Effect of Mother's Education on Child Stunting in the Urban Slums of Nairobi

Abstract

Background: Poor health and poor nutrition are more of a characteristic of children living in the urban areas than of children in the rural areas. As such, the urban advantage as a protective mechanism is being eroded for young children. In East Africa, 48% of children under-five are stunted while 36% are underweight. This study sought to determine effect of mothers' education on child stunting (n=5,156). **Methods:** Data is from a maternal and child health project nested within the Nairobi Urban Health and Demographic Surveillance System (NUHDSS). We used binomial amd multiple logistic regression to estimate theb effect of education in the univariate and multivariate models respectively**. Results:** Results show that close to 40% of children in the study are stunted. Maternal education is a strong predictor of child stunting but the association is mediated by other factors at maternal, household and community level. These factors, including child birth weight, and gender, mother's marital status, mother's health knowledge and health seeking behaviour, are also independently associated with stunting and, alter the significance of the relationship between maternal education and stunting. Household socio-economic status and community level factors also alter the effect of maternal education on child stunting but they are not significantly associated with child stunting when other factors are controlled for.

Conclusion: Overall, mothers' education is important as far as it imparts health knowledge to women and alters their health seeking behaviour, which leads to better child nutrition.

Keywords: Education, child stunting, health, urban slum, Kenya

Background

Malnutrition, particularly stunting is still a severe public health problem in Sub-Saharan Africa (Stephenson, Latham, & Ottesen, 2000). For example, about 35% of preschoolers are stunted,

while 29% are underweight in Sub-Saharan Africa (Leenstra et al., 2005). In addition, the Fourth Global Nutritional Report estimates that in East Africa 48.1% of children under-five are stunted while 35.9% are underweight (ACC/SCN, 2000). Malnutrition has both short term and long term adverse ramifications. In the short-term for the individual, it is associated with ill health and mortality. (World Health Organization, 2002). For instance, 35 % of under-five are stunted (Leenstra et al., 2005). In the long-term, it leads to impaired cognitive development, poorer educational achievement and economic productivity (Victora, 2008; Grantham-McGregor, 2007).

Rapid growth in urban population has been experienced in the entire world in recent decades. For instance, the population in cities in the developing countries was 2 billion in 2000 and is expected to rise to about 4 billion in 2030 (United Nations 2004). This rapid and uncontrolled urbanization in many Sub-Saharan African countries, Kenya included has resulted in a vast majority of people living in slum conditions. The slums are characterized by overcrowding, filth, inadequate water supply, poor drainage, and poverty; leading to poor health for the urban dwellers (Zulu et al., 2002, APHRC, 2002; Kimani-Murage, 2007). According to Gould (1998) the effects of the unhealthy slum conditions and congestion include diarrhoea outbreaks for long periods of time which leads to instances of malnutrition, poor health, and death among young children. According to Haddad et al, the urban poor and the urban underfed have increased, and will surpass those in rural areas (Haddad et al., 1999). The authors projected that in the next 20 years, there would be an increase in the urban poor, and with it would be increased levels of malnutrition. Recent research in the Kenyan context shows that ill health and poor nutrition are a characteristic of children living in the urban areas than those children in the rural areas (APHRC, 2002). A study using data from 15 countries showed that the urban advantage is being

eroded for young children (Fotso, 2006). This is attributed to deterioration in conditions in urban areas rather than an improvement in rural areas. The deterioration in urban areas is attributed to the rapid population growth therein which has surpassed the provision of sanitation and health services (Brockerhoff, & Brennan, 1998; Lalou & Legrand, 1997, Fotso, 2006).

Women's Education and Child Malnutrition

Research shows that there is a strong linkage between maternal education and children's health. For instance, it is estimated that an additional school year a girl undertakes yields a 10 percent reduction in the under-five mortality since education imparts knowledge of children's health, sanitation and nutritive food intake (Smith, 1999). Maternal education has also been associated with nutrition outcomes among children in studies in various settings including Jamaica (Handa, 1999; Bolivia (Frost, et al, 2005) and Kenya (Kabubo-Mariara et al, 2008; Abuya et al, 2010). Children born to educated women suffer less from malnutrition which is manifest as wasting and stunting in children.

However, the mechanisms that link mother's education and child health in general are still not well understood. Glewwe (1999) highlights three links through which education may affect child health. First, formal education of mothers directly transfers health knowledge to future mothers. Second, the literacy and numeracy skills that women acquire in school enhance their ability to recognise illness and seek treatment for their children. Third, increased number of years in school makes women more receptive to modern medicine. Against this background, this study focuses on the urban poor in Kenya, a country which still registers a relatively high child mortality rates in Africa. For example the child mortality rate in Kenya is 74/1000 (KDHS, 2008). Progress towards the 2015 MDG targets has been slower than anticipated, the reason why there is need for further research into ways in which maternal education influences child

nutrition. The purpose of this study is to better understand factors that influence poor health outcomes in the urban slums of Nairobi, Kenya. We seek to answer the question: Does mother's education affect child nutritional status in the context of urban poverty

Methods

Study Setting

The study was carried out in two urban informal settlements of Korogocho and Viwandani in Nairobi, Kenya. The study is nested within the Nairobi Urban Health and Demographic Surveillance System (NUHDSS) run by the African Population and Health Research Center (APHRC). The two slum areas are densely populated, with 63,318 and 52,583 inhabitants per square km in Viwandani and Korogocho, respectively. They are characterized by high unemployment rates, lack of a basic infrastructure, poor housing, violence, insecurity, and poor health indicators.(APHRC, 2002a; APHRC, 2002b). The two slums are heterogeneous particularly with regards to socio-economic status: Viwandani has relatively higher levels of education and employment, high mobility of residents and split households while the population in Korogocho is more stable with greater co-residence of spouses.

Data Source and Data Collection

Data for this study is derived from a study nested within the Nairobi Urban Health and Demographic Surveillance System (NUHDSS). The NUHDSS follows a population of slightly more than 60,000 people; 57% and 43% from Viwandani and Korogocho slum respectively. The follow up comprises of a systematic quarterly recording of vital demographic events including births, deaths and migrations occurring among residents of all households in Korogocho and Viwandani since 2003. Other data that is collected includes: household assets, morbidity, and education which is also collected and updated regularly. In particular, this paper draws on data from the maternal and child health component, which is a part of a broader

longitudinal study entitled *Urbanization, Poverty and Health Dynamics (UPHD) in sub-Saharan Africa.* The UPHD project addresses key health consequences of rapid urbanization and growing urban poverty at different stages of the life course namely childhood, adolescence, adulthood, and old age. Initially, all women who had given birth from September 2006 to January 2007, as well as their children were enrolled in the study starting in February 2007. Data were collected at baseline and updated every 4 months, at which point more mother and child pairs were enrolled. The study therefore involves eight sub-cohorts of children (n=5156) aged 0-42 months enrolled between February 2007 and January 2010. Anthropometric measurements for each child were taken during every update. Length for children aged less than 24 months was measured using a measuring board (Shorr Productions, LLC, Maryland, US) while height for those aged 24 months or more was measured using a height board (Seca 213, Seca GmbH, Germany). During each visit field interviewers administered questionnaires to collect data on vaccination, health care seeking and child care practices.

Variables and measurement

The analysis focuses on the effect of mother's education on child stunting. The dependent variable is stunting; measured by height-for-age z-scores (HAZ). The height for age z-scores were generated using the World Health Organization (WHO) 2006 growth standards with the WHO Anthro 2005 program, Beta Version (World Health Organization, 2006). The variable was coded as "1" (stunted) if HAZ was <-2, and "0" (not stunted) if HAZ was ≥-2. Mother's education is the main predictor variable. The two education categories (primary education or less and secondary or higher) were coded as "1" and "0" respectively. The covariates included: child level characteristics, maternal demographic characteristics, maternal health knowledge and seeking behaviour; household characteristics and community characteristics.

Child level characteristics: Birth weight was constructed from the children's weight reported on the birth card or mother's recall. Birth weight has two categories—less than 2500g and above 2500g coded as "1" and "0" respectively. Gender of child has two categories; female and male coded as "0", and "1" respectively.

Maternal demographic characteristics: Mother's age has five categories: 15-19, 20-24, 25-29, 30-34, and 35+. The mother's marital status was coded into 3 groups: currently in union (currently married or living together), ever in union (separated, divorced, and widowed), and never married. This variable was coded as "0", "1", and "2" respectively. Parity defined as the number of children per woman was divided into three categories (first birth, second birth, and third birth and above) and coded as "0", "1"and "2" respectively. Ethnicity comprised of five categories (Kikuyu, Luhya, Luo, Kamba and others.

Maternal health knowledge and seeking behaviour: Decision on whether the pregnancy was wanted, used as a proxy for family planning intention was categorized as wanted now, wanted later and not at all; coded as "0", "1", and "2" respectively. Number of ante-natal visits was coded as "0" for 4 or more visits and "1" for less than 4 visits. This measure of four ante-natal visits and above is what is recommended in Kenya. Place of delivery was categorized into three categories; health facility, TBA/home and others (e.g. enroute to health facility); coded as "0", "1" and "2" respectively. Knowledge on when to initiate complementary foods was categorized as "yes" (coded as "0") if the mother knew that complementary foods should be initiated at 6 months as recommended by WHO, and "no" (coded as "1") if the mother said she did not know, or if she said that the foods should be initiated earlier or later than 6 months.

Household characteristics: Wealth index was constructed from household assets and amenities using principal component analysis (Filmer & Pritchett, 2001). The three wealth index categories (low, middle, and highest) were coded as "0", "1", and "2" respectively.

Community characteristics: The study site was used as a proxy for community level characteristics. The variable site was coded as "0" for Viwandani and "1" for Korogocho.

Insert Table 1

Analytical techniques

The analysis was restricted to the most recent update for each child. Cross tabulation and univariate analysis was used to explore the relationship between mothers' education and child stunting as well as the effect of other covariates. Cross tabulations were used to show the distribution of the various characteristics listed above among the stunted children. In addition, univariate analysis was done in an exploratory manner to determine the effect of each factor on child stunting. The univariate models were estimated using the binomial logistic regression.

Thereafter, we conducted a multiple logistic analyses. In the multiple logistic analyses we entered all the variables that were used in the univariate analysis. However, the explanatory variables were entered sequentially in groups. The key predictor (mother's education) was entered into the model first; followed by child characteristics, maternal demographic characteristics, maternal health knowledge and healthcare seeking behavior, household characteristics and community level factors. We adjusted for clustering at the household level, to account for the nature of the data where some mothers had more than one child. Some explanatory variables had missing values including mother's age, ethnicity, mother's education, and socio-economic status. Imputation was done for socio-economic status.

Findings

Descriptive Statistics for Child Stunting

Table 1 presents percentages of stunted children by different explanatory variables. The results show that 44% of boys are stunted compared to 34% girls. Korogocho slum has more stunted children with about 41% compared to Viwandani with 38%. Stunting is more common among children born to single mothers and older mothers, with 45% and 46% respectively. Mothers that have at most primary level of education have 43.1% of their children stunted compared to 36.9 % for mothers with at least secondary level of education. About 35% of children born to mothers who wanted to get pregnant now were stunted compared to 44% of children born to mothers who wanted the pregnancy later, while 42% of children born to mothers who did not want to get pregnant at all were stunted. On overall, 71.1% of children were born in a health facility while 26.2% were born at TBA/home. Among those that were born in health facilities, 37% were stunted compared to 45% and 35% who were born at home/TBA and in other places (enroute to hospital) respectively. Mothers with 3 and more births had 43% of their children stunted compared to 41% of children born to mothers with 2 births, and 35% among mothers who had only one birth. 62% of children who were underweight(less than 2500) were stunted compared to 36% of the children who were of optimal weight (above 2500).

The univariate results presented in Table 2 show that mothers education, child gender, birth weight, place of birth, slum site, mothers' marital status, decision on the pregnancy and social economic status can significantly determine a child's nutritional status ($p<0.05$). Additionally, being the first born, a female of normal weight, born in a health facility, by a mother who is currently in union, who has at least secondary education, in a household that has high SES, will

be protective against child malnutrition ($p<0.05$). Moreover, children born in Korogocho have a high tendency to be stunted compared to children born to mothers who live in Viwandani. However, mothers' age, number of ante-natal visits and ethnicity do not determine stunting.

Insert Table 2

Multiple Logistic Regressions Results (Effect of Mother's Education on Child Stunting)

Table 3 presents the multiple regression results predicting the effect of mother's education on child stunting in the urban slums of Nairobi. Six models were fitted sequentially in this estimation, with an aim of observing the impact of mother's education on child's stunting and whether the impact of education is sustained when other variables (mothers' and child characteristics, household, and community level) are introduced into the model. The estimation started with a simple model—mothers' education regressed against child stunting. Thereafter, we sequentially added other grouped variables. Model 1 is the baseline model which introduces one explanatory variable, mothers' education, model 2 introduces the child characteristics, while model 3 adds mother's demographic characteristics. Model 4 adds variables related to the mothers' health knowledge and health seeking behaviors. Model 5 and 6 add household and community characteristics respectively.

Model 1 indicates that child stunting is significantly related to the mothers' education level ($p<0.01$). The odds of child stunting are 29% higher for mothers with no education or lower than secondary education, relative to mothers that have at least secondary education. Addition of child characteristics (child birth weight and gender) in model 2, do not change the significance of the relationship between mothers' education and child stunting. However, both child birth weight and gender are strongly related to stunting ($p<0.01$, respectively). Males have 58% higher

chances of being stunted compared to girls, while children of low birth weight are 3 times more likely to be stunted relative to children of normal birth weight.

Insert Table 3

Model 3 introduces mothers' demographic characteristics (mothers' age, marital status, parity and ethnicity). The presence of these demographic characteristics do not significantly affect the significance of the relationship between mothers' education and child stunting, although the level of significance changes. However, mothers' marital status is independently significantly associated to child stunting, while mother's parity is marginally associated ($p<0.1$). For instance, the odds of stunting for children born to mothers who were never married are 72% higher relative to those who are currently in union respectively ($p<0.05$). Similarly the odds of stunting for children born to mothers who have 2 births, and 3 or more births are 32% and 36% higher compared to those that have one child respectively ($p<0.05$). Hence, being in a union and having one child have protective effects against child malnutrition.

Controlling for both mothers health knowledge and health seeking behavior (decision on the pregnancy, ante-natal visits, place of delivery and knowledge on when weaning should be initiated) alters the significance of the relationship between education and child stunting. The inclusion of these two components marginally reduces the odds of a child getting stunted attributable to the effect of the mother's education from 1.26 to 1.25. Therefore, the decision on pregnancy (whether child was wanted at conception or later or not wanted at all), place of delivery, and mothers' knowledge on when to start weaning the child determines the nutrition level of a child. In addition, the odds of stunting for a child born to a mother who gives birth in a TBA facility or at home are 61% higher compared to giving birth in a health facility ($P<0.05$). Those children whose mothers wanted to get children later had 37% higher odds of being stunted

compared to those children whose mothers wanted them at conception (P<0.05). Knowledge on when to initiate complementary feeding was marginally associated with child stunting (p<0.1). Inclusion of the household socioeconomic status (SES) in model 5 reduces the significance of the relationship between mothers' education and child stunting. However, being in low, middle or high SES does not have any significant impact on child stunting. The introduction of SES reduces the education effect on child stunting from 1.25 to 1.24, which is marginally significant at 0.05 significance level. Consequently, controlling for household socioeconomic status and other demographic characteristics, results in the odds for child stunting being 24% higher for mothers who have no education or lower than secondary level education relative to those who have at least secondary education level. Introduction of the slum of residence into model 6 made the effect of mothers' education insignificant. Though being in Viwandani or Korogocho slum was not significantly related to child stunting.

Discussion

The objective of this study was to assess the effect of maternal education on child stunting in the urban slum of Nairobi. The prevalence of stunting among children aged up to 42 months in these communities was close to 40%. We found that mother's education is an important factor in child stunting but its effect is not causal as found in other studies (Desai, 1998). We found that the effect of mother's education on child stunting is mediated by other factors including marital status, and health knowledge and seeking behaviour, household social economic status, and community level factors. This is consistent with findings of other studies (Glewwe, 1999 Frost, 2005; Desai & Alva, 1998).

Child level factors including sex and birth weight are independently and strongly associated with stunting. While the association between birth weight and nutritional status has been well documented and understood in sub-Saharan Africa (Hien, 2008; Ukwuani, 2003), few studies have documented gender difference with regards to malnutrition in young children particularly in sub-Saharan Africa (Kabubo-Mariara et al., 2008; Wamani, 2007). It has been argued that such differences occur in low socio-economic status settings (Wamani, 2004). Despite the strong significance of these child level factors in influencing child stunting, our study concludes that they do not substantially alter the effect of education on child stunting.

In addition to child level factors, maternal level factors including marital status and mothers' health knowledge and health seeking behavior including decision on pregnancy used as a proxy for family planning, place of delivery used as a proxy for health seeking behavior, and knowledge about timing of complementary feeding were significantly related to child stunting. The relationship between maternal level factors and child nutritional status has also been documented in several other studies (Frost, 2005). These maternal level factors also alter the significance of the relationship between education and child stunting. We conclude that these factors mediate the effect of education on child stunting, a finding similar to previous studies (Glewwe, 1999; Frost, Forste, & Haas, 2005). We can conclude that mothers' education is important as far as it imparts health knowledge to women, and influences their health seeking behaviour which leads to better child nutrition.

The introduction of household wealth index into the model makes education to be marginally significant. This suggests that SES explains part of the effect of education on child stunting, a finding similar to what other scholars have found (Desai & Alva, 1998; Frost, 2005). However, we find that SES is not significantly related to child stunting contrary to some other studies

(Frost et al, 2005; Wamani et al, 2004), which found a statistically significant relationship between SES and child malnutrition. We also find that the introduction of the slum of residence further reduces the magnitude of the effect of mother's education on stunting. This indicates that part of the effect of mother's education on stunting may be explained by community level factors not accounted for in the analysis (Alderman et al. 2003). Inclusion of this proxy for community level factors renders the effect of maternal education on stunting insignificant. We were therefore able to account for all the effect of education on child stunting using the factors included in the models.

Our results were limited by the absence of direct measures for family planning, SES, and community level characteristics for which proxy measures were used. In the case of SES, an index was constructed from household assets. The use of proxy measures and the construction of an index might have affected the impact of these variables on the dependent variable. Overall, our study has significant policy implications for child health in urban slums in Kenya. Evidence indicates that improving nutritional status has many benefits that cannot be overemphasized including improved health and survival, cognitive development and human capital (Black et al, 2008; Victora et al, 2008; Grantham-McGregor et al, 2007). Our study has indicated that the most important factors influencing child nutritional status in the slums of Nairobi include child level factors and maternal health knowledge and health seeking behavior. Mother's education is an important factor in child stunting and its effect is mediated by various factors at maternal, household, and community level as found in other studies (Frost et al, 2005; Glewwe 1999). This suggests that improving mother's years of schooling may have significant influence on child nutritional status mediated through maternal health knowledge and practices and health care

seeking behavior, household socio-economic status and community level factors (Frost et al, 2005).

Inclusion of health knowledge skills in schools curriculum may lead to substantial improvement in child nutritional status by directly enabling the girls who are future mothers to have an improved health knowledge, practices, and health seeking behavior (Glewwe 1999). This study indicates that among children born in the slums, only a substantial proportion were born at home or with the assistance of a TBA. This therefore indicates that several mothers do not adequately benefit from the baby-friendly hospital initiative being implemented in Kenya. The aim of the initiative is to enhance optimal breastfeeding and young child feeding practices hence improved infant and child nutritional status (WHO, 2002). The study therefore calls for awareness creation to enhance delivery at health facilities. Future work should focus on establishing the specific community level factors that mediate the effect of mother's education on child nutritional status not identified in this study for appropriate policy making and targeting.

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Table 1: Characteristics of mothers and stunted children aged between 0-42 months

Factor	Category	Stunted (%)	Number of Subjects	%
Gender	Male	44.2	2410	50.5
	Female	34.2	2360	49.5
Site	Korogocho	40.9	2490	52.2
	Viwandani	37.5	2280	47.8
Mother Education level	Primary and below	43.09	2,961	76.7
	Secondary +	36.9	897	23.3
Mother's age	15-19	39.9	406	10.3
	20-24	40.1	1415	35.9
	25-29	42.2	1185	30.1
	30-34	42.9	564	14.3
	35 >	45.6	373	9.5
Marital status	Currently in union	37.8	3954	82.9
	Ever in union	48.3	375	7.9
	Never married	44.8	440	9.2
Decision on pregnancy	Yes	35.2	2378	50.0
	Wanted later	43.5	1773	37.3
	Not at all	42.3	608	12.8
Anti natal Visits	Less than 4	38.7	2460	54.9
	Above 4	38.5	2018	45.1
Place of delivery	Health Facility	37.4	3390	71.2
	TBA & Home	44.6	1239	26.0
	Others(enroute to hospital)	34.9	132	2.8
Parity	1 birth	34.5	1633	34.3
	2 births	40.6	1325	27.8
	3 and above	42.5	1806	37.9
Child birth weight	Less than 2500	61.8	220	7.0
	Above 2500	36.2	2940	93.0
Knowledge when to introduce other food	No	41.3	1477	31.0
	Yes	38.4	3293	69.0
Social Economic Status	Low	42.5	812	27.3
	Middle	44.5	991	33.3
	High	39.7	1172	39.4
Ethnicity	Kikuyu	43.2	1057	26.7
	Luhya	39	689	17.4
	Luo	41.5	768	19.4
	Kamba	42.5	835	21.1
	Others	40.6	606	15.3

Table 2: A table of odd ratios for different variables based on univariate analysis

Factor	Category	Odds ratio	95% Conf. Interval	p-values
Gender	Female (ref.)	-		
	Male	1.520	(1.353 1.710)	0.000
Site	Viwandani (ref.)			
	Korogocho	1.157	(1.029 1.299)	0.014
Mother Education level	Secondary + (ref.)	-		
	Primary and below	1.281	(1.096 1.498)	0.002
Mother's age	15-19 (ref.)	-		
	20-24	1.010	(0.806 1.265)	0.931
	25-29	1.099	(0.874 1.383)	0.419
	30-34	1.132	(0.873 1.467)	0.349
	35 >	1.261	(0.949 1.677)	0.11
Marital status	Currently in union (ref.)	-		
	Ever in union	1.536	(1.242 1.988)	0.000
	Never married	1.335	(1.094 1.628)	0.004
Decision on pregnancy	Yes (ref.)	-		
	Wanted later	1.420	(1.252 1.611)	0.000
	Not at all	1.348	(1.124 1.616)	0.001
Anti natal Visits	Above 4 (ref.)	-		
	Less than 4	1.008	(0.893 1.138)	0.894
Place of delivery	Health Facility (ref.)	-		
	TBA & Home	1.343	(1.177 1.532)	0.000
	Others	0.894	(0.621 1.287)	0.547
Parity	First birth (ref.)	-		
	2 births	1.299	(1.118 1.509)	0.001
	3 and above	1.406	(1.225 1.615)	0.000
Child birth weight	Above 2500 (ref.)	-		
	Less than 2500	2.848	(2.148 3.777)	0.000
Knowledge when to introduce other food	Yes (ref.)	-		
	No	1.131	(0..999 1.281)	0.054
Social Economic Status	Low (ref.)	-		

	Middle	1.022	(0.924 1.131)	0.674
	High	0.843	(0.765 0.928)	0.000
Ethnicity	Kikuyu (ref.)	-		
	Luhya	0.938	(0.845 1.041)	0.229
	Luo	0.927	(0.837 1.026)	0.144
	Kamba	0.996	(0.901 1.100)	0.934
	Others	0.818	(0.735 0.910)	0.000

Table 3: A table of odd ratios for different grouped variables using multiple logistic model

Factor	Category	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Mother Education	Secondary + (ref.)	-	-	-	-	-	-
	Primary and below	1.294 ***	1.296 ***	1.264 **	1.253 **	1.242 *	1.134
Gender	Female (ref.)	-	-	-	-	-	-
	Male		1.585 ***	1.504 ***	1.506 ***	1.485 ***	1.569 ***
Child birth weight	Above 2500 (ref.)	-	-	-	-	-	-
	Less than 2500		3.191 ***	3.341 ***	3.334 ***	3.458 ***	2.588 ***
Mother's age	15-19 (ref.)	-	-	-	-	-	-
	20-24			1.057	1.116	1.028	0.923
	25-29			1.068	1.149	1.101	0.921
	30-34			1.105	1.125	1.035	0.863
	35 >			1.192	1.252	1.181	0.901
Marital status	Curr. in union (ref.)	-	-	-	-		-
	Ever in union			1.418 **	1.350 *	1.384 *	1.286
	Never married			1.718 ***	1.644 ***	1.676 ***	1.626 **
	Others						
Parity	First birth (ref.)	-	-	-	-		-
	2 births			1.315 **	1.262 *	1.234 *	1.351 *
	3 and above			1.357 **	1.234 *	1.225	1.413 *
Ethnicity	Kikuyu (ref.)	-	-	-	-	-	-
	Luhya			0.822	0.781 *	0.745 *	0.734 *
	Luo			0.896	0.808 *	0.791 *	0.801
	Kamba			1.005	0.998	0.973	1.045
	Others			0.911	0.928	0.903	0.852

Decision on pregnancy	Yes (ref.)	-	-	-	-	-	-
	Wanted later				1.366 ***	1.365 ***	1.385 **
	Not at all				1.194	1.175	1.262
Anti natal Visits	Above 4 (ref.)	-	-	-	-	-	-
	Less than 4				0.989	1.002	1.040
Place of delivery	Health Facility (ref.)	-	-	-	-	-	
	TBA & Home				1.608 ***	1.695 ***	1.537 **
	Others (enroute to hospital)				1.235	1.295	1.153
Knowledge when to introduce other food	Yes (ref.)	-	-	-	-	-	-
	No				1.157 *	1.156 *	1.209 *
Social Economic Status	Low (ref.)	-	-	-	-	-	-
	Middle					1.017	1.147
	High					0.978	0.963
Site	Korogocho (ref.)	-	-	-	-	-	-
	Viwandani						0.891
Log-Likelihood		*-3165.20*	*-3103.50*	*-2597.87*	*-2406.02*	*-1745.75*	*-1701.87*

*** = (p-value < 0.01); ** = (0.01 < p-value < 0.05); * = (0.05 < p-value < 0.1)