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Adolescent childbearing experiences in Kenya: geographical and socioeconomic determinants

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1. Teenage fertility and maternal health: key development priorities[1]

The improvement of maternal health has been established as a key development priority among the Millennium Development Goals (MDGs). Indeed the Fifth MDG (MDG5). "*Improving maternal health*" mainly aims at: 5A) reducing the maternal mortality ratio by three quarters, between 1990 and 2015; 5B) achieving universal access to reproductive health by 2015. MDG5 further focuses on the improvement of the reproductive health and quality of life in the years before the women become mothers and throughout adulthood. The well-being status of mothers and children is recognized to be significantly influenced by the health, knowledge and by the different choices when they were adolescents and during a sexual relationship, without being pregnant. Sexual and reproductive choices will give women and girls great decision-making and negotiation power within their relationships, and enable them to choose their own health and life paths (MDG5, 2010).

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).

Sub-Saharan Africa – with Latin America and the Caribbean - shows one of the highest level of teenage pregnancies. In spite of the persistence of this situation, the analysis which aim at investigating the determinants and the different diffusion of teenage sexual behavior and childbearing on a local scale are not so widespread until now (Were, 2007). Some studies on this topic highlighted the presence of unmet reproductive health needs of adolescents in different regions. Nevertheless, upgrading reproductive and maternal health is usually associated with the eradication of inequality and poverty and with the presence of health care programs and services aimed at promoting girls' education and poverty alleviation.

At the same time, many problems associated with childbearing could be reduced by appropriate heath care during the pregnancy months.

The diffusion of health facilities throughout developing countries surely represents a crucial factor to protect women's health during pregnancy and delivery.

[1] Work in progress. First results of this research have been presented at the European Population Conference 2010- section 20: Sexual and reproductive health: adolescent. 1-4 September 2010. Vienna.

Limiting adolescent fertility can be considered a priority for women living in world's developing regions. In many developing countries, poor women start bearing children between ages 15 and 19. Their higher levels of pregnancy reflect early marriage, less ability to negotiate delays in sex and reproduction, and less access to family planning. Each year, one in every ten births worldwide is to a mother who is herself still a child (Save the Children, 2004).

The consequences of adolescent childbearing have been studied in 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, Prata and Stewart, 2009). Most reproductive health problems experienced by adolescents are experienced by older women as well, but health problems are often exacerbated among adolescents. Differences may be essentially those of degree in facing problems. Age-related customs (for example, female circumcision and early marriage) and age-related vulnerability (as in economic pressures and in male dominion) represent the most important causes of different degrees in reproductive health problems (Zabin and Kiragu, 1998).

Young women are more likely to suffer pregnancy-related complications that endanger their lives or lead to infertility. Younger, unmarried women, more often, consider late, unsafe abortions as an alternative to carrying a pregnancy to term (Biddlecom, 2008).

The most recent UNICEF Report (2009) outlines key aspects and consequences of early motherhood:

• Maternal deaths related to pregnancy and childbirth are an important cause of mortality for girls aged 15–19 worldwide, accounting for 70,000 deaths per year;

• The younger a girl is when pregnant, the greater the health risks. Girls who give birth

before the age of 15 are five times more likely to die in childbirth than women in their twenties;

• If a mother is under the age of 18, her infant's risk of dying in its first year of life is 60 per cent greater than that of an infant born to a mother older than 19;

• Even if the child survives, he or she is more likely to suffer from low birth weight, under nutrition and late physical and cognitive development.

•Additionally, early childhood interacts with future educational and social prospects of the young woman and her infant: childbearing (as child marriage) increases the risk that adolescent girls will drop out of school, with negative implications for maternal and newborn health and for future income-earning capacity (Lloyd, 2006; Bledsoe and Cohen, 1993; Taffa, Omollo and Matthews, 2003; UNFPA, 2004; Santelli and Melnikas, 2010). Adolescent mothers are at elevate risk of poverty, downward social mobility, and divorce or separation. This, in turn, contributes to the vicious cycle of gender discrimination, with poorer families being more disposed to permit the premature marriage of daughters out of economic necessity. On the other hand, the gains from education go beyond reducing the risk of maternal and newborn deaths and ill health.

Comprehensive sexuality education, in and out of school, can change gender stereotypes and the traditional attitudes that disempower girls and women (MDG5, 2010).

2. Aim of the paper, data and methods

In this paper we attempt to investigate the geographical and socioeconomic determinants of both teenage pregnancies and maternal health behaviours among adolescent women in Kenya.

We firstly introduce a descriptive analysis aiming at presenting the main trends in fertility and reproductive health behaviour of Kenyan women as emerging from the 2003 and 2008-09 Kenya Demographic and Health Surveys (KDHS).

Secondly, we study childhood among younger women as emerging from 2003 KDHS[2].

The 2003 and 2008-09 KDHS were designed to produce separate estimates for key indicators for each of the eight provinces in Kenya, and employed a two-stage stratification sampling. In the first stage 400 sample points (clusters) were selected as primary sampling units. In the second stage a nationally representative sample survey of women age 15

[2] Although we present some key data and indicators from 2008-09 KDHS, our analysis is based on 2003 KDHS. Our future intention is to enlarge our analysis on the most recent survey.

to 49 (8,195in 2003 and 8,444 in 2008-09) and men aged 15 to 54 (3,578 and 3,465 respectively) were extracted from clusters.

The DHS data sets further collect Global Positioning System locators for each of the primary sampling units (PSUs) included in the samples that enable a deep geographical analysis (Agwanda *et al.*, 2004; David and Haberlen, 2005).

Other community variables such as the presence of health care facilities together with their distance from the PSUs are used. A complete list of health facilities, split up by type of facility is provided by The Kenya Health Facility List, Kenya Ministry of Health (http://www.kenyahealthfacilities.net/). The list refers to year 2004, and gives details concerning Kenyan Health Facilities' geographical information. Geographical location was considered at district level.

The list of health facilities provided by The Kenya Medical Research Institute (KEMRI)-Welcome Trust Research Programme include geographic information along with provided services about Kenya Health Facilities for 2005.

In our analysis we used both the complete list of health facilities and the nursing homes and maternity hospitals list as services specifically addressed to women's reproduction care.

A very important factor is represented by the availability of structures giving antenatal, delivery and postpartum care. Formal health sector in Kenya provides both basic and advanced level services for child health, maternal health, family planning, HIV/AIDS, and other communicable diseases. As described in the 2004 Kenya Service Provision Assessment Survey (KSPA), antenatal care (ANC) is widely available throughout Kenya (Godia et al, 2005). Nationwide, 79 percent of health care facilities provide ANC services, usually 5 days per week. Not surprisingly, hospitals (84 percent), health centres (86 percent), and maternities (76 percent) are most likely to offer ANC. Other components of maternal health (normal delivery, postnatal care and especially emergency services) are far less available. Only one-third of all facilities provide both ANC and normal delivery. Attention towards young women is nevertheless inadequate: only 2 percent of facilities providing ANC have youth friendly services (NACPD and ORC Macro, 2006).

Delivery services are most available in Western province (69 percent) and least available in Central (18 percent) and Coast provinces (27 percent) (Kichamu et al., 2004).

We use this information to ascertain the influence of the availability of health care facilities, by focusing on those addressed to the specific needs of motherhood and reproductive and sexual health.

We perform a multivariate multilevel analysis to estimate the influence of individual-, household-, and community-level factors on the risk of adolescent childbearing. In addition we use a spatial component taking into account the presence and proximity of maternal health services. Geographical location was considered at district level.

Our final aim is to investigate the impact of individual, family and community level determinants on maternal health behaviour among adolescents.

3. Trends of fertility in Kenya

If we examine the long trend evolution of Kenyan TFR, after a decline observed at the end of the 80's (table 1), fertility seems to slightly rise, from 1998 on. Results from 2008-09 Kenyan Demographic and Health Survey show a little decrease of the total fertility rate, for the first time since 1999. On average women gave birth to 4.6 children in the three-year period preceding the 2008-09 survey with respect to 4.9 children in 2003[3].

[3] Data refers to the three-year period preceding the survey (mid-2000 to mid-2003 for 2003 survey).

Table 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 2008-09 KDHS.

Age group	1977-78 KFS[1]	1989 KDHS	1993 KDHS	1998 KDHS	1999 Census	2003 KDHS	% change 1989-2003	2008-09 KDHS	% change 2003-2008/09
	1975-1978	1984-1989	1990-1993	1995-1998		2000-2003		2006-2008	
15-19	168	152	110	111	142	114	-25.0	103	-9.6
20-24	342	314	257	248	254	243	-22.6	238	-2.1
25-29	357	303	241	218	236	231	-23.8	216	-6.5
30-34	293	255	197	188	185	196	-23.1	175	-10.7
35-39	239	183	154	109	127	123	-32.8	118	-4.1
40-44	145	99	70	51	56	55	-44.4	50	-9.1
45-49	59	35	50	16	7	15	-57.1	12	-20.0
TFR	8.1	6.7	5.4	4.7	5.0	4.9	-32.2	4.6	-1.2

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; Munguti and Buluma, 2010.

Looking at the age specific fertility rates trends from mid'70 to nowadays (figg. 1 and 2) we can see how fertility rates under age 25 remain persistently high and almost stable starting from 1990; for most of the age groups a slight upward is even observed in 1998-2003.

Moving to age profiles, fertility rates reach their higher intensity in 20-24 and 25-29 age groups. The downfall experimented between mid'80 and 1990 is mostly concentrated after the 20-24 age group.

Figure.1 Trends in age specific fertility rates

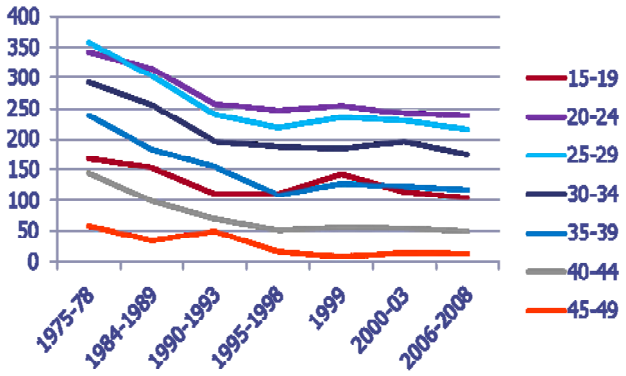
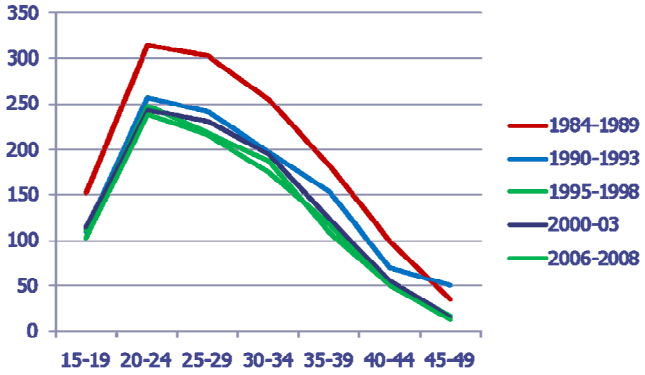


Fig. 2 – Age specific fertility rates from 1984 to 2008.



Fertility by age is considerably higher in the rural areas (5.4 children per woman) than in the urban ones (3.3 children per woman). This disparity is mainly due to favourable factors which are most probably associated with urbanisation (e.g., better education, higher status of women, better access to family planning information and services and later marriage). Regional differentials in fertility are still large, and closely associated with regional disparities in knowledge and use of family planning methods (Opiyo, 2004). Strong regional differences characterize as well the recent declining paths to lower TFRs: the Rift

Valley region has shown the most intensive fall from 5.8 children per woman in 2003 to 4.7 in 2008-09 (Manguti and Buluma, 2010).

In general, we can say that one of the persistent feature of Kenyan reproductive models is a clear presence of fertility differentials by residence, region, education and socio-economic status.

Paths in adolescent fertility (15-19 years of age) reflect those of total fertility as well. In younger ages the drops in the fertility levels are modest between the last two surveys. Data from 2008-9 KDHS continue to confirm that Kenya is one of the countries where adolescent fertility is reported to be among the highest in Africa at the beginning of the XXI century.

International comparisons show the persistence of a critical situation in adolescent fertility (table 2). For the decade 1997-2007 in a general context of wide disparities, Kenya emerges as the country with the lowest decrease in adolescent fertility levels, and still a very high value in 2007. Conversely, the percentage of women 20-24 years old who were married or in union before they were 18 is lower than in other sub-Saharan countries.

Table 2. Demographic indicators of fertility and child marriage. Kenya and other Developing Countries

	TFR 2007	Adolescent fertility rate			Child marriage 1998-2007*	
		1997	2007	Total	Urban	Rural
Developing Countries	2.8	124.3	103.0	36a	22a	46a
CEE/CIS	1.7	21.8	17.4	11	11	13
East Asia/Pacific	1.9	45.8	35.0	19**	12**	25**
Middle East/North Africa	3.0	95.2	67.0	18	12	23
South Asia	3.0	85.9	72.6	49	32	58
Latin America/Caribbean	2.4	133.8	117.7	-	-	-
Sub-Saharan Africa	5.2	105.7	103.5	40	25	48
Kenya	**5.0**	**133.3**	**130.4**	**25**	**19**	**27**
Tanzania	5.2	72.5	70.1	41	23	49
Somalia	6.1	111.5	104.4	45	35	52
Etiopia	5.3	85.5	56.8	49	27	55
Sudan	4.3	191.0	150.0	34	24	40
Uganda	6.5	124.3	103.0	46	27	52

Adolescent fertility rate : Births per 1000 women ages 15-19; United Nations 2010; * Child marriage**:** Percentage of women 20–24 years old who were married or in union before they were 18 years old. ** Excludes China; a excludes China and Nigeria. Sources: UNICEF, 2009; WDI online, 2009.

4. Adolescent pregnancy and fertility.

In spite of the high level of teenage pregnancy in Kenya, there is a paucity of empirical research on the causes of this phenomena, as in general in all African countries (Were, 2007). In fact, according to Kiragu et al. (1998), adolescent reproductive health in Kenya has now become an even greater priority at a policy level, as attested to by the recent sectional papers on AIDS as well as the national Information, Education, Communication, and Advocacy Strategy.

4.1 The identification of the target group

In the past decades the issue of adolescent pregnancy has been ever more perceived as a problem. The health consequences of early fertility have drawn the attention of researcher as well as policy makers, both in developed and in developing countries (Makinson, 1985; Gage, 1998; Ocholla-Ayayo, Wekesa and Ottieno, 1993; Singh, 1998; UNICEF, 2009; Villarreal, 1998; Zabin and Kiragu, 1998).

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 (Villarreal, 1998).

It is important to define the concept of adolescence, usually considered as the preparation time for entry into adulthood.

In this paper we need to define also the concepts of “early adolescence” and “early adolescent childbearing”.

As pointed out by Bledsoe and Cohen (1993), understanding why particular patterns of adolescent fertility emerge in Africa is not an easy task. Most basic is the task of identifying our subject population: Who is an "adolescent"? What is a "youth," a "teen," or a "schoolgirl"? The studies we rely on are frequently inconsistent in their terminologies.

Studies on adolescents usually use a five-year age range, 15 to 19, as their primary source of data. Even within the international community there is no ready and straightforward agreement[4]. Adolescence itself is a

[4] For example, the United Nations Convention on the Rights of the Child covers all children, defined as anyone under the age of 18. The International Labour Organization (ILO)’s Minimum Age Convention (No. 138) distinguishes between acceptable “child

cultural construct that diverges across situations and contexts, and in many parts of developing world is a controversial notion (Villarreal, 1998).

Due to the difficulties of providing a meaningful definition, for the most part, the adolescents are defined as all of those belonging in a particular age group (whose limits vary), in part due to the configuration of available data. This can be considered a weak definition from a cultural point of view. The classical 15-19 grouping, demographers tend to use, hides enormous heterogeneity from the health, social and psychological points of view.

If adolescence is a cultural construct, adolescent pregnancy is only one aspect which is especially sensitive to cultural context. The meaning assigned to teenage pregnancy varies among different cultures, so do its implications and consequences.

Young mothers are difficult to study, in part because they have been a poorly defined group. The youngest teenage mothers have been catalogued into a variety of age groups, ranging from younger than 18 years to 13 years or younger. The inconsistencies in defining early adolescent childbearing have made difficult comparisons across studies. Literature provides us several definitions of "early adolescent childbearing", definite as giving birth at 15 years or younger (Phipps and Sowers, 2002), or at 17 years or younger (Oxford, Lee and Lohr, 2010). The meaning of a pregnancy for an unmarried 15-17 year old, for example, is entirely different from that for a 19 year old married woman.

When setting up programmes or formulating policy, it is important to have an appropriate definition of their target group, and in the case of adolescents this definition is context-dependent (Villarreal, 1998).

However, the fact that adolescence itself is a cultural construct that varies significantly from society to society and across time, has to be kept in mind when designing policies and programmes directed to adolescents, for needs vary with the different contexts and so should approaches.

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labor" (under the age of 15) and "child work" that may contribute to a child's healthy development. Light work may be allowed for children 12 and older (Diallo *et al.*, 2010). The World Health Organization (UNICEF and WHO, 1995), which has used the terms "adolescent" for those aged 10-19, "youth" for those aged 15-24, and "young people" for those aged 10-24.

Early motherhood has been the subject of a growing number of studies, research projects and intervention programs in Africa. African women in general marry at a much earlier age than their non-African counterparts, leading to early pregnancies (Locoh, 2008). Early pregnancy, when within marriage, is rarely seen as a problem. Pregnancy out of wedlock, on the other hand, is perceived differently depending on the social environment.

Cultures also define who is entitled to access reproductive health services, sometimes by social control and sometimes by laws, policy restrictions or other measures. In many African societies only married women have access to family planning and other health services, and unmarried pregnant adolescents are particularly affected. Pregnant adolescents face far more health problems than older women, particularly single girls who often receive less prenatal care (Bledsoe and Cohen, 1993; Loch, 2008).

In Kenya, where adolescent fertility is reported to be among the highest in Africa, sexual custom varies greatly among ethnic groups, with differing values on virginity, consequences of premarital pregnancy, practice of genital mutilation, level of knowledge and use of contraception, among other characteristics (Villarreal, 1998).

Like other vulnerable groups, adolescent mothers as youths (prior to becoming parents) are exposed to a greater number of risk factors that covary with poor adulthood outcomes, including poverty and correlates of poverty (Oxford, Lee and Lohr,2010).

4.2 Adolescent fertility trends in Kenya.

Among the 1856 women aged 15-19 years at the 2003 DHS survey, 445 (24%) have already begun child-bearing. Sixty-four percent of them are currently married, and the percentages raise as age increases (tab. 3).

Table 3 - Women ages 15-19 at the 2003 KDHS survey who have begun child-bearing.

Age	Women already mothers		Women pregnant with first child		Women who have begun childbearing*			Total num. of women 15-19
	Num.	% married	Num.	% married	Tot.	% on total women	% married	
15	8	62.5	6	50.0	14	4.0	57.1	351
16	19	42.1	11	54.5	31	8.6	46.7	360
17	44	63.6	15	60.0	61	16.7	62.7	365
18	121	57.9	31	80.6	159	40.1	62.5	397
19	151	70.2	25	56.0	180	47.5	68.2	383
15-19	343	63.3	88	64.8	445	23.9	63.6	1856

*We include here also women without any live birth or not pregnant at the survey, who experienced a terminated pregnancy. Source: our elaborations on DHS data, weighted data.

Data from the 2008-09 KDHS show a modest decrease in percentages of younger women who have begun childbearing by exact age 20. In the whole age-group the percentage decreases from 23.9 to 17.7 (Munguti and Buluma, 2010).

In both 2003 and 2008 surveys regional differences are particularly striking (tab. 4). Rift Valley, North Eastern and Coast Regions show, by far, the highest rates of adolescent childbearing; the levels are lower in Eastern and Central regions. It is interesting to note that Rift Valley, North Eastern and Coast Regions present also the highest illiteracy rates, with a worrying situation for females (Kyalo Ndeng'e, 2004). Conversely data does not show a pronounced differential in teenage fertility between urban and rural context either in 2003 or 2008-09 KDHS.

Table 4 - Women ages 15-19 who have begun child-bearing by region. 2003 KDHS

Region	% women who are already mothers	% women pregnant with first child	% women who have begun child-bearing	Total number of women 15-19
Nairobi	15.2	4.2	19.4	144
Central	13.5	1.7	15.2	230
Coast	23.5	6.2	29.7	145
Eastern	11.0	3.7	14.7	316
Nyanza	21.2	6.0	27.2	325
Rift Valley	25.6	5.3	30.9	391
Western	16.4	4.8	21.2	268
North Eastern	21.0	7.9	29.0	39
Kenya	18.5	4.7	23.2	1858
Country number cases	344	88	431	

Source: our elaborations on DHS data, weighted data

In table 5 concise data on adolescent fertility are included. Out of the 8,195 women interviewed in the 2003 KDHS, 3,565 (43.5%) gave their first birth before their twentieth birthday. Among them, 345 became mother before the age 15, when themselves were still children.

Data allow us to appreciate differentials and changes in early motherhood over time and between generations. Only slight changes seem to be verified. Among women aged 40-49 years at the time of the survey, the proportion of those who had given first birth by exact age 20 reaches 57%, compared with 44% of women aged 20-24.

The proportion of women without children at age 20 declines in the oldest cohorts. Data show that the percentage of women belonging to the oldest generations who Geographical location was considered at district level. first birth by exact age 16 is almost twice that of more recent generations. This result can be mainly linked to the highest level of education of younger Kenyan women. As expected, higher education is strongly associated with lower fertility (Kyalo Ndeng'e, 2004; Gupta and Mahy, 2003). Notwithstanding the proportions having their first birth by age 17 and 18 are quite similar for women aged 25 or more at the survey.

This observation is consistent with a constant or slightly rising age at first birth. Median age at first birth has largely remained the same or has

slightly increased[5]; the same trend emerges for the age at first marriage (Opyio, 2004).

Table 5 - Among all women, percentage who gave first birth by exact age, and median age at first birth, by current age, Kenya 2003.

	Percentage who gave first birth by exact age						Women (%) who have not given birth by exact age 20	Total number of women	Median age at first birth
Current age	15	16	17	18	19	20			
15-19	1.5	-	-	-	-	-	-	1856	-
20-24	3.4	5.6	13.1	21.4	32.1	44.1	55.9	1691	-
25-29	4.4	8.4	14.0	25.0	36.4	48.4	51.6	1382	20.1
30-34	5.7	10.9	19.4	30.7	42.7	54.9	45.1	1086	19.6
35-39	6.1	11.4	18.9	27.8	39.0	50.8	49.2	871	19.9
40-44	5.7	10.6	18.6	31.5	44.6	57.0	43.0	788	19.4
45-49	7.5	14.7	22.2	33.5	47.1	57.1	42.9	521	19.3
N. of women	345	311	533	764	839	771		8195	

Sources: our elaborations on KDHS data; weighted data.

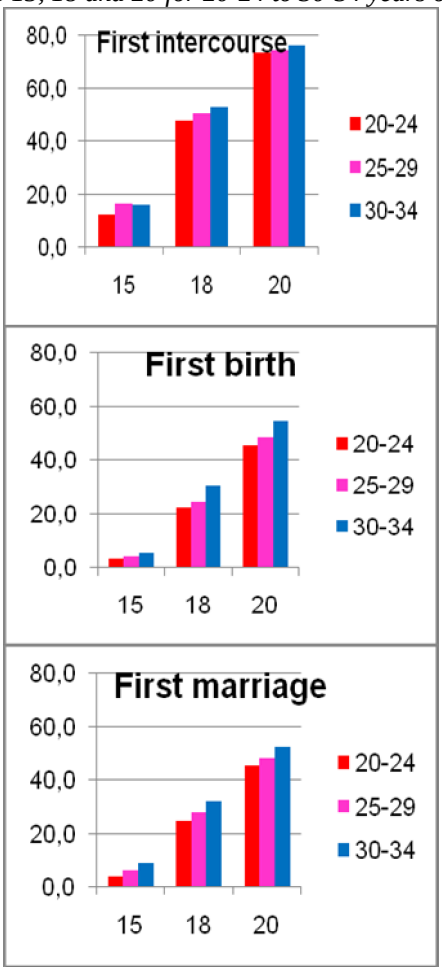
In table 5, 18 years of age appears as the inflection point at which the percentages of women who have given first birth by exact age appear to stabilize at higher levels, ranking over 20-25 and 33 per cent for all the cohorts. Taking this information into consideration, we propose that the Kenyan age group definition for "early adolescent childbearing" be established as 17 years and younger. Ages 18 and 19 can be considered as "the older teenage years"[6].

To better understand the persistence of a strong tendency to relative high level of fertility in teen ages it is necessary to link the first birth to other milestone events that usually come together: the sexual debut and the first marriage (figure 3).

[5] Median age at first birth for women age 25-29 shows a decrease to 19.8 years in 2008-09. As stressed by Munguti and Buluma (2010) caution should be exercised in interpreting these slight changes, as they are likely to be statistically insignificant.

[6] This definition is also proposed in the global review on adolescent childbearing in developing countries carried on by Singh (1998).

Figure 3 - Age at first intercourse, at first marriage and at first birth by exact age 15, 18 and 20 for 20-24 to 30-34 years old women at the interview



As observed for first birth before age 20, the percentage of girls experiencing first intercourse and first marriage by exact ages is similarly declining for last cohorts. The drop is especially evident for the last cohort 20-24 in teenage (<18 year of age). The down falling trend in different dimensions of the transition to adulthood constitutes a clear sign of a positive evolution of female behavior towards a more safe life.

Notwithstanding the rate of decrease is still too much low if compared to the speed of other African countries.

5. Individual, household and community level effects on teenage motherhood.

5.1 From first sex to first pregnancy during adolescence

Adolescent sexual behaviours depend on both cultural norms, values, and opportunity organizations, and early sexual experiences are a key marker of the transition from childhood to adulthood.

In this context, we consider of special interest to detect specific evolutions of the age at sexual debut giving that age at first sex is a key factor of exposure to risk of pregnancy during adolescence.

The timing of first intercourse is usually linked to the social and cultural atmosphere the woman lives in the household and in the village, and adolescent sexual behaviours depend on cultural norms, values, and opportunities. It is widely recognized that early initiation of sexual activity often induces negative sexual, psychological and reproductive health outcomes as unwanted pregnancies and sexually transmitted diseases (Zaba *et al.*, 2004; Kabiru et al., 2010).

Table 6 describes trends in transition to first sex by socio-demographic categories. Median and quartile ages at first sex are life table measures. The input data consist of the ages of respondents at the survey, whether or not they ever had first sexual intercourse and, in case, recalled age at first sex. The failure event is represented by reported age at first intercourse, and women that never had sex are censored at their age at the survey[7] .

[7] Higher the age of the woman at the survey, higher the risk that recalled age is not exact.

Table 6- Median age at first sex° by women's socio-demographic characteristics. 2003 Kenya DHS

	Quartile			N. of cases (*)			Mean age
	25	Median age	75	N. women	Censored	% censored	
All women	20	18	15	8176	1398	17,10	18
Urban	21	18	16	2742	484	17,65	19
Rural	19	17	15	5434	914	16,82	18
Age at survey							
15-19	-	18	16	1818	1058	58,2	17
20-24	20	18	16	1706	274	16,06	18
25-29	20	18	15	1393	50	3,59	18
30-34	20	17	15	1113	11	0,99	18
35-39	19	17	15	857	3	0,35	18
40-44	19	17	15	779	1	0,13	17
45-49	19	17	15	510	1	0,20	17
Region							
Nairobi	21	19	17			19,02	20
Central	20	18	16			18,61	19
Coast	20	17	15			16,67	18
Eastern	19	17	15			17,84	18
Nyanza	18	16	14			12,41	16
Rift Valley	20	17	15			15,46	18
Western	19	17	15			19,37	17
North Eastern	20	17	15			17,47	18
Reached education							
No educat. /preschool	18	16	14	1287	112	8,7	17
Primary	18	17	15	4341	743	17,12	17
Secondary	21	19	17	1970	1970	22,59	19
Higher	24	21	19	578	578	16,96	22

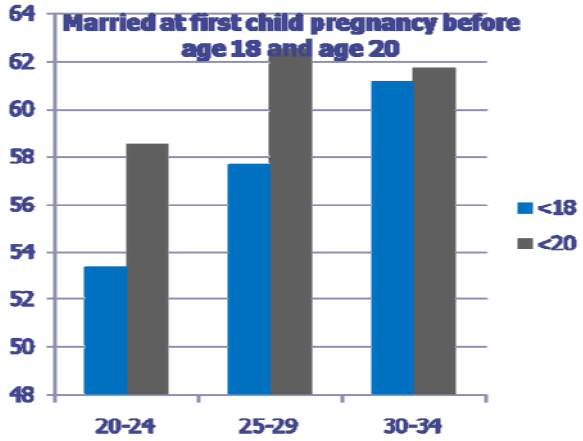
(*) Unweighted figures as deriving from Kaplan-Meier output.
° Age at first intercourse was declared by women. If woman stated "at first union" we have considered age at first marriage. Censored cases are represented by women that had not experienced sex yet. Results from Kaplan-Meier estimates.

As stated above it is possible to observe a rise in the age at sexual debut over time and cohorts in Kenya, nevertheless the 15-19 age group show the same level of the 20-24 age group. As stated by the table, 25% of women aged 15-24 years have already experienced a first sexual activity by age of 16. There is a wide difference in age at first sex by Region of residence at the survey and by attained educational level. We

can point out the case of Nairobi region as well as higher educated groups: in both situations the median ages rise to higher levels (19-21 years).

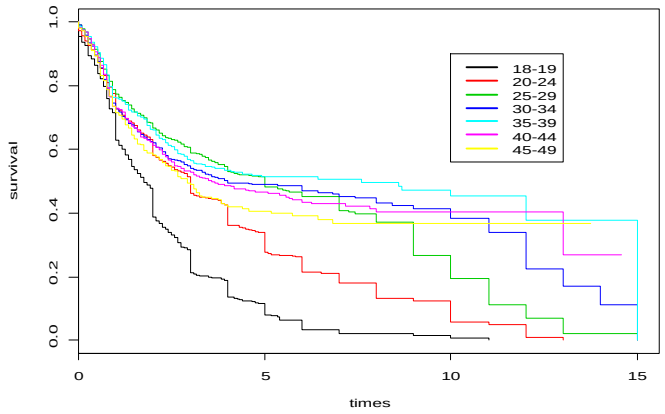
Another important variable linked to childbearing is the marital status of the mother at the birth of her child. Despite the observed increase of the age at first marriage and the slight decline in the percentages of teen age pregnancies along the cohorts, if we consider woman's married status at first pregnancy we observe that the proportion of out of wedlock births is rising mainly for women beginning a first pregnancy before 20 or 18 years of age (figure 4).

Figure 4 - Percentages of women married at first pregnancy before age 18 and 20 by age group at the interview.



The Kaplan-Meier estimates of the distance between the age at first sex and the age at first pregnancy before age 18 clearly highlight that the interval between first sexual intercourse and first pregnancy is narrowing among younger cohorts. This means that there is an anticipation of the first pregnancy for those who experienced first sex in their teens (figure 5).

Fig. 5 Kaplan –Meier curves of the distance between first sex and first pregnancy for women experiencing a first pregnancy before age 18 by age group at the interview



The descriptive analysis performed till now support the hypothesis that in a general trend of slow increasing ages at the milestone events connected with childbearing, adolescent fertility seems mostly related to early sexual experiences, more and more released from a recognized union.

In this view and stated the persistence of a relative high level of the phenomenon, teen age childbearing could constitutes a serious social problem needed to be managed with specific social and welfare policies.

In order to better understand the interrelations between teen age fertility and the more general social and economic context we estimate the risk of a first pregnancy (whether or not ending in a live birth) in the next analysis. Our sample is constituted by women ranging from 18 to 49 years old who have had a first sexual intercourse and eventually experienced a first pregnancy before the age of 18.

5.2 Teenage transition to first pregnancy

The risk of a pregnancy before the age of 18 is modeled by a Cox proportional duration model. In such model the risk of having first

pregnancy depends on the span between first sexual intercourse and first pregnancy assuming that a baseline risk is proportionally modified by covariates effect.

The baseline risk, that could be interpreted as the risk for a reference woman with all covariates sets at reference category, does not have a specified parametrical form while covariates are exponentially connected to this baseline. Such structure identified the model as a semi-parametric duration model.

Table 7 shows estimated coefficients with associated standard errors and statistical significances. At first glance we observe a rise of the risk for younger cohorts compared to those of women 35 years old and more with the strongest differences interesting women less than 24 years old.

Table 7 - Loglikelihood estimation of the risk having a first pregnancy before age 18.

Parameter		Parameter estimates	S.E.	Pr > Chi^2
Age group (ref. 45-49)	15-19	1.034	0.088	<.0001
	20-24	0.522	0.081	<.0001
	25-29	0.157	0.083	0.0578
	30-34	0.203	0.084	0.0152
	35-39	0.010	0.088	0.9106
	40-44	0.063	0.086	0.4685
Region (ref. Central)	Nairobi	0.307	0.093	0.0010
	Coast	0.170	0.090	0.061
	Eastern	-0.107	0.074	0.144
	Nyanza	0.291	0.074	<0.001
	Rift Valley	0.250	0.07’	0.0004
	Western	0.227	0.078	0.0037
	North Eastern	0.144	0.157	0.0241

Table 7- continuation

Parameter		Parameter estimates	S.E.	Pr > Chi^2
Migration (ref. No migr.-countrys.)	from countryside to city	0.011	0.066	0.8621
	from large city/town to countryside	0.076	0.059	0.200
	from abroad	-0.282	0.139	0.0416
	no migration-city	-0.046	0.080	0.5598
Completed years of education (ref. < 7 years)	8-11 years	-0.043	0.106	0.6816
	>12 years	-0.237	0.161	0.141
In union at 1st sex (ref. Yes)	No	-0.482	0.057	<.0001
In union at 1st pregnancy (ref. Yes)	No	0.567	0.041	<.0001
Use and knowledge of contraception (ref. Never used.)	Knows modern methods-never used	0.022	0.062	0.7242
	knows modern/begin use before 1st child	-0.030	0.086	0.7285
	knows modern/begin use after 1st child	0.241	0.064	0.0002
Ever had abortion (ref. No)	Yes	0.108	0.054	0.0455
Student at age 15 (ref. No)	Yes	-0.437	0.104	<.0001
Mean n° of children per woman in PSU		0.056	0.025	0.0241

A difference in the risk of adolescent pregnancy is observed across Kenyan provinces with Nairobi, Nyanza, Rift Valley and Western regions

characterized by statistically significant higher risks when compared with Central region.

Education plays an important role: women enrolled in a school program at the exact age of 15 are 60% less likely to get pregnant before 18 than not enrolled women. At the same time women who spent more than 7 years at school have a lower risk of pregnancy before the age of 18 even if the effect is not statistically significant. Attending school at the age of 15 considerably reduces the risk of pregnancy: the enrolment at this age represents an important turning-point since it suggests a positive social situation and a good access to more information sources on maternal health care.

When partnership status is considered, is noteworthy that being in a union at first sexual intercourse decreases the risk of having a pregnancy before age 18 and this could be related to the fact that more and more teenage pregnancies occur out of a legal union.

Using survey information about knowledge and use of contraceptive methods we construct a unique variable distinguishing essentially women who know and use methods from women who don't use it even if they know how to avoid a pregnancy. The unique statistically significant coefficient shows that, compared with women that never used methods, the knowledge and the use of contraception has a positive and significant risk for those women who know modern contraceptive methods but start to use them only after the first pregnancy.

Among considered variables, the mean number of children at PSU levels highlights the importance of the context on fertility behaviour: the higher the mean number of children per PSU is, the higher the risk of having a first pregnancy in teen age.

5.3 Teenage antenatal and delivery care

The differences in the health seeking behavior and in the use of antenatal and delivery services are further investigated.

The study of the effect of individual and community covariates involves all young women - aged 15-24 at the survey - experiencing a pregnancy before age 20 in the last 5 years preceding the survey.

Data on maternal health reported in KDHS 2003 refer only to the last pregnancy in the 5 years preceding the survey: 635 young women are then included in this group.

We want to assess the importance of the availability, accessibility and typology of health care services, using a hierarchical multilevel linear regression model.

The purpose is to understand the individual and community characteristics which affect the way pregnant adolescents use health services during pregnancy and at delivery.

"The use of health care services" is a multidimensional phenomenon; it could be regarded as the number of visits a person require in a specific period or the type of visits he has. The required visit can be dedicated or not, can be taken in a high-quality hospital and, in case of a specific event like pregnancy, it is important to verify if the recommended timing for a right monitoring of risk related to pregnancy is followed. Also for the delivery of baby we can hypothesize various aspects: the place (home or any organized structure), the type of assistance (the presence of a doctor, a midwife and so on…).

In the attempt to catch this multidimensionality we select a set of variables collected in the survey and we use them in a correspondence analysis to obtain a scale variable, represented by the individual score. Active variables we consider to construct the score and their percentage distribution are included in table 8.

The estimated factor explains a large amount of the variability and indicates the level of the safety and care of pregnancy on a scale from negative to positive values.

Maternal health services are provided by facilities at every level of the Kenyan healthcare system.

As recently stated by The World Bank (Montagu *et al.*, 2005, Barnes *et al.*, 2010), among others, the private sector is an important source of care even among the poor.

Table 8 – Percentage distribution of women aged 15-24 at the survey, who gave birth before age 20, by use of maternal health care services and delivery assistance.

Pregnancy		%
Did you see anyone for antenatal care	No attendance for pregnancy care	12,9
	Doctor for pregnancy care	8,7
	Doc &.Midwife for pregnancy care	6,9
	Midwife for pregnancy care	66,1
	Traditional att. for pregnancy care	5,4
Where did you receive antenatal care	Home	4,2
	Governmental structure	65,1
	Private structure	17,8
	No antenatal care	12,9
Months of pregnancy at fist antenatal care	<4	12,6
	4-6	52,9
	7+	20,0
	No visits	14,5
N° of antenatal visits	1	6,9
	2-4	51,5
	5-10	25,0
	11+	2,0
	0	14,5
Weighted during pregnancy		77,5
Height meausured		26,9
Blood pressure measure		69,1
Urine sample given		41,3
Blood sample given		50,9
Any information about AIDS virus		25,2
Any information about breastfeeding		32,3
Told about the signs of pregnancy complications		30,4
Tetanus injection given		79,5
Iron tablets or syrup given		45,2
Drugs to prevent malaria		19,4

Table 8 - continuation

Delivery		%
Delivery assistance	No attendante for delivery	3,9
	Doctor	14,5
	Doc &.Midwife	
	Midwife	38,4
	Traditional att./relatives and friends	43,2
Place of delivery	Home	49,1
	Public structure	36,7
	Private structure	13,9
	Other	0,3
	Total	
Caesarian section		5,2

The way an adolescent chooses to take care of her health and baby surely depends on a number of characteristics as stated by the literature we recall in paragraph 4, but, as it is natural to think, sometimes this decision can be forced by the surrounding situation. In a very simple thought the first condition to use a facility is to have it in an easy way or, in other words, to have the possibility to reach it.

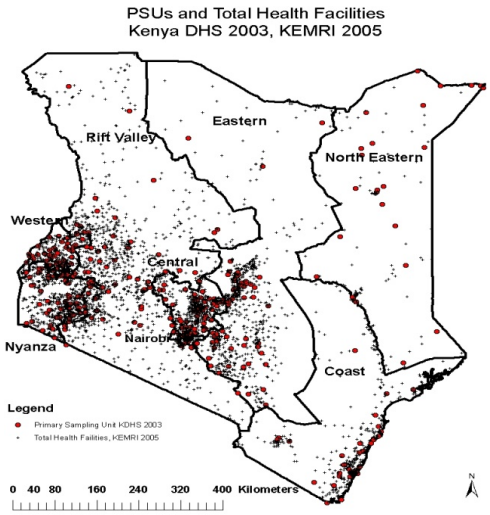
To incorporate some information about the location of the health facilities in our model, we structured it as a multilevel one where the second level of analysis is represented by the administrative district.

As introduced, DHS data set collects also Global Positioning System locators at cluster level and informs us about the specific geographical position of the primary sampling units (PSUs) where each woman lives. This geographical position represents then the position of all women living in the PSU.

In addition, the Kenya Medical Research Institute (KEMRI)-Welcome Trust Research Programme provides the list of Kenya Health Facilities for 2005, including also the specific geographical position of any facility. Map shown in figure 4 refers to both the diffusion of the PSU and the health facilities throughout Kenyan country. As we can see diffusion of

health facilities is very dissimilar from region to region and, in a certain way, is influenced by territorial physical structure as mountain.

Figure 4- PSU (KDHS 2003) and health facilities(2004-2005) in Kenya.



Using the geographical position of both health facilities and PSU, we calculate a set of variables representing the minimum distance between the PSU center and any type of health facilities in the district. The same measure is also calculated considering only the health facilities specialized in maternal care. Other variables are represented by the number of any type of health facilities per district and by the number of public and private health facilities per district.

Such type of variables are useful to take into account not only individual variability in the access to maternal care among young mothers, but also the variability due to the medical facility distribution in the district they live in. The diffusion of health facilities throughout the country can be considered as one of the most important community-factor (Stephenson *et al.*, 2006).

In a general way, if we consider a level higher than the individual one, we can recognize and test for the existence of a variability in the analyzed

phenomena related to characteristics, observed or not, of each level of the hierarchy.

Multivariate analysis is therefore carried out by using multilevel modeling techniques. Multilevel models allow the identification of clustering in the outcome by the specification of a random effect part in the model, which represents the extent to which the variable of interest varies between each level of the hierarchy. The multilevel strategy adjusts model parameter estimates for the hierarchical nature of the data and corrects the standard error of the estimates to allow for clustering structure (Hox, 2002).

Statistics test related to the specification of the district level reveal the existence of a significant part of the total variability associated with this territorial level.

The general form of the used model is as follow

$$Y_{ij} = \beta_{0j} + \beta X_{ij} + \varepsilon_{ij} \quad , \quad \beta_{0j} = \gamma_0 + \gamma_{01} Z_j + u_{0j}$$

where Y_{ij} is the response variable for a specific women i in the jth district; X_{ij} are the covariates and $\beta_1 ... \beta_k$ are the usual, fixed, regression parameter estimates. The intercept coefficient β_{0j} is assumed to vary across district and it's variation is explained by explanatory variable at district level, Z_j with effect expressed by fixed coefficient γ_{01}.

The quantities u_{0j} and ε_{ij} are the residual at district and women level. These residual errors are assumed to have zero mean and to be independent with, respectively, variance term $\sigma^2_{u_0}$ and σ^2_e.

Accordingly with this formulation the effect of individual and district level variables are assumed to be constant across women but the average of the index on use of health facilities during pregnancy and delivery is predicted at district level using covariates Z_j by the intercept β_{0j}.

The intercept-only model $Y_{ij} = \gamma_{00} + u_{01} + \varepsilon_{ij}$ is useful as a null-model that can be used as benchmark in comparison with other models. The intercept-only model does not explain any variance in Y but just

decomposes the variance into two independent components. This decomposition allows the calculation of the proportion of variance in the observed outcome explained by the grouping structure of the population that is the proportion of group level variance compared to the total variance:

$$\rho = \frac{\sigma_{u_0}}{\sigma_e}$$

While the variance of the intercept is a reflection of the heterogeneity between clusters, the intracluster coefficient represents the ratio of the between-clusters variance to the total variance and is a measure of the level of homogeneity within cluster. As a result, when the intracluster coefficient is low a high portion of the variance is due to within-cluster variation.

In order to obtain more stable results, districts with less than 15 women have been aggregated to the nearest one belonging to the same region.

Tables 9 presents fixed coefficient estimation results for individual and community variables selected in the model while table 10 shows random effect estimates along with the percentage of district level variability attributable to district level variables.

Table 9 – Fixed effect estimates for the use of maternal health care during pregnancy and delivery.

Variables		Individual mod. (IL)	District models			
			DM1 (IL+DHF)	DM2 (DM1+ DNC)	DM3	DM4
Individual level variab.	Ref. label	Coeff. (*st.error*)	Coeff. (*st.error*)	Coeff. (*st.error*)	Coeff. (*st.error*)	Coeff. (*st.error*)
Years of education	0-5					
6-9		0.295 (*0.078*)***	0.274 (*0.079*)***	0.253 (*0.079*)***	0.251 *0.079*) ***	0.250 *0.080*) ***
10+		0.388 (*0.084)***	0.369 (*0.084*)***	0.344 (*0.084*)***	0.341 (*0.084*)***	0.341 (*0.084*)***
Marital status	Not marr.					
married		0.065 (*0.059)*	0.071 (*0.059*)	0.077 (*0.059*)	0.078 (*0.062*)	0.078 (*0.062*)
Desirability of pregnancy	Then					
Wanted later		-0,1036 *(0.059)*	-0,099 *(0.058)*	-0.093 (*0.057*)	-0.093 (*0.057*)	-0.092 (*0.058*)
Wanted no more		-0,1166 *(0.064)*	-0,110 *(0.064)*	-0.103 (*0.064*)	-0.103 (*0.064*)	-0.105 (*0.064*)
Work conditions	Doesn't work					
Work at home		0.172 (*0.056)***	0.162 (*0.057)***	0.161 (*0.057)***	0.163 (*0.056)***	0.163 (*0.057*)***
Work outside home		0.128 (*0.059)***	0.119 (*0.060)**	0.113 (*0.060)**	0.111 (*0.060)**	0.112 (*0.060*)*
Household level variab.						
Household's wealth index	Richest					
Poorest		-0.339 (*0.086)***	-0.337(*0.088)***	-0.293(*0.088)***	-0.289(*0.088)***	-0.288(*0.088)***
Poorer		-0.233 (*0.079)***	-0.228(*0.079)***	-0.197(*0.079)**	-0.191(*0.080)**	-0.195(*0.080)**
Medium		-0.143 (*0.080)***	-0.137(*0.080)**	-0.116(*0.079)*	-0.113(*0.080)*	-0.115(*0.081)*
Richer		-0.112 (0.078)	-0.108(*0.078)*	-0.101(*0.077)*	-0.100(*0.077)*	-0.101(*0.077)*
District level variables						
Distance from health facility° (DHF)	> 20 Km					
0-10 km			0.168(*0.031)***	0.141(*0.058)***	0.153(*0.062)***	0.155(*0.057)***
10-20 km			0.172(*0.034)***	0.122(*0.086)**	0.122(*0.076)**	0.112(*0.046)**
District mean numb. of children 0-5 years (DMNC)				-0.174(*0.061)***	-0.162(*0.065)***	-0.160(*0.070)***
District human poverty index (DHPI)					-0.093 (*0.055)**	-0.090 (*0.058)**
Poor access to qualified doctor (pop.%) (PAQD)						-0.345 (*0.128)**
Constant		-0.331(*0.114)***	-0.419(*0.128)***	0.238(*0.199)*	0.231(*0.189)*	

Model IL considers only Individual Level variables and gives evidence of a strong effect of educational level measured as completed years of educations. Education improves the propensity to a positive maternal health care behaviour during pregnancy and delivery. This variable can express that women with more than 5 years of education have more probability to understand the importance of care and to have better access to information sources.

Desirability of the pregnancy shows that desired pregnancies are more likely to receive appropriate maternal care even if estimated coefficients are non statistically significant.

Working conditions, a proxy of women empowerment, have a strong positive effect on improving the way women choose to have care of themselves during pregnancy and at the delivery of the baby.

Rural women show lower chances of a positive behaviour but the rural-urban residence category loses importance when in the model is introduced a family characteristic i.e. the wealth index. This last indicator of social-economic condition of the household shows that women belonging to first, second and third quintile (from poorest to medium) are less likely to adopt a positive behaviour compared with women belonging to the richest quintile. The study of the relationship between urban-rural residence and the household wealth index quintile suggests the importance of having a certain socio-economic status to improve positive health behaviour also in a general context of lower opportunities for rural women.

Marital status results less important than expected, even if married women show a positive coefficient indicating a possibly better behaviour for women in legal union.

The null intracluster coefficient points out that 15.5 percent of the total variability is allocated at district level while in model IL, so after including all considered women's characteristics, this coefficient declines to 8% but is still significant. Although some of the between-cluster differences are attributable to women characteristics, unexplained variation between district remains.

Models from DM1 to DM4 report the inclusion of community variables in model IL in the attempt to catch district level variability.

An important contextual factor is represented by the distance between the PSU centre of women residence and the nearest health facility

dedicated to maternal health. This variable clearly indicates that women living closer to a maternal health facility are more likely to use it and to assume a conscientious behaviour in childbearing. This distance variable reduces of about 12% the district estimated variance while other constructed variables related merely to the presence (i.e. number of facilities per district) do not result to be influent in the way women seek care during pregnancy and at delivery.

An important contextual variable is represented by the mean number of children less than 5 years old per woman in the district; table 9 shows that when this number is high women are less likely to have positive maternal care behaviour. This relation could reflect the fact that first child is more likely to be cared than followers since "women at all higher parities were less likely to have delivered their last child in a health facility in all countries" (Stephenson *et al.,* 2006).

Districts were the number of children per woman is high could be characterized by globally lower access to health facilities. This variable has a strong impact on district variance estimation slowing it down of about 26 percent.

Table 10 – Percentage distribution of women aged 15-24 at the survey, who gave birth

	District level	
	VAR	• Var(%)-IL
Null model	0.061***	--
IL = Individual Level	0.027***	--
DM1 = IL + DHF	0.023***	-12.2
DM2 = DM1 + DNC	0.018**	-36.1
DM3 = DM2 + DHPI	0.017**	-3.5
DM5 = DM4 + PAQD	0.016*	-2.3

Model DM3 adds human poverty index at district level as community variable. This variable works as expected reducing the likelihood of use health care services during pregnancy and delivery by young women while the percentage of related district variability is small.

Last model proposed in table 9 considers another community variable related to health facilities' access: the percentage of people in the district who don't have access to a qualified doctor. Women living in districts where this percentage is high have less probability to assume a healthy

behaviour during pregnancy and delivery. An incorrect or poor healthy behaviour can be induced also by the lack of a good quality assistance. In general, women with the possibility to reach a qualified doctor have more chances of positive outcome in case of risky pregnancy or delivery. As for human poverty index the variation in district variability due to this variable is not so important and the remaining unexplained part is still significant.

6. Conclusions

Despite a rise in age at first sexual intercourse, first marriage and first child, our provisional results highlight the persistence of some critical aspects concerning fertility behaviours of younger generations of Kenyan women.

More specifically the proportion of out of wedlock pregnancies is rising in younger generations together with a narrowing of the distance between first sex and first pregnancy.

The transition to first pregnancy confirms a higher risk for younger cohorts. The number of years spent in education and student status at the age of 15, knowledge of contraception, mobility and marital status are the most important explicative variables. The mean number of children at PSU level highlights the importance of the context on fertility behaviour.

In a framework of general spreading of the use of maternal health care many differences persist.

At community level, the variance of the use of health facilities during pregnancy and delivery can be explained by the distance to the nearest maternal dedicated health facility, the possibility for the whole population to be assisted by a qualified doctor and the general level of wellness in the community women lives in, among other things. As stated for the timing of the pregnancy before age 18, the fertility behaviour context plays an important role about the aware use of the health facilities.

This study has shown that the propensity of a woman to take care of herself and her baby during pregnancy is associated with a wide range of socio-economic and demographic factors and confirms some findings of other studies. However, these factors do not explain all the variability in

the attention paid to pregnancy and delivery by adolescent women since significant unexplained variation exists among teenagers and districts.

Our results underline once more the necessity for developing countries to implement policy strategies and programs specifically addressed to women and maternal health care.

Our intention is to verify these results for 2008-2009 KDHS data together with a better specification of geographical variables, taking into account for example road infrastructures and orographic elements of Kenyan geography.

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