# ANALYSIS OF SOME FACTORS ASSOCIATED WITH CONTRACEPTIVE USAGE AMONG KENYAN URBAN WOMEN

by

By Sophie Chelagat Malinga

A project submitted in partial fulfillment of the requirements for the degree of Master of Science in Quantitative Research Methods

School of Mathematics, Applied Statistics and Actuarial Science
MASENO UNIVERSITY

## Abstract

This study was necessitated by the lack of baseline information regarding some factors associated with contraception since most information obtained is either out dated, is on subsets of the population or not tested critically examined in previous studies. This study was aimed at providing information regarding contraceptive usage based on a selected background characteristics as well as reproduction characteristics. Age group, marital status, religion and education level were the background characteristics selected whereas reproduction characteristics involved age at first pregnancy, parity, early pregnancy loss as well as stillbirths. Women of reproductive ages 15- 49 years from the major urban areas of Kenya- Nairobi, Mombasa and Kisumu were observed with data from the Kenya Urban Reproductive Health Initiative survey of 2010 to provide baseline information. A bivariate analysis was carried out for each of the variables with respect to contraceptive usage. Significant variables that made it to the logistic regression model were seven- still births did not. This model was later compared with other models to ensure that the best model was fit. This was done using stepwise selection of variables procedure. The binary logistic model fit revealed that current contraceptive usage is high (68%). Women who had their first pregnancies after the age of 20 years were more likely users of contraceptives when compared with those who had them in their teenage. Women with five children had increased odds of contraceptive usage than those without (OR=15, p=0.000). Early pregnancy loss sufferers had a reduced odds of contraceptive usage compared with those never had (OR=0.77, p=0.04). There is need to breakdown early pregnancy loss to examine it as miscarriages and abortions separately and their effect on contraceptive usage. The need to examine how early pregnancy loss and stillbirths differed in terms of contraceptive usage within the larger. There is need to examine parity controlled for desire for more children with respect to contraceptive usage.

# Chapter 1 Introduction

## 1.1 Background Information

The population of the entire world has shown a steady increase over the years. This increase is attributed to improved health systems in most countries. The increase has been on an upward trend specifically over the last few decades with about 4 billion people in 1974, to 5 billion in 1987, 6 billion in 1999 and about 7 billion in 2011 [1]. There has been an increase in supply of skills as well in the labour market, thus causing a decrease in employment opportunities as a result of the few available opportunities in formal employment. The problem augments when a country is unable to keep up with the high level of skilled workers hence rendering most of them jobless. Governments have been in the forefront to control population growth in their respective countries. Overpopulation is worse in developing countries since it leads to overreliance on aid, or less development taking place.

There is also the unmet need for contraception among 222 million women in developing countries [2]. Some of the reasons include: having limited choices, access to contraception by certain groups is limited (that is, the young, poor and unmarried people), myths and believes about side effects caused by contraceptives among many other.

In Kenya, the issue of Family Planning begun way back in 1957 through the Family Planning Association of Kenya in the Ministry of Health. In 1965, the government of Kenya formally endorsed family planning under the National Planning Strategies. According to the population and housing census of Kenya in 2009, it showed that the population stood at 38.6 million, compared to 28.7 million in 1999 [3]. The female population was the dominant one in 2009 that is 19.4 million against the male one of 19.1 million. The TFR for the country was estimated to be 4.6 in 2008 and was expected to decline to 3.9 in 2012 [4]. The CBR has also been on the decline over the years from 50.0 in 1948 to 48.0 in 1989 and down to 37.7 in 2008. The high fertility rate in the country has had a negative impact on the female population in that cases of abortion have equally been on the rise leading to high maternal deaths. A recent study conducted revealed that unsafe abortions accounted for 35% of maternal deaths in Kenya in the year 2009 much higher than the world wide average of 13% [5]. The Kenyan government together with the UNFPA came up with a plan to reduce fertility rates further to 2.6 by the year 2030 [6]. To date, fertility has been on the decline due to factors such as urbanization, decrease in child mortality and

increased longevity [7]. The Kenyan government through the ICPD Programme of Action has in place policy instruments that address sexual and reproductive health, namely; National and Reproductive Health Policy of 2012 and article 43 of the Constitution of Kenya 2010 [7].

Despite the efforts in place to control population growth, there is still the unmet need for contraceptives in the slum areas of Kenya. This has to some extent contributed to postpartum conception due to delayed contraceptive usage [8]. Studies in Kenya however have revealed that wherever maternal health, reproductive health or child health services are provided, the facility is usually better placed to offer appropriate family planning services as well as educate people on the same [9]. This already serves as part of the intervention.

As to some factors thought to be associated with contraceptive usage, a study was carried out to women of 19 years old and above, residents of Gothenburg Sweden, which revealed that age and parity greatly influenced the choice of women's use of contraceptives [10].

From the studies above, we see that subsets of the populations cannot be relied on to provide baseline information when intervention is required to provide national estimates. Some of these studies have broadly looked at various characteristics hence limiting the number of variables examined within a category. The issue of overreliance on health facility records to capture family planning records is limiting since not all information is captured at facility level, such as pregnancy loss due to abortion for fear of victimization. Such information is best captured in interviews by persons unknown to the individuals.

It is important to see whether these studies are consistent with the Kenyan case; specifically the urban woman population of child bearing ages. The urban population being a cosmopolitan one is thought to some extent reflect the status of a nation. More factors will be incorporated into this study to be looked at in depth. The expected result will be to come up with a model that brings together some of these significant variables in one model and evaluate their behaviors in the model. This will then form the baseline of family planning interventions based on a few characteristics.

### 1.2 Statement of the Problem

Kenya heavily relies on major surveys such as the Kenya Demographic and Health Survey (KDHS) and population censuses to capture information on its population. Such surveys take place in a span of five to ten years. Therefore the estimates used may not be up to date to warrant

their use as baseline information especially for inter censal years. Previous studies on contraceptive usage have been of narrow scopes, hence limiting the study to subsets of the population. This study therefore uses information obtained from households from women of child bearing ages and goes further to test some of the assumptions made concerning some variables' association with contraceptive usage.

## 1.3 Objectives of the Study

The main objective of the study is to come up with baseline information upon which some background and reproductive characteristics can be measured.

Specific objectives for this study are:

1) To examine whether some background characteristics are associated with the use of contraceptives
2) To examine whether some reproduction characteristics are associated with contraceptive usage
3) To fit a parsimonious model of factors influencing the use of contraceptives among urban women

## 1.4 Significance of the Study

This study tests for the association of variables with respect to contraceptive usage and comes up with estimates for the urban population of Kenya when fit to a model. It will form a good starting point for baseline information upon which assessment of interventions can be made based on background and reproduction characteristics.

## 1.5 Basic Concepts

This section gives a definition of terms used as well as abbreviations used throughout the document.

| | |
|---|---|
| Menarche | age at which a woman is able to conceive |
| Sub fecundity | the reduction in the probability of conception |
| Maternal mortality/ Death | Death of a pregnant woman or a mother within 42 days of delivery Irrespective of the duration, from pregnancy related issues |
| Contraceptives | a substance, device or method capable of preventing pregnancy |

| | |
|---|---|
| Odds Ratio | the probability that an event occurs to that of it not occurring |
| Parity | the number of children born alive to a woman |
| Gravidity | the number of pregnancies a woman has had (miscarriages+ abortions + still birth + live birth) |
| Reproductive Health | a state of physical, mental, and social well-being in all matters relating to the reproductive system, at all stages of life. |
| Pregnancy interval | time between successive pregnancies of a woman |
| Still birth | death of a fetus which is more than 28 weeks old but before delivery |
| Twinning | bearing of twins |
| Post-partum Contraception | the initiation or use of contraception within the first year after delivery |

## 1.6 Limitations and Delimitations

Limitations

Limitations are influences beyond the researcher's control. The study therefore is limited to the following areas.

- Not all selected households and individuals will respond, therefore the sample for the study will be large enough to ensure the validity and high power of statistical tests.

Delimitations

Delimitations are choices that the researcher makes to the study with justification. These are:

- Despite using three major urban areas, the analysis will not be carried out by urban site level since what is of interest is urban areas in general.
- Many factors are thought or known to influence the usage of contraceptives. This study covers only two broad characteristics- background and reproduction.
- This study is bias towards the urban population

## 1.7 Overview of the Chapters

This piece of research is summarized in five chapters. Chapter one talks about the background of the study and justification for the same. This information is necessary to provide the reader with

sufficient information necessary to understand the general structure of the report. The second chapter, dabbed Chapter 2, looks at different studies carried out in the past and presents the gaps. It concludes by giving a conceptual framework of the same. The methodology used to arrive at the results of the study is all captured in chapter three. Findings from the analysis are captured in the fourth chapter, while a further discussion in the fifth chapter. The last section summarizes the study as well as gives recommendations to the relevant quarters.

# Chapter 2 Literature Review

## 2.1 Introduction

This chapter provides a detailed review of previous studies carried out with emphasis on the research topic. Previous studies have examined factors leading to usage of contraceptives among different populations including couple matching analysis. This study particularly examines a few variables related to the background of the woman and her reproduction characteristics since they differ by population. These factors are explained in text and conceptually in line with the objectives of the study.

## 2.2 Background Characteristics

***Age Group***

Age of a woman is thought to influence her choice of contraception. Fertility is high at early ages of child bearing. This is because menarche comes in early. Sub fecundity is higher in older ages. Women in the middle ages of child bearing ages tend to use contraceptives so as to vary their pregnancy interval. This is because at higher ages, a woman has had the desired number of children. A study on12,279 women interviewed between 2006–2010 from the National Survey of Family Growth (NSFG) revealed that those aged 15-19 and 40-44 years were the least users of contraceptives in the United States [11]. This study was descriptive in nature and did not go further to test for age as a factor associated with contraceptive usage.

A study conducted in 2010 among the slum women of the three major urban areas, namely; Nairobi, Mombasa and Kisumu revealed that family planning is highest among women between the ages of 20 to 39 years and 49% of the women who use contraceptives are in the age group 20-29 [12]. This study used age groups with intervals of 10 years and did not use age in the regression model. This study used many variables but left out age. It therefore did not check for an association between contraceptive usage and age.

This research therefore explores whether age in general is associated with the use of contraceptives in this population in terms of 5 year intervals.

***Education Level***

Education is believed to influence the decision of a woman to use contraceptives. Assertive women are thought to be more into contraceptives. Assertive women for our case are the urban women.

A study was conducted in 1995 to observe the behavior of education level versus fertility. It was concluded that in developed countries, education level greatly influenced fertility while in that the higher the level of schooling the fewer the children, whereas in less developed countries there was no significant effect [13]. This is contradictory to a study on Ugandan women of child bearing ages [14].

Another study carried out in Ghana in 1999 showed that more years of education greatly influenced fertility levels by changing the student's values through impartation of cognitive skills [15].From the above studies; we see that education level was used to test for fertility. It is of importance to observe whether the low fertility was as a result of contraceptive usage.

Closer home, a study in the slum areas of Kenya in 2010 revealed that education level greatly influenced contraceptive usage in that women with no formal education rarely practiced contraception while those with post primary education proved to be using contraceptives [12].

This study gives a summary of the education levels of women and goes further to check for an association between education level and contraceptive usage.

***Religion***

Religion is believed to play a major role in the reproductive choices of women. It is believed that religious practices could influence the use of contraceptives. A study carried out on women of reproductive ages in the United States found that in the Catholic religion, the use of contraceptives is strongly disapproved as they say that it is against the natural law of reproduction, but their women still use it with 2% using natural family planning methods, 68% using highly effective methods such as sterilization, the pill and other hormonal methods [16]. The study goes further to show that contraceptive usage is common among sexually active women of all religions. The study is limited to descriptive analysis hence one cannot conclusively say whether there is scientific evidence of association of contraceptive usage with religion.

In a study conducted in the slum population of major urban areas of Kenya to examine determinants of contraceptives, descriptive analysis was first done. This revealed that Protestants were the greatest users of contraceptives (52%) followed by muslims(35%) while catholics accounted for the least number of users (13%). This study involved selecting variables thought to influence contraceptive usage and doing a correlation analysis with the dependent variable to

determine whether there was correlation. Predictors that had correlations of more than 0.5 were included in the logistic regression analysis. Religion showed high significance ($p=0.000$ at $\alpha=.05$) [12].

A descriptive analysis was looked at to determine frequencies for contraceptive usage by religion. Further analysis, that is model fitting, to religion was dependant on whether it significantly affected contraceptive usage.

***Marital Status***

With marriage comes the desire to bring up a family. According to many African societies, a young lady is advised by her folks to work hard in school, get a job, get married and then start a family. With such expectations, a woman would want to have a desired number of children. Considering the high risk of getting pregnant in a marital union, a lady in one way or another would be faced with choices of contraception in order to have a desired family size. It is therefore important to see whether the marital status of women is significantly associated with use of contraceptives. In 1995, the greater proportion of contraceptive users in the United States are married women compared to the never married ones (77% vs. 42%) [13]. This research was descriptive in nature and therefore needed further analysis to identify whether there was an association between the predictor and response variable.

In a descriptive analysis in the Kenyan case, 62% of the slum population which stated that they were married were in use of contraceptives as compared to 37% singles in use of the same. In the logistic regression model, the study found that marital status in general was not significantly associated with contraceptive usage ($p=0.775$ at 0.05 level of significance) [12]. This study limited itself to the slum population of women which is a subset of the urban areas under the study and hence cannot be generalized to the population.

From this analysis, we shall be able to tell whether being in a marital union automatically means that one can be using contraceptives.

## 2.3 Reproduction Characteristics

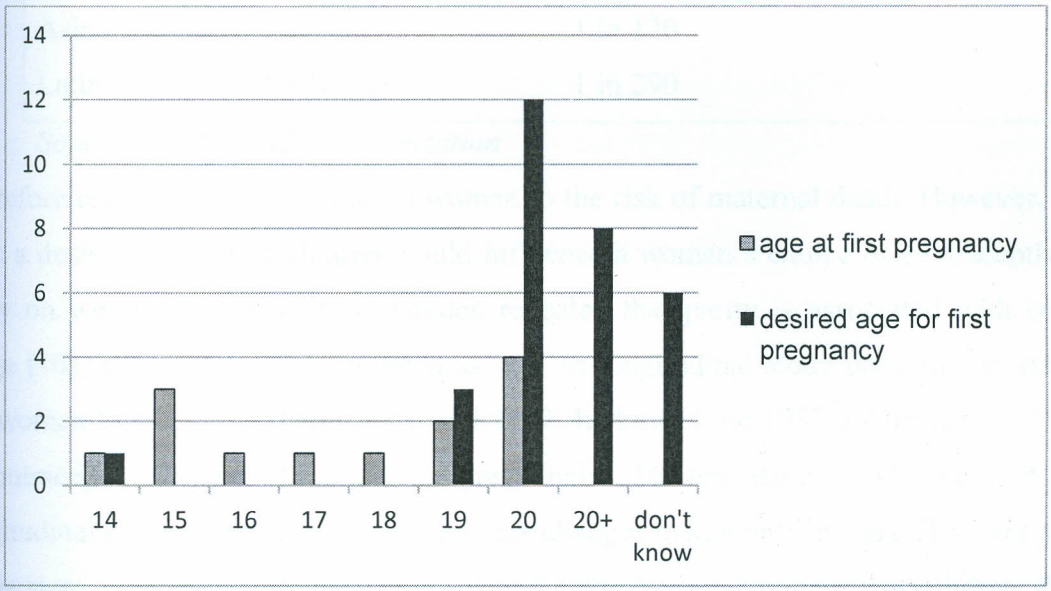
***Age at first pregnancy***

At younger ages of the onset of fecundity, it is possible that young girls have unprotected sex. This exposes young ladies to possible unplanned pregnancies. According to a study carried out on 300 pregnant adolescents in urban prenatal clinics in the United Kingdom in 1998 showed

that of those observed, 20% were 12- 15 year olds; 38% 16- 17 years and 42% 18- 19 year olds. Of those pregnant, 41% of 18-19 year olds had a previous pregnancy [17]. This study was only conducted to adolescents. It is possible that age at first pregnancy goes beyond the adolescent ages of women and therefore the need to increase the scope to cover all women of child bearing ages.

A study conducted to women from Ngukurr in Australia examined the actual age at pregnancy versus preferred age at first pregnancy for women which revealed that of the 13 women interviewed regarding their first pregnancy and current status showed that majority of them had their first pregnancy earlier than their desired time [18]. This is depicted in the figure below:

**Figure 2.3: Actual versus desirable age for first pregnancy**




*Source: Australia National University website*

The above figure also shows that age 19 is the desired age for first pregnancy for the individuals sampled. This study limits us to descriptive analysis and the sample is inadequate for any inferential analysis. It points to the need to do further analysis on age at first pregnancy and desired age for first pregnancy.

In order to do a further analysis, one has to establish whether the variable of interest is indeed associated with contraceptive usage. Therefore, this study examines whether this age is significant as far as contraceptive use is concerned.

***Parity***

Each time a woman goes into delivery; there are chances that she could die. The risk of death varies across regions. The more the number of pregnancies, the higher the risk of maternal death. The risk is higher when the pregnancy interval is shorter [19]. The table below gives the risks of women from pregnancy and child birth in sampled regions.

**Table 2.3: Women's Risk of Death From Pregnancy and Child Birth**

| Region | Lifetime risk of maternal death |
|---|---|
| World | 1 in 92 |
| developed countries | 1 in 7,300 |
| developing countries | 1 in 75 |
| Sub-Saharan Africa | 1 in 22 |
| Asia | 1 in 120 |
| Latin America & Caribbean | 1 in 290 |

*Source: World Health Organization*

Therefore each pregnancy exposes a woman to the risk of maternal death. However, the need to have a desired number of children could influence a woman's choice of contraceptive usage. A study on women in Gothenburg Sweden revealed that parity is associated with contraceptive usage [10]. This was a cross-sectional as well as longitudinal study done to cohorts of 19 year old women for the period1962, 1972 and 1982. It showed the 1982 cohort recorded an increase in contraceptive use (78%) and reduced pregnancies. The ten year age span of cohorts is good for longitudinal studies since one is able to assess changes in key fertility variables over the years.

In the slum areas of the major urban areas of Kenya, women having many children, that is 7 to 9 had higher desire to use contraceptives as compared to those having less children, hence the higher the number of children, the higher the desire for contraception. However, in the multivariate model, it was seen that the number of living children had no significant effect on contraceptive usage ($p=0.342$) [12]. This research having taken place in the same year as the KURHI 2010 survey revealed analysis on a subset of the urban population. It would be of good comparison with this study's analysis.

Therefore, this study looked into the population of both slum and non-slum areas of the major cities, whether they shared the same results regarding contraceptive usage with respect to number of living children.

***Early Pregnancy Loss***

Gravidity that does not result in a live birth can be regarded as a miscarriage, abortion or still birth. The number of pregnancies a woman has had could influence her choice to use contraceptives.

Previous studies have tried to show that early pregnancy loss could be linked to prolonged contraceptive usage. Others have tried to link reduced fertility to prolonged contraceptive usage. For instance, a prospective observational study carried out on 518 women in China to examine rates of conception and pregnancy loss and their relations with time to clinical pregnancy and reproductive outcomes revealed that early pregnancy loss in a preceding cycle was associated with increased odds of conception (OR=2.4 at 5% significance level) but was not associated with spontaneous abortion [20].

Another study carried out on 221 healthy women who were trying to conceive revealed that 31% of them had spontaneous abortions while 40 women with unrecognized early pregnant losses had normal fertility since they were able to conceive within two years. This study however does not look into the issue of contraceptive status for such women [21].

As for this study, the intention was to see whether early pregnancy loss could in one way or the other affect a woman's use of contraception. It is expected that a woman who aborted a pregnancy would be more careful to use contraceptives and one who had a miscarriage stay away from contraceptives.

For baseline information, it was important to examine whether early loss of a pregnancy would influence a woman's decision to use contraceptives. The study population here was women who have had previous miscarriages or abortions. The study went deeper into exploring whether of those who responded "yes" or "no" to the question on ever having a miscarriage or an abortion; does it significantly affect contraceptive use?

***Still birth***

When a woman loses a pregnancy before its full term, but late in the gestation period, it is referred to as still birth or fetal death. Still birth has rarely been studied in relation to contraceptive usage.

A study in the United States was conducted on 19,887 women who had reportedly used oral contraceptives. This was done by administering questionnaires to these women. It was

discovered that the rates of spontaneous abortions and stillbirth was about twice higher for non-users as compared to users of oral contraceptives (p=0.1). Other effects of the oral contraceptives was increase is twinning after stoppage of oral contraceptive usage (p=0.02) [22]. This study was confined to a subset of the population, namely; oral contraceptives users as well as combined Early Pregnancy Loss (spontaneous abortion) with still birth.

This study therefore examined the relationship between still birth and general use of contraceptives.

## 2.4 Summary of Literature Review

Family Planning studies have tried to look at broad categories of characteristics with respect to contraceptive use. As can be seen from the text above, most of these studies focused on subsets of the population assumed other variables to be covariates and proceeded on to model these factors. Therefore there has been less emphasis on the individual broad categories of variables, and more on using as many variables from different categories as possible.

Subsets of the population have also been examined in relation to contraceptive usage. Some of the subsets include teenagers, slum dwellers, younger versus older women, and so on. All these subsets do less in addressing contraceptive needs of a general population of a place. The need to have data on women in general for purposes of baseline information is important. This can then form a master sample upon which subsets of the population can be examined in depth.

In other countries, contraceptive usage information has been collected through major surveys that have intervals of close to five years.

Some studies have tried to explain what triggers contraceptive usage, and one of the studies, revealed that contraceptive use is triggered by resumption of menstruation for post partum women [8]. This is dangerous since fecundity is preceeded by a period of fertility in which conception can occur.

Comparison studies have been used to show the extent of use of contraceptives by two distinct groups. For instance, the rich versus the poor and younger vs older women respectively [14,23,24,25].

Most studies have used binary logistic regression to model contraceptive usage [8, 14, 24] while others that take into consideration various levels have preferred the hierarchical regression model [24]. Some though have preferred ordinal regression for modeling contraceptive usage [26].

Going by the various studies on contraceptive usage, it is safe to say that logistic regression is preferred in most instances.

Most studies have relied on cross sectional data to capture contraceptive usage [14, 24, 25] despite having the disadvantage of temporality [24]. However, there are some instances where longitudinal and prospective studies have been carried out to assess contraceptive usage [8, 10]

Demographic variables examined for contraceptive usage are diverse. Most of the studies therefore use age, education level and marital status as covariates since they have shown significance in different populations.

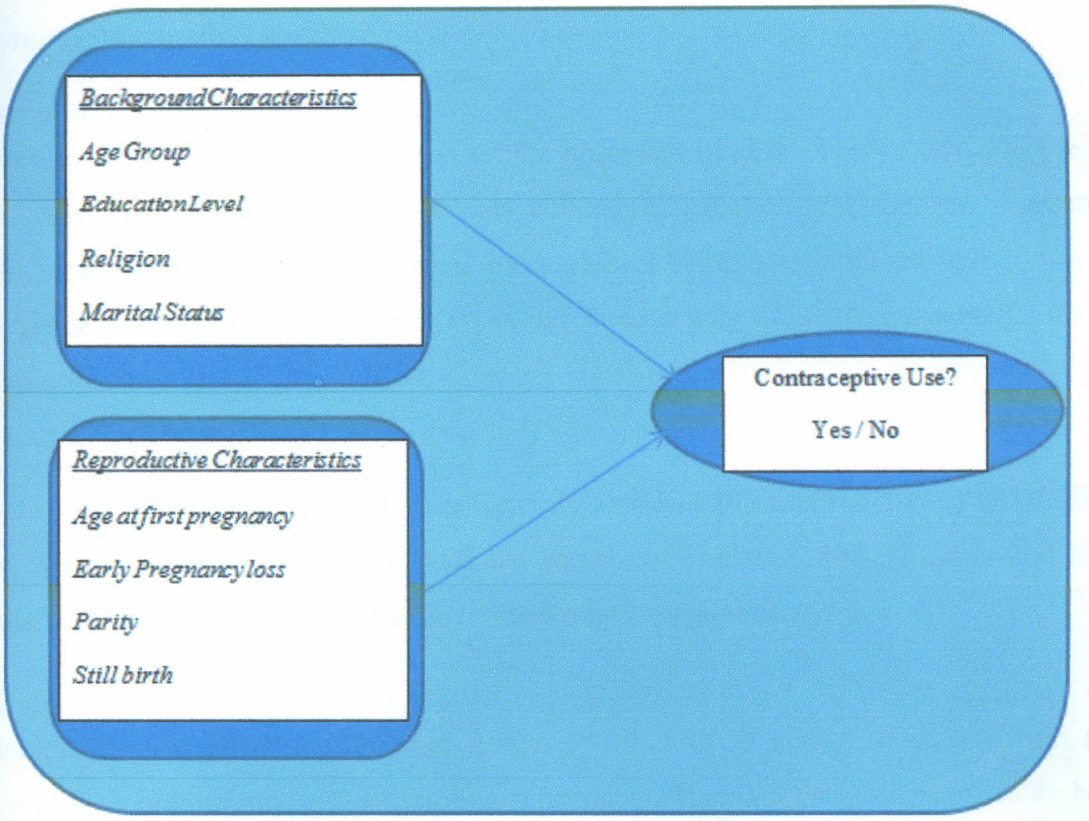
The need to examine factors considered to be covariates together with other variables is important in modeling. This study therefore intended to look at only two broad categories of characteristics and observe variables individually, as well as examine some variables not usually examined. These two broad categories were analyzed in detail to ensure comparability with other previous studies touching on similar variables as well as include variables rarely examined. Findings of this particular study will form a baseline from which interventions can be measured. Recall that the original survey was intended to provide baseline information upon which interventions which are regular are to be measured.

This study therefore looked into consistencies in reporting variables' association with contraceptive usage and provides baseline data since the towns selected are believed to be highly cosmopolitan.

## 2.5 Conceptual Framework

A conceptual framework is a map that gives a summary of the research process to be followed. Below is one such that shows how predictors may be used to predict contraceptive use.

**Figure 2.5: Conceptual Framework for contraceptive usage**


Background Characteristics
Age Group
Education Level
Religion
Marital Status
Reproductive Characteristics
Age at first pregnancy
Early Pregnancy loss
Parity
Still birth
Contraceptive Use?
Yes / No

# Chapter 3 Methodology

## 3.1 Introduction

This section gives a detailed explanation on the processes used in order to arrive at the desired results. It contains the sample design, data collection, collation and analysis. A quantitative analysis of the data was carried out since the variables being examined are numeric in nature. The variables examined were looked at in the three levels of analysis, namely; univariate, bivariate and multivariate.

## 3.2 Source of Data

Data was sourced from the Kenya Urban Reproductive Health Initiative Survey (KURHI) 2010. This was availed courtesy of Kenya National Bureau of Statistics, who is the custodian of the raw data. The data obtained was specific to the woman questionnaire.

## 3.3 Sample Design

A sample design is plan or procedure drawn up on how to obtain a sample from a given population. It therefore guides the sampling procedures. This is a cross sectional study based on secondary data.

The sample was drawn from the three major urban areas, namely; Nairobi, Mombasa and Kisumu. Scale up towns of Machakos and Kakamega were in the original dataset. A two stage cluster sampling design was used with clusters from the Population and Housing Census (2009). Each cluster represents an enumeration area. An enumeration area consists of 100- 149 households. Stage one sampling involved selecting random clusters in the three towns, namely; 142 in Nairobi, 74 in Mombasa and 74 in Kisumu using stratified sampling.

In stage two of the cluster sampling procedure, systematic random sampling was used to select 30 households within each cluster. Household heads or his/ her appointee was interviewed. Purposive sampling was used to select women who were eligible, that is, between ages 15 and 49 years. This is because this is the standard childbearing age group for women. This was done by administering the household questionnaire which was used to determine women in the child bearing ages.

For this particular study, data was cleaned based on the key variables of interest, eliminating missing values from the variables of interest.

### 3.4 Data Collection

Since the study used secondary data, data was cleaned to suite the analysis needs. It involved reducing the variables and removing missing variables and inconsistent responses and cases. This dataset was obtained from the Kenya National Bureau of Statistics.

### 3.5 Variables

The study examines only two broad categories of variables, namely;

Background characteristics: - age group of woman, education level, religion, marital status

Reproductive health characteristics: - age at first pregnancy, early pregnancy loss, parity and still birth occurrence.

A few variables were therefore selected since they differ among populations.

For univariate and bivariate analysis, all variables were used as factors, but in the regression analysis, all the variables were recoded to suite analyses. Some of these variables were computed from other variables, such as parity which required one to compute the number of live births a woman has had in the past. This is given by adding the number of boys and girls alive and those who also passed on any period after birth as well as those alive but not living with parents. Some of these variables have a response of yes/ no.

### 3.6 Data Cleaning

This is an important step towards realizing that only suitable cases are used for analysis. It involved recoding variables, removing missing variables, harmonizing data so as to meet the analysis requirements. Cleaning for this particular dataset involved removing all missing variables, which would not add value to the study. Removing missing variables also meant only cases responding to all the relevant questions formed the final sample for the study. Therefore contraceptive usage would be studied based on women responding to all the variables of interest.

The original dataset consisted of 8,932 cases for the towns: Nairobi, Mombasa, Kisumu, Machakos and Kakamega. Step one involved filtering cases for the three major urban areas, namely; Nairobi, Mombasa and Kisumu which reduced the sample to 5,774 cases. Step two involved selecting "yes" and "no" responses to question w310 which asked a woman whether she uses contraceptives or not. This was done so as to make the response variable a binary one. The sample hence reduced to 3,924. Step three involved the question on religion (w110 in the questionnaire). There were only three missing variables and hence the sample was reduced to 3,921.

Step four involved the question on marital status (w511 in the questionnaire) and the valid responses were 3,190. The fifth step was reducing the sample based on education level (w105). The sample became 3,087. The sixth step was the response to the question on early pregnancy loss (w210) which reduced the sample to 3,086. The question on age at first pregnancy (w215) reduced the sample to 2,978 in the eighth step. Step nine was the question on whether one had had a still birth before (w212) and this reduced the sample to 2,976. The question on parity (w208), a computed variable, which marked the last stage in cleaning, was answered by all respondents, hence making the final sample to remain at 2,976. All this was done using SPSS vs 21.

## 3.7 Data Analysis

Analysis of data was carried out using R software version 3.1.2. This is because R is open source software therefore making it easy to obtain and work with. Prior knowledge of use of the software made it easy to work with it.

There were three levels of analyzing this data. The first one was univariate analysis which involves summarizing data in charts, graphs and frequency tables for single variables. It basically involved examining factors by their units of measurements.

The next level of the analysis is a bivariate one. Bivariate analysis is the analysis of two variables in order to establish the relationship that exists between them. This was done by cross tabulation (descriptive) as well as testing association of variables using Chi Square. Both background and reproductive characteristics were examined for their association with the response variable-contraceptive usage.

The general form of the Chi Square test statistic is given by

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Where j= 1, 2, …, c

i= 1, 2,…., r

$O_{ij}$= observed frequency (contraceptive usage)

$E_{ij}$= expected frequency (contraceptive usage)

c= the categories of the response variable (for each explanatory variable)

r= the categories of the predictor variables

The last stage was a regression analysis of variables/ model fitting. This involved examining many variables simultaneously in order to identify the patterns and relationships that exist as well as come up with a model that can be used for prediction purposes. This was meant to answer the third objective of the study. A binary logistic regression model was fit in R of the factors associated with use of contraceptives.

Binary logistic regression is a type of generalized linear model that is used to predict a categorical (binary) variable from a set of predictor variables which are either in interval/ratio scale or dichotomous. The link function in a logistic regression model is the logit, that is, the logit is the continuous criterion upon which linear regression is conducted. The logit of the odds ratio is fit to the predictors so as to be able to predict an outcome which is categorical. It also:

- Describes the relationship and strengths among variables
- Predicts the membership to a given group since it uses the odds ratio

Instead of the coefficient of determination that we are so familiar with, the deviance is usually interpreted. Chi square is used as the measure of fit. The bigger the difference between the observed values and expected values, the poorer the fit. That is to say that the deviance should be as small as possible so as to conclude that the model fits well.

The maximum likelihood (ML) is used to find the smallest deviance between observed and predicted values, and it is believed to be a chi-square value. The other output to be interpreted is the likelihood ratio test. It compares the fit of two models; the null model versus the alternative hypothesis one. It is expected that the deviance decreases with addition of more predictors in the model.

Coefficients of the explanatory variables which are the wald statistics were examined as well as their exponents (which becomes odds ratios) of analysis will be interpreted by raising the value obtained by an exponent so as to enable interpretation.

## 3.8 Model Fitting

Significant variables are those with p-values less than or equal to 0.05, that is, $p \leq 0.05$. These variables were entered into the model given by the following equation:

Assuming that each explanatory variable showed significance:

$$\Pr(y_i = 1) = \log it^{-1}(X_i\beta)$$

$$\ln\left(\frac{p}{1-p}\right) = \sum \beta_i x_i$$

$$= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8$$

$$= \beta_0 + \beta_1(\text{age group}) + \beta_2(\text{education level}) + \beta_3(\text{religion}) + \beta_4(\text{marital status}) + \beta_5(\text{age at first pregnancy}) + \beta_6(\text{parity}) + \beta_7(\text{early pregnancy loss}) + \beta_8(\text{still birth})$$

Where $\Pr(y_i=1)$ is the probability that a woman uses contraceptives

$\Pr(y_i=0)$ is the probability that a woman does not use contraceptives

$\beta_0$ is the coefficient of the model when no explanatory variables are present

$\beta_i$ represents coefficients which when exponentiated give the odds ratios of the explanatory variables.

$x_i$ is the explanatory variables significantly associated with contraceptive usage which could be age group, marital status, parity, still birth etc.

In order to select the most parsimonious model stepwise regression was used. The AIC (Akaike Information Criterion) was used to select the best model. The one with the least AIC was considered as the best model. In order to determine the best model, it was only appropriate to also include the full model to establish its AIC so that if it was to be left out, then there would be justification for the same. The following models were examined:

A null model was fit (model 1). This represents the model when no explanatory variable present. It is suitable for comparison with other models to be fit.

Model 2 was also fit which constituted all the explanatory variables. It is known as the full model. This model was compared with the null model to observe whether it was an improvement from the previous model.

The third model (model3) to be fit was the model of interest, that is, one with significant explanatory variables from the bivariate analysis. Again this was compared to the null model as well as full model.

All comparisons were made based on the AIC (Akaike Information Criterion). The model with the lowest AIC was selected as the best. Further backward elimination was used to see whether further improvement could have been made to the model.

# Chapter 4 Results

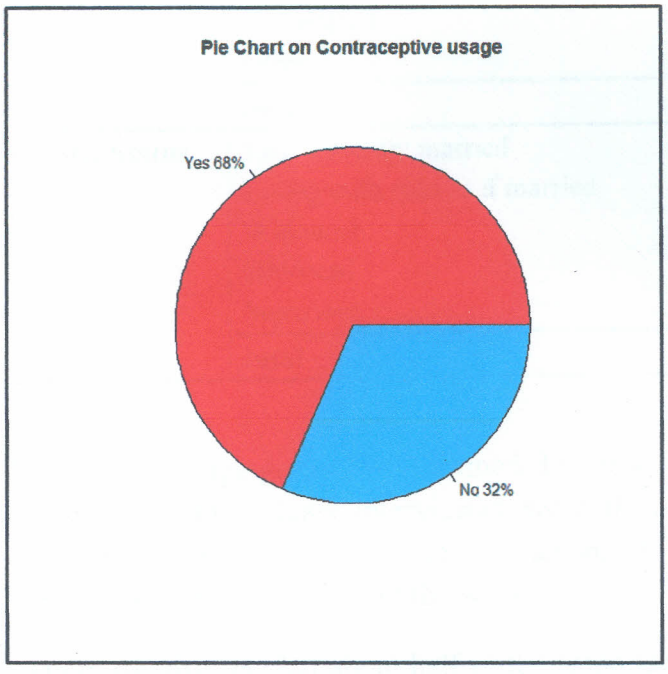
## 4.1 Introduction

This chapter presents findings of the three levels of analysis. The first level is univariate which summarizes findings based on responses in a frequency table. The second level presents bivariate analysis using cross tabulations as well as chi square test of association of variables. Lastly, the chapter examines the behaviour of variables in a model and tries to fit a parsimonious one.

## 4.2 Univariate Analysis of Variables

Contraceptive usage is looked at in a nut shell. The summary is presented in the pie chart below:

Figure 4.2: Pie Chart on Contraceptive usage




### 4.2.1 Background Characteristics

The background characteristics that were carefully examined and summarized in a frequency table given below:

**Table 4.2.1: Background Characteristics of urban women**

| Background characteristic | Categories | Frequency | Percentage |
|---|---|---|---|
| **Age** | 15-19 | 85 | 2.9 |
| | 20-24 | 632 | 21.2 |
| | 25-29 | 841 | 28.3 |
| | 30-34 | 587 | 19.7 |

| | | | |
|---|---|---|---|
| | 35-39 | 428 | 14.4 |
| | 40-44 | 264 | 8.9 |
| | 45-49 | 139 | 4.7 |
| | **total** | **2,976** | **100.0** |
| **Education Level** | Primary and below | 1,468 | 49.3 |
| | Vocational/ Post Primary | 92 | 3.1 |
| | Secondary educ | 1,072 | 36.0 |
| | College level | 278 | 9.3 |
| | University level | 66 | 2.2 |
| | **total** | **2,976** | **100.0** |
| **Religion** | Catholic | 657 | 22.1 |
| | Protestant/other Christian | 2,022 | 67.9 |
| | Muslim | 245 | 8.2 |
| | No religion | 16 | 0.5 |
| | Other | 36 | 1.2 |
| | **total** | **2,976** | **100.0** |
| **Marital Status** | Yes, currently married | 2,306 | 77.5 |
| | Living with man as if married | 161 | 5.4 |
| | Widowed | 145 | 4.9 |
| | Divorced | 107 | 3.6 |
| | Separated | 257 | 8.6 |
| | **total** | **2,976** | **100.0** |

Table 4.2.1 shows that age group 25-29 formed the greatest part of the sample (28.3%) whereas the least number of individuals interviewed were those aged between 15- 19. This could probably be because most of them were in school at the time of the interview since the interviews were carried out throughout the week.

From the table, we also see that about half of the respondents had attended nursery and primary school (49.3%), whereas those who attended university were the least (2.2%).

Most respondents in the urban areas interviewed were Christians (catholics and protestants/ other Christian categories), accounting for 90%. Of these Christians, about 69% are protestants and belong to other Christian congregations. Less than 1% of the respondents had no religion. This shows that majority are religious.

Majority of the respondents were married women (77.5%). About 5.4% of the women interviewed also reported to be living with a man as if married- cohabiting. The total of women cohabiting as well as married came to 2,467, which accounts for about 85% of the total respondents. This is the category expected to be sexually active and therefore greatest contraceptive user in an ideal situation.

4.2.2 Reproduction Characteristics

Reproduction characteristics were examined to determine their frequencies. This enabled us obtain the total number of respondents who met the selection criteria for the study based on the key variables.

**Table 4.2.2: Reproduction Characteristics of Urban Women**

| Reproduction characteristic | Categories | Frequency | Percentage |
|---|---|---|---|
| **Parity** | no child | 27 | 0.9 |
| | 1 | 745 | 25.0 |
| | 2 | 891 | 29.9 |
| | 3 | 602 | 20.2 |
| | 4 | 327 | 11.0 |
| | 5 | 192 | 6.5 |
| | 6 | 95 | 3.2 |
| | 7 | 46 | 1.5 |
| | 8 | 25 | 0.8 |
| | 9+ children born alive | 26 | 0.9 |
| | **total** | **2,976** | **100.0** |
| **Age at first pregnancy** | <15 years | 111 | 3.7 |
| | 15-19 | 1,383 | 46.5 |
| | 20-24 | 1,127 | 37.9 |
| | 25-29 | 304 | 10.2 |
| | 30+ years | 51 | 1.7 |
| | **total** | **2,976** | **100.0** |
| **Early Pregnancy loss** | Yes | 368 | 12.4 |
| | No | 2,608 | 87.6 |
| | **total** | **2,976** | **100.0** |
| **Still Birth** | Yes | 67 | 2.3 |
| | No | 2,909 | 97.7 |
| | **total** | **2,976** | **100.0** |

Most respondents who took part in the study had a total number of two children (about 30%). About 45% of all the respondents had three or more children.

Majority of respondents had their first pregnancy at their early years of child bearing (50.2%). This shows that teenage pregnancy is still high for the urban women population. Very few of them (about 4%) had their first pregnancy outside the standard child bearing (15- 49 years) age bracket. It can be deduced that sexual activity begins much early.

Miscarriages and abortions were not very high compared to live births (12.4% vs 87.6%). However, having more than 10% cases of early pregnancy loss is quite high. Most pregnancies, as seen, result in live births.

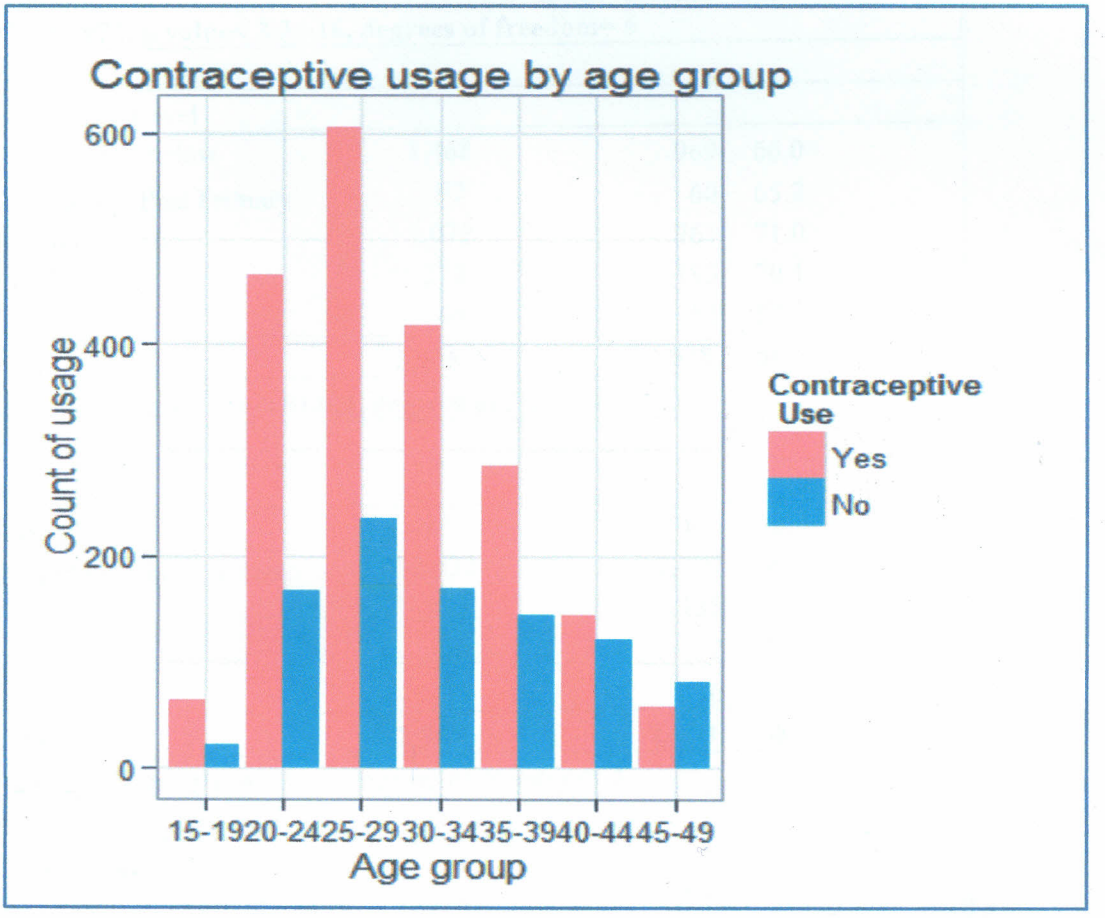
Still births are not so common in the urban areas of Kenya, accounting for less than 5% as reported by respondents. Handling of fetuses at the late stages of childbearing is important since such losses are not acceptable. Of importance to mention is that for every still birth, there are five cases of miscarriages/ abortions.

## 4.3 Bivariate Analysis of Variables

### 4.3.1 Relationship with Background Characteristics

A descriptive cross tabulation of results of contraceptive use shows that age group 25- 29 years were the greatest users of contraceptives whereas those aged 15- 19 the least.

**Figure 4.3.1: Contraceptive usage distributed by the various age groups**




The figure above shows that contraceptive usage is highest in all age groups except that of 45- 49 years. This is probably because at this age group, sub fecundity is highest and therefore the risk to pregnancy is significantly reduced. This then leads to fewer women using contraceptives.

For a clearer perspective on relationship of variables, a chi square test was carried out using R. A summary of the bivariate analysis of background characteristics is given in the table below.

**Table 4.3.1: Contraceptive usage by background characteristics**

| Background characteristic | Frequency | Total using contraceptives | Percentage using contraceptives |
|---|---|---|---|
| **Age Group** | | | |
| 15-19 | 85 | 64 | 75.3 |
| 20-24 | 632 | 465 | 73.6 |
| 25-29 | 841 | 605 | 71.9 |
| 30-34 | 587 | 418 | 71.2 |
| 35-39 | 428 | 285 | 66.6 |
| 40-44 | 264 | 143 | 54.2 |
| 45-49 | 139 | 58 | 41.7 |
| **total** | **2,976** | **2,038** | 68.5 |
| **$\chi 2$= 87.977, p value< 2.2e-16, degrees of freedom= 6** | | | |
| | | | |
| **Education Level** | | | |
| Primary and below | 1,468 | 969 | 66.0 |
| Vocational/ Post Primary | 92 | 60 | 65.2 |
| Secondary educ | 1,072 | 761 | 71.0 |
| College level | 278 | 195 | 70.1 |
| University level | 66 | 53 | 80.3 |
| **total** | **2,976** | **2,038** | 68.5 |
| **$\chi 2$= 12.366, p value= 0.01483, degrees of freedom= 4** | | | |
| | | | |
| **Religion** | | | |
| Catholic | 657 | 466 | 70.9 |
| Protestant/other Christian | 2,022 | 1,399 | 69.2 |
| Muslim | 245 | 135 | 55.1 |
| No religion | 16 | 12 | 75.0 |
| Other | 36 | 26 | 72.2 |
| **total** | **2,976** | **2,038** | **68.5** |
| **$\chi 2$= 23.159, p value= 0.000, degrees of freedom= 4** | | | |
| | | | |
| **Marital Status** | | | |
| Yes, currently married | 2,306 | 1,707 | 74.0 |
| Living with man as if married | 161 | 120 | 74.5 |
| Widowed | 145 | 54 | 37.2 |
| Divorced | 107 | 45 | 42.1 |

| | | | |
|---|---|---|---|
| Separated | 257 | 112 | 43.6 |
| **total** | **2,976** | **2,038** | **68.5** |
| **$\chi 2$= 209.567, p value< 2.2e-16, degrees of freedom= 4** | | | |

*Age Group of Respondent*

Contraceptive users are mainly aged 15- 34 years, each of which represented more than 70% of respondents. It can be said that contraceptive usage is highest in the age group 15- 19 years while lowest among age groups 45- 49 of the participants in the survey (75.3% vs 41.7%). The proportion of contraceptive users steadily declines as one goes to higher age groups. A bivariate analysis shows a very strong association between contraceptive usage and age group of the respondent ($p<2.2e-16$, at 5% level of significance) and a chi square value of $\chi 2= 87.977$.

*Education Level reached*

Contraceptive usage is highest among respondents who have attended universities (80.3%) and lowest among those with only nursery/ kindergarten education (66.0%). The chi square test shows that there is an association between contraceptive usage and the level of education ($\chi 2 = 12.366$, $p=0.01483$ at 5% level of significance). This however is not a very strong relationship.

*Religion*

People with no religion accounted for the greatest proportion of contraceptive users (75.0%) followed by Catholics and Protestant Christians (70.9% vs 69.2% respectively). A larger sample size would however be required to conclusively say that contraceptive usage is highest among people with no religion. A **p** value of less than 0.05 suggests a strong relationship between contraceptive usage and religion.

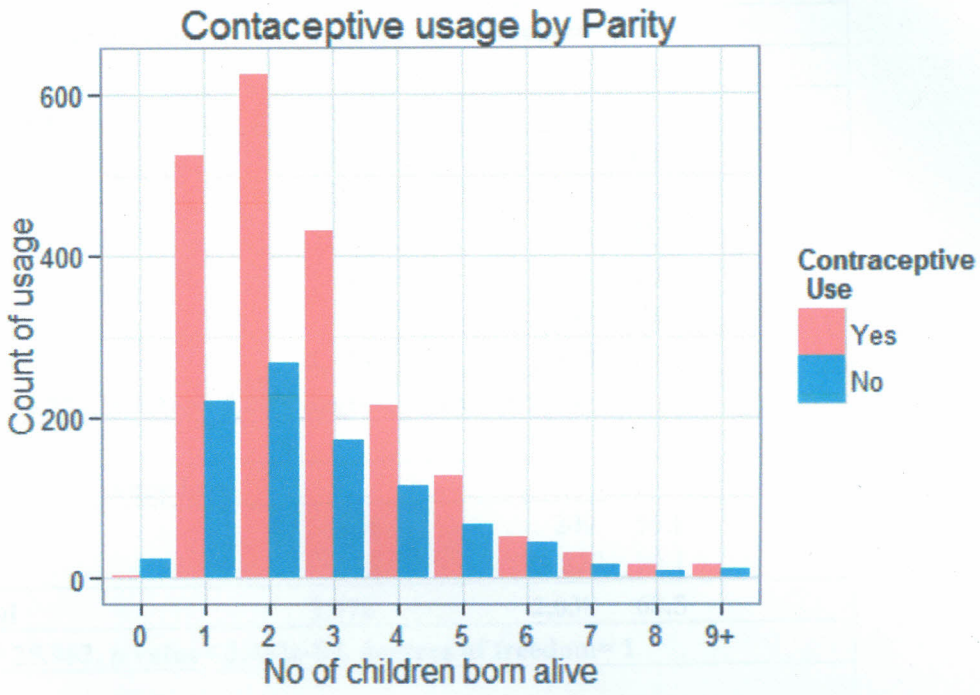
*Marital Status*

Respondents who are married and those living together as if married accounted for 90.0% of total contraceptive users whereas the least category of contraceptive users were the widowed and divorced (37.2% and 42.1% respectively). From the analysis, it is evident that contraceptive usage is associated with one's marital status ($p<0.05$ at 5% level of significance).

### 4.3.2 Relationship with Reproduction Characteristics

Contraceptive usage can be graphically examined for a few reproduction characteristics. For instance, with respect to the number of children born alive to women of child bearing ages, this is shown in figure 3 below:

**Figure 4.3.2: Bar graph of contraceptive usage by number of live births to women**




The figure above shows that contraceptive usage is lower in women with no children. This could probably be as a result of sexual activity not having begun. Contraceptive usage is highest among women who have had one to five live births.

A bivariate test was also carried out in order to establish whether contraceptive usage was significantly associated with a selected number of reproduction characteristics.

**Table 4.3.2: Contraceptive usage by Reproduction characteristics**

| Reproduction characteristic | Frequency | Total using contraceptives | Percentage using contraceptives |
|---|---|---|---|
| **Parity** | | | |
| 0 | 27 | 4 | 14.8 |
| 1 | 745 | 525 | 70.5 |
| 2 | 891 | 625 | 70.1 |
| 3 | 602 | 430 | 71.4 |
| 4 | 327 | 214 | 65.4 |
| 5 | 192 | 127 | 66.1 |
| 6 | 95 | 51 | 53.7 |
| 7 | 46 | 30 | 65.2 |
| 8 | 25 | 17 | 68.0 |
| 9+ children born alive | 26 | 15 | 57.7 |

| | | | |
|---|---|---|---|
| **total** | **2,976** | **2,038** | **68.5** |
| **$\chi2$= 54.110, p value= 1.799e-08, degrees of freedom= 9** | | | |
| | | | |
| **Age at First Pregnancy** | | | |
| **<15 years** | 111 | 67 | 60.4 |
| 15-19 | 1,383 | 911 | 65.9 |
| 20-24 | 1,127 | 812 | 72.0 |
| 25-29 | 304 | 213 | 70.1 |
| 30+ years | 51 | 35 | 68.6 |
| **total** | **2,976** | **2,038** | **68.5** |
| **$\chi2$= 14.759, p value= 0.005, degrees of freedom= 4** | | | |
| | | | |
| **Early Pregnancy Loss** | | | |
| **Yes** | 368 | 209 | 56.8 |
| **No** | 2,608 | 1,829 | 70.1 |
| **total** | **2,976** | **2,038** | **68.5** |
| **$\chi2$= 25.962, p value= 3.482e-07, degrees of freedom= 1** | | | |
| | | | |
| **Still Birth** | | | |
| Yes | 67 | 40 | 59.7 |
| No | 2,909 | 1,998 | 68.7 |
| **total** | **2,976** | **2,038** | **68.5** |
| **$\chi2$= 2.049, p value= 0.152, degrees of freedom= 1** | | | |

***Parity***

The modal number of live children born is between one and three. They account for 77.5% (1,580 respondents) of contraceptive users. It can be seen that contraceptive usage is highest among women with one to three children and lowest to those with no children (14.8%) and those with six children (53.7%). The bivariate analysis also reveals a chi square value, $\chi2$ = 54.110 and that contraceptive usage is very strongly associated with the number of children one has (p=1.799e-08).

***Age at first Pregnancy***

All respondents reported to have had their first pregnancy between the ages 10 and 35 years. Half of the respondents using contraceptives had their first pregnancy in their teenage years. Of the different ages at first pregnancy, age 20- 24 years recorded the greatest percentage of contraceptive users (72.0%). Age at first pregnancy is strongly associated with contraceptive usage ($\chi2$= 14.759, p=0.005).

***Still birth***

Still birth is not so common among the urban women. For those women who have not had still births, 68.7% use contraceptives whereas those who experienced fetal death, about 60.0% use contraceptives. From the analysis, there is no relation between loss of a pregnancy at the later stages in the gestation period with contraceptive usage ($\chi 2$= 2.049,p=0.152).

***Early Pregnancy Loss***

Despite losing pregnancy through miscarriages or abortions, more than half of these women still use contraceptives (56.8%). Contraceptive usage is highest among women with no early pregnancy loss (70.1%). Contraceptive usage is therefore strongly associated with early pregnancy loss ($\chi 2$= 25.962, p=3.482e-07).

## 4.4 Regression Analysis

### 4.4.1 Introduction

This was the last stage of the analysis. It involved selecting all variables that showed statistical significance in the bivariate analysis. The dependent variable used was contraceptive usage (w310) whose outcome was either "yes" or "no". As can be seen from the bivariate analysis, only one variable did not show association with contraceptive usage, namely: Still birth (w212), p=0.152 at 5% level of significance. Variables that showed significance were: age group, education level, marital status, religion, age at first pregnancy, early pregnancy loss and parity.

### 4.4.2 Regression Equations

Several equations were considered. We had the null model, full model, and model of significant variables.

They are as listed below as read from R software:

The null model command used was given by:

```
model1 = glm (Conc_use_b~1, data=statadata, family="binomial")
```

Its AIC was given by 3711.2. This is to be compared with the other models. Its confidence interval for the odds ratio is quite wide 0.9378 and 147.933.

The full model equation was given by the command:

```
model2 = glm (Conc_use_b ~ Age_Group + Education_level + Religion +
Marital_Status + Parity_b + Age_Firstpreg_b + stillbirth + EPL, data=statadata,
family="binomial")
```

Its AIC was given by 3421.1.

The model of significant variables from the chi square test is given in the model below. This model excludes the variable stillbirth which showed no significant association with contraceptive usage.

model3 = glm (Conc_use_b ~ Age_Group + Education_level + Religion + Marital_Status + Parity_b + Age_Firstpreg_b + EPL, data=statadata, family="binomial")

Its AIC was given by 3419.5

From the three models, the best of them was model3. To further check whether the removal of any of the factors would improve the model fit, backward elimination was used and the AICs examined. From the output, the best model is the one with the significant variables.

**Table 4.4.2: Effect of removing a variable on AIC**

| Variable | Df | Deviance | AIC |
|---|---|---|---|
| 1. <none> | | 3353.5 | 3419.5 |
| 2. Education_level | 4 | 3362.8 | 3420.8 |
| 3. EPL | 1 | 3357.8 | 3421.8 |
| 4. Age_Firstpreg | 4 | 3370.4 | 3428.4 |
| 5. Religion | 4 | 3373.9 | 3431.9 |
| 6. Parity_b | 9 | 3412.7 | 3460.7 |
| 7. Age_Group | 6 | 3416.0 | 3470.0 |
| 8. Marital_Status | 4 | 3490.4 | 3548.4 |

From the table above, removing any of the above variables in the model of significant variables would increase the AIC as well as the deviance. When a woman's level of education is removed from the model, the AIC increases to 3420.8 from 3419.5. When the marital status is removed, the AIC records a large increase to 3548.4. Therefore, the parsimonious model is the one with the lowest AIC which for this case is model3 (recorded as <none> with AIC= 3419.5).

In order to test for the validity of model3, a Durbin Watson (DW) test was carried out as well. It revealed a DW statistic of 1.944 and p value 0.13. Hence we reject the hypothesis that there is presence of serial correlation. This then proves that the model is valid. Therefore, interpretation of the output is based on model3.

### 4.4.3 Interpretation of model output

Based on model3, the results below are displayed as output from a binary logistic model. It is evident that contraceptive usage is associated with various factors. The binary outcome variable was coded as "0" for "No" and "1" for "Yes" with respect to contraceptive usage. Age group, religion and marital status are thought to affect contraceptive usage negatively with respect to the reference group. For instance, contraceptive usage among women aged 25-29 years decreased by

0.54 compared to the age group 15- 19 years. Women approaching menopause, age group 45-49 years, had significantly reduced contraceptive usage compared to those at their earlier years (OR= 0.13, p=0.000). The odds of contraceptive usage among women of age group 20- 24 years is 2.95 times of those aged 40-44 years.

Women with secondary and university level education had a higher odds of contraceptive usage compared to those with primary level and below education (OR= 1.24, p= 0.03 and OR=2.19, p=0.02 respectively). The odds of contraceptive usage among women with university education and college level is 2.20 and 1.15 times the odds of the ones with only post primary/ vocational level education respectively. This means that women with university level education seem to be more contraceptive users that those with college level education when compared with those with only primary level education. This study is consistent with other studies that reveal that the higher the level of schooling, the more the assertiveness to use contraceptives hence the lower the fertility levels [12, 13, 15]. The case is more or less similar when modern contraceptives are considered [25].

Generally, contraceptive usage shows significance in the model with reference to religion ($p<0.05$). This is consistent with studies such as on a subset of the population-slum population [12]. When compared to Catholic women, contraceptive usage among Protestants and Muslims ladies is reduced by OR=0.88, p= 0.234 and significantly by 0.48 (p=0.000) respectively. People of no religion had a higher odds of contraceptive usage compared with those of the Protestant faith (1.33), but this is not statistically significant.

Marital status greatly influences contraceptive usage. Contraceptive usage is less among the widowed, divorced and separated women when compared to the married ones. For instance, the likelihood of using contraceptives among the separated is about a third the odds of those cohabiting. This is expected since they are believed not to be sexually active. There is no much difference in contraceptive usage among married women and those living with men as if married (that is, cohabiting relationships) since they have more or less similar risk of sexual activity (OR=1.00, p =0.991).

It is evident that parity greatly influences contraceptive usage. The more the number of live births a woman has had, the more the likelihood of contraceptive usage [12]. For instance, women who have had five children are about 28.9 ($p<0.05$) times likely to use contraceptives than those with only one (OR=15.0, $p<0.05$) when compared to women without children. Women with four children are 1.8 times more likely to use contraceptives than those with only one, probably because of other underlying factors.

Women who had their first pregnancies after the age of 20 years have an increased likelihood of using contraceptives as compared to those who had their first pregnancies below age 15 years. For instance, women who had their first pregnancy in the age interval 25- 29 years had 1.8 times odds of using contraceptives compared to those in their teenage (15- 19 years). This could be

because teenage pregnancy is discouraged and that men who get who aren't adults pregnant are liable for prosecution. Then again, at this age, a lady in teenage is still under parental care.

Abortions and miscarriages are thought to influence a woman's choice on contraception. Women who have lost a pregnancy are 0.77 times likely to use contraceptives than those who have never suffered loss. Probably there is phobia that comes with loss of pregnancy hence the need to avoid contraceptives.

**Table 4.4.3a: Binary Logistic Regression general output**

| | Estimate (B) | Std.Error | z value (Wald Statistic) | df | Pr(>\|z\|) | Exp(B) Odds Ratio | lower limit 2.5% | Upper limit 97.5% |
|---|---|---|---|---|---|---|---|---|
| **(Intercept)** | -1.578307 | 0.645102 | -2.447 | 1 | 0.00367 ** | 0.206324 | 0.051646 | 0.680347 |
| **Age_Group** | | | | | | | | |
| *15-19* | *1* | | | | | | | |
| 20-24 | -0.423063 | 0.288437 | -1.467 | 1 | 0.14245 | 0.655038 | 0.36393 | 1.132941 |
| 25-29 | -0.611806 | 0.294595 | -2.077 | 1 | 0.03782 * | 0.54237 | 0.297948 | 0.950001 |
| 30-34 | -0.726872 | 0.312379 | -2.327 | 1 | 0.01997 * | 0.483419 | 0.257069 | 0.878436 |
| 35-39 | -0.939908 | 0.321646 | -2.922 | 1 | 0.00348 ** | 0.390664 | 0.204215 | 0.723487 |
| 40-44 | -1.504635 | 0.338545 | -4.444 | 1 | 0.00001 *** | 0.222098 | 0.112476 | 0.425577 |
| 45-49 | -2.05376 | 0.371136 | -5.534 | 1 | 0.00000 *** | 0.128252 | 0.061035 | 0.262254 |
| **Education level** | | | | | | | | |
| *Primary and below* | *1* | | | | | | | |
| Post Primary/ Vocational | -0.005082 | 0.241794 | -0.021 | 1 | 0.98323 | 0.994931 | 0.62415 | 1.614818 |
| Secondary/'O' and 'A' level | 0.217361 | 0.09781 | 2.222 | 1 | 0.02626 * | 1.242793 | 1.026392 | 1.506171 |
| College (middle level) | 0.136342 | 0.163452 | 0.834 | 1 | 0.40420 | 1.146074 | 0.834326 | 1.584318 |
| University | 0.78194 | 0.343864 | 2.274 | 1 | 0.02297 * | 2.185709 | 1.148355 | 4.459847 |
| **Religion** | | | | | | | | |
| *Catholic* | *1* | | | | | | | |
| Protestant/other christian | -0.125944 | 0.105799 | -1.19 | 1 | 0.23389 | 0.881665 | 0.715437 | 1.083336 |
| Muslim | -0.730079 | 0.165574 | -4.409 | 1 | 0.00001 *** | 0.481871 | 0.348319 | 0.666872 |
| No | 0.15615 | 0.639266 | 0.244 | 1 | 0.80703 | 1.169002 | 0.364746 | 4.722885 |
| Other | -0.193492 | 0.396545 | -0.488 | 1 | 0.62559 | 0.824076 | 0.389609 | 1.872148 |
| **Marital Status** | | | | | | | | |
| *Married* | *1* | | | | | | | |
| Living tog. as if married | 0.002233 | 0.193763 | 0.012 | 1 | 0.99080 | 1.002236 | 0.691469 | 1.480604 |
| Widowed | -1.331899 | 0.189265 | -7.037 | 1 | 0.00000 *** | 0.263976 | 0.181352 | 0.381346 |
| Divorced | -1.198622 | 0.210617 | -5.691 | 1 | 0.00000 *** | 0.301609 | 0.198811 | 0.454873 |
| Separated | -1.224574 | 0.140331 | -8.726 | 1 | <0.00000 *** | 0.293883 | 0.222934 | 0.386625 |
| **No. of children born alive** | | | | | | | | |
| *0* | *1* | | | | | | | |
| 1 | 2.70722 | 0.565022 | 4.791 | 1 | 0.00000 *** | 14.98756 | 5.462477 | 52.92699 |
| 2 | 2.93763 | 0.567671 | 5.175 | 1 | 0.00000 *** | 18.87108 | 6.838325 | 66.9167 |
| 3 | 3.199419 | 0.574269 | 5.571 | 1 | 0.00000 *** | 24.51827 | 8.75369 | 87.8226 |
| 4 | 3.280234 | 0.58585 | 5.599 | 1 | 0.00000 *** | 26.58199 | 9.244774 | 96.91844 |
| 5 | 3.364875 | 0.597096 | 5.635 | 1 | 0.00000 *** | 28.92988 | 9.812872 | 107.3561 |
| 6 | 3.021643 | 0.617221 | 4.896 | 1 | 0.00000 *** | 20.52498 | 6.653024 | 78.59798 |
| 7 | 3.719838 | 0.671401 | 5.54 | 1 | 0.00000 *** | 41.25771 | 11.92878 | 172.9687 |
| 8 | 4.005185 | 0.751245 | 5.331 | 1 | 0.00000 *** | 54.88196 | 13.53717 | 266.2679 |
| 9+ | 3.618955 | 0.72005 | 5.026 | 1 | 0.00000 *** | 37.29856 | 9.718873 | 169.9582 |
| **Age at first pregnancy** | | | | | | | | |
| *<15* | *1* | | | | | | | |
| 15-19 | 0.298413 | 0.220284 | 1.355 | 1 | 0.17552 | 1.347719 | 0.869855 | 2.066685 |
| 20-24 | 0.638482 | 0.23249 | 2.746 | 1 | 0.00603 ** | 1.893604 | 1.194475 | 2.976546 |
| 25-29 | 0.75853 | 0.272625 | 2.782 | 1 | 0.00540 ** | 2.135135 | 1.248221 | 3.639091 |
| 30+ | 0.958259 | 0.419488 | 2.284 | 1 | 0.02235 * | 2.607152 | 1.15775 | 6.024377 |
| **Early pregnancy loss** | | | | | | | | |
| *No* | *1* | | | | | | | |
| Yes | -0.266966 | 0.128368 | -2.08 | 1 | 0.03755 * | 0.7657 | 0.596216 | 0.98647 |

Form the above results, it is necessary to examine these variables to establish their general effect on the model with the reference categories in mind.

**Table 4.4.3b: General Effect of variables in the logistic model**

| Variable | Estimate | Degrees | Pr(>\|z\|) | Conclusion |
|---|---|---|---|---|
| 1. Age Group | 61.5 | 6 | 0.00000 | very significant |
| 2. Education level | 8.9 | 4 | 0.06400 | not significant |
| 3. Religion | 20.9 | 4 | 0.00034 | very significant |
| 4. Marital status | 135.4 | 4 | 0.00000 | very significant |
| 5. Parity | 45.6 | 9 | 0.00000 | very significant |
| 6. Age at first pregnancy | 16.8 | 4 | 0.00210 | significant |

The table above shows that education level when placed in a regression model together with other variables is not statistically significant. This could be driven by the fact that Post primary and college (middle level) education levels do not significantly affect contraceptive usage.

# Chapter 5 Discussion

## Introduction

This chapter discusses findings of the study with respect to contraceptive usage and goes further to make comparisons with previous studies.

## Background Characteristics

Contraceptive users are mainly aged 15- 34 years, each of which represented more than 70% of respondents. The proportion of contraceptive users steadily declines as one goes to higher age groups. A bivariate analysis shows a very strong association between contraceptive usage and age group of the respondent ($p<2.2e-16$, at 5% level of significance) and a chi square value of $\chi2= 87.977$. Women approaching menopause, age group 45- 49 years, had significantly reduced contraceptive usage compared to those at their earlier years (OR= 0.13, p=0.000). Education Level reached determines one's usage of contraceptives. The higher the level of schooling, the more the usage of contraceptives. Women with secondary and university level education had a higher odds of contraceptive usage compared to those with primary level and below education (OR= 1.24, p= 0.03 and OR=2.19, p=0.02 respectively). This study is consistent with other studies that reveal that the higher the level of schooling, the more the use contraceptives hence the lower the fertility levels [12, 13, 15]. The case is more or less similar when modern contraceptives are considered [25]. People with no religious affiliation showed significance with contraceptive usage. Religion in general has shown relationship withcontraceptive usage even in smaller populations [12]. The married and cohabiting women are the greatest users of contraceptives. This contradicts a study on the slum population of Kenya [12], but consistent with others.

## Reproduction Characteristics

The modal number of live children born is between one and three. The more the number of live births a woman has had, the more the likelihood of contraceptive usage, but not for the slum population [12]. All respondents reported to have had their first pregnancy between the ages 10 and 35 years. Half of the respondents using contraceptives had their first pregnancy in their teenage years. Women who had their first pregnancies after the age of 20 years have an increased likelihood of using contraceptives as compared to those who had their first pregnancies below age 15 years. School factor as well as underlying laws against teenage pregnancy could have played a role in discouraging teenage pregnancy. Still birth is not so common among the urban women. For those women who have not had still births, 68.7% use contraceptives whereas those who experienced fetal death, about 60.0% use contraceptives. From the analysis, there is no relation between loss of a pregnancy at the later stages in the gestation period with contraceptive usage ($\chi2= 2.049$,p=0.152). Little information is available if any on this stillbirth versus contraceptive usage. Early Pregnancy Loss with regard to contraceptive usage is a study that needs to be examined. Women who have lost a pregnancy were less likely to use contraceptives than those who have never suffered loss.

# Conclusion and Recommendations

## Introduction

This chapter concludes the study by giving a summary of key findings of the study and proposes the way forward.

## Conclusion

The sample used was a reduced one based on the variables of interest. The original sample selected was 8,932 which later reduced to 2,976. Emphasis was on the sample's adequacy for use in the bivariate analysis. The sample constituted women of childbearing ages 15- 49 years in the major urban areas of Kenya that is, Nairobi, Mombasa and Kisumu.

From the above analysis, it is clear that several factors are associated with contraceptive usage. Of the eight variables selected, seven of them showed statistical significance to the women population of urban areas of Kenya.

Most respondent in this sample were between the ages 25- 29 years, had attended primary level education, were protestant/ Christians of other faiths, and were currently married. They also had their first pregnancies at teenage (15- 19 years), had two children and a few had had previous loss of pregnancies.

What comes out clearly is that some of the variables tested for association with contraceptive usage are consistent with previous studies carried out to some subsets of the population. It is clear that contraceptive usage is high (68%). Background characteristics greatly influence contraceptive usage. Age group, Marital Status and religion are good predictors of contraceptive usage. The number of live births a woman has had, her age at first pregnancy and previous pregnancy loss at early stages of gestation (early pregnancy loss) are also associated with contraceptive usage.

The best model was one with the seven predictors: Age group, religion, marital status, education level, age at first pregnancy, parity, and early pregnancy loss which resulted in the lowest AIC of 3419.5 and which gave a DW test of 0.13 hence making the model valid.

## Recommendations

After carefully analyzing and interpreting output, several things can be drawn.

An interesting observation that comes out clearly is that current contraceptive usage needs to be looked at in terms of pregnancy loss at different points in the gestation period. The bivariate analysis revealed that contraceptive usage has no association with stillbirths encountered yet associated with early pregnancy loss. Both instances are losses of pregnancies. There is need to examine why the difference. A retrospective study on women who have had early pregnancy loss and still birth need to be looked at with respect to contraceptive usage.

There is need to break down early pregnancy loss to miscarriages and abortions. This is because abortions are self-induced whereas miscarriages are beyond a woman's control. The reduced level of contraceptive usage among people who have suffered early pregnancy loss could be driven by women with miscarriages as opposed to those who aborted pregnancies. Critics may argue that abortive women may be irregular users of contraceptives, or ignorant ladies who may not be users of contraceptives. All these need to be examined independently.

The high odds of using contraceptives among women with many children need to be critically examined. In order to assess effectiveness of contraceptive usage among women with children, there is need to control for the desire for more children.

The sample was greatly reduced as a result of missing variables. There is need to carry out a proper analysis on the tools used, research assistants, timing of the study to ensure the validity of results obtained and to increase the response rate.

There is need to obtain estimates for the rural areas as well so as to establish whether contraceptive use is a common practice. This way, the relevant stakeholders can know where intervention is required most.

## References


[1] United Nations Population Fund. "People and possibilities in a world of 7 billion." *UNFPA state of world population 2011*, (2011): 132.

[2] World Health Organization. May 2013. Family Planning. Accessed August 22, 2014.

http://www.who.int/mediacentre/factsheets/fs351/en/

[3] Kenya National Bureau of Statistics. "The 2009 Kenya Population And Housing Census." In *Population Distribution by Age, Sex and Administrative Units* 1C, 1-532. Nairobi: Ramco Printing Works Limited, 2010.

[4] DHS Program. "2008-09 Kenya Demographic and Health Survey (KDHS)." *DHS Program.* n.d. Accessed July 1, 2014.http://www.dhsprogram.com/pubs/pdf/GF17/GF17.pdf.

[5] Center for Reproductive Rights. *In Harm's Way: the Impact of Kenya's restrictive abortion law.* New York: Center for Reproductive Rights, 2010.

[6] Morse, Anne Roback. *Controlling Women's Desires in Kenya.* 2013. Accessed July 1, 2014.

http://www.pop.org/content/controlling-women's-desires-kenya.

[7] National Council for Population and Development. *Kenya Population Situation Analysis.* Nairobi: Government of Kenya, 2013.

[8] Ndugwa, Robert P, John Cleland, Nyonavi J. Madise, Jean-Christophe Fotso, and Eliya M Zulu. "Menstrual Pattern, Sexual Behaviors,and Contraceptive Use among Postpartum Women in Nairobi Urban Slums." *Journal of Urban Health:bulletin of the New York Academy of Medicine*, 2010: S341-S355. http://researchonline.lshtm.ac.uk/3756/1/11524_2010_Article_9452.pdf

[9] National Council for Population and Development. *Kenya Service Provision Assessment Survey.* Nairobi: Government of Kenya, 2010.

[10] Lindh, Ingela. "Factors influencing women's choice of contraception."PhD thesis.University of Gothenburg, 2011. https://gupea.ub.gu.se/bitstream/2077/25573/1/gupea_2077_25573_1.pdf

[11] Guttmacher Institute. *Contraceptive methods women have ever used: United States, 1982-2010.* 2013. Accessed July 1, 2014.http://www.guttmacher.org/pubs/fb_contr_use.html#5

[12] Okech, Timothy C., Dr. Nelson W. Wawire, and Dr. Tom K. Mburu. "Contraceptive use among women of reproductive age in Kenya's city slums." *International Journal of Business and Social Science* 2, *no.1,* (2011): 22-43.

[13] Population Reference Bureau.(2000). "Is education the best contraceptive?" *Population Reference Bureau Web site.* May 2000. Accessed July 1, 2014. http://www.prb.org/pdf/IsEducat-Contracept_Eng.pdf

[14] Gharaibeh, Muntaha K., Arwa Oweis, Farouk M. N. Shakhatreh, Erika Sivarajan Froelicher. "Factors Associated with Contraceptive Use among Jordanian Muslim Women: Implications for Health and Social Policy." *Journal of International Women's Studies 2013, 12 (3).*

[15] Glewwe, Paul."School Quality, Student Achievement, and Fertility in Developing countries."*Critical Perspectives on Schooling and fertility in the Developing World.* C Bledsoe, J Casterline, J Johnson-Kuhn, and J Haaga, eds. (Washington DC: National Academy of Science Press, 1999):128-131. http://www.nap.edu/openbook.php?record_id=6272&page=109

[16] Jones, Rachel K., and Joerg Dreweke. "Countering Conventional Wisdom: new evidence on religion and contraceptive usage." In *Guttmacher Institute Web site.* April (2011). Accessed July 1, 2014.. http://www.guttmacher.org/pubs/Religion-and-Contraceptive-Use.pdf.

[17] Phipps, MG, C Rosengard, S Weitzen, A Meers, and Z Billinkoff. "Age group differences among pregnant adolecents: sexual behaviour,habits and contraceptive use." *Journal of Pediatric and Adolescent Gynaecology*, February, (2008): 9-15. http://www.ncbi.nlm.nih.gov/pubmed/18312794

[18] Senior, Dr Kate. "Boyfriends, babies and basketball: present lives and future aspirations of young women in Ngukurr." *Australia National University.* June 2003. http://naru.anu.edu.au/__documents/seminars/2003/seminar_senior_jun2003.pdf.

[19] World Health Organization. Maternal mortality in 2005: estimates developed by WHO, UNICEF, UNFPA, and the World Bank 25, (2007) available at http://whqlibdoc.who.int/publications/2007/9789241596213_eng.pdf

[20] Wang, Xiaobin, Changzhong Chen, Lihua Wang, Dafang Chen, Wenwei Guang, and Jonathan French and The Reproductive Health Study. "Conception, early pregnancy loss, and time to clinical pregnancy: a population-based prospective study." *Fertility and Sterility* 79, *no.2*, (2002): 577-584. http://www.sciencedirect.com/science/article/pii/S0015028202046940

[21] Wilcox, Allen J., et al. "Incidence of Early Loss of Pregnancy." *The New England journal of medicine* 319, *no.4*, (1988). http://www.nejm.org/doi/full/10.1056/NEJM199906103402304

[22] Rothman, Kenneth J. "Fetal loss, twinning and birthweight after oral-contraceptive use." *The New England Journal of Medicine*, (1977): 468-471. http://www.nejm.org/doi/full/10.1056/NEJM199310073291501

[23] Fotso, Jean Christophe, Ilene S Speizer, Carol Mukiira, Paul Kizito and Vane Lumumba. "Closing the poor-rich gap in contraceptive use in urban Kenya: are family planning programs increasingly reaching the urban poor?" *International Journal for Equity in Health 2013, 12.* http://www.equityhealthj.com/content/pdf/1475-9276-12-71.pdf

[24] Tumlinson, Katherine, Ilene S. Speizer, Joshua T. Davis, Jean Christophe Fotso, Paul Kuria, Linda H. Archer. "Partner Communication, Discordant Fertility Goals, and Contraceptive Use in Urban Kenya." *African Journal of Reproductive Health September 2013; 17(3).*

[25] Asiimwe, John Bosco, Patricia Ndugga, John Mushomi and James Patrick Manyenye Ntozi. "Factors associated with modern contraceptive use among young and older women in Uganda; a comparative analysis." *BMC Public Health 2014, 14.*

[26] Mutombo, Namuunda, Pauline Bakibinga, Carol Mukiira, Eva Kamande. Benefits of family : an assessment of women's knowledge in rural Western Kenya. BMJ Open 2014;4: e004643. doi:10.1136/ bmjopen-2013-004643
http://bmjopen.bmj.com/content/4/3/e004643.full

[27] De Rose, Laurie F., Alex C. Ezeh. Decision-Making Patterns and Contraceptive Use: Evidence from Uganda. Popul Res Policy Rev (2010) 29:423–439 DOI 10.1007/s11113-009-9151-8