: where postnatal care services are in a range of 5 km from the community, the percentage of attendance by young women is 40%, versus 29% for women living in communities where PNC services are further away. Also the availability of services addressed to youths seems to correlate with the PNC attendance, reporting 38% of attendance when a youth service is within 15 km of the community while, if further away, only 27% of young women receive the recommended postnatal care. Moreover, the presence of a professional doctor in the community, as well as the presence of a community health worker in close range, is correlated to a higher percentage of young women attending postnatal care in the first 48 hours after delivery, assisted by a skilled attendant. Services for postnatal care reflect the distribution of maternal healthcare services in the country. As reported by the 2010 Kenya Service Provision Assessment, "the proportion of facilities offering PNC increased from one-third of all facilities in 2004 to six of every ten facilities in 2010." (KSPA, 2010; NCAPD *et al*., 2011) However, wide disparities still exist at the provincial level. Figure 8.1

shows the distribution of the primary sampling unit by province, and the distribution of the healthcare facilities. The gray areas represent the diffusion of the facilities offering service for postnatal care. The dimensions of the areas are proportional to the diffusion of the service offered, since the data reported is derived from a weighted sample. The diffusion of postnatal care services in the country can range from 0,1 to 49,8 healthcare facilities offering that service. As it emerges from the map, some communities are not covered by these services, and the average distance to the closest postnatal care service can also reach more than 100 km, as, for example, in the northern parts of Eastern Province and Rift Valley Province.

Fig. 8.1 PSUs and health facilities offering PNC services, Kenya DHS 2008/9, KSPA, 2010
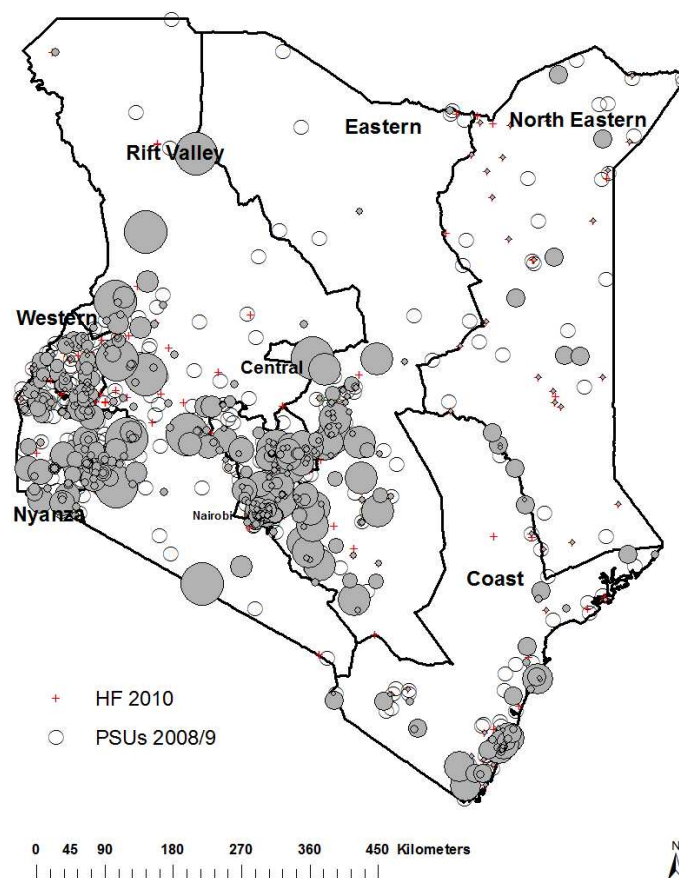
8.3 Aims of the analysis, data and methods

The following investigations aim to assess whether and to what extent individual characteristics influence postnatal-seeking behavior among young women in Kenya, and whether the community, defined both as the availability and reachability of services, and as some background characteristics of the place where the women live, play a determinant role in influencing postnatal care behavior.

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Following the recommendations concerning correct postnatal care behavior, aimed at catching the possible complications arising mostly during the first few hours after delivering in time, a 2-level logistic multilevel model to assess the probability of having a visit from a skilled attendant in the first 48 hours after delivering for a young women in Kenya (women aged 15-25) has been employed. All women aged 15-25 who delivered their last birth in a healthcare facility or at home have been considered in the analysis. The sample is composed of 1660 women, who delivered their last birth at home or in a healthcare facility, clustered in a primary sampling unit of 376 women, which is considered a community in this study. The aim of this analysis is, therefore, to discover the individual and community factors influencing the propensity of young women to follow the suggested guidelines for postnatal care.

The following table lists and describes the dependent variables used to analyze the propensity for young women to receive postnatal care visits by skilled attendants in the 48 hours succeeding the delivery. Also reported are all the independent variables concerning individual and community characteristics tested and employed in the model, or tested but not employed in final models.

Tab. 8.1 Individual, Household and Community variables for Modeling of receiving postnatal care by a professional skilled attendant in the first 48 hours after delivery (last birth from a women aged 15-25), 2008/9 KDHS	
Dependent Variables	
Probability to receive a postnatal care visit by a skilled attendant in the first 48h after delivery	The variable is a binary variable where 1 stands for: professional skilled attendant in the first 48 hours from delivery and 0 stands for: not skilled attendant or after 48 hours. Professional skilled attendant category includes: doctor, nurse, midwife; not professional skilled attendant category includes: TBAs, community/village health worker, no one. This variable is used in models 8.1 and 8.2.
Probability to receive a postnatal care visit of a young women who delivered at home	The variable is a binary variable where the categories are 1=yes; 0=no. This variable is employed in model 8.3.
Probability to receive a postnatal care visit by a skilled attendant	The variable is a binary variable where the categories are 1=yes; 0=no. This variable is employed in the models of the province groups 8.4.1, 8.4.2 and 8.4.3. It does not differentiate by the timing of postnatal care in order to reduce the influence of place of delivery which is not controlled in the models.
Individual and household independent Variables	
Age at first intercourse	Self-reported age of respondent. Binary response variable on age at first intercourse: at less than 16 (or 17) years or at more than 16 (or 17) years (V525, KDHS, 2008/9)

Place of residence	Current place of residence: urban or rural (V025, KDHS, 2008/9)
Parity	Self reported number of children ever born. The variable has been used as continuous or as categorical (less than 3 children, 3 children or more). (V201, KDHS, 2008/9).
Religion	Self reported membership to one religious group: Roman Catholic, Protestant/other Christian, Muslim, no religion, other. The variable has been divided by 3 main groups: any Christian, Muslim, no religion or other (V130, KDHS, 2008/9).
Province	The variable reports the *de facto* region (or province-interchangeable) of residence. Kenya has 8 regions or provinces: Nairobi, Central, Coast, Eastern, Western, Nyanza, Rift Valley, Northern. (V024, KDHS, 2008/9).
Education of the mother	Number of years of education of the mother calculated by two variables: education in single years - recoded using the highest education level attended - educational achievement. Education in single years is divided by classes following the levels of education (no education, between 1 and 7 years of education, 7 or more). Educational achievement recodes the education of the respondent into the following categories: none, incomplete primary, complete primary, incomplete secondary, complete secondary, higher education. This has been recorded in new classes: no education, primary (non completed and completed), secondary (non completed and completed), higher. (V133 from V106 and V149, KDHS, 2008/9).
Multidimensional Poverty Index	The index, at household level, is used in the model as a continuous variable and also as a binary variable (not multidimensionally poor, multidimensionally poor) or as three categorical variable (divided by 3 groups: not poor, poor, at risk of poverty following the UNDP cut-off points). It is constructed following the UNDP indication and using the KDHS 2008/9 variables. Technical notes about the Index are reported in Par. 2.2.4 'Health inequalities, health geography and the multidimensional poverty index'.
Wealth Index[29]	The wealth index is a composite measure of a household's cumulative living standard. The wealth index is calculated using easy-to-collect data on a household's ownership of selected assets, such as televisions and bicycles; materials used for housing construction; and types of water access and sanitation facilities. Generated with a statistical procedure known as principal components analysis, the wealth index places individual households on a continuous scale of relative wealth. DHS separates all interviewed households into five wealth quintiles to compare the influence of wealth on various population, health and nutrition indicators. The wealth index is presented in the DHS Final Reports and survey datasets as a background

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[29] For additional information on the Wealth Index construction and limitations see:
http://www.measuredhs.com/topics/Wealth-Index.cfm;
Rutstein, S.O., Johnson, K., 2004, *The DHS Wealth Index.* DHS Comparative Reports No. 6, Calverton, Maryland: ORC Macro.;
RUTSTEIN, S.O., Macro International Inc. Calverton, 2008, The DHS Wealth Index: Approaches for Rural and Urban Areas (English), Working Paper, October 2008, Macro International Inc. Calverton, Maryland, USA.

	characteristic. In this study it is employed with the usual categories using quintiles (richest, richer, middle, poorer, poorest) or divided by 3 categories (rich, middle, poor) where central groups are aggregated. (V190, KDHS, 2008/9)
Media influence about family planning	The variable reports whether women has heard about family planning from any of the following sources in the last few months preceding the survey: radio, TV, newspapers. The variable is used as discrete (if she does heard or not). (V384A, V384B, V384C, KDHS, 2008/9)
Family planning usage	Ever use of a modern or traditional method is classified into modern, and traditional methods as follows: modern methods are pill, IUD, injections, diaphragm/foam/jelly, condom, female sterilization, male sterilization and Norplant. Traditional methods are periodic abstinence (rhythm), withdrawal, and abstinence, and any other country specific methods. If a respondent uses both a traditional method and a modern method then the modern method takes priority and she is coded as knowing a modern method. In this study the variable is employed as binary, using modern method or not using or using traditional method (V302, KDHS 2008/9).
Ethnic groups	Country specific ethnic group. The major ethnic groups in Kenya are: Kikuyu, Embu, Kalenjin, Kamba, Kisii, Meru, Luhya, Luo, Masai, Mijikenda, Swahili, Somali, Taita-Taveta. (V131, KDHS, 2008/9).
Type of wedding	Arranged or chosen husband (arranged, chosen, no husband) (S616A KDHS 2008/9)
Relationship of ages with first partner	Relationship of ages with first partner (older, younger, about the same age) (S616B KDHS 2008/9)
Partner 10+ years older	If partner more or less than 10 years older (more than 10 years older; less than 10 years older) (S616C KDHS 2008/9)
Money for sex	If the in interviewed in the past 12 months was given or received money/gifts for sex (yes or not). From variable S640A KDHS 2008/9
Knowledge of family planning	Knowledge of any method is classified into modern, traditional and folkloric methods as follows: modern methods are pill, IUD, injections, diaphragm, condom, female sterilization, male sterilization, implants, female condom, foam/jelly and lactational amenorrhea. Traditional methods are periodic abstinence (rhythm), withdrawal, and abstinence. Folkloric methods are the category "other". If a respondent knows both a traditional method and a modern method then the modern method takes priority and she is coded as knowing a modern method. Similarly, if a woman knows a traditional method and a folkloric method, the traditional method takes priority. In this study the variable is used as categorical: does not know any method of contraception, know only traditional methods, knows also modern methods. (V301, KDHS 2008/9)
Place for family planning	Source of any method of contraception is formed from a combination of responses. For current users of modern methods, it is the source of that method. For women who are not currently using any method, it is a source from which they know they can

	obtain family planning methods, if they know any source. From variable V379, KDHS 2008/9
How often have talked with partner about FP	The question concerns the communication with partner about family planning in the last year and it is asked to women who do not use contraception. The categories used in this study are: never talked with partner about FP, once a year, often, using contraception. From variable S720B, KDHS 2008/9
Marital Status	Current marital status of the respondent. It is recoded as married (married and living together) and not married (never married, widowed, divorced, not living together) (V501, KDHS 2008/9)
Acceptability of media advertisement about condom	It is asked to women if for husband/partner it is acceptable to advertise condoms at the radio. From variable S648A, KDHS 2008/9
Age of women	Current age in completed years is calculated from the century month code of the date of birth of the respondent (V011) and the century month code of the date of interview (V008). Variable V012, KDHS 2008/9
Employment of women	Whether the respondent works at home or away from home. It is categorized in 'not working', 'working at home', 'working outside home'. From variable V721, KDHS 2008/9
Outcome of pregnancy	The variable measures whether last child was alive or dead during the first 28 completed days of life (neonatal period)[30]. As a proxy of delivery complication and maternal health care the variable about the positive or negative outcome of the pregnancy it is employed in the model. (Var B5$01 and B6$01, 2008/9 KDHS)
Antenatal care	Number of visits for antenatal care held by the mother at her last pregnancy. Women who did not see anyone for antenatal care during the pregnancy are coded 0. The variable has been divided by 2 categories: if had any visit or no visits at all. And the type of person who gave prenatal care to the respondent prior to the birth. This question has multiple coding categories and each category is recorded separately in these variables. For this study the categories have been merged (M14; M2A-N, KDHS, 2008/9)
During ANC visit somebody told where to go for pregnancy complication	Told about pregnancy complications at the time of last antenatal visit. The variable is used as categorical for the last birth had in the 5 years preceding the survey. (Variable M43$1, 2008/9 KDHS)
Community Variables	
Community Multidimensional poverty index	Mean score by PSU of the UNDP multidimensional poverty index divided by 3 groups: not poor, poor, at risk of poverty following the UNDP cut-off points. See the individual level variable 'Multidimensional Poverty Index' in this table. (Elaboration from 2008/9 KDHS data)
Community level of female education	Proportion of women in the PSUs with at least secondary education. The variable is divided by quartiles or is employed as

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[30] Health statistics and health information systems, WHO -
http://www.who.int/healthinfo/statistics/indneonatalmortality/en/

	a binary variable (less than 25% of women in the PSUs has secondary or higher education and 25 or more). (Elaboration from 2008/9 KDHS data)
Community level of fecundity	Mean number of children born in the PSUs. The variable is divided by two classes: has up to 3 children; has more than 3 children. (Elaboration from 2008/9 KDHS data)
Community median age at marriage for female	Median age at marriage in the PSUs (Elaboration from 2008/9 KDHS data)
Community main religion	Whether at least 70 per cent of population is Christian, Muslim or mix/no religion. (Elaboration from 2008/9 KDHS data)
Community distance to the health facilities	Distance from each PSU to the closest HF (KEMRI list, elaborated using ArcGis Software). The variable is used as a continuous variable and as a categorical variable (less than 5km of distance from the PSU and the closest HF, between 5 and 15km, more than 50km).
Youth services accessibility	Availability of health facilities offering services addressed to youth[31] in different range of kilometers from each PSU (5km, 10km, 15km, 30km). The variable has been created merging the Health Facility List provided by the Ministry of Health (last update at 14th February 2012) containing the indication for some services provided by each facility, and the geographic indication provided by KEMRI list. Elaboration using ArcGis software. The variable is used in the model as continuous or as binary (availability of the service in the range or not availability).
Partner approval of family planning in the PSU	Proportion of men in the PSU who approves families using FP (if less or more than 20% approves). From variable S720A, KDHS 2008/9
Partner education level in the PSU	Proportion of men in the PSU with at least secondary education. From variable V701, KDHS 2008/9
Community availability of postnatal care services	The variable measures the availability of health facilities offering postnatal care services in different ranges of km. It has been weighted[32] and elaborated using ArcGis software. From variable Q400 (SPA 2010)
Community availability a professional medical doctor specialized	The variable assesses the presence of specialists or pathologists assigned or employed in the facility around different ranges from each PSU. From SPA 2010, variables from A105$1-A105$29 are extracted and weighted to create the variable.

[31] "YFS are services that are provided in a manner that recognizes the special information and service needs of young people. Characteristics of YFS include:
- Provider training in YFS in RH issues and communication (at least one staff Nurse, Clinical officer, Medical Doctor)
- Friendliness in attitude – being respectful and non-judgmental, Confidentiality and privacy
- Service provision environment – comfortable and non-threatening, Convenience in time and location
- Affordability of services
- Community involvement / support, Participation of the Youth

Stratify into:
- **Integrated Services:** Services to the youth offered alongside other services
- **Stand-alone Services**: Separate building (Youth Centre) with provision of OPD services Comprehensive RH package and should have recreational facilities e.g. games etc" (MoH, 2005 National Guidelines for Provision of Youth- friendly Services(YFS) in Kenya).

[32] For the weighting procedure and rationale see the chapter on Data and Methods

Presence of community health worker in the community	The variable assesses the presence of a community health worker in catchment area of each health facility. It has has been weighted using KSPA 2010 weights. The variable has been elaborated in ArcGis and measures the distance from each primary sampling unit to each facility with community health worker in catchment area. The new variable has been then employed as a binary variable concerning the presence of CHWs in a range of 5km from PSUs. From SPA 2010, variable Q432.

8.4 Factors influencing postnatal reproductive behaviors among young women: results from multilevel modeling

A 2-level logistic model was first created, analyzing the propensity of receiving a visit from a skilled attendant in the first 48 hours after delivery for postnatal care of young women in Kenya (women aged 15-25).

Model 8.1 Multilevel logistic modelling for risk of having a visit from a skilled attendant in the first 48 hours after delivering for Postnatal care of a young women in Kenya (births from women aged 15-25)			
Response	odds ratio	CI +95%	CI-95%
Fixed Part			
cons	0,062	**0,196**	**0,019**
Region (Central)			
Nairobi	1,366	2,799	0,667
Coast	1,553	2,856	0,844
Eastern	1,770	**2,890**	**1,083***
Nyanza	0,665	1,136	0,389
Rift Valley	1,296	2,283	0,735
Western	0,660	1,190	0,366
Northeastern	1,495	3,683	0,607
Place of Residence (Urban)			
Rural	1,153	1,798	0,739
Had ANC visit for last pregnancy (no)			
Yes ANC	3,823	**7,941**	**1,840**
Education (no educ)			
Educ:1-7 years	1,050	1,776	0,621
Educ:7+	1,793	**3,056**	**1,052**
Employment (not working)			
working	1,366	**1,763**	**1,059**
Parity	0,782	**0,902**	**0,678**
Wealth index (poor)			
middle	1,586	**0,980**	**0,790**
rich	1,770	**0,980**	**0,790**
Heard FP on newspaper (no)			
yes	1,398	**1,854**	**1,054**

Age at first intercourse (less than 16 years)			
more than 16 years	1,343	**1,785**	**1,011**
Told where to go for pregnancy complication (no)			
yes	2,155	**2,781**	**1,671**
Baby died (no)			
yes	1,533	**2,318**	**1,014**
Presence of a specialized doctor at 2km from PSU (no)			
yes	1,387	**1,922**	**1,01***
Has PNC service in a range of 5Km from PSU (less than 5km)			
at more than 5km	0,763	**0,994**	**0,586***
Has youth services in a range of 15km (at less than 15km)			
at more than 15km	0,760	**0,989**	**0,583***
Distance from closest HF to PSU (less than 5km)			
Up to 15km	0,925	1,695	0,505
15+	0,714	2,319	0,220
Community health worker (at less than 1 Km)			
at more than 1Km	0,559	**0,814**	**0,384**
Proportion of women in PSU with at least secondary educ (less than 25%)			
25-50%	1,170	**0,934**	**0,429**
50-75%	0,830	1,326	0,520
75-100%	2,368	**4,776**	**1,174**
Partner approval of FP in the PSU (less than 20%)			
more than 20%	1,553	2,907	0,829
Random Part			
Level: PSU			
Community level variability (S.E.)		0,312	(0,116)
Level: women			
Women level variability		1	0
ICC	8,67%		
Units: PSU	376		
Units: women	1660		

Looking at the results for Model 8.1, and starting from a consideration of previous knowledge and behavior of women concerning reproductive healthcare, it is highlighted that women who attended some antenatal care during pregnancy are almost 3 times more likely to attend postnatal care within the time suggested, and assisted by a professional healthcare worker. Also, if the women received information concerning a place of reference in case of complications during pregnancy, even during postnatal care, they are much more disposed to seek healthcare visits. Women who have the possibility to acquire family planning information from media sources, such as the newspaper, are 40% more likely to receive

postnatal care visits. Concerning women's individual background, for women having more than 7 years of schooling, compared to those with no education, the probability of correct behavior for postnatal care is 80% higher. For every additional birth the mother has, the probability of receiving correct postnatal care decreases by 20%.

For women having had first sexual intercourse after the age of 16, the propensity to seek postnatal care in time increases by 35%, compared to women who had first sexual intercourse before the age of 16. When the pregnancy had a negative outcome, the mother was two times more likely to seek postnatal care than in the case of pregnancies with a positive outcome. This variable may be a proxy variable for postnatal complications. Women who have any kind of employment, in the family or outside the family, as well as women living in a wealthy household, have a higher propensity to seek postnatal care.

With reference to the context in which women live, and its impact on seeking postnatal care in the proper allotted time and from the personnel suggest by the guidelines, it is shown by the model that, all the other characteristics being equal, there are no relevant differences among provinces of residence, between urban and rural areas, or for distance from the community where the women live to any type of healthcare facility. This might be explained by the correction effected by introducing variables concerning the availability of specific services for postnatal care and of professional healthcare attendants or community healthcare workers into the model. Indeed, in communities where there is a close presence of community healthcare workers, the propensity to seek postnatal care increases; this propensity also increases where there is an easy availability of specialized doctors near the area. Moreover, for women living in communities where postnatal care services are not more than 5 Km away, the probability of receiving correct postnatal care increases by 35%. Also, having specific services addressed to youths not far from the community increases the postnatal care seeking behavior for young women.

The primary sampling unit-level variation is reduced by the addition of contextual factors in the complete model presented, against the 'only constant model' (not shown) but it is still significant. It means that there is still some variation that can be explained by other factors. This implies that even after controlling for observable community factors relating to availability and accessibility of services, and to community behavior in general, there still exist unexplained community factors that have a significant effect on postnatal care. Such factors could range from quality of care and affordability of services at the existing facilities, to cultural values and practices within specific communities.

The cluster effect accounts for 9% of total unexplained variation in postnatal care; therefore, the intra-class correlation indicates that there is some homogeneity among young women within the same community in postnatal care behavior, even if the highest degree of variability is explained by the individual-level characteristics. Indeed, only 9% of the variation in postnatal care attitudes can be attributed to the community.

Some territorial differences in the analysis of the probability of young women receiving postnatal care by any skilled attendant are also of notable regard (see Appendix 8, Models 8.4.1-8.4.3). Following the regional categorization ideated by Oucho (2007)[33] for Kenyan provinces, three different models have been employed, analyzing the probability of young women receiving postnatal care by a skilled attendant, grouping the provinces as follows: 'High status' category: Includes Nairobi and the neighboring Central province. 'Medium status' category: Includes the Coast and parts of Eastern and Rift Valley provinces. 'Low and very low status' categories: Made up of two western Kenya provinces of Nyanza and Western and of North Eastern province" (J.O. Oucho, 2007). Low and Very Low status categories have been merged in this analysis. Comparing the results for the three models, it emerges that only for the lower status provinces, the exposure to the media for information concerning family planning is an important determinant influencing postnatal-seeking behavior. Concerning the knowledge and usage of family planning in these three provinces, the differing behavior among young women regarding skilled postnatal care is influenced by the source of family planning: having only friends or community-based assistance as a reference for family planning reduces the propensity to seek postnatal care. The model also accounts for the Wealth Index, significant in this model, that shows how, even in a very Low Status area, wealth status diversity is relevant in seeking qualified postnatal care. All these results highlight how the more vulnerable groups of women are mostly disadvantaged.

Lastly, the age at first intercourse accounts for explaining differences in postnatal behavior only in these three provinces: having first sexual intercourse at an age older than 16 raises the possibility of having a skilled postnatal visit by 58%. This might occur because in this group of provinces, and especially in Nyanza and Western provinces, the average age at first intercourse is about 1 year younger than in other provinces (KDHS, 2008/9-KNBS and ICF Macro, 2010), therefore, younger women in these provinces have a noticeably lower probability of receiving postnatal care. Looking at the 'Medium status' group of provinces,

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[33] For a description of the categorization see chapter 7 and 'Oucho, J.O., 2007. Local / Global Encounters Migration and Regional Development in Kenya Oucho: Kenyan Regional Migration. American Economic Review, 50(4), 88-93.'

which includes Coast, Eastern and Rift Valley provinces, the distances from specialized healthcare services seems to count more in explaining young women's postnatal care behaviors. The distance from the community to a general healthcare facility results as significant in both Low and Medium status provinces. This is most likely because the Medium status provinces' access to healthcare facilities is more widely spread than in Low status provinces; in Coast, Eastern, and Rift Valley Provinces the difference in postnatal care is mostly due to the possibility of attaining higher-level services, such as specialized doctors and services addressed to youths. The partner's approval of family planning methods as well as women's education is a determinant, in this case, for skilled postnatal care for young women. Looking at Nairobi and Central provinces group (model 8.4.3 in Appendix 8), despite the small sample size, which does not allow us to perform a 2-level model for the probability of young women receiving a skilled postnatal care visit, some remarkable results can be highlighted. As for the Medium status provinces group, the availability and the easy reachability of high-level services in the community increases the probability of receiving postnatal care services by skilled attendants. However, it is important to underline that the variability in young women's behavior concerning the possibility of receiving postnatal care by a skilled attendant may depend on individual characteristics, such as economic factors, but also by the concrete accessibility to these services and by their presence in the territory.

When adding the place of delivery of the women to the model, whether at home or in a healthcare facility, this variable seems to be highly correlated with many others, and seems to explain a large part of the individual-level variability. Many of the individual characteristics influencing the propensity towards seeking postnatal care are, indeed, determinants in the possibility of delivery in a healthcare facility instead of at home. Nevertheless, some variables still result as fundamental in explaining this particular behavior related to postnatal care. Results from Model 8.2 are highly indicative.

Model 8.2 Multilevel logistic modelling for risk of having a visit from a skilled attendant in the first 48 hours after delivering for Postnatal care of a young women in Kenya (births from women aged 15-25)			
	odds ratio	CI +95%	CI -95%
Fixed Part			
cons	0,011	**0,039**	**0,003**
Region (Central)			
Nairobi	2,477	**5,065**	**1,211**

Coast	2,707	**4,981**	**1,472**
Eastern	2,309	**2,890**	**1,084**
Nyanza	1,161	1,943	0,693
Rift Valley	3,277	**5,877**	**1,827**
Western	1,660	3,036	0,908
Northeastern	2,020	5,094	0,801
Place of Residence (Urban)			
Rural	1,336	2,110	0,846
Had ANC visit for last pregnancy (no)			
ANC_bi_1	1,759	3,899	0,794
Education (no educ)			
Educ:1-7 years	1,046	1,902	0,575
Educ:7+	1,394	2,559	0,759
Parity	0,888	1,039	0,759
Wealth index (poor)			
middle	1,177	1,855	0,747
rich	1,081	1,997	0,585
Place of delivery (home)			
HF	27,495	**40,851**	**18,506**
Age at first intercourse (less than 16 years)			
more than 16 years	1,178	1,628	0,853
Told where to go for pregnancy complication (no)			
yes	2,266	**3,034**	**1,692**
Baby died (no)			
yes	1,287	2,076	0,798
Heard FP on newspaper (no)			
yes	1,088	1,494	0,792
Employment (not working)			
working	1,326	**1,687**	**1,042***
Has youth services in a range of 15km (at less than 15km)			
at more than 15km	0,788	1,093	0,568
Distance from closest HF to PSU			
15km	1,516	2,958	0,777
15+	1,339	5,087	0,352
Community health worker (at less than 1 Km)			
at more than 1Km	0,643	**0,939**	**0,441**
Proportion of women in PSU with at least secondary educ (less than 25%)			
25-50%	0,894	1,277	0,626
50-75%	0,656	**0,978**	**0,440***
75-100%	1,562	3,157	0,773
Partner approval of FP in the PSU (less than 20%)			
more than 20%	1,692	3,367	0,850
Presence of a specialized doctor at 2km from PSU (no)			
yes	1,241	1,848	0,834

Has PNC service in a range of 5Km from PSU (less than 5km)			
at more than 5km	0,760	**0,997**	**0,578***
Random Part			
Level: PSU			
Community level variability (S.E.)		0,054	(0,113)
Level: women			
Women level variability		1	0
ICC	1,62%		
Units: PSU	376		
Units: women	1660		

When controlling for place of delivery, all the other characteristics for every woman in the analysis being equal, some provinces result highly significant in explaining the object of analysis. It means that when taking into account the fundamental difference between delivering at home or in a healthcare facility, the province where a woman lives matters greatly. And, irrespective of the place of delivery, in some provinces, the propensity towards receiving postnatal care in the first 48 hours after delivery, and by a professional attendant is higher than in Central Province. A second aspect, which results independently from place of delivery, is the proportion of women in the community with at least a secondary level of schooling; where the proportion is high, the probability of seeking postnatal care increases. Having received information about pregnancy and complications during antenatal care also increases the propensity of seeking postnatal care, as does employment. Concerning the availability of services for postnatal care, all other characteristics being equal, and controlling for the place of delivery, in communities where services for postnatal care are easily available in terms of distance, the propensity to seek postnatal care is much higher.

Given the wide differences created by the place of delivery on the propensity to seek postnatal care by young women in Kenya, and considering that having delivered a baby in a healthcare facility increases the probability of seeking postnatal care by more than 20 times, a separate analysis has been performed, in order to study the real impact of factors influencing postnatal care for women who delivered at home. Home deliveries account for 55% of total deliveries and, as is widely analyzed in a previous chapter, are performed in most disadvantaged and vulnerable parts of the country. Among young women who delivered at home, only 28% had postnatal care visits (KDHS, 2008/9-KNBS and ICF Macro, 2010). Therefore, the following model analyzes the factors influencing postnatal care-seeking behavior by women who delivered at home, and what determines the probability of receiving postnatal care versus not

having any postnatal care visits, for women who delivered at home. Despite the small sample of women aged 15-25 years who delivered their child in the 5 years preceding the survey, and who delivered at home, the analysis still gives some notable advice concerning the phenomenon in analysis. In particular, the distance from the community to the closest PSU, and the presence in the community of a specialized doctor, highly influences the propensity of young women to seek postnatal care. The second-level variability, which in the null model justifies a 2-level logistic model (var.= 0,473; S.E.=0,178; not shown), loses its significance, meaning that all the second-level variability of the phenomenon is explained by the primary sampling unit variables employed in the model. Therefore, a one-level logistic model is reported here, measuring the probability of receiving a postnatal care visit for a young woman who delivered at home. Education of the community is a significant influence on the probability of women who delivered at home receiving postnatal care. Moreover, the factors influencing the probability of postnatal care concern the distance between women and generic healthcare facilities, as well as specialized doctors.

Model 8.3 One level logistic modelling for risk of having a visit for postnatal care of a young women who delivered at home in Kenya (births from women aged 15-25)			
Response	odds ratio	CI +95%	CI-95%
Fixed Part			
cons	0,09	**0,44**	**0,02**
Region (Central)			
Nairobi	1,39	5,84	0,33
Coast	2,17	6,60	0,72
Eastern	2,03	6,43	0,64
Nyanza	1,01	3,04	0,34
Rift Valley	1,94	5,76	0,65
Western	2,06	6,31	0,67
Northeastern	0,74	2,77	0,20
Place of Residence (Urban)			
Rural	1,28	2,39	0,69
Had ANC visit for last pregnancy (no)			
yes	1,39	2,34	0,83
Education (no educ)			
Educ:1-7 years	1,08	1,77	0,66
Educ:7+	1,07	1,85	0,62
Parity	1,04	1,22	0,89
Wealth index (poor)			
middle	0,90	1,33	0,61
rich	1,17	2,48	0,55

Age at first intercourse (less than 16 years)			
more than 16 years	1,25	1,77	0,89
Told where to go for pregnancy complication (no)			
yes	1,24	1,78	0,86
Baby died (no)			
yes	1,23	2,04	0,74
Heard FP on newspaper (no)			
yes	1,09	1,70	0,69
Distance from closest HF to PSU			
15+	0,11	**0,51**	**0,03**
Has PNC service in a range of 5Km from PSU (less than 5km)			
at more than 5km	1,51	2,56	0,89
Community health worker (at less than 1 Km)			
at more than 1Km	0,76	1,28	0,45
Proportion of women in PSU with at least secondary educ (less than 25%)			
25-50%	1,09	1,64	0,73
50-75%	1,77	**3,12**	**1,01***
75-100%	1,19	5,20	0,27
Partner approval of FP in the PSU (less than 20%)			
more than 20%	1,40	2,87	0,69
Presence of a specialized doctor at 2km from PSU (no)			
yes	1,63	**2,54**	**1,04***
Units: women	859		

8.5 Discussion on postnatal care

From the different analyses presented in this chapter, it is possible to conclude that postnatal care is strictly related to and depends upon the place where a woman delivers her baby. Therefore, the group of those young girls who do not receive any postnatal care or receive it too late, when complications can arise, is a very homogeneous group and holds very similar characteristics. This group pertains to young girls who delivered at home, for whom the model presented does not completely explain their characteristics and the factors determining their attitude towards receiving postnatal care. What emerges from this study is the importance of the presence of healthcare facilities on the territory of the community where the young girls live, both generic healthcare facilities and specialized doctors who can face post-delivery complications. The availability of these services may, indeed, also increase the probability of accessing postnatal care for those young girls who delivered at home.

Moreover, a crucial aspect influencing postnatal care-seeking behavior in the time and way suggested by the WHO and by the Ministry of Health (in the first 48 hours after delivery and by a skilled attendant), is the community's level of education where, for communities having more than 50% of women with secondary or higher education, the probability for young girls who delivered at home to seek postnatal care is considerably higher, compared to those girls who grew up in communities with lower levels of education.

Some other considerations emerge looking at the analysis results. Differently from the antenatal care behavior of young women, and similar to the place of delivery habits, postnatal care behavior highly differs by province of residence, highlighting how more vulnerable groups living in less wealthy provinces are also disadvantaged in terms of accessing care. Distance from healthcare facilities also has some relevance in explaining postnatal care behavior; in communities where services for postnatal care are easily available, the propensity to seek postnatal care is higher. The proximity of a community health worker to where young women live also seems to produce a sort of bridge to the proper healthcare facilities, perhaps due to the relationship of trust created between the worker and the girls, combined with the easy access to these facilities. Together with the fundamental role of delivery in a proper healthcare facility in facilitating postnatal care, having attended some antenatal care visits increases the propensity to seek proper postnatal care, especially when these visits also include some general consultation on pregnancy and complications.

Therefore, it is crucial to identify further aspects aimed at catching peculiar characteristics of this group of young women who delivered at home. In order to better assess and address policies and recommendations to this group, further research and analysis is necessary in order to understanding this underestimated aspect of reproductive healthcare, and in order to find the determinants influencing their attitude towards delivering in a healthcare facility, which is the major factor that leads to receiving postnatal care.

Part 9 - Conclusion and Recommendations

Summary, Conclusions and Policy Implications

The overall aim of this study was to improve our understanding of the factors associated with poor maternal healthcare and reproductive behavior of the particularly vulnerable group of young women (aged 15-25 years old) in Kenya. Many inequalities exist in Kenya, at different levels, including wealth, literacy, and place of residence, and all these inequalities are exacerbated when some other barriers decrease the possibility of receiving adequate care during pregnancy and delivery. Disparities among young women in Kenya are not only at an individual level, such as the level of literacy. Given the influence of the community on the young women's behavior, as well as the different availability of resources in each area, many inequalities are observed at a territorial level (Magadi *et al.*, 2000; Magadi *et al.*, 2006; Family Health International, 2006). Moreover, young women's feelings toward proper healthcare facilities and skilled attendants contrast, and the role of traditional birth attendants in taking care of maternal health in the community is still highly debated (Gage, 1998). Indeed, many factors influence the propensity of young women to seek appropriate maternal healthcare, and they all need to be considered when analyzing young women's reproductive behavior.

This study aimed at contributing to the analysis concerning Kenyan teenagers' and young women's determinants on maternal healthcare-seeking behaviors for the 5 years preceding the 2008/9 Kenya Demographic and Health Survey. It also aimed at considering the influence of the community (where young women grow up, and also of the availability of general and specific healthcare facilities in the community areas) and of the individual background of the women on young women's propensity to seek antenatal, delivery and postnatal care. The specific objectives were to: investigate the individual and contextual variables (social, economic, cultural, community-oriented) that may explain maternal healthcare habits; measure the individual, household and community effect on maternal healthcare attitudes in young women; assess the link between young women's characteristics, such as literacy, wealth status and place of residence, and the use of facilities for maternal healthcare; find a relationship between young women's behavior and the community where they live (such as the impact of education in the community on their propensity to seek reproductive healthcare); examine how the role of the local presence of healthcare facilities influences reproductive behavior, and if the specificity of services offered by healthcare facilities, including the services addressed specifically to youths, affect their inclination to use

healthcare facilities and measure the geographic differences that influence the propensity to seek appropriate maternal healthcare.

The first part of this work aimed at framing the research problem from a broader and multi-disciplinary point of view, and in order to do so, a wide-ranging study of the literature was undertaken. Moreover, the study was enriched by many interviews done during a period of fieldwork in both urban and rural areas.

In addition, in order to achieve the goals of this study, several data sources have been used, as well as statistical modeling. The main data sources include two national surveys: the 2008/9 Kenya Demographic and Health Survey; the 2010 Kenya Service Provision Assessment Survey and two complete lists of Kenyan healthcare facilities: The Kenya Medical Research Institute (KEMRI) Welcome Trust Research Program and the Kenya Health Facility List, from the Kenya Ministry of Health.

The statistical models used in this study were multilevel models. Most of the data analyzed in this study has a hierarchical structure; hence the multilevel models are used to take into account the data structure. Also, in the case of the determinants of the late initiation of antenatal care for young women, the description of the phenomenon was also developed by a multiple correspondence analysis. Moreover, one of the objectives of this study was to establish the contextual determinants of usage of healthcare facilities during pregnancy, delivery and the postnatal period. Therefore, in this study, the context is also considered as the geographic background where a young girl (unit of analysis) has grown, as, for example, the availability of certain kinds of healthcare services. In order to take into account the geographic aspect, some procedures available in ArcGis software (ESRI) were employed in order to create contextual variables using the 2010 KSPA and the Country Lists of Health Facilities from the Ministry of Health as data sources.

We performed three major analyses that concerned the individual and contextual determinants influencing antenatal care (discussed in Part 6), delivery care (Part 7), and postnatal care (Part 8). Our results show that there is a significant variation in antenatal, delivery and postnatal care between communities, even if the majority of variability is explained by individual characteristics.

The determinants of antenatal care

The analysis based on timing of antenatal care visits and on the frequency of the visits, used two-level linear regression models, while the analysis concerning the probability of receiving at least one visit was based on a multilevel logistic model. The results showed that the timing

of antenatal care visits, as well as the frequency of visits for young women in Kenya, are associated with a range of socio-economic and demographic factors, as well as with contextual factors.

The unexplained variability emerging from the results of this study can be associated with the individual and contextual factors not considered in the model that can be related to many individual factors, such as to the impossibility of accessing healthcare facilities for monetary reasons, or other kinds of barriers not measured by the source of data or related to the limitation of data discussed in Part 5.

These results are coherent with those of previous studies investigating the determinants influencing antenatal, delivery and postnatal care in Kenya. At the same time, our study has many elements of novelty. First, it focuses on the young women's age group, highlighting that they are particularly vulnerable in seeking maternal healthcare. Second, the use of multilevel models better helps to explain the different levels at which various factors do influence maternal healthcare-seeking behavior. Third, the geographic component was fundamental in order to assess whether and to what extent the presence of some healthcare services, especially those offering specific reproductive healthcare services and those addressed to youths, played a role in young women's healthcare behavior.

Among the socio-economic factors considered, employment of women and wealth status play a crucial role in influencing receiving antenatal care behavior on time. The wealth index, which measures the socio-economic status of the household-by-household amenities and possessions, and is considered as a proxy variable of the economic possibility of accessing healthcare facilities, influences the timing and frequency of antenatal care visits, as well as the probability of having at least one visit. Those women belonging to households with a higher wealth index receive more visits and in the proper timeframe, increasing the propensity to respect the suggested guidelines in order to have a safe pregnancy (minimum of 4 antenatal visits starting in the first trimester)[34].

Together with the socio-economic status, the empowerment of women (measured by the employment of women outside home) is a determinant, influencing the access to maternal services. Typically, having employment outside the home implies receiving a salary, and this

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[34] The antenatal period presents opportunities for reaching pregnant women with interventions that may be vital to their health and wellbeing and that of their infants. WHO recommends a minimum of four antenatal visits commencing in the first trimester based on a review of the effectiveness of different models of antenatal care. WHO guidelines are specific on the content of antenatal care visits, which should include: blood pressure measurement; urine testing for bacteriuria & proteinuria; blood testing to detect syphilis & severe anaemia; and weight/height measurement (optional) http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/effective_antenatal_care.pdf

increases independence in the decisions relative to one's own healthcare. Moreover, working in a different environment from the home facilitates the acquisition of knowledge on healthcare, and increases the sharing of experiences.

Family planning knowledge, and the influence of media broadcasts on family planning are also fundamental determinants, acting positively on early access to antenatal care. Furthermore, acceptance of family planning by the husband, and his openness to the topic increases the possibility that the girls seek proper access to antenatal care.

Our results also suggest that membership in a particular community explains part of the variation in the use of antenatal services among women. The importance of the environment where a young girl grows up is demonstrated by a number of significant variables. Concerning variables referred to the healthcare facilities existing in the community, the presence of many types of specific services (services for counseling, traditional birth attendants and community health workers in the area) as well as the closeness to generic healthcare facilities, shows a consistent influence on the number of visits performed. Counseling and additional information on pregnancy are crucial aspects that healthcare facilities should improve on in order to attract young women to seek maternal healthcare. Especially for young girls who need special attention, the component of trust and acceptability with providers is fundamental when receiving healthcare service. However, it emerges from the logistic model (assessing the probability for a young women to receive at least one antenatal care visit against the risk of not receiving any) that the presence in the area nearby her place of residence of counseling services is less important than the presence of essential supplies for antenatal care. This result suggests that the group of women who never had any visit is probably the most disadvantaged group. They might tend primarily to seek first aid in case of emergency instead of more specific services or counseling. Considering the low and unequal diffusion of supplies for antenatal care and of counseling services on the vast territory of Kenya, and given the results of this study, it is important for policies to focus on the introduction of such services addressing youth needs and facilitating reachability. Moreover, the presence of a traditional birth attendant or of a community health worker linked to the health facilities and which can refer the patients to a hospitals is also considered a fundamental factor of facilitating access to proper antenatal care services. The results suggest that these workers may have a positive influence on young women to initiate antenatal care earlier, as well as to receive more visits. However, it is important to highlight that the national data sources used in this study surveyed only those traditional birth attendants and community health workers linked to and formally recognized by the healthcare facilities.

The determinants of delivery care

A further aim of our study (investigated in Part 7) is to assess the leading factors of home deliveries and contribute to the research addressing policies for adolescent and youth health-seeking behavior. The analysis also aimed at assessing to what extent the community plays a role in the reproductive behaviour of young women. The analysis concerning young women's health facility delivery attitudes has shown that the communities where women live, the environment in which they grow up, the distance from healthcare facilities in general, as well as the distance from specific services, such as Comprehensive Emergency Obstetric Care (CEMOC), have an influence on delivering. This also means that the quality of the healthcare facility and the services offered matter in the propensity of delivering in hospitals. The results of the models performed by group of provinces, grouped by development status, support the argument of widely differentiated conditions within the country, and of the necessity for creating separate approaches for intervention to improve maternal healthcare.

Regarding the community's influence on the probability of delivering in a healthcare facility versus the risk of delivering at home, it emerges that the community has a different impact depending on the place of residence. In lower status provinces (Nyanza, Western and North Eastern provinces) it is more important for women to access any type of healthcare facility than to have specific services addressed to youths, where counseling services also are provided and privacy for young people is more respected. This is compared to medium status provinces (Rift Valley, Eastern and Coast Provinces) where, likely, the basic access to healthcare facilities is almost assured, and the possibility of accessing them (also from an economic point of view) is much higher than in low status provinces. Therefore, young girls in these provinces tend to seek more specific services, compared to women from lower status provinces, who mostly seek basic healthcare services and for whom a higher level of education in the community results as highly influencing the health facility delivery, meaning that, even in under-developed areas, the role of education is crucial.

Despite the fact that the community's influence on women's healthcare facility seeking for delivery plays an important role, the women's characteristics and backgrounds have a higher power of explication of the phenomenon. In fact, there are differences at the women's level in the risk of delivering in a health facility instead of at home: older age at first intercourse, utilization of modern methods of family planning, higher levels of education of the mother, having attended antenatal care visits, especially if performed by a trained provider, and having

heard information on family planning from media sources increases the propensity to deliver in a health facility.

The determinants of postnatal care

Following the recommendations of the WHO and Ministry of Health concerning correct postnatal care behavior, aimed at catching the possible complications arising mostly during the first few hours after delivery on time, a 2-level logistic multilevel model for the probability of having a visit from a skilled attendant in the first 48 hours after delivery for a young women in Kenya (births from women aged 15-25) has been employed. The results showed how correct behavior concerning postnatal care is highly dependent on the place of delivery, where, for women who delivered their last child in a healthcare facility, the probability of receiving postnatal care at the right time and by a skilled attendant is more than 20 times higher than for those who delivered at home. However, even after controlling for place of delivery, and all the other characteristics for every woman in the analysis being equal, some provinces result highly significant in explaining the object of analysis. It means that when taking into account the fundamental difference between delivering at home or in a healthcare facility, the province where a woman lives matters greatly. A second aspect that results to be independent from place of delivery is the proportion of women in the community with at least a secondary level of education. Where the proportion is higher, then the probability of seeking postnatal care increases. Having received information about pregnancy and complications during antenatal care also increases the propensity of seeking postnatal care, as does being employed in a job. Concerning the availability of services for postnatal care, all the other characteristics being equal, and controlling for place of delivery, in communities where services for postnatal care are easily available in terms of distance, the propensity to seek postnatal care is much higher.

In addition to the significant results discussed so far, this analysis raises the important issue of the strict relationship between delivery and proper postnatal care. The group of young girls who do not receive any postnatal care, or receives it too late when complications can arise, is a very homogeneous group and holds very similar characteristics. Therefore, a one-level logistic model for the probability of having a postnatal care visit for young women who delivered at home in Kenya was employed. The model presented here does not completely explain their characteristics and the factors determining their attitudes towards attending

postnatal care. However, we can reliably report that the presence of healthcare facilities on the territory of the community where the young girls live, (both generic health facilities, and specialized doctors who can face post delivery complications), significantly influence women's propensity to seek postnatal care. This presence, indeed, might increase the probability of accessing postnatal care also for those young girls who delivered at home. Therefore, the crucial issue raised by these results is that the behavior of this group of women needs to be better investigated with more appropriate instruments and with *ad hoc* surveys, in order to assess the factors hindering their propensity to deliver at home, which of course is linked to postnatal care.

Moreover, antenatal care visits, as well as consultation during pregnancy, are revealed to influence postnatal care attitudes for all women. This implies that the entire period, from pregnancy to postnatal care, is strictly correlated and needs to be seen in a comprehensive way by policy makers, and not as constituted by separate periods. Women, therefore, have to be followed throughout the process of maternity.

It is also crucial to identify further aspects aimed at catching peculiar characteristics of the group of young women who delivered at home. To better assess and address policies and recommendations to this group, further research and analysis is necessary, that aims to understand this underestimated aspect of reproductive healthcare, and to find the determinants influencing the women's attitude to deliver in healthcare facilities, which is the major factor leading to receiving postnatal care.

In some parts of the country, where basic needs are scarce and where even the general health facilities are difficult to reach, youth friendly services or counseling services for maternity are less used. This might also depend from other barriers, as reported by Dr. Mohammed, Program Manager for Adolescent Sexual Reproductive Health, Division of Reproductive Health, Ministry of Health of Kenya, in an interview released in April 2011: "Health facilities are an issue: they are not many, not well located, not well equipped, is not always possible to find a doctors available. Furthermore, what we can say after so many years of work on that is that also the attitude of the community matters in individual choices. The most representative case is the low utilization of maternal shelters we built for pregnant women, especially for the poorest. If you have a look at the maternal shelters in North Eastern region, many of them are locked because of the very scarce utilization. This is actually the region with the highest maternal mortality ratios. Because of the role of women in the family and because of the community behaviors during pregnancy and delivery they do not go to the shelters. Women are extremely important in the household; they do everything, including housework and

childcare. She cannot leave the house for an entire month also because the community would not approve it and would not help the family when the mother is not there."

The maternal shelters are places created by the Ministry of Health and spread around the country where mothers at high risk of having poor pregnancy outcomes spend their last weeks before delivery. As is highlighted by Dr. Mohammed, the maternal shelters are not always well perceived and so not used to their full capacity. Lack of awareness of the shelter's existence and its aim is one reason for not using them. The other is that husbands and mothers-in-law refuse to grant pregnant women permission to stay at the shelters. Indeed, the lack of social support plays a critical role in maternal mortality. Therefore, especially in these cases, important aspects such as education, family planning knowledge diffusion, and improvement of the general conditions of life have to be the priorities for policies. Especially concerning young girls, the designed youth friendly services, which intend to overcome barriers in access to healthcare by involving young people in programming the services and providing convenient opening hours, walking distances and privacy, are a starting point. However, the percentage of healthcare facilities offering these kinds of services is still very low in all the eight provinces, and availability does not always mean accessibility and use of the services, since, as emerges from the results of the analysis conducted in this study, the individual characteristics of women play the major role in determining maternal healthcare seeking behavior.

Economic barriers, distances and lack of transportation should also be considered when assessing policies. Together with the expansion of the multi-sectoral approach for essential healthcare, implemented since 2004 and providing the utilization of motorbikes and ambulances in order to increase access to the HF, it is crucial to stress both the availability and accessibility aspects. A better reallocation of healthcare facilities to increase availability, as well as the diffusion of knowledge of family planning leading to a higher empowerment and awareness of women on their own healthcare are both crucial for the development of appropriate intervention programs.

This study helped to elucidate the main factors associated with the reproductive healthcare behavior of young women in Kenya. At the same time, the study highlighted gaps in the methodology and data sources. First, the youth age group, as described in this study, is composed of a variety of subgroups, including the early-adolescent and the late-adolescent groups, with the concept of youth overlapping all, consisting of late adolescence and early adulthood. The data used in this study only surveyed women from 15 to 49 years old, while

for a better analysis on adolescence and youth, a wider sample of young girls, starting from age 10 (which is not available for the whole country) would be essential. Second, further data is needed on postnatal care in order to perform better analysis and evaluation: the survey does not provide any information on delivery complications, and data on postnatal care has only been recorded since the beginning of 2000. Third, given the results of this study, a specific survey should be addressed only to women who never delivered in a healthcare facility, in order to increase our knowledge on this particular group of women, and to help in implementing a successful safe motherhood program in the country. Fourth, the influence of the costs for accessing healthcare facilities should be considered with more attention, and be better investigated. From a methodological point of view, given the small size of sub-samples used to study only the youth age group or only the women who delivered at home, employing two-level models was not possible.

Moreover, qualitative studies focusing on cultural values and habits would help the understanding of these issues, especially concerning ethnicity and religious groups, which were difficult to insert into the study because of their strict correlations with the eight provinces. Furthermore, it is necessary to perform better investigation (also using qualitative methodologies) at provincial and lower levels, so as to catch the variation and the complexity of practices and behaviors in each province, and ultimately to improve the design of more appropriate programs that are as close as possible to the communities. All these points remain important objectives for future research.

Appendices

Appendix 6 - Table

Appendix 6.1 Mean, Standard deviation and median of independent variables by the timing of first antenatal visit among young women in Kenya, 2008/9 KDHS				
	Mean	Std. Deviation	Median	N
Parity				
1	5,44	1,78	5	710
2	5,40	1,77	5	494
3	5,41	1,56	5	241
4	5,78	1,86	6	89
5	6,22	2,03	6	32
6	5,79	2,30	5	8
7	6,00	0,00	6	4
Total	5,46	1,76	5	1577
Place for family planning				
public	5,38	1,63	5	290
private	5,36	1,89	5	148
friends or CBd	5,50	1,77	6	1139
Total	5,46	1,76	5	1577
How often have talked with partner about FP (never)				
Never	5,98	1,80	5,42	51
Once	5,20	1,70	5	197
Often	5,24	1,62	5	192
Using FP	5,52	1,78	6	1137
Total	5,46	1,76	5	1577
Wealth index				
Poor	5,76	1,85	6	411
Middle	5,60	1,59	6	840
Not poor	5,12	1,81	5	410
Total	5,46	1,76	5	1577
Current marital status				
not married	5,72	1,88	6	419
Married	5,37	1,70	5	1158
Total	5,46	1,76	5	1577
Years of education of women				
no educ	5,85	2,33	5,53	164
1-7 years	5,54	1,72	5	517
7+	5,34	1,64	5	897
Total	5,46	1,76	5	1577
Mean level of educ in PSU (no educ)				
no educ in psu	6,66	2,34	6,72	7
primary	5,58	1,94	5	496
seconday+	5,40	1,65	5	1074
Total	5,46	1,76	5	1577
Acceptable to advertise condoms at radio (no)				
no	5,79	1,76	6	247
yes	5,40	1,75	5	1331
Total	5,46	1,76	5	1577

Type of place of residence				
Urban	5,27	1,71	5	361
Rural	5,52	1,77	5	1217
Total	5,46	1,76	5	1577
Know contraceptive methods				
no methods	6,50	2,37	7	67
only traditional methods	9,00	0,00	9	3
modern methods	5,41	1,70	5	1508
Total	5,46	1,76	5	1577
Main religion in PSU (any christian)				
christian	5,41	1,71	5	1341
muslim	5,88	1,95	6	131
mix or no religion	5,63	1,97	5,5	105
Total	5,46	1,76	5	1577
Region				
Nairobi	5,15	1,73	5	95
Central	5,30	1,89	5	137
Coast	5,45	1,88	6	145
Eastern	5,53	1,59	5	203
Nyanza	5,40	1,66	5	350
Rift Valley	5,58	1,83	6	436
Western	5,39	1,58	5	171
Northeastern	6,02	2,21	5	40
Total	5,46	1,76	5	1577
Distance to closest HF (less than 5Km)				
5km	5,40	1,72	5	1417
15km	5,92	1,89	6	140
15+	6,61	2,14	6	20
Total	5,46	1,76	5	1577
Current age of respondent				
15	7,07	1,89	7,14	3
16	6,42	1,74	6	36
17	5,51	1,74	5	43
18	5,65	1,49	6	76
19	5,64	1,74	5,47	96
20	5,79	1,87	6	187
21	5,11	1,87	5	178
22	5,32	1,78	5	266
23	5,26	1,54	5	214
24	5,48	1,77	5	247
25	5,47	1,72	5	231
Total	5,46	1,76	5	1577
If ANC councelling service in the PSU				
less than 15KM	5,44	1,78	5	1198
15-30Km	5,78	1,72	6	136
more than 30km	5,37	1,64	5	244
Total	5,46	1,76	5	1577
Presence of a TBA in PSU				
at less than 10 km	5,42	1,65	5	817
at more than 10 km	5,50	1,86	5	760

Total	5,46	1,76	5	1577
Employment				
not working	5,44	1,81	5	742
works at home	5,57	1,71	6	428
works outside home	5,38	1,71	6	407
Total	5,46	1,76	5	1577
Heard FP on radio last month				
no	5,69	1,69	6	511
yes	5,35	1,78	5	1067
Total	5,46	1,76	5	1577
heard FP on TV last month				
no	5,56	1,78	5	1052
yes	5,26	1,70	5	524
Total	5,46	1,76	5	1576

Appendix 6 - Maps

PSUs and health facilities and midwifes
in catchment area,
Kenya DHS 2008/9, KSPA, 2010
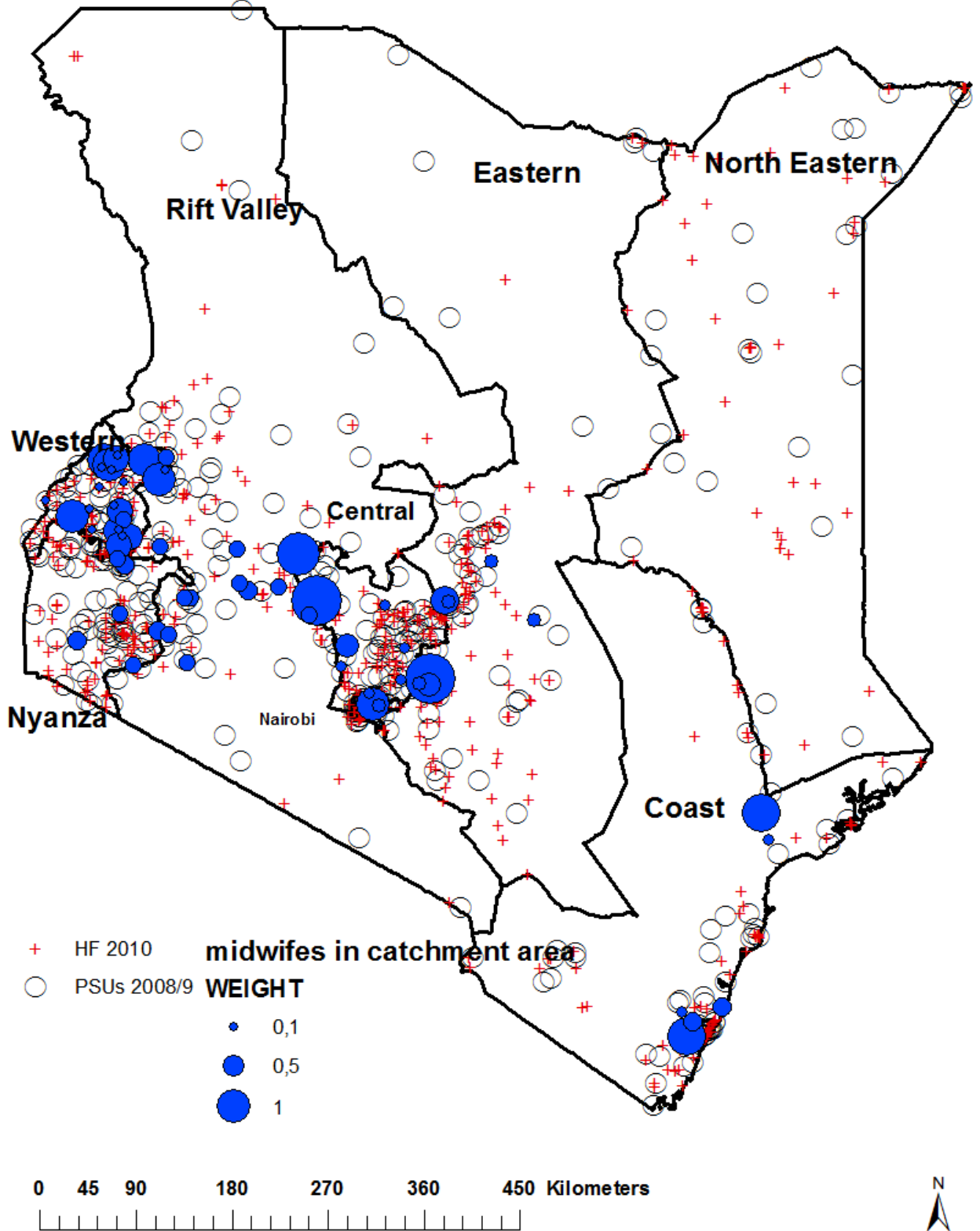
PSUs and health facilities and community health workers in catchment area, Kenya DHS 2008/9, KSPA, 2010

Rift Valley

Eastern

North Eastern

Western

Central

Nyanza

Nairobi

Coast

+   HF 2010

◯   PSUs 2008/9

CHWs in catchment area

WEIGHT

• 0,1

1

10

0   45   90   180   270   360   450   Kilometers

N
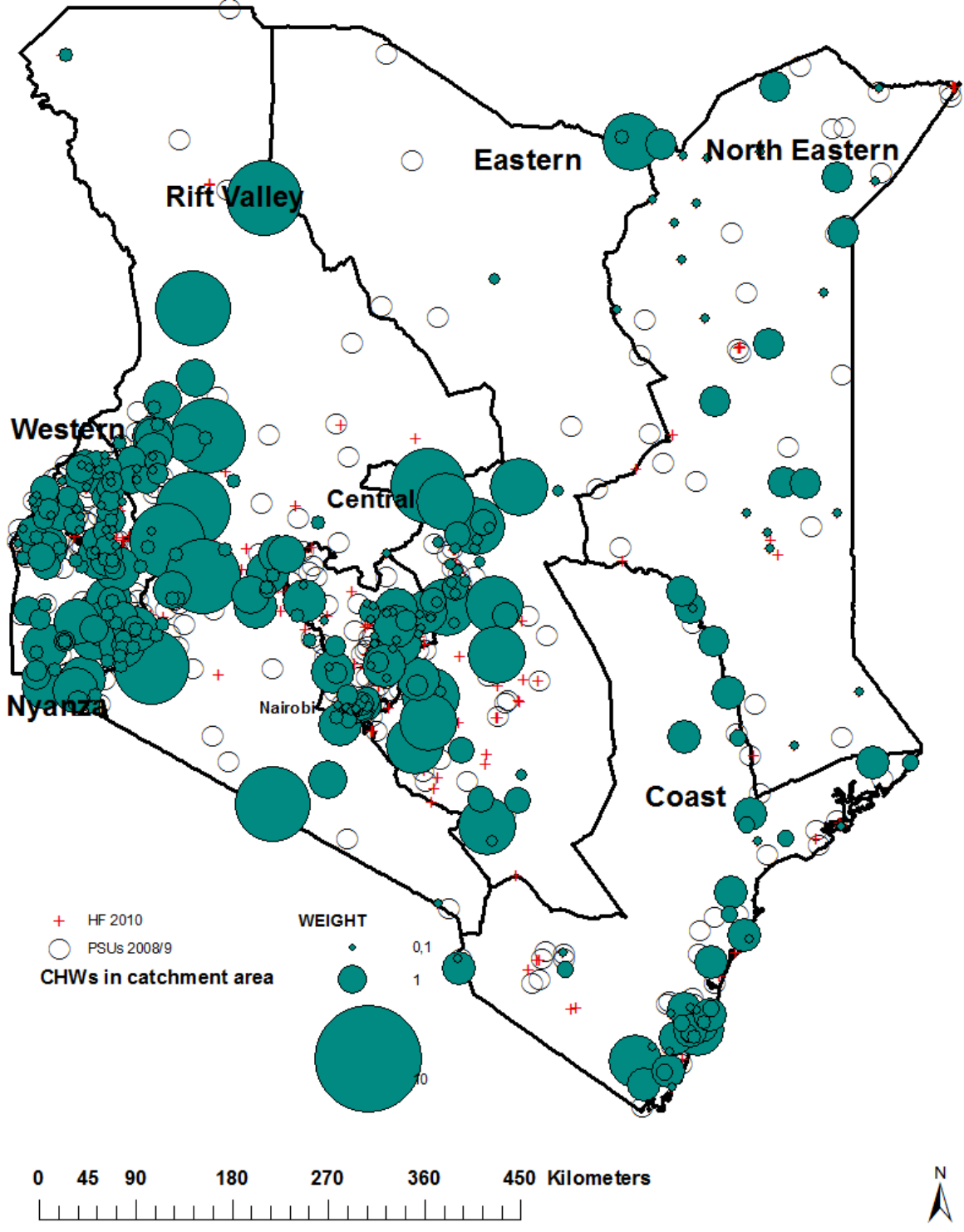
Appendix 6 - Models

Model Appendix 6.1.1 Multilevel modeling for the timing of antenatal care of a young women in Kenya (births from women aged 15-25)			
Fixed Part	Parameter Estimate	CI+95%	CI-95%
cons	5,131	257,856	111,008
Province (Central)			
Nairobi	-0,087	1,622	0,518
Coast	-0,030	1,569	0,600
Eastern	0,202	1,982	0,756
Nyanza	0,013	1,575	0,652
Rift Valley	0,196	1,921	0,771
Western	-0,084	1,480	0,571
Northeastern	0,549	**2,963**	**1,012**
Place of residence (urban)			
Rural	0,407	**1,996**	**1,131**
Random Part			
Level: V021			
cons/cons	0,475	0,087	
Level: CASEID			
cons/cons	2,875	0,112	
bcons,1/bcons,1			
-2*loglikelihood:	6.662.495		
DIC:			
pD:			
Units: V021	376		
Units: CASEID	1661		
Model Appendix 6.1.2 Multilevel modeling for the timing of antenatal care of a young women in Kenya (births from women aged 15-25)			
Fixed Part	Parameter Estimate	CI+95%	CI-95%
cons	6,171	1020,002	224,627
Province (Central)			
Nairobi	-0,138	1,535	0,494
Coast	-0,171	1,360	0,522
Eastern	0,122	1,819	0,702
Nyanza	-0,094	1,412	0,587
Rift Valley	0,063	1,678	0,676
Western	-0,205	1,304	0,509
Northeastern	0,275	2,306	0,752
Place of residence (urban)			
Rural	0,124	1,580	0,811
Parity	0,030	1,119	0,949
Place for family planning (public HF) V379			
private	0,324	**1,860**	**1,027***

friends or CBd	0,224	1,770	0,884
How ofter have talked with partner about FP (never)			
S720B_2 once	-0,546	**0,995**	**0,337**
S720B_3 often	-0,572	**0,973**	**0,327**
S720B_999 we use FP	-0,462	1,108	0,358
Wealth Index (poor)			
mean	-0,340	**0,909**	**0,557**
not poor	-0,609	**0,792**	**0,373**
Marital status (not married)			
c394_1 married	-0,247	**0,982**	**0,621**
Random Part			
Level: V021			
cons/cons	0,419	0,082	
Level: CASEID			
cons/cons	2,854	0,111	
-2*loglikelihood:	6.633.728		
Units: V021	376		
Units: CASEID	1661		

*statistical significance at 90% (-p<0.1)

Model Appendix 6.1.3 Multilevel modeling for the timing of antenatal care of a young women in Kenya (births from women aged 15-25)			
Fixed Part	Parameter Estimate	CI+95%	CI-95%
cons	6,741	1927,926	371,593
Province (Central)			
Nairobi	-0,165	1,485	0,484
Coast	-0,287	1,213	0,464
Eastern	0,036	1,666	0,645
Nyanza	-0,072	1,438	0,602
Rift Valley	-0,001	1,571	0,635
Western	-0,213	1,291	0,506
Northeastern	-0,078	1,675	0,511
Place of residence (urban)			
Rural	0,114	1,561	0,805
Parity	0,012	1,101	0,930
Place for family planning (public HF) V379			
private	0,299	**1,814**	**1,002***
friends or CBd	0,198	1,724	0,862
How ofter have talked with partner about FP (never)			
S720B_2 once	-0,556	**0,985**	**0,334**
S720B_3 often	-0,584	**0,960**	**0,324**
S720B_999 we use FP	-0,510	**0,961**	**0,375***
Wealth Index (poor)			
mean	-0,248	1,001	0,608
not poor	-0,502	**0,889**	**0,412**

Marital status (not married)			
c394_1 married	-0,277	**0,953**	**0,603**
Mother's education (no educ)			
Educ:1-7 years	-0,484	**0,858**	**0,443**
Educ:7+	-0,583	**0,785**	**0,397**
Random Part			
Level: V021			
cons/cons	0,403	0,081	
Level: CASEID			
cons/cons	2.843	0,11	
-2*loglikelihood:	6.622.553		
Units: V021	376		
Units: CASEID	1661		

*statistical significance at 90% (-p<0.1)

Model Appendix 6.1.4 Multilevel modeling for the timing of antenatal care of a young women in Kenya (births from women aged 15-25)			
Fixed Part	Parameter Estimate	CI+95%	CI-95%
cons	8,788	21164,489	2030,262
Province (Central)			
Nairobi	-0,245	1,344	0,456
Coast	-0,370	1,021	0,468
Eastern	-0,167	1,341	0,534
Nyanza	-0,066	1,427	0,614
Rift Valley	-0,179	1,300	0,538
Western	-0,229	1,248	0,507
Northeastern	-0,854	**0,785**	**0,231**
Place of residence (urban)			
Rural	-0,031	1,337	0,703
Parity	0,087	**1,182**	**1,006***
Place for family planning (public HF) V379			
private	0,288	**1,786**	**1,000***
friends or CBd	0,174	1,674	0,846
How ofter have talked with partner about FP (never)			
S720B_2 once	-0,564	**0,968**	**0,334**
S720B_3 often	-0,586	**0,950**	**0,326**
S720B_999 we use FP	-0,570	**0,987**	**0,324**
Wealth Index (poor)			
mean	-0,154	1,097	0,670
not poor	-0,382	**0,940**	**0,496***
Marital status (not married)			
c394_1 married	-0,291	**0,938**	**0,595**

Mother's education (no educ)			
Educ:1-7 years	-0,109	1,264	0,636
Educ:7+	-0,116	1,272	0,623
Heard FP at radio last month (no)			
yes	-0,167	**0,992**	**0,722***
Heard FP on TV last month (no)			
V384B_1	-0,193	**0,975**	**0,697***
Acceptable to advertise condoms at radio (no)			
S648A_1 yes	-0,401	**0,846**	**0,530**
Knowledge of contraception (no methods)			
only traditional m	2,054	104,485	0,582
modern methods	-0,842	**0,639**	**0,291**
Age of women V012	-0,052	**0,989**	**0,911**
Distance to closest HF (less than 5Km)			
less than 15km	0,587	**2,720**	**1,189**
15+	1,205	**6,187**	**1,800**
Random Part			
Level: V021			
cons/cons	0,328	0,073	
Level: CASEID			
cons/cons	2.772	0,107	
-2*loglikelihood:	6.554.221		
Units: V021	376		
Units: CASEID	1660		

*statistical significance at 90% (-p<0.1)

X

Appendix 7 – Table

Appendix 7.1 Percent distribution of health facility deliveries for all births in the 5 years preceding the survey by socio economic and demographic, reproductive health care behaviour and service accessibility characteristics, 2008/9 KDHS				
Factors		Health facility deliveries (per cent)	Number of cases	Significance
Region				
	Nairobi	82,70%	110	
	Central	79,20%	173	***
	Coast	43,30%	215	
	Eastern	51,00%	288	
	Nyanza	47,00%	553	
	Rift Valley	33,30%	630	
	Western	29,60%	267	
	North Eastern	21,30%	75	
Place of residence				
	Urban	64,90%	462	***
	Rural	39,70%	1851	
Marital Status				
	Never married	50,00%	320	
	Married	43,90%	1678	**
	Living together	42,60%	129	
	Widowed	34,40%	32	
	Divorced	16,00%	25	
	Not living together	52,00%	127	
Final say on own health care				
	Respondent alone	46,20%	416	**
	Respondent and husband/partner	45,70%	794	
	Husband/partner alone	39,40%	594	
	Earns her own money	48,13%	509	
Religion				
	Roman Catholic	51,50%	491	
	Protestant/ other Christian	45,50%	1496	***
	Muslim	35,00%	226	
	No religion	17,40%	92	
	Other	100,00%	2	
Ethnicity				
	Embu	69,20%	13	
	Kalenjin	41,20%	337	
	Kamba	44,40%	216	
	Kikuyu	77,10%	245	***
	Kisii	50,70%	148	
	Luhya	32,40%	376	
	Luo	48,10%	468	
	Masai	27,50%	51	
	Meru	82,20%	73	
	Mijikenda/ Swahili	34,80%	155	

	Somali	28,00%	93	
	Taita/ Taveta	77,80%	9	
	Other	14,00%	129	
Pattern of use of FP				
	Currently using	54,30%	751	***
	Used since last birth	54,30%	302	
	Used before last birth	45,20%	396	
	Never used	32,80%	864	
Multidimensional poverty index				
	not multidimensional poor	57,70%	914	***
	multidimensional poor	36,20%	1398	
Educational attainment				
	No education	19,40%	304	***
	Incomplete primary	32,90%	796	
	Complete primary	51,10%	753	
	Incomplete secondary	59,20%	228	
	Complete secondary	85,30%	191	
	Higher	70,70%	41	
Desirability of pregnancy				
	Then	45,60%	1295	***
	Later	41,00%	737	
	No more	51,00%	280	
Age at first marriage				
	<14	24,70%	243	
	15-19	43,90%	1358	***
	20-25	56,80%	392	
	never married	50%	320	
Parity				
	3 or less	47,80%	1999	***
	More than 3	22,20%	313	
Age at first intercourse				
	less than 14 years	36,80%	329	
	15-18 years	45,90%	1362	***
	more than 18	59,40%	357	
	at first union	28,50%	263	
Assistance ANC				
	doctor	57,9%	337	***
	nurse/midwife	49,5%	1085	
	traditional birth attendant	31,0%	42	
	no one	18,3%	109	
Place of ANC visit				
	home	0%	13	
	GVT hospital	60,8%	385	***
	Other public	42,10%	826	
	PVT hospital	73%	122	
	Other private	64,3%	112	
	No anc	18,30%	123	
Wealth Index				
	Poorest	25,00%	573	

	Poorer	33,50%	445	
	Middle	48,00%	406	
	Richer	49,70%	489	***
	Richest	76,10%	397	
Exposure to radio for PF				
	no	33,90%	690	***
	yes	49,20%	1620	
Exposure to media for FP				
	TV or radio	49,50%	1639	***
	no media or newspaper	33,00%	673	
Exposure to family planning information				
	no media on FP	33,0%	669	***
	at least 1 media on FP	39,7%	899	
	2 out of 3 media on FP	54,4%	252	
	all media on FP	64,5%	490	
Mean number of children in PSU				
	less than 3 children per PSU	55,90%	1202	***
	3 and above	32,50%	1110	
Median age at marriage in the PSU				
	up to 17 years	27,80%	453	
	more than 17 years	48,80%	1859	***
Level of educ in PSU				
	no educ	0,00%	11	
	up to 7 years (primary complete)	30,20%	854	***
	7 years and above (secondary +)	53,50%	1446	
Proportion of women with secondary and above educ in the PSU				
	up to 25% has secondary + in the PSU	32,10%	1139	***
	more than 25% has secondary + in the PSU	57,30%	1149	
Distance from closest HF				
	less than 5Km	47,80%	2049	***
	between 5 and 15Km	23,60%	225	
	more than 15Km	2,70%	37	
Availability of CEMOC				
	no cemoc service in 5Km	38,70%	1613	***
	has cemoc service in 5Km	58,40%	699	
Availability of youth services				
	no youth service in 5Km	39,90%	1827	***
	has youth service in 5Km	62,70%	485	
Availability of a car				
	no car	43,60%	2210	***
	yes car	64,20%	53	

Number of visits for ANC				
	no visits	18,30%	123	***
	3 or less	43,50%	771	
	more than 3	59,20%	677	
Timing of first ANC check				
	first 2 months	66,10%	59	***
	between 3 and 6 months	53,20%	1119	
	7 or more	38,00%	285	
Partner's education level				
	No education	16%	182	
	Primary	37,80%	1200	***
	Secondary	61,60%	549	
	Higher	84,40%	58	
Respondent currently working				
	No	43,90%	1130	*
	Yes	45,20%	1167	
Proportion of partners with secondary + educ in PSU				
	Less than 20%	24,8%	540	***
	More than 20%	50,9%	1773	
Proportion of partners approving FP in PSU				
	Less than 25%	34,1%	1187	***
	More than 20%	56%	1126	
Type of marriage				
	Own choice	47%	1691	***
	Arranged	27%	300	
	Not married	50%	320	
Relationship of ages with first partner				
	Older	44%	1822	ns
	Younger	41%	17	
	Same age	43%	144	
Partner has 10+ years older				
	Ten or more years older	36%	489	**
	Less than 10 years older	47%	1314	
Received money/gifts for sex				
	No	50%	2246	**
	yes	39%	63	
Community health worker in a range of 5Km from PSU				
	CHW not in 5Km	36,6%	1106	***
	CHW In 5Km	52,1%	1206	
Note: *** -p<0.01	** -p<0.05	* -p<0.1		

Appendix 8 – Table

Appendix 8.1 Percent distribution of proper postnatal care visits[1] by socio economic and demographic, reproductive health care behaviour and service accessibility characteristics, 2008/9 KDHS				
Factors		Proper postnatal care (per cent)	Number of cases	Significance
Region				
	Nairobi	65,6%	96	
	Central	45,3%	137	***
	Coast	28,5%	144	
	Eastern	41,2%	204	
	Nyanza	25,1%	350	
	Rift Valley	32,7%	437	
	Western	22,4%	170	
	North Eastern	15,0%	40	
Place of residence				
	Urban	47,4%	361	***
	Rural	29,1%	1217	
Marital Status				
	Never married	35%	294	ns
	Married	32,4%	1077	
	Living together	45,1%	82	
	Widowed	11,1%	18	
	Divorced	7,7%	13	
	Not living together	34,4%	93	
Religion				
	Roman Catholic	39,7%	350	
	Protestant/ other Christian	32,8%	1034	*
	Muslim	27,6%	134	
	No religion	12,7%	55	
	Other	100%	2	
Ethnicity				
	Embu	72,7%	11	
	Kalenjin	34,3%	233	
	Kamba	32,6%	150	
	Kikuyu	51,9%	204	***
	Kisii	32,4%	108	
	Luhya	28%	260	
	Luo	28,7%	292	
	Masai	12,1%	33	
	Meru	50,8%	57	
	Mijikenda/ Swahili	28,2%	99	
	Somali	19,2%	52	
	Taita/ Taveta	71,4%	7	

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[1] First postnatal care visit after delivery to be held in the first 48 hours by a professional skilled attendant (doctor, nurse or midwife)

	Other	21,4%	70	
Educational attainment				
	No education	13,4%	164	***
	Incomplete primary	21,7%	517	
	Complete primary	37,6%	526	
	Incomplete secondary	42,4%	170	
	Complete secondary	62,7%	166	
	Higher	50,0%	34	
Parity				
	3 or less	35,2%	1445	***
	More than 3	12,1%	132	
Age at first intercourse				
	less than 16 years	32,2%	827	
	16 or more years	34,3%	752	*
Multidimensional poverty index				
	Not poor	48,7%	314	***
	At risk of poverty	34,3%	370	
	poor	27,4%	893	
Wealth Index				
	Poorest	29,9%	381	***
	Middle	34,5%	783	
	Richest	34,1%	414	
Outcome of pregnancy				
	Child alive	33,1%	1224	*
	Child not alive	39,5%	354	
Use of FP				
	Never	25%	561	***
	Only trad methods	33%	82	
	Modern methods	38%	934	
Exposure to newspaper for PF				
	no	27,5%	1144	***
	yes	48,4%	432	
Proportion of women with secondary and above educ in the PSU				
	up to 25% has secondary + in the PSU	22,9%	278	*
	more than 25% has secondary + in the PSU	38,9%	1300	
Distance from closest HF				
	less than 5Km	34,9%	1417	***
	between 5 and 15Km	21,4%	140	
	more than 15Km	5,0%	20	
Availability of PNC services				
	no PNC service in 5Km	29,7%	565	***
	has PNC service in 5Km	39,8%	1013	
Availability of youth services				
	no youth service in 15Km	27,4%	866	***
	has youth service in	38,1%	712	

	15Km			
Has a specialized doctor in community				
	Yes in 2km	49,2%	59	***
	At more than 2km	30,2%	1119	
Respondent currently working				
	No	32%	784	*
	Yes	35,0%	786	
Proportion of partners approving FP in PSU				
	Less than 25%	27,9%	730	***
	More than 20%	37,9%	847	
Community health worker in a range of 1Km from PSU				
	CHW not in 1Km	31,5%	1224	***
	CHW In 1Km	39,5%	354	
Note: *** -p<0.05 * -p<0.1 ns: not significant				

Appendix 8 – Models

Model 8.4 Multilevel logistic modeling for risk of having a visit from a professional attendant for Postnatal care of a young women in Kenya (births from women aged 15-25)			
	odds ratio	CI +95%	CI-95%
Fixed Part			
Region (Central)			
Nairobi	1,045	2,129	0,513
Coast	1,169	2,113	0,647
Eastern	1,448	2,571	0,815
Nyanza	0,555	**0,937**	**0,329**
Rift Valley	0,947	1,643	0,546
Western	0,437	**0,780**	**0,245**
Northeastern	1,550	3,544	0,678
Place of Residence (Urban)			
Rural	1,049	1,612	0,683
Had ANC visit for last pregnancy (no)			
ANC_bi_1	2,965	**5,413**	**1,625**
Employment (not working)			
working	1,412	**1,858**	**1,073**
Education (no educ)			
Educ:1-7 years	0,986	1,594	0,610
Educ:7+	1,744	**2,852**	**1,066**
Distance from closest HF to PSU			
15km	1,051	1,816	0,608
15+	0,448	1,381	0,146
Parity	0,880	**0,980**	**0,789***
Wealth index (poor)			
middle	1,516	**2,174**	**1,057**
rich	1,728	**2,916**	**1,024**
Place of family planning (government)			
private	0,633	**0,934**	**0,429***
friends or CBd	0,701	**0,965**	**0,509**
Community health worker (at less than 1 Km)			
at more than 1Km	0,501	**0,726**	**0,346**
Proportion of women in PSU (less than 25%)			
25-50%	1,061	1,469	0,766
50-75%	0,726	1,142	0,462
75-100%	2,046	**4,152**	**1,008**
Partner approval of FP in the PSU (less than 20%)			
more than 20%	2,160	**3,881**	**1,202**
Age at first intercourse (less than 16 years)			
more than 16 years	1,301	**1,631**	**1,037***

Told where to go for pregnancy complication (no)			
yes	2,164	**2,776**	**1,687**
Baby died (no)			
yes	1,297	1,919	0,876
Presence of a specialized doctor at 2km from PSU (no)			
yes	1,483	**2,165**	**1,016**
Has PNC service in a range of 5Km from PSU (less than 5km)			
at more than 5km	0,773	**0,996**	**0,599***
Heard FP on newspaper (no)			
yes	1,556	**2,055**	**1,178**
Has youth services in a range of 15km (at less than 15km)			
at more than 15km	0,690	**0,933**	**0,510**
Random Part			
Level: V021			
cons/cons		0,259	0,104
Level: CASEID			
bcons,1/bcons,1		1,000	0,000
ICC	7,3%		
Units: V021		376	
Units: CASEID		1660	

Model 8.4.1 Multilevel logistic modelling for risk of having a visit from a professional attendant for Postnatal care of a young women <u>in Nyanza, Western and North Eastern provinces</u> (births from women aged 15-25)				**Model 8.4.2 Multilevel logistic modelling for risk of having a visit from a professional attendant for Postnatal care of a young women in <u>Rift Valley, Eastern and Coast provinces </u>(births from women aged 15-25)**			
	odds ratio	ci+ 95%	ci- 95%		odds ratio	ci+ 95%	ci- 95%
Fixed Part				**Fixed Part**			
Place of Residence (Urban)				**Place of Residence (Urban)**			
Rural	0,793	1,508	0,417	Rural	1,576	3,306	0,751
Had ANC visit for last pregnancy (no)				**Had ANC visit for last pregnancy (no)**			
ANC_bi_1	4,504	**16,160**	**1,255**	ANC_bi_1	2,335	**5,256**	**1,037**
Employment (not working)				**Employment (not working)**			
not working	1,230	1,938	0,781	working	1,343	2,027	0,890
Education (no educ)				**Education (no educ)**			
Educ:1-7 years	0,879	2,445	0,316	Educ:1-7 years	1,143	2,079	0,629
Educ:7+	1,401	3,889	0,505	Educ:7+	2,171	**4,072**	**1,157**
Parity	0,972	1,188	0,796	**Parity**	0,870	1,063	0,713
Wealth index (poor)				**Wealth index (poor)**			

middle	2,241	**4,123**	**1,218**	middle	1,077	1,747	0,664
rich	2,678	**6,123**	**1,171**	rich	1,850	4,322	0,792
Place of family planning (government)				**Place of family planning (government)**			
private	0,504	1,209	0,210	private	0,658	1,422	0,305
friends or CBd	0,543	**0,942**	**0,313**	friends or CBd	0,883	1,428	0,547
Community health worker (at less than 1 Km)				**Community health worker (at less than 1 Km)**			
at more than 1Km	0,501	**0,943**	**0,266**	at more than 1Km	0,435	**0,848**	**0,223**
Proportion of women in PSU (less than 25%)				**Proportion of women in PSU (less than 25%)**			
25-50%	0,967	1,596	0,585	25-50%	1,751	**2,943**	**1,041**
50-75%	0,708	1,467	0,341	50-75%	0,712	1,579	0,321
75-100%	1,001	3,309	0,303	75-100%	2,173	10,022	0,471
Partner approval of FP in the PSU (less than 20%)				**Partner approval of FP in the PSU (less than 20%)**			
more than 20%	1,637	4,244	0,632	more than 20%	2,230	**4,804**	**1,035***
Age at first intercourse (less than 16 years)				**Age at first intercourse (less than 16 years)**			
more than 16 years	1,589	**2,436**	**1,036**	more than 16 years	1,212	1,847	0,795
Told where to go for pregnancy complication (no)				**Told where to go for pregnancy complication (no)**			
yes	2,815	**4,191**	**1,891**	yes	2,059	**3,041**	**1,394**
Baby died (no)				**Baby died (no)**			
yes	1,203	2,145	0,675	yes	1,415	2,659	0,753
Presence of a specialized doctor at 2km from PSU (no)				**Presence of a specialized doctor at 2km from PSU (no)**			
yes	0,712	1,512	0,336	yes	1,775	**3,049**	**1,034**
Has PNC service in a range of 5Km from PSU (less than 5km)				**Has PNC service in a range of 5Km from PSU (less than 5km)**			
at more than 5km	0,828	1,378	0,497	at more than 5km	0,994	1,661	0,595
Heard FP on newspaper (no)				**Heard FP on newspaper (no)**			
yes	1,878	**2,924**	**1,206**	yes	1,273	2,009	0,806
Region (Nyanza)				**Region (Coast)**			
Western	0,728	1,247	0,424	Eastern	1,055	1,923	0,579
Northeastern	2,989	**7,688**	**1,162**	Rift Valley	0,692	1,205	0,397
Marital status (not married)				**Marital status (not married)**			
Married	1,603	**2,424**	**1,060**	Married	0,631	**0,984**	**0,404**
KEMRI2008priv	0,868	**0,995**	**0,756**	**KEMRI2008priv**	1,010	**1,062**	**0,96***
Has youth services in				**Has youth services in a**			

a range of 15km (at less than 15km)				**range of 15km (at less than 15km)**			
at more than 15km	0,850	1,365	0,529	at more than 15km	0,664	**0,967**	**0,456***
Random Part				**Random Part**			
Level: V021				Level: V021			
cons/cons		0,109	0,143	cons/cons		0,290	0,163
Level: CASEID				Level: CASEID			
bcons.1/bcons.1		1.000	0	bcons.1/bcons.1		1.000	0
ICC	3,2%			ICC	8%		
Units: V021		131		Units: V021		157	
Units: CASEID		700		Units: CASEID		701	

Model 8.4.3 One level logistic modelling for risk of having a visit from a professional attendant for Postnatal care of a young women in <u>Nairobi and Central provinces</u> (births from women aged 15-25)

	odds ratio	ci+ 95%	ci- 95%
Fixed Part			
Place of Residence (Urban)			
Rural	1,217	3,299	0,449
Had ANC visit for last pregnancy (no)			
ANC_bi_1	5,371	**23,915**	**1,206**
Employment (not working)			
working	1,514	9,709	0,236
Education (no educ)			
Educ:1-7 years	0,361	3,871	0,034
Educ:7+	0,914	9,678	0,086
Parity	0,599	**0,923***	**0,388***
Wealth index (poor)			
middle	0,494	9,893	0,025
rich	0,344	8,019	0,015
Place of family planning (government)			
private	0,457	1,226	0,171
friends or CBd	0,399	**0,960**	**0,166**
Community health worker (at less than 1 Km)			
at more than 1Km	0,375	**0,755**	**0,186**
Proportion of women in PSU (less than 25%)			

25-50%	0,462	**0,993**	**0,214***
50-75%	0,826	2,214	0,308
75-100%	1,861	5,857	0,591
Partner approval of FP in the PSU (less than 20%)			
more than 20%	3,380	17,333	0,659
Age at first intercourse (less than 16 years)			
more than 16 years	1,090	2,406	0,494
Told where to go for pregnancy complication (no)			
yes	1,146	2,200	0,596
Baby died (no)			
yes	1,306	5,070	0,336
Presence of a specialized doctor at 2km from PSU (no)			
yes	1,982	4,930	0,797
Has PNC service in a range of 5Km from PSU (less than 5km)			
at more than 5km	0,306	**0,630**	**0,149**
Heard FP on newspaper (no)			
yes	1,623	3,222	0,817
Has youth services in a range of 15km (at less than 15km)			
at more than 15km	0,307	**0,888**	**0,106**
KEMRI2008priv	0,784	1,147	0,536
Marital status (not married)			
Married	0,686	1,491	0,316
Units: V021		88	
Units: CASEID		259	

In red, the differences between models

List of tables and figures

Acknowledgements

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