

DEMAND FOR CONTRACEPTION AMONG ADOLESCENTS IN KENYA

BY

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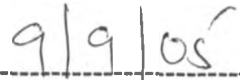
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DECLARATION

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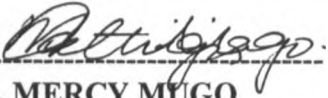


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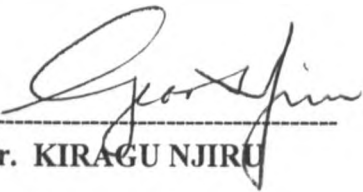
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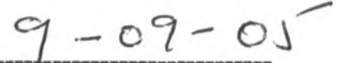
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Date



Mr. KIRAGU NJIRU



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DEDICATION

To my parents Onesmus Mwangi and Siphirah Nyambura.

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Foremost I would appreciate God our heavenly father the giver and custodian of life and with whom all things are possible.

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ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
ARHDP	Adolescent Reproductive Health and Development Policy
ASFR	Age Specific Fertility Rate
CBS	Central Bureau of Statistics
FPAK	Family Planning Association of Kenya
GOK	Government of Kenya
HIV	Human Immunodeficiency Virus
ICPD	International Conference on Population and Development
IIA	Independence of Irrelevant Alternatives
KDHS	Kenya Demographic and Health Survey
MOH	Ministry of Health
NASSEP	National Sample Survey and Evaluation Programme
NCPD	National Council for Population and Development
NPPSD	National Population for Sustainable Development
NPPSD	National Population for Sustainable Development
OECD	Organization for Economic Cooperation and Development
PSI	Population Services International
ROK	Republic of Kenya
STDs	Sexually Transmitted Diseases
TFR	Total Fertility Rate
UNFPA	United Nations Population Fund
WHO	World Health Organization

ABSTRACT

The government's efforts in the provision of family planning services have been successful in lowering the countries fertility rate, however adolescents have generally been sidelined as a special category group. This study has examined the determinants of contraceptive demand using data from KDHS (2003) by employing binary and multinomial logit models. Individual and provider characteristics display the expected signs with age, gender, educational attainment, socioeconomic status and frequency of listening to the radio positively influencing the use of contraceptives while marital status and distance having a negative influence. Choice of public facilities as sources of contraceptives is influenced by individual's gender, marital status, fertility and access to information while private is only influenced by gender. The education level of individuals has a negative influence on the choice of pharmacy as a source but females use the facility more than males. The variables used could however not explain why individuals use traditional methods (self-care) of family planning.

CHAPTER 1: INTRODUCTION

1.1 Background

Kenya has adopted the World Health Organization (WHO) definition of reproductive health as “a state of complete physical, mental, emotional and social well-being and not merely the absence of disease or infirmity, in all matters relating to reproductive health system, its functions and processes” (Ministry of Health, 2003). Its components include; family planning (contraception) needs, safe motherhood and child survival, management of STDs/HIV/AIDS, promotion of adolescent and youth health, management of infertility, gender issues and reproductive rights and other reproductive health issues which include chronic illnesses and concerns of the reproductive health system¹ (MOH, 2003).

The national reproductive health strategy, developed in 1996 for the period 1997 to 2010 has the goal of enhancing service provision in reproductive health to achieve an optimum level of reproductive health for all. The country has experienced favorable reduction in the total fertility rate (TFR) from 7.1 children per woman in mid 1970s to recent estimated level of 3.5 children per woman (KDHS, 2003). However, fertility levels among adolescents have remained high with the age specific fertility rate (ASFR) for 15 to 19 year olds being 110/1000 in 1993 and 111/1000 in 1998. For the 20 to 24 age group it was 257/1000 and 248/1000 in 1993 and 1998 respectively (Republic of Kenya, 2003). In spite of high fertility and early sexual debut, contraceptive use among adolescents has remained very low with an average of 24% of all sexually active adolescents using contraception (NCPD, 1998). Ahawo (1981) observes that early marriage leads to early child bearing and a longer time spent in childbearing ages and hence contributing a greatly to the rise in the fertility rate of this age group and the country in general. This has been attributed to poverty especially in rural areas and low level of education among

¹ This paper considers the family planning aspect of reproductive health among Kenyan adolescents both male and female.

adolescents which is primarily caused by early school drop out rates especially among girls (NCPD, 1998).

In analyzing demand for health care in general, the major conceptual analysis is that the fundamental demand by the consumer is for health and not healthcare per se. Consumers demand health as a consumption commodity in that the health condition increases the utility derived from the consumption of other goods or as an investment commodity that has benefits in health status. The demand for health care is thus a derived demand based upon the consumer's desire for health which is desirable for the enjoyment of all production and consumption activities (McGuire et al., 1988). The study of health care as a commodity is however complicated by the fact that medical care is consumed conditional to being sick. In addition, the physician agency relationship undermines consumer's sovereignty since consumers can only decide either to receive or not to receive medical services, considering that the number of doctor visits is determined by physicians. This study focuses on the demand side and consistent with similar studies (Beltran, 1999; Feyisetan and Ainsworth, 1994), we define demand for family planning services as the probability of seeking family planning services. Adolescent reproductive health issues have received considerable attention in the recent past as a special category group whose needs should be addressed if the country is to further reduce the fertility rate and improve the welfare of adolescents².

² There is no universally accepted definition of adolescence. The World Health Organization gives the age limit as 10 to 20 years and youth as persons aged 10 to 24 years. The United Nations considers adolescence as persons aged 15 to 24 years. For the purposes of this paper adolescents (or youths) refer to persons aged 15 to 24 years a definition which has also been adopted in the ARHDP. This study focuses on this age group since KDHS (2003) data used in this study collects data from individuals who are above the age of 15.

1.2 Kenya Adolescent Reproductive Health and Development Policy (ARHDP)

Although past national reproductive health strategies acknowledged adolescent reproductive health issues, they did not suggest clear-cut strategies and targets on improving their reproductive health situation in Kenya. As a response to concerns raised in various international conventions and conferences including; the Millennium Development Goals, National Population for Sustainable Development (NPPSD), the National Reproductive Health Strategy 1997-2010 and the Children's Act of 2001, the International Conference on Population and Development (ICPD) and the Universal Declaration of Human Rights, the first adolescent reproductive health and development policy was launched in 2003. It aimed to incorporate adolescent reproductive health issues in all planning activities of the health sector and development planning in general.

The goal of the policy was to contribute to the improvement of the quality of life and well-being of Kenya's adolescents and youth. One of the priority concerns identified in the policy was adolescent sexual and reproductive health and rights. To achieve this, there was the recognition of the need to have health information and services being available, accessible, affordable and acceptable through the incorporation of adolescent sexual and reproductive health education into the curricula of all education and training institutions. One of the key indicators to guide the policy up to the year 2015 has been the contraceptive use rate. The policy aims to double the contraceptive use rate among 15-19 years from 4 per cent in 1998 to 8 per cent by the year 2015, and among 20-24 years from 19.9 percent to 40 per cent during the same period (ROK,2003).

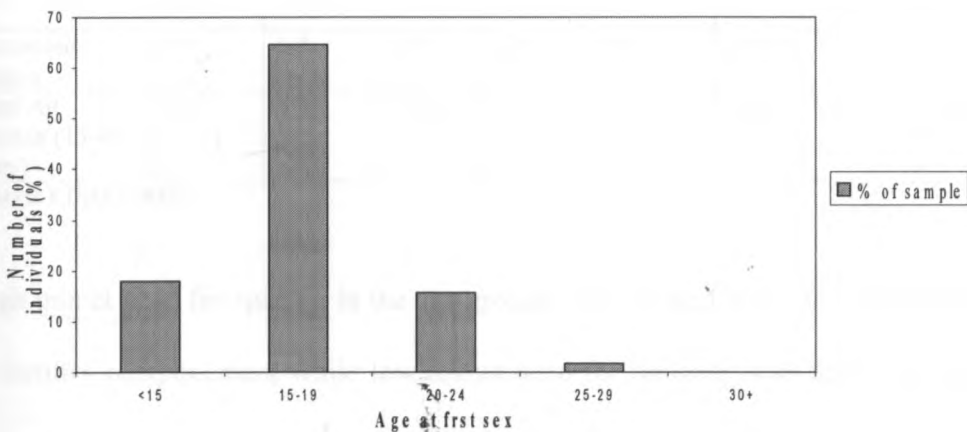
Identified areas of concern to access of reproductive health services by adolescents are;

- The provision of health information and services at all levels by strengthening the capacities of institutions and service providers to provide appropriate information, counseling and services to all adolescents.
- Education and sensitization of parents and communities on the sexual and reproductive rights and health of adolescents and the need for the incorporation of adolescent sexual and reproductive health education in the curriculum of all education and training institutions.

1.3 Adolescent Reproductive Health Situation in Kenya

Estimates from KDHS (2003) indicate that 34.3 per cent of the Kenyan population consists of young people aged 15-24 years and nearly 76 per cent have sexual intercourse before 20 years of age. Similarly, from a nationally representative sample of 8298 individuals composed of 5301 females (15-49 years) and 2997 males (15-49 years), the majority (82.7%) of individuals had their first sexual experience before attaining the age of 20 years as shown in the graph below.

Figure 1: Populations age at first sex (N = 8298)



Source: Authors computation

The KDHS (2003) survey also shows that contraceptive knowledge is almost universal in Kenya with 96 per cent of all women age 15-49 and 98 per cent of all men age 15-54 knowing at least one method of family planning. The use of family planning services is however low with the lowest rate of use being among adolescents at 23 per cent among sexually active adolescents. This low prevalence of contraceptive use among adolescents has been attributed to the lack of access to information and services, infrequent and unplanned sex and social-economic factors (NCPD, 1998). The problem of unmet need for family planning³ among adolescents compared to rest of the population is seen from the table below.

Table 1: Unmet need for family planning among married female adolescents compared to other categories of the population ⁴(Total number of women aged 15 to 49 in the sample is 8195)

Background Characteristics	Unmet need for family planning			Met need for family planning (currently using)			Total demand (unmet need + met need) for family planning			% of Demand Satisfied	Number of Women
	a) For Spacing	b) For Limiting	c) Total	d) For Spacing	e) For Limiting	f) Total	For Spacing (a+d)	For Limiting (b+e)	Total (c+f)		
Age 15-19	26.6	1.2	27.8	12.7	3.7	16.4	40.6	5.6	46.1	39.7	333
Age 20-24	27.6	4.8	32.4	19.8	8.0	27.8	50.2	13.2	63.4	48.9	965
Unmarried women	1.9	0.8	2.7	6.2	5.7	11.9	8.6	6.7	15.3	82.5	3276
Total All Women (15-49 years)	9.4	6.4	15.8	11.1	17.3	28.4	21.6	24.1	45.6	65.4	8195

Source: KDHS (2003)

High unmet need for spacing in the age groups 15 to 19 and 20 to 24 can be explained by the preference of fertility postponement while low unmet need for limiting is an indicator of preferred future fertility

³ Unmet need for family planning describes women who are currently married who do not want any more children or wish to postpone childbearing but are not using any contraception for any reason including access barriers including cost, method related barriers (such as side effects), social and religious beliefs (KDHS, 2003).

⁴ The statistics presented in the table focus on females which has been the primary focus in all past demographic and health surveys. This bias is founded on the understanding that fertility issues focus on females since child bearing and the need for family planning (i.e. for limiting and spacing) can be effectively linked which may not be the case for males. The values presented in the table have been aggregated and the totals may therefore not add up.

intentions. High unmet need for family planning is indicative of the problem facing many adolescents relative to the rest of the population. Various studies have documented that low levels of contraception nonuse is associated with demographic and socioeconomic factors such as age, educational attainment, income levels, religious beliefs and cultural practices (Oliver, 1995; Beegle, 1995)

High levels of unmet need for family planning has a significant bearing on unwanted fertility among the most affected categories of the population of individuals (20 to 24 years) who have the highest fertility rate of 243/1000 (KDHS, 2003). The high total demand for contraceptives (63.4%) in the 20 to 24 age group can be explained by the fact that the majority of the population starts sexual relations at this age (Figure 1) which explains the high fertility rate. Demand for family planning services is strongly associated with demographic and socioeconomic indicators and variations on the level of use exist across different ages, marital status, education levels and rural-urban setups. KDHS (2003) results observed unmet need for family planning to be higher among less educated individuals, the poorest and in rural areas due to access barriers, lack of information and misguided beliefs on the use of contraceptives.

1.4 Statement of the Problem

Availability and access to family planning services is an important aspect of life which ensures that people are not only able to exercise their reproductive rights but also participate in economic life and enjoy better health. The use of preventive health care services like family planning is done with the expectation that the cost of seeking services will be significantly lower than the costs that may arise due to non-use (Heller, 1982; Beltran, 1999; Thomas and Maluccio, 1995; Scribner, 1995; Oliver, 1995). The government through the Ministry of Health has made family planning services available in all

government facilities at subsidized cost making contraceptives easily affordable to all who can access them. Organizations such as Population Services International (PSI) have also been involved in the distribution of these services to chemists, shops and community based distributors thus reducing the actual and distance costs involved in accessing them. Information on sources used to access contraceptives is therefore important for planning by implementers of various programs on provision of the services especially for a targeted segment of the population.

Adolescent fertility in Kenya is both a social and policy concern since the country has continued to record increasing adolescent childbearing compared to the rest of the population. With low contraceptive use among this age group the consequences has been unwanted pregnancies, high school dropout rates and a high rate of abortion which leads to high mortality and morbidity. The Ministry of Health (MOH, 2003) has recommended the provision of reproductive health services to all people irrespective of age, gender or other socioeconomic factors. However, as is evident in other countries the availability of family planning services does not guarantee that they will be used or that there will be a decline in fertility (Oliver, 1995). It is against this understanding that this study seeks to determine individual and provider attributes that hinder the use of family planning services among adolescents in Kenya.

1.5 Objectives of the Study

The broad objective of the study is to identify and analyze factors that influence an individual to seek family planning services. Specifically the study aims to;

- Determine and analyze the factors that influence the demand for family planning services among adolescents in Kenya
- Analyze the influence of these factors on the types of sources/facilities used to access the services

- Draw policy recommendations based on the study's findings.

1.6 Significance of the Study

Kenya has a predominantly young population whose health and education is and will always be an important factor in determining the future economic and social development of the country. Unlike other parts of the world, Kenya and sub-Saharan Africa in general have continued to experience high adult and adolescent child bearing. Recent statistics (UNFPA, 2003) show that while Africa has continued to record high fertility rates of 4.2 children per woman on average, the developed nations of the OECD countries have been experiencing very low fertility at less than 2 children per woman. The greatest concern contributing to very high fertility rate in Africa is adolescent fertility. Early childbearing and sexual activity also poses serious health risks such as increased maternal mortality and morbidity, infant mortality and morbidity, and complications arising due to teenage abortion⁵. Understanding the factors that influence adolescent decision making on seeking family planning services will ensure that interventions affecting overall health, fertility and population momentum for the country address the problems being faced.

The government and the civil society have made efforts towards the provision of family planning services through education and providing services at subsidized costs to the population. However, the strength and effectiveness of provision programs are best evaluated through proxy indicators of whether a large proportion of the target population has ever used modern contraceptives. The current situation is that most services designed for adolescents are relatively new and focus mostly on education and awareness rather than provision of family planning services. With a relatively recent policy on

⁵ Scribner (1995) observes that legal and illegal abortion is a common method of fertility control in developing countries and that widespread incidence of abortions indicates a lack of information/knowledge on responsible sexual behavior and a high unmet need for family planning to prevent pregnancy.

adolescent reproductive health, this study will add to the limited literature on adolescent access to family planning services and thus contribute towards the implementation and realization of the ARHDP.

CHAPTER 2: LITERATURE REVIEW

2.1 Theoretical Literature

Grossman (1972) presents an argument for health capital as being different from other forms of human capital, in that the stock of health of an individual determines the total amount of time he can spend producing money earnings and commodities. His central proposition is that a person determines his optimal stock of health at any age by equating the marginal efficiency of this capital to its user cost in terms of the price of gross investment. Using a stock approach in his analysis, he proposes that if the rate of depreciation in health increases with age, then the quantity of health capital demanded decreases over the life cycle and that the demand for health and medical care should be positively correlated with the wage rate. In his model the variables enter the analysis through their impact on either the cost of health capital or its marginal efficiency.

Other analyses of individual demand for health care (Deb and Trivedi, 2002; Mushi, 2001) view an individual to be maximizing an intertemporal utility function with a time constraint. When health care is perceived as an investment it is modeled as a derived demand from the demand for good health since it is consumed to produce good health, if it is perceived as consumption good then the health condition increases the utility derived from the consumption of other goods. This means that good health and health care are interrelated in the consumption approach in the analysis of demand for health care (Kamgnia, 2004). Modeling demand for health care can take various specifications; some forms distinguish between users and nonusers (two-part model) of health care and those that distinguish between infrequent and frequent users (Deb and Trivedi, 2002).

A static framework of health care demand models demand as a simple random utility model between use and nonuse of services. An essential feature of the model is the trade off between health and non-health consumption which arises if the health status due to use of a service is higher than that from nonuse (Boulduc et al., 1996). The demand for a health care service is influenced by the price of that service, prices of alternative services, household income and tastes (Mwabu et al., 2001). It is also related to the organization of the health care delivery system and is affected by the availability, quality, costs, continuity and comprehensiveness of services; social structure and health beliefs (Anderson, 1968; Fieldler, 1981). The costs to accessing health care can broadly be categorized as monetary and nonmonetary costs including the actual price of a service (consultation fees or cost of medication), distance in kilometers/travel time or costs of traveling to a health facility. Availability, quality, continuity and comprehensiveness of a health care service is analyzed by virtue of cost barriers, the availability and quality of drugs and health care personnel and the frequency or past use of services.

While some studies (Deb and Trivedi, 2002; Boulduc et al., 1996; Mwabu et al., 2001) measure counts of utilization with reported illness as the initial stage demand for health care, the demand for family planning services as a preventive form of health care is modeled as demand derived from the demand for children. In the economic model of household production applied to various contraception and fertility studies (Beegle, 1995; Oliver, 1995) households/individuals choose to allocate resources in order to maximize utility. Beegle (1995) describes and uses an economic model of contraception use⁶ where the demand for children is a function of the economic contribution of children to the household, the cost of raising children including the value of the woman's time (measured by lost opportunities in educational attainment and employment), and household income. The demand for contraception is therefore a

⁶ An underlying notion to this model is that a woman chooses an amount of family planning to limit her fertility to the number of children they desire, the demand for contraception is therefore derived from the demand for children (Beegle, 1995).

primary function of the desire to control fertility below the “natural” number of births. Contraception is in this sense an input into the production of the optimal number of children, child quality and child health⁷. The decision to use contraceptives will therefore depend on the perceived costs relative to the benefits of having children which are reflected in the level of fertility and related to the pursuit of education (the educational attainment) by the individual and their socioeconomic status.

Low education levels and high poverty maintain high desired family size and consequently hinder a greater demand for contraception (Beegle, 1995). This scenario is characteristic of many developing countries where high fertility has been motivated by the contribution of children’s labour to production and as a form of social security in old age which this is especially so for women due to lack of property rights. Similar analyses outlined by Oliver (1995) argue that as individual’s income increase investments in children increase and the demand for children therefore decreases. This argument would therefore partly explain why higher income individuals/households have fewer children.

The logit model has been widely used to analyze the determinants of contraceptive use since the variable takes a discrete form between use and nonuse (Beegle, 1995; Beltran, 1999; Feyisetan and Ainsworth, 1994; Negussie and Obare, 2003). With regard to provider choice the multinomial logit approach is widely used since it focuses on the most important decision (to seek care or not) and the facility/sources used to receive that care. The main disadvantage of the multinomial logit in estimation is that it imposes the property of independence of irrelevant alternatives⁸. The property is a consequence of the implied

⁷ Contraception is not only used to limit the number of births but also to space them which is evidenced to produce better health outcomes for children (Beegle, 1995).

⁸ The independence of irrelevant alternatives assumption (IIA) states that the odd of facility type *i* being chosen over facility *k* are independent of the availability of alternatives other than *i* and *k* (The IIA follows from an initial assumption that disturbances are independent and homoscedastic). The assumption is however unrealistic as it imposes restriction on consumer behavior while in reality individuals compare alternatives available to them.

assumption of no correlation between the error terms between the different alternatives. The multinomial logit is therefore limited in its ability to show which providers are substitutes. The model however gives similar results to the probit model and is relatively easy to estimate and for this reason, it is widely used in demand modeling (Bolduc et al., 1996).

2.2 Empirical Literature

From the theoretical literature reviewed, different studies on demand for contraceptives have focused on either the general framework of analyzing demand for health care or the economic model of contraceptive use. Basing their analysis of contraceptive use on specific countries in Africa Beegle (1995), Feyisetan and Ainsworth (1994), Oliver (1995) and Thomas and Maluccio (1995) focus on the effect of different determinants of access to contraceptives. The education level of an individual is often mentioned as key determinant to use of health services. Studies show education to have a positive and significant impact on use of contraceptives (Beltran, 1999; Feyisetan and Ainsworth, 1994; Beegle, 1995; Oliver, 1995; Lindelow, 2004). Their main argument is that education increases the opportunity cost of women's time through high paying jobs making childbearing costly which reduces the demand for children and consequently increasing use of contraceptives. The effect of education as a determinant to contraceptive use showed varied effects and was significant at the top of the educational distribution (education levels higher than primary school). Studies by Nichols et al. (1987), Beegle (1995), and Ali (1999) attribute an increase in contraceptive use to higher educational attainment due to diffused information regarding birth control, which resulted to users that are more effective and changing attitudes towards contraception.

Studies have used different variables to proxy income as a factor influencing the use of contraceptives and demand for health care in general. Thomas and Maluccio (1995) use the ownership of household

assets such as electronics, motor vehicles or livestock and observe that individuals in households where these assets are present have higher levels of education and contraceptive use. Beegle (1995) and Oliver (1995) argue that the effect of income on demand for family planning is uncertain. That if having children is a normal good, then an increase in income would increase the demand for children and decrease the demand for family planning. However, the costs of having children increases as wages rise and hence explaining why women in households with greater wealth (was measured by the type of flooring used in the dwelling) had a higher chance of using contraceptives. A similar result indicated a positive correlation between the fact that an individual works and contraceptive use and showed that women had more independence and power in decision making to control fertility (Beltran, 1999; Nichols et al., 1987). By inference it can be observed that a positive correlation between income and educational attainment explains higher use among educated individuals. Involvement in economic activities among adolescents who were not attending school also explained why they recorded higher contraceptive use than those in school (Nichols et al., 1987; Njue et al., 2005).

Feyisetan and Ainsworth (1994), Beltran (1999), Thomas and Maluccio (1995) and Beegle (1995) in their studies show that contraceptive use across the life cycle increases with age but at a decreasing rate. They argue that as women advance in age, the longer the potential exposure to pregnancy and their fertility will approach desired family size. The age of women thus shows a quadratic relationship with contraceptive use. Beltran (1999) related this result with family size (number of children) and observed that individuals with larger families tend to use contraception more than those with small families. The relationship between family size and contraceptive use also took a quadratic form with women having more than four children using contraceptives less than those with fewer children. Among adolescents,

Negussie and Obare (2003) observed that contraceptive use decreased with increase in age resulting to a high fertility rate.

While there are a few studies (Nichols et al., 1987; Ali, 1999) which have focused on both females and males as users of contraceptives, Beltran (1999) has focused on the role of the woman's partner in influencing the use of contraception by the woman. The study observed that the probability of using contraception increased if a woman was married. This was attributed to possible influence of increased income potential and decision making through their partner. This result is supported by reports from the KDHS 2003, whereby 75% of all males interviewed believe that contraception decisions should involve males/partners and are not the sole decision of females. Negussie and Obare (2003) however found that adolescent marital status had a negative correlation with the use of health services (meaning that married adolescents were less likely to use contraception than their single counterparts) and individually, females tend to use contraception more than males. While studies have found differing effects of marital status on the use of health services a possible explanation for a negative correlation is possible future fertility preferences among married individuals than the single.

Another factor influencing the use of health care services and contraception in particular is the place of residence. Beegle (1995), Beltran (1999) and Thomas and Maluccio (1995) in their studies come up with the conclusion that urban dwellers have a higher probability of using modern contraceptives than rural dwellers. Consequently, higher fertility rates are experienced in rural areas. In Njue et al. (2005) and Negussie and Obare (2003) the problem of adolescent child bearing was highly manifested in rural areas and in low socioeconomic settlements. The disparity in contraceptive use is attributed to higher incomes, greater coverage, access and quality of services found in urban areas but lacking in rural areas. This

difference also serves as an indicator of social inequality in access to health care services between the poor and rich and rural and urban households (Leyva-Flores et al., 2001; de Bartlome and Vosti, 1995). By controlling for income and schooling differentials between rural and urban setups Beegle (1995) and Thomas and Maluccio (1995) observed minimal differences on the probability of using contraceptives between urban and rural dwellers.

Different studies have also focused on quality of health services and barriers to access relating to the provision of health services by using measures such as the number and training of medical personnel, availability of drugs, waiting time, travel time or distance to a health facility. Feyisetan and Ainsworth (1994), Lindelow (2004), de Bartlome and Vosti (1994) and Beegle (1995) focus on the effect of distance as a barrier to accessing health services. Their studies observe a negative and significant effect of distance on demand for health care as it places prohibitive costs in terms of travel time and monetary costs. Related to distance and access/availability of services, Beltran (1999) focuses on the role of the number of health facilities on access to contraceptives. The study associated higher use of contraceptives to availability of many health facilities in a region. With regard to quality of services provided, the number of medical personnel and the doctor population ratio have been used. Oliver (1995) establishes a positive relationship between the ratio and the use of contraceptives. However other studies (Beltran, 1999; Beegle, 1995; Lindelow, 2004) find a positive though insignificant effect. While medical personnel play a vital role and especially on provision of advice to patients this result with regard to contraceptive use may indicate that individuals do not necessarily consult with qualified medical persons to obtain contraceptives.

2.3 Overview of the Literature

The analysis of different studies that have focused on contraceptive use show that different individual characteristics may have similar and different effects on the use of contraception. Several studies reviewed reveal that educational attainment, income, area of residence (urban or rural) and age have a positive and significant effect on the use of contraception. Two studies (Nichols et al., 1987; Ali, 1999) that have focused on both males and females observe the same findings where females seek services more than males. However, this is not the case with other variables such as an individual's marital status. While Negussie and Obare (2003) observe that married individuals use contraceptives less than the single, other studies (Nichols et al., 1987; Ali, 1989) observe the contrary. Studies by Nichols et al. (1987), Ali (1999) and Njue et al. (2005) have focused on adolescents as a special category age group and none has studied the sources used to access these services. While studies do not agree on the results and significance of the variables they use, the variation can possibly be attributed to different measures adopted for the same factors (such as socioeconomic status as a measure of income or the use of monetary income of individuals), the nature of the study area or region, methodologies used and the health issue being addressed.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This study uses the two-part model in analyzing demand for contraception. The two-part model is a binary outcome model that describes the distinction between users and non users of health care while the second part describes the distribution of use conditional on some use (Deb and Trivedi, 2002). The model is appropriate for this study as the decision to use contraception takes a binary outcome and the two parts can easily be estimated separately. The decision to use contraception can follow the economic model of household production of health where individuals choose to allocate resources in a way that maximizes their utility. The decision to use contraceptives will however depend on individual perceived costs relative to the benefits and takes the form of a discrete dependent variable where the individual chooses between use and non-use of contraceptives. Following Ellis and Mwabu (1991), we can define an individual's utility maximization function as

$U = U(H, C)$, where individual allocates resources between health care, H , and other commodities C .

Individuals use health care to improve on their health status through determinants of H and C which can be given as;

$H = h(A, Z, H^0)$; where A are the individual characteristics influencing use, Z are the provider characteristics and H^0 is the initial health status before use

$C = I - P_k - P_c$ where I is the income measure of individual, P_k is the costs of using a facility k and P_c are the costs of other commodities

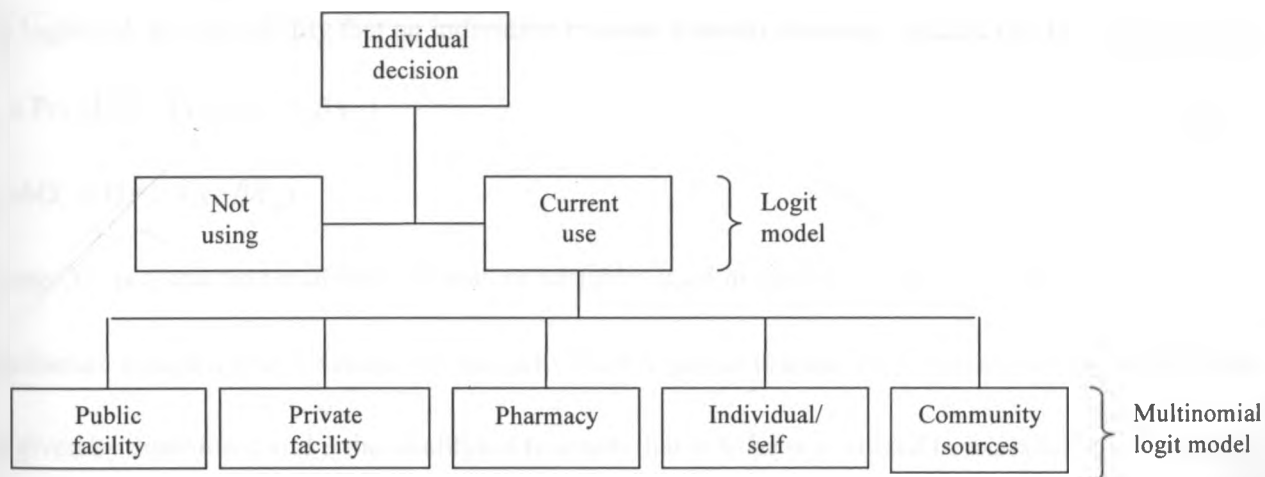
As is evidenced from the literature several individual, community and provider characteristics have an influence on the use of health services and a reduced form demand equation from maximizing the utility function described above subject to the constraints can be given as;

$D = D(P_{fp}, P, R, Q, \mu, \varepsilon)$;

where P_{fp} is the cost of family planning services, P is the price of other commodities, R are the individual characteristics and Q are provider characteristics. Unobservable individual characteristics and the random component are represented by μ and ε .

This basic demand formulation will be used in the paper to study the use of contraceptives and the facilities used to access them. Individual's decision making process to use or not to use contraceptives takes the form below.

Figure 2: Individuals decision making tree on contraceptive use



The decision to seek family planning services from a given facility is modeled depending upon the characteristics of the individual and provider factors relating to access of these services.

3.2 Model Specification

3.3.1 Logit Specification

The probability that an individual i uses contraception or not depends on the utility derived from doing so $U_{ij} = \beta X_{ij} + \varepsilon_{ij}$ (equation 1) is positive, in this case j represents two alternatives-currently using

contraception or not using and X_{ij} are the explanatory variables explained through parameters β . We can define the endogenous variable current use, Y_i as;

$Y_i=1$ if the individual is currently using some method given that $U_{ij} > 0$

$Y_i=0$ if not currently using some method given that $U_{ij} < 0$

From equation 1 assuming that there is a critical value μ for a combination of explanatory variables, then $Y_i=1$ if $\mu \leq \varepsilon$ and $Y_i=0$ otherwise. The error term can therefore be approximated to be a linear function of its arguments $\varepsilon = -\beta.X$ and by assuming that the cumulative distribution of ε_{ij} in equation 1 is logistical, the probability that an individual is using a family planning method can then be given as

$$P_i = \text{Prob}(Y_i) = \text{Prob}(\mu_i > -\beta X_{ij}) \quad (2)$$

$$\text{Prob}(Y_i = 1) = 1 - F(-\beta X_{ij}) \quad (3)$$

Where X_{ij} is a row vector of the explanatory variables used in the model and F is the cumulative distribution function of ε_{ij} ⁹. Given that the individual response is a binomial process whose probabilities are given by equation 2 and 3 the likelihood function that is to be maximized to explain the coefficient values, β for the explanatory variables is given as

$$L = \prod_{Y_i=1}^N P_i \prod_{Y_i=0}^N (1 - P_i) \quad (4)$$

Where L is the likelihood function, \prod is a multiplication operator, P_i is the probability of current use or nonuse and N is the sample size.

⁹ The functional form of F in equation 3 depends on the assumption around the error term μ . If the cumulative distribution of ε is logistical, the model is a logit, while if the errors follow a standard distribution we have a probit model. This study makes use of the logit model since it is easy to estimate and interpret as the values of estimated variables would range between 0 and 1.

3.3.2 Multinomial Logit Specification

This specification is an extension of the logit model and is used when there are more than two choices facing the individual (in this case the facility used to access contraceptives). The model estimates the probability of going to a particular health facility conditional to individual's decision to use contraceptives. To estimate the probability of the individual seeking family planning services from a particular source, we specify demand function to reflect the aspect of provider choice. The underlying assumption to the demand function for a provider is that the individual will seek services from a facility k if the expected utility from that option is higher than from any other alternative. If the individual makes a choice between the alternative providers the conditional utility derived from accessing one form of care can then be expressed linearly as

$$U_{ik} = U(X_{ik}) + \varepsilon_{ik} \quad (5)$$

Where

U_{ik} is expected utility from a provider k (Public facility=1, Private facility=2, pharmacy =3, community sources=4 or individual=4)¹⁰

X_{ik} are the explanatory variables (observable characteristics of the individual and providers)

ε_{ik} is a random error term

Rewriting equation 5 to reflect the components of the different parameters

$$U_{ik} = R_i \alpha_k + Q_{ik} \gamma$$

Where R_i is a vector of individual characteristics and Q_{ik} are the provider characteristics.

¹⁰ This study has categorized the different sources of care as Public; (includes government hospital, government health centre and government dispensary), Private; (to include mission/church clinic or hospital, Family Planning Association of Kenya (FPAK) facility, private hospital or clinic, nursing or maternity home), pharmacy/chemist, community sources (includes mobile clinic, community based distributors, shop, friends or relatives) and individual/self-care. This categorization has been applied so as to ease estimation since individual sources are many and varied with some having very few observations ie there is only one case of community based distributor.

The individual is assumed to know all the sources and chooses one that has the highest conditional utility. The individual arrives to the choice made through the differences in utility functions and not with the levels of utility per se. The parameters from one alternative provider j, (in this case the community) have to be normalized for identification¹¹ purposes (Bolduc et. al., 1996).

Subtracting the utility of each alternative from the utility from the reference choice j the utility derived from each alternative relative to j can be written as;

$$U_{i1} = \bar{Q}_{i1}\gamma + R_i\bar{\alpha}_1 + \bar{\varepsilon}_{i1}, U_{i2} = \bar{Q}_{i2}\gamma + R_i\bar{\alpha}_2 + \bar{\varepsilon}_{i2}, U_{i3} = \bar{Q}_{i3}\gamma + R_i\bar{\alpha}_3 + \bar{\varepsilon}_{i3} \text{ and } U_{iK} = \bar{Q}_{iK}\gamma + R_i\bar{\alpha}_K + \bar{\varepsilon}_{iK}.$$

Where \bar{Q}_{is} reflects the differences in provider characteristics between one provider and the reference provider j explained by the coefficient γ , $\bar{\alpha}_{ks}$ reflect differences in individual characteristics and $\bar{\varepsilon}_{is}$ are the differences in the error term between one provider and the reference alternative. The above specifications represent the multinomial logit specification if we assume that the error terms to the different alternatives are identically and independently distributed with type 1 extreme value density function.

The probability that individual i chooses a given provider can then be expressed as

$$P_{ik} = \frac{\exp(R_i\bar{\alpha}_k + \bar{Q}_{ik}\gamma)}{\sum_{k=1}^K \exp(R_i\bar{\alpha}_k + \bar{Q}_{ik}\gamma)} \quad (6)$$

The log-likelihood function is derived if for each individual observation in the sample an alternative k is chosen and 0 if not for the K-1 possible outcomes.

The log likelihood function to be estimated by maximum likelihood method is

¹¹ The logit model identifies the difference in utility from the alternatives and therefore estimating the coefficients of one alternative is done on the basis of a reference alternative (j) since in the estimation of the odds ratio P_{ik} / P_{ij} it is necessary that the provider (k) is not influenced by other choices.

$$\ln L = \sum_{i=1}^N \sum_{k=1}^{K=5} D_{ik} \ln P_{ik} \quad (7)$$

Where;

N is the sample size, i is the individual, k is source of contraceptive; k=1 for public source, k=2 for private source, k=3 for pharmacy, k=4 for community and k=5 for individual/self care. D_{ik} is a dichotomous variable taking the value of 1 if an individual chooses an alternative k and 0 otherwise.

P_{ik} is the probability of a provider k being chosen

3.3 Selection and Definition of Variables

Dependent Variables

The potential measures of contraceptive use include ever use or current use. The ever use alternative produces more observations compared to current use, however so as to address the issue of source of contraception it may be less practical because fewer individuals can be linked to the provider. This study will thus use current use of some contraception method either modern or traditional. Current use is appropriate for this study as the measure only focuses on sexually active adolescents rather than all adolescents and given the high unmet need for contraception among adolescents, policy concerns would be to raise the contraceptive prevalence rate. Secondly, we estimate the influence of individual characteristics and provider related factors with dependent variable being the choice of a facility.

Explanatory Variables

From the literature reviewed in chapter 2, various factors are identified as having an influence on contraceptive use. Individual, socioeconomic and access factors have been selected to be included in this study. They include age of individual between 15 and 24 years, gender, wealth index (as a proxy for the level of income or financial/ economic endowment) marital status, education, residence, access to information about contraceptives which has been measured by how often individuals listen to a radio

(radio frequency) and the fertility level of individuals (being a parent). The study will also determine how these factors influence the source of contraceptives which is an aspect addressed by a few studies that have been reviewed. Provider characteristics identified for this study are the average distance to a health facility, the number of health facilities (it is assumed that the number of services has a direct implication on service access) and the doctor population ratio. Other factors which have not been included include the cost of contraceptives, social structure, health beliefs and the influence of other commodities. These factors were excluded from the analysis since there was no appropriate way of including them as data on the variables was not collected or be matched to the individuals that were interviewed in the KDHS (2003).

Age: is the age of the individual between 15 and 24 years

Gender: whether the individual is male or female. This is a dummy variable taking the value of 1 if individual is female and 0 if male.

Education: Represented by highest level of education reached and takes a dummy variable of 0 if individual has no education, 1 is incomplete primary, 2 is complete primary, 3 is incomplete secondary, 4 complete secondary and 5 is higher education (college or university).

Marital status: Establishes the marital status of the individual. It is a dummy variable where 1=married and 0=single.

Frequency of listening to the radio (radio frequency): The variable determines how frequently an individual listens to the radio. It acts as a measure of access to information about contraceptive methods and knowledge of facilities offering family planning services. It is expected that information dissemination improves the probability of use and reported response of knowledge of some contraceptive method. According to KDHS (2003) the variable takes a categorical form of 1= if individual doesn't listen, 2= if listens less than once a week, 3= at least once a week and 4= everyday.

Wealth index: This variable is a measure of socioeconomic status stratification employed in the survey and has been used to categorize the individuals into different groups. The calculation of the wealth index is based on the household living conditions (basic infrastructural facilities such as source of water, electricity and the nature of the building materials such as roofing) in which an individual lives and possession of household assets such as radio, television, vehicles as indicators of wealth. Individuals are categorized as poorest, poorer, middle, richer or richest. The measure is used for convenience since a majority of adolescents are not in employment. However, it allows a broader categorization of the individuals. Nevertheless, it may not be a true measure of the actual wealth/poverty/purchasing power which is largely dependent on income flows and consumption patterns of individuals.

Residence: Indicates the place of residence of the individual. The variable is a dummy taking the value of 1 if individual lives in an urban area and 0 otherwise.

Number of children: Determines the number of children that an individual has (or fathered for males). The variable intends to relate the influence of fertility on the use of contraception since contraceptive demand is premised to be based on the demand for children.

Distance: Is a measure of the average distance (in kilometers) to a health facility faced by the individual. In place of actual price this variable will serve as a proxy to the cost of obtaining contraceptives. While other studies have used travel time as a measure of cost of accessing services, the average distance is used in this study since information on travel time or actual costs to every health facility was not collected.

Number of health facilities: Are the number of health facilities public or private that are within the individuals district. The variable is a measure of the coverage of family planning services and therefore their accessibility since a majority of health facilities offer family planning services.

Doctor-population ratio: this variable serves as a proxy for service availability and quality through access to qualified medical personnel. The underlying assumption is that better quality of services has an influence on the use of health services.

Table 2: Expected signs of the explanatory variables

Variable	Expected sign of the coefficient	Explanation of expected results
Age	Positive	As individual age increase it is expected that they will increase their demand for contraception.
Gender(female=1)	Positive	Females are expected to use contraceptives more than males
Education	Positive	Increase in education is expected to lead to higher demand for contraception as individuals become more aware of the risks involved.
Marital Status(married =1)	Negative	Married adolescents are less likely to use contraception as they are likely to have higher preference for future fertility intentions
Information	Positive	Those who have had communication on contraceptives are more likely to use contraceptives as they would probably know where to get them.
Wealth index	Positive	Individuals of higher socioeconomic status use contraceptives more as they are better able to meet the associated costs.
Residence	Positive	Urban residence will have higher probability of using a method due to access factors
Number of children	Positive	Individuals with children are expected to have demand for contraception more those with out. This may be explained by the need for spacing and use increases with the number of children.
Distance	Negative	It is expected that the longer the average distance to a health facility the less likely that an individual uses contraceptives due costs-traveling time and monetary costs.
Facility	Positive	The availability/concentration of health facilities in a region will positively influence contraceptive use by making services readily available.
Doctor population ratio	Positive	A high number of doctor population ratio is expected to have a positive effect on contraceptive use through possible better services offered.

Source: Authors computation

3.4 Data Sources and Types

The study will use secondary cross-sectional data obtained from the Kenya Demographic and Health Survey for 2003 and several district development plans for the period 2002 to 2008 (GOK, various issues). The KDHS (2003) survey was implemented by the Central Bureau of Statistics (CBS) between April and September 2003 in the whole country. Using household and individual questionnaires the survey collected detailed information on socioeconomic and demographic information including fertility levels, sexual activity, fertility preferences, awareness and use of family planning methods from 8195 women aged 15 to 49 and 3,578 men aged 15 to 54 from selected representative clusters using the NASSEP framework employed by CBS. Facilities offering family planning services were classified into different categories to include the public sector (government hospital, government health centre, government dispensary and other public facilities), private medical sector (mission/church hospital or clinic, FPAK health centre or clinic, private hospital or clinic, pharmacy/chemist and nursing/maternity home), and other sources (mobile clinics, community based distributors, shop, friend/relatives and others). For the purposes of this study these options have been classified into five categories as;

- Public facilities (to include all public facilities)
- Private facilities (includes all private facilities including nursing/maternity homes)
- Pharmacy/chemists
- Community (includes mobile clinics, community based distributors and shops)
- Individual/self (category caters for natural/traditional methods used and individual does not necessarily source from an established health facility)

This categorization has been adopted for ease of estimation, to allow comparison across different sectors of family planning providers and analyze the use of traditional methods relative to modern methods of contraception that are accessed in health facilities.

Accessibility factors associated with different providers were not addressed in the KDHS and statistics were obtained from the district development plans including the average distance to a health facility, the number of facilities (both public and private) and the doctor population ratio for each district. These statistics were then matched with the individual depending on their district of residence and it is assumed that the individuals face these conditions in accessing health care.

3.5 Diagnostic Tests

3.5.1 Hausman-McFadden test for IIA

The multinomial logit model has the independence from irrelevant alternatives (IIA) property which implies that the odds of a facility being chosen over another facility is independent of other alternatives that may be available. This assumption is often cited to be a major drawback on the model which necessitates this test since the assumption should hold if the model is to be used in the analysis. Hausman specification test procedure is applied by testing the reverse implication of the independence from irrelevant alternatives property. The test statistic is easy to compute since it only requires computation of the difference of the coefficient estimates (the model is first estimated with all choices i.e. the various providers and then re-estimated removing from the data set all observations that make a particular choice) and the differences of the estimated covariance matrices. If the assumption holds the two sets of estimates should not be statistically different and therefore have a chi-square statistic of 0 and a p-value of 1.

3.5.2 Test for Multicollinearity

Multicollinearity is a common feature in cross-sectional data and is said to be present if two independent variables are linearly dependent (if $p > 0.5$). Its existence inflates the variances of parameter estimates and may result in wrong signs and the magnitude of coefficient estimates leading to incorrect conclusions.

The problem is addressed by dropping one of the variables that are correlated, increasing the sample size or retaining the variables if they are not highly correlated.

3.6 Interpretation of Results

Estimated coefficients in the models have been translated into slopes dp/dx evaluated at the mean of all independent variables. In the logit model dp/dx is thus the marginal effect of a unit increase in the independent variable x on the probability of contraceptive use evaluated at the mean. That is

$$\frac{dp}{dx_i} = \beta_i \left(\frac{\exp(x\beta)}{[1 + \exp(x\beta)]^2} \right)$$

In the multinomial logit model the marginal effects for continuous variables (such as age and the number of children) is computed as

$$d \text{Prob}(Y = k) / dx = P_k \left[\beta_k - \sum_{k=1}^{K-1} P_k \beta_k \right] \text{ where } P_k = \text{Prob}(Y = k) \text{ and } \beta_k \text{ is the coefficient of the}$$

independent variable relating to a facility k and x is the independent variable. The marginal effects for the dummy and categorical variables in the model are estimated by taking the difference of predicted probability when the variable is equal to 1 and when it is equal to 0.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Descriptive Statistics

The KDHS (2003) covered a total of 5003 adolescents between the age of 15 and 24 years comprising 3530 and 1503 females and males respectively. It is from this number that we draw a sample of 2024 sexually active adolescents. The individual's were asked whether they were using any method of contraception whether modern or traditional and the usual source of the method that they had lately used (in situations where more than two methods of contraceptives were used at the same time, the source for the most modern/effective method by KDHS ranking was used).

Table 3: Descriptive statistics of the explanatory variables

Variable	N	Mean	Maximum	Minimum	Standard deviation	Range	Skewness	Kurtosis
Age	2024	20.526	24	15	2.530	9	-0.338	2.183
Gender	2024	0.534	1	0	0.499	1	-0.137	1.019
Educational attainment	2024	1.942	5	0	1.326	5	0.678	2.580
Marital status	2024	0.548	1	0	0.498	1	-0.195	1.038
Wealth index	2024	3.362	5	1	1.441	4	-0.324	1.731
Number of children	2024	0.743	7	0	0.983	7	1.364	4.915
Radio frequency	2024	2.451	4	0	1.065	9	-0.680	7.507
Residence	2024	1.670	2	1	0.470	1	-0.725	1.526
Distance	2024	12.309	91	0.3	18.604	90.7	2.833	10.387
Number of health facilities	2024	115.348	358	11	105.654	347	1.538	3.981
Doctor population ratio	2024	55772.92	356000	2500	65481.2	353500	2.555	10.773

Source: Authors computation

Several observations can be made regarding the explanatory variables used. Firstly the mean age for all individuals both male and female is 20.5 (Table 3) with the majority (53.4%) being female (Table 4). The average distance to a health facility indicates that the mean average distance is 12.3 kilometers but there is a large difference between the shortest and longest distance faced at 0.3 and 91 kilometers respectively. The average number of children is below 1 meaning that sampled adolescents do not have a child. From the sample of 924 individuals have a child and 1% (23 individuals) have more than 4.

Table 4: Frequency distribution for dummy and categorized explanatory variables

Explanatory variables-dummies	Frequency	Percentage	
Gender	Female	1081	53.4
	Male	943	46.6
Residence	Urban	667	32.9
	Rural	1357	67.1
Marital Status	Married	914	45.2
	Single	1110	54.8
Wealth index	Poorest	300	14.8
	Poorer	341	16.8
	Middle	337	16.7
	Richer	421	20.8
	Richest	625	30.9
Educational attainment	No education	178	8.8
	Incomplete primary	772	38.1
	Complete primary	505	25.0
	Incomplete secondary	220	10.9
	Complete secondary	256	12.6
	Higher	93	4.6
Radio frequency	Not at all	217	10.7
	Less than once a week	120	5.9
	Once a week	257	12.7
	Everyday	1424	70.3
	Missing values	6	0.3

Source: Authors computation

The sample consists of a largely rural and single population with females being slightly more than males. Many (61.9 %) of adolescents have do not have education higher than complete primary with only a small proportion having complete secondary education or higher education. Access to information is very high with the majority being frequent listeners to the radio.

Table 5: Current contraceptive use by source and gender

Source	Males(n=375)	Females(n=340)	Total (715)
	Percentage	Percentage	Percentage
Public	8.8	40.6	23.9
Private	0.3	24.4	11.7
Pharmacy	11.7	10.6	11.3
Community	52.3	6.8	30.6
Individual	26.9	17.6	22.5
Total	100	100	100

Source: Authors computation

Distribution of seeking family planning across the different providers by gender indicates that community sources have the highest number of individuals seeking family planning services with the greatest proportion being male. Generally it is observed that more females than males seek family planning services in public and private health facilities while males largely source from community facilities and use self applied methods (individual source). From the categorization adopted for this study, it is evident that community and public providers are often used to access family planning services than any other sources. A possible explanation for this is that it is convenient and services are easily accessible due to reduced costs and distance faced than any other sources.

Table 6: Cross tabulation of variables and choice of contraceptive provider (percentage values in brackets)

Variable (N=715)	Choice of provider					Total
	Public	Private	Pharmacy	Community	Individual	
Radio frequency						
Don't listen	17(9.9)	3 (3.6)	2 (2.5)	3 (1.4)	7(4.3)	32 (4.5)
Less than once a week	9 (5.3)	3 (3.6)	1 (1.3)	7(3.2)	8 (4.9)	28 (3.9)
Once per week	18 (10.5)	20(23.8)	7(8.8)	28 (12.8)	20 (12.4)	93 (13)
Everyday	127(74.3)	58 (69)	70 (87.5)	180(82.2)	126(78.3)	561(78.5)
Marital status						
Married	136(79.5)	77(91.7)	23 (28.8)	15 (6.8)	62 (38.5)	313(43.8)
Single	35(20.5)	7(8.3)	57(71.3)	204(93.2)	99 (61.5)	402(56.2)
Wealth index						
Poorest	11(6.4)	3 (3.6)	2 (2.5)	19 (8.7)	15 (9.3)	50 (7)
Poorer	22 (12.9)	11(13.1)	8 (10)	34 (15.5)	18 (11.2)	93 (13)
Middle	33 (19.3)	16 (19)	4 (5)	33 (15)	24 (14.9)	110(15.4)
Richer	42 (24.6)	20(23.8)	13 (16.2)	44 (20)	40 (24.8)	159(22.2)
Richest	63 (36.8)	34(40.8)	53 (66.2)	89 (40.6)	64 (39.8)	303(42.4)
Educational attainment						
No education	3 (1.8)	0	0	6 (2.7)	4 (2.5)	13 (1.8)
Incomplete primary	52 (30.4)	26 (31)	15 (18.8)	75 (34.3)	51(31.7)	219(30.6)
Complete primary	67(39.2)	32(38.1)	16 (20)	49 (22.4)	44 (27.3)	208(29.1)
Incomplete secondary	17(9.9)	12(14.3)	10 (12.5)	30 (13.7)	16 (9.9)	85 (11.9)
Complete secondary	27(15.8)	11(13.1)	17(21.3)	38 (17.4)	34 (21.1)	127(17.8)
Higher	5 (2.9)	3 (3.6)	22 (27.5)	21(9.6)	12 (7.5)	63 (8.8)
Residence						
Rural	105(61.4)	57(67.9)	33 (41.3)	116 (53)	103 (64)	414(57.9)
Urban	66 (38.6)	27(32.1)	47(58.8)	103 (47)	58 (36)	301(42.1)

Source: Authors computation

Marital status influence on the source of contraceptives indicates that married adolescents tend to use public and private health facilities more than the single that source largely from pharmacies, community, and the individual facilities. Considerably less poor individuals (as indicated by the wealth index variable) and rural residents use contraception than the rich and urban dwellers across all the sources, this is evident from the numbers and can possibly be attributed to access factors such as distance to a health facility, possible monetary barriers and the number of health facilities available in rural areas. Rural adolescents comprise 67.1% of sexually active adolescents (Table 6) but only 42.1% (Table 4) were using contraceptives indicating high unmet need for contraception in rural than urban areas.

4.3 Empirical Results

Estimated coefficients following Hausman-McFadden test indicate that the IIA assumption holds since the estimates are not significantly different and it can be interpreted that the model is correctly specified. Test for multicollinearity (Appendix C) shows collinearity between some variables which have been retained since collinear variables are dropped automatically during estimation¹².

Table 7: Estimated marginal coefficients for the logit model

Variable	Marginal Coefficient	Standard error	z-statistic
Age	0.020	0.005	3.70***
Gender (female=1)	0.081	0.035	2.28**
Residence (urban=1)	0.045	0.033	1.33
Educational attainment	0.046	0.001	4.68***
Marital status (married=1)	-0.278	0.038	-7.38***
Wealth index	0.053	0.011	4.76***
Number of children	0.071	0.016	4.47***
Radio frequency	0.034	0.012	2.79***
Distance	-0.002	0.001	-2.38**
Number of facilities	0.0002	0.0001	1.50
Doctor population ratio	-0.126	0.067	-1.56

Dependent variable is current use

Number of obs 2024
 LR chi2 (11) 275.34
 Prob > chi2 0.0000
 Pseudo R2 0.1045

Log likelihood = -1179.7989

*** significant at 1%, ** at 5%, and * at 10%.

¹² This implies that some dummy or categorical variables are dropped upon estimation of the models which explains their absence from the results presented in this study.

The results from this estimation indicate that age, gender, marital status, the wealth index, level of educational attainment, the number of children that an individual has, distance to facility and the doctor population ratio significantly influence the use of contraceptives by individuals. Age is positively correlated to contraceptive use meaning that as individuals increase in age they are more likely to use contraception while male adolescents are less likely to use contraceptives than the female. With increased age there is increased fertility and sexual activity which may explain high contraceptive use among older adolescents. A positive and significant coefficient in the gender variable indicates that females use contraceptives more than males. This is explained by the fact that adolescent mothers would probably be offered family planning services during routine visits to health facilities for other services such as antenatal care/postnatal and the social relegation of fertility control to women in many communities. Married adolescents are also less likely to use contraceptives than the single by 27.8% due to possible future fertility preferences among the married.

Educational attainment has a positive sign as expected meaning that with increased education individuals tend to use contraceptives more. From Appendix C on educational attainment variables show that each level is statistically significant though the probability of use increases with higher level of education attained. Schooling is believed to decrease the cost of obtaining information of contraception therefore enhancing use. Awareness through listening to the radio also significantly influences the use of contraceptives as was expected.

The wealth index variable as a measure of socioeconomic status and ability to purchase contraceptives is positive and significant implying that contraceptive use increases with socioeconomic status. As can be observed from Appendix C the "poorer" category is not significant in explaining contraceptive use in

this category while use clearly increases with increased socioeconomic status. This is possible through higher access to contraceptives by being able to pay for costs involved in acquiring them.

The number of children born by the individual as a measure of fertility shows that with increased fertility, the probability of using contraceptives increases. Individual regulation of fertility motivated by the desire to limit the number of births to a specific ideal and space children explains this result. Individuals having no (or fewer) children therefore use contraceptives less than those with children. The positive coefficient of residence indicates that urban dwellers are more likely to be users of contraceptives than those who live in rural areas but the effect is insignificant meaning that the difference in use between the urban and rural residents is not great.

The coefficient for distance to a health facility is negative and statistically significant to contraceptive use. This implies that as average distance to a health facility increases individuals are less likely to use contraceptives. As a proxy for price in this study, this result is in agreement with economic theory on the effect of price on the demand for a good-in this case the demand for family planning services.

Service availability as measured by the facility variable though positive is insignificant in explaining the probability of using contraceptives. A possible explanation is that while the focus is on established health facilities, as observed from statistics the majority (524) of adolescents who use contraceptives do not obtain them from public or private hospitals but from pharmacies, community sources or use self applied methods. The doctor population ratio has an unexpected negative impact on contraceptive use though it does not significantly influence contraceptive use.

Table 8: Estimated coefficients for multinomial logit model (z-values in parentheses) with community facility as the reference category

Variable	Public	Private	Pharmacy	Individual
Age	-0.008(-0.11)	-0.122(-1.34)	0.021(0.28)	0.008(0.14)
Female	1.774(4.39***)	4.723(4.33***)	1.648(4.00***)	0.617(1.66)
Single	-2.17(-4.49***)	-2.55(-4.07***)	-0.702(-1.28)	-1.68(-3.64***)
Poorest	-0.346(-0.49)	-1.601(-1.66)	-1.893(-2.10**)	-0.714(-1.27)
Poorer	-1.078(-1.80*)	-2.02(-2.81***)	-1.360(-2.18**)	-1.269(-2.50**)
Middle	-0.224(0.691)	-1.142(-1.68)	-1.93(-2.77***)	-0.775(-1.64)
Richer	-0.008(-0.02)	-0.741(-1.25)	-1.039(-2.04**)	-0.388(-0.95)
Incomplete primary	0.570(0.53)	16.974(0.01)	16.708(0.01)	-0.018(-0.02)
Complete primary	1.709(1.58)	17.956(0.01)	17.126(0.01)	0.479(0.58)
Incomplete secondary	0.767(0.68)	16.974(0.01)	17.106(0.01)	-0.047(-0.05)
Complete secondary	1.637(1.48)	17.925(0.01)	17.460(0.01)	0.645(0.77)
Higher	0.884(0.72)	17.690(0.01)	18.216(0.01)	0.365(0.40)
Urban	-1.29(-2.71***)	-2.36(-3.89***)	-1.119(-2.30**)	-1.50(-3.70***)
Number of children	0.762(2.69***)	0.671(2.08**)	0.106(0.31)	0.242(0.382)
Don't listen	15.621(7.56***)	11.267(0.00)	15.631(0.01)	16.416(9.68***)
Less than once a week	14.149(6.72***)	10.159(0.00)	13.897(0.00)	15.789(9.39***)
At least once a week	13.709(6.84***)	11.196(0.00)	14.769(0.00)	15.370(9.76***)
Everyday	13.843(7.05***)	10.409(0.00)	15.034(0.00)	15.241(9.78***)
Distance	-0.03(-3.01***)	-0.021(-1.95*)	-0.007(-0.60)	-0.013(-1.50)
Facility	-0.001(-0.21)	0.001(0.26)	-0.001(-0.39)	0.001(0.42)
Doctor population ratio	49.885(0.02)	47.490(0.02)	47.067(0.02)	-655.594(-0.30)
Constant	-13.870	-27.057	-32.042	-13.819

*** significant at 1%, ** at 5% and * 10%

Dependent variable is choice of facility

Number of obs	715
LR chi2 (84)	546.01
Prob > chi2	0.0000
Pseudo R2	0.2484

Log likelihood = -825.8873

Table 8 shows that several factors influence the choice of facility to obtain contraceptives. These include gender, marital status, socioeconomic status, residence, number of children, the frequency of listening to the radio and distance to a health facility. Other variables have no significant effect on the choice of the provider.

Females have been found to have a positive and significant effect on using all facilities except individual/self care, meaning that females are more likely to use public, private and pharmacies and while the males tend to use individual care. As observed from the descriptive statistics a majority of females use public facilities to source contraception and this may be due to provision of family planning services in public facilities alongside other services such as ante/post natal care for adolescent mothers and the provision of free or highly subsidized contraceptives in these facilities. Males however obtain them from community sources or use self applied methods (individual). This disparity can be partially attributed to higher ability to pay for services offered by community facilities by males than females. Individuals who are single are less likely to use public, private or self care as sources of contraception which have a negative and statistically significant coefficient and use community or pharmacies.

The age of the individual has no significant influence on the facility used to access family planning services and has a negative effect on the use of public or private facilities and this could be explained by awareness of other sources to access family planning services and could be more knowledgeable about traditional family planning methods than the younger adolescents. While Table 7 indicates that educational attainment is positive and significantly correlated to contraceptive use, though positive for all providers it does not significantly influence the choice of facility. Fertility as reflected by the number of children has a positive sign for all the facilities but it is only significant for the public and private choices. This means that individuals with children are more likely to use public or private health facilities which can be explained by the possibility that individuals receive family planning services as they take their children to hospital making them use the facilities more than other facilities.

Table 9: Marginal effects on probability of seeking services from a public facility

Variable	dy/dx	Std. Err.	z	P> z	[95% C.I.]		X
age	.0036752	.00804	0.46	0.648	-.01209	.01944	20.9552
female	.1208393	.05016	2.41	0.016	.02252	.219159	.475524
single	-.1405825	.05573	-2.52	0.012	-.249802	-.031363	.562238
poorest	.0679083	.08831	0.77	0.442	-.105183	.240999	.06993
middle	.0624972	.06401	0.98	0.329	-.062958	.187953	.153846
richer	.041928	.05737	0.73	0.465	-.070511	.154367	.222378
richest	-.0351913	.0608	-0.58	0.563	-.15435	.083967	.423776
number of children	.0607986	.02479	2.45	0.014	.012213	.109384	.699301
doctor population ratio	.3830218	5.33201	0.07	0.943	-10.0675	10.8336	.005026
urban	.016773	.05005	0.34	0.73	-.081332	.114878	.420979
distance	-.0025957	.00112	-2.33	0.020	-.004784	-.000408	9.12042
facility	-.0000644	.00018	-0.35	0.727	-.000426	.000297	140.439
incomplete primary	.0116209	.12	0.10	0.923	-.223578	.24682	.306294
complete primary	.0994463	.13872	0.72	0.473	-.172446	.371339	.290909
incomplete secondary	.0117649	.12902	0.09	0.927	-.241103	.264633	.118881
complete secondary	.0783972	.14704	0.53	0.594	-.209797	.366592	.177622
higher	-.0505853	.11216	-0.45	0.65	-.270418	.169248	.088112
don't listen	.3255594	.12581	2.59	0.010	.078969	.57215	.044755
less than once a week	.1511667	.12066	1.25	0.21	-.085317	.38765	.039161
everyday	.0728227	.03915	1.86	0.063	-.003912	.149558	.784615
Logit estimates					Number of obs		715
					LR chi2 20)		167.76
					Prob > chi2		0.0000
					Pseudo R2		0.2133
Log likelihood =-309.44696							

From the estimation results in Table 9 the variables gender, marital status, number of children, distance to a health facility and dummy variable “don’t listen” dummy of radio frequency influence the use of public facilities. As has been observed in Table 8, females are more likely to use public facilities 12% more than males. The probability of singles using public facilities as sources of contraception is less by 14% compared to married adolescents. Having a child increases the probability of using public facilities by 6% more than those with no child. While the impact of distance on use of public facilities is negative and significant the effect is only 0.02%. Individuals who do not listen to the radio visit public facilities more which could be an indicator of lack of knowledge of other sources or reduced income to be able to obtain them from other sources.

Table 10: Marginal effects on probability of seeking services from a private facility

Variable	dy/dx	Std. Err.	z	P> z	[95% C.I.]	X
age	-.0026491	.002	-1.26	0.208	-.006771 .001473	20.9701
female	.145102	.03975	3.65	0.000	.067189 .223015	.477208
single	-.0285025	.02006	-1.42	0.155	-.067823 .010818	.562678
poorest	-.0022073	.01524	-0.14	0.885	-.032074 .027659	.066952
middle	.0066791	.01301	0.51	0.608	-.018814 .032172	.150997
richer	.0096533	.01337	0.72	0.470	-.016551 .035857	.225071
richest	.0226201	.01847	1.22	0.221	-.013575 .058815	.42735
number of children	.0030534	.00467	0.65	0.513	-.006098 .012205	.700855
doctor population ratio	-.0502203	.72521	-0.07	0.945	-1.47161 1.37117	.005118
urban	-.0241126	.01579	-1.53	0.127	-.055055 .00683	.421652
distance	-3.29e-06	.00017	-0.02	0.984	-.000331 .000324	9.08946
facility	.0000287	.00004	0.72	0.474	-.00005 .000107	141.158
incomplete primary	.0016963	.01698	0.10	0.920	-.031592 .034984	.311966
complete primary	.0050749	.0174	0.29	0.771	-.029036 .039186	296296
incomplete secondary	.0082094	.02179	0.38	0.706	-.034505 .050924	.121083
complete secondary	.0036688	.01797	0.20	0.838	-.031561 .038899	.180912
don't listen	-.0174151	.01041	-1.67	0.094	-.037817 .002987	.042735
less than once a week	-.0170044	.01034	-1.64	0.100	-.037269 .003261	.039886
everyday	-.0231877	.01687	1.37	0.169	-.056261 .009886	.786325
Logit estimates					Number of obs	702
					LR chi2 (19)	153.27
					Prob > chi2	0.0000
					Pseudo R2	0.2981
Log likelihood = -180.46867						

Gender is the only significant variables for private facility as a source of contraception and females are 14.5% more likely to use private facilities than males.

Table 11: Marginal effects for the probability of seeking contraceptives from a pharmacy/chemist

Variable	dy/dx	Std. Err.	z	P> z	[95% C.I.]	X
Age	.0029789	.00522	0.57	0.569	-.00726 .013218	20.9701
female	.0778645	.03696	2.11	0.035	.005434 .150295	.477208
single	.0685469	.03782	1.81	0.070	-.005573 .142667	.562678
poorest	-.0484712	.03672	-1.32	0.187	-.120448 .023506	.066952
middle	-.057212	.03227	-1.77	0.076	-.120452 .006028	.150997
richer	-.0187162	.03402	-0.55	0.582	-.085393 .047961	.225071
richest	.0444373	.04608	0.96	0.335	-.045869 .134744	.42735
number of children	-.0304963	.02198	-1.39	0.165	-.073569 .012576	.700855
doctor population ratio	-.1841911	4.85942	-0.04	0.970	-9.70849 9.3401	.005118
urban	-.0098961	.03115	-0.32	0.751	-.070951 .051159	.421652
distance	.0005897	.00079	0.75	0.454	-.000955 .002134	9.08946
facility	-.0000801	.00011	-0.75	0.453	-.000289 .000129	141.158
incomplete primary	-.0772966	.03529	-2.19	0.029	-.146471 -.008123	.311966
complete primary	-.0842677	.03359	-2.51	0.012	-.150099 -.018437	.296296
incomplete secondary	-.052038	.02652	-1.96	0.050	-.104009 -.000067	.121083
complete secondary	-.0586087	.02547	-2.30	0.021	-.108523 -.008695	.180912
don't listen	.0000592	.06699	-0.00	0.999	-.131351 .131232	.042735
less than once a week	-.0509761	.0442	-1.15	0.249	-.137615 .035662	.039886
everyday	.0303012	.02829	1.07	0.284	-.025138 .085741	.786325
Logit estimates					Number of obs	702
					LR chi2(19)	58.05
					Prob > chi2	0.0000
Log likelihood =-219.98781					Pseudo R2	0.1166

Gender, marital status and educational attainment are the only factors that significantly influence the probability of seeking services from a pharmacy. Females are 7.7% more likely to use pharmacies than males while educational attainment is negatively correlated with the use of pharmacies as source of contraceptives. Single individuals are 6.9% more likely to use pharmacies as sources of contraception by this result indicating that pharmacies are an important source of contraception for this category of adolescents. Educational attainment dummies are negative and significant in influencing the choice of a pharmacy as a facility to access contraceptives, meaning that as individuals educational attainment increases, they are less likely to source from pharmacies.

Table 12: Marginal effects for the probability of using individual (self applied methods) as a source of contraception

Variable	dy/dx	Std. Err.	z	P> z	[95% C.I.]	X
age	9.30e-09	.00000	0.10	0.923	-1.8e-07 2.0e-07	20.9552
female	2.30e-07	.00000	0.10	0.923	-4.5e-06 4.9e-06	.475524
single	-4.87e-07	.00001	-0.10	0.923	-.00001 9.4e-06	.562238
poorest	1.42e-08	.00000	0.09	0.925	-2.8e-07 3.1e-07	.06993
middle	1.68e-07	.00000	0.10	0.923	-3.3e-06 3.6e-06	.153846
richer	1.78e-07	.00000	0.10	0.923	-3.4e-06 3.8e-06	.222378
richest	4.62e-07	.00000	0.10	0.923	-8.9e-06 9.8e-06	.423776
number of children	7.70e-07	.00001	0.10	0.922	-.000015 .000016	.699301
doctor population ratio	.0011444	.01079	0.11	0.916	-.020011 .0223	.005026
urban	-6.55e-07	.00001	-0.10	0.923	-.000014 .000013	.420979
distance	-5.90e-09	.00000	-0.10	0.923	-1.2e-07 1.1e-07	9.12042
facility	-1.41e-09	.00000	-0.11	0.916	-2.8e-08 2.5e-08	140.439
incomplete primary	-2.93e-07	.00000	-0.10	0.923	-6.3e-06 5.7e-06	.306294
complete primary	-1.17e-08	.00000	-0.09	0.925	-2.5e-07 2.3e-07	.290909
incomplete secondary	-1.60e-07	.00000	-0.09	0.926	-3.5e-06 3.2e-06	.118881
complete secondary	-1.31e-07	.00000	-0.09	0.927	-2.9e-06 2.7e-06	.177622
higher	-7.77e-07	.00001	-0.10	0.923	-.000017 .000015	.088112
don't listen	2.03e-08	.00000	0.06	0.952	-6.4e-07 6.8e-07	.044755
less than once a week	1.42e-07	.00000	0.10	0.924	-2.8e-06 3.1e-06	.039161
everyday	-1.10e-07	.00000	-0.10	0.923	-2.4e-06 2.1e-06	.784615
Logit estimates					Number of obs	715
					LR chi2(20)	447.82
					Prob > chi2	0.0000
					Pseudo R2	0.4536
Log likelihood	-269.72228					

While Table 8 shows that the probability of using individual sources is influenced by marital status, wealth index, residence and radio frequency, the marginal effects (Table 12) above show that the effects are very small and insignificant in explaining why individuals use traditional methods of family planning.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

1 Conclusion

This paper has examined individual and provider factors that influence the use of contraceptive among adolescents using a nationally representative sample of 2024 individuals. From the sample of sexually active adolescents only 715 were users of contraception according to the survey data used. This is very low compared to high national average of contraceptive use thus necessitating an investigation to the factors hindering use among adolescents. Using a discrete choice model several factors are identified as having a significant influence on the use of contraceptives, these are age, gender, educational attainment, marital status, fertility as measured by the number of children, the frequency of listening to the radio and the average distance to a health facility. The marital status, distance and the doctor population ratios have a negative sign which was expected except for the doctor population ratio. The insignificant variables are residence, facility and the doctor population ratio meaning they have no impact on whether adolescents use contraceptives or not. The estimated parameters have the expected signs except for the doctor population ratio which had a negative sign on the probability of using contraceptives.

From the results discussed it is evident that females form a large proportion of users of public facilities while males tend to use community and individual sources. Marital status is negatively correlated with the use of either public, private, pharmacy or individual sources meaning that singles are generally more likely to use community facilities. Distance as a cost factor was found to negatively influence the use of both public and private facilities meaning that individual use other facilities to access contraceptives such as community sources. Although marginal coefficients from the individual source do not adequately explain the use of the source, it is notable from Table 3 that a significant proportion (22.5%) of adolescents uses traditional contraceptive methods (individual care) which may not be very effective.

5.2 Policy Implications

There is need for the expansion of provision of family planning services in rural areas where the majority of sexually active adolescents who are not using contraception will enhance use of contraceptives and reduce the level of fertility. The disparity in contraceptive use between the urban and rural areas can be attributed to problems of access, coverage and income differentials. Individuals living in rural areas access services through public facilities and this may be attributed to higher costs at private and pharmacies. This is also manifested in the effect of distance on use of contraceptives in public facilities which are hindered by the distance factor. Policy concerns would then be to make contraceptives accessible, available and affordable at all facilities both in rural and urban areas by ensuring that facilities are within reach and they provide the services.

Contraceptive use has low sensitivity to quality issues from this analysis as reflected by the doctor population ratio. This could be attributed to the fact that firstly, family planning services are offered technically by most health personnel and as over-the-counter services by nonmedical personnel and thus the doctor population ratio does not have a significant bearing on contraceptive use. This is reinforced by the fact that more than 50% of individuals who are currently using contraception do not use public or private health facilities to access contraception.

Fertility is related to use of public facilities meaning that individuals with children use the facilities more. The provision of contraceptives in public facilities could be enhanced through an integrated programme of provision of ante/post natal care and family planning services so as to check fertility for individuals who already have young children.

5.3 Limitations of the Study and Areas for Further Research

The price of health care as a good is a principal factor influencing the demand for health services. However, the data used for this study did not collect information on the prices of contraceptives at specific facilities and consequently the price effect on demand has not been adequately addressed considering the fact that most are donations or highly subsidized. Studies reviewed on contraceptive use have primarily focused on demographic factors and future areas to explore would be the influence other associated monetary and nonmonetary factors such as travel time to a health facility, actual distance faced and the influence of traditional and religious beliefs and social values.

Provider characteristics have been linked to current use in this study they however may have an impact on the continuation or discontinuation of use and the effectiveness of services, an issue that is not addressed by this study. The quality of services as perceived by the individual was not measured by the KDHS and may contribute to high nonuse. Research on provision of services should therefore focus on provider issues that lead to discontinued use, the role of side effects and beliefs on contraceptive use.

This study uses cross-sectional data to examine the correlation between the explanatory variables discussed and the probability of current use of contraceptives. The study can therefore only conclude on the correlation between the two but causality cannot be established.

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APPENDICES

Appendix A: Summary of literature review

Variable	Effect on use on health care services	Models used
Age ^(1, 2, 3, 8, 9, 10)	Positive(1***, 2**, 3**, 4**, 10**, 13***) Negative(6)	Logit model ^(1,2,3,8,9,13) Probit model ^(4,5) Multiple logistic regression ⁽¹⁰⁾ Descriptive analysis ^(6,7,11,12)
Age squared ^(1,2)	Negative(1***, 2**, 13***)	
Gender ^(7, 8, 9, 10)	Positive(8**, 11, 12) Negative(9***)	
Marital status ^(2, 4) (married)	Positive(4**, 5**, 11, 12) Negative(2**, 6)	
Education ^(1, 2, 3, 4, 5, 6, 9, 12)	Positive(1***, 2**, 3***, 4**, 5***, 11, 12, 13***)	
Residence ^(2,3,4,5,6,8,9) (urban)	Positive(1***, 2**, 3**, 4**, 5***, 6)	
Income ^(2,5,10)	Positive(2***, 7, 10**, 12, 13***)	
Fertility ⁽²⁾	Positive (2**)	
Access to information ⁽²⁾	Positive(2**, 12)	
Distance/travel time to a facility ^(1,3,5,9)	Negative(1**, 3**, 5***, 9**)	
Number of health facilities ⁽²⁾	Positive(3**, 9**)	
Medical personnel ^(1,2,5)	Positive(13***)	
* significant at 10%; ** significant at 5%; *** significant at 1%		
1) Beegle, 1995; 2) Beltran 1999; 3) Feyisetan and Ainsworth, 1994; 4) Thomas and Maluccio, 1995; 5) Lindelow, 2004; 6) Negussie and Obare, 2003; 7) Njue et al., 2005; 8) Leyva-Flores et al., 2001; 9) de Bartolome and Vosti, 1995; 10) Khe et al., 2002; 11) Ali, 1999; 12) Nichols et al., 1987; 13) Oliver, 1995		

Appendix B: Test for multicollinearity

	age	gender	Marital status	residence	educational	wealth index	nohold	radiofreq	noofchildren	distance	facility
age	1										
gender	0.1823	1									
maritalstatus	0.3079	0.7586	1								
residence	-0.112	-0.033	0.0101	1							
educationald	0.2395	-0.18	-0.233	-0.3247	1						
wealthindex	0.1198	-0.018	-0.095	0.6323	0.4187	1					
radiofreq	0.0293	-0.222	-0.205	-0.0932	0.3131	0.225	0.0041	1			
Noofchildren	0.4051	0.5216	0.599	0.0969	-0.2278	-0.176	-0.022	-0.188	1		
distance	0.0021	0.0449	0.0868	0.285	-0.2089	-0.268	0.1233	-0.206	0.097	1	
facility	0.1268	0.0019	-0.057	0.6277	0.3313	0.541	-0.191	0.111	-0.113	-0.272	1
Docpopratio	-0.004	0.086	0.0835	0.0412	-0.0367	-0.049	-0.013	0.027	0.074	-0.021	-0.0330

Appendix C: Marginal effects for different categorizations in the logit model

Variable	dy/dx	Standard error	z-statistic
Incomplete primary	0.275	0.069	3.96*
Complete primary	0.369	0.072	5.15*
Incomplete secondary	0.332	0.079	4.19*
Complete secondary	0.403	0.074	5.43*
Higher	0.481	0.070	6.90*
Poorer	0.053	0.048	1.10
Middle	0.107	0.049	2.16**
Richer	0.148	0.048	3.06**
Richest	0.206	0.055	3.77*
Don't listen	0.102	0.282	0.36
Less once a week	0.201	0.292	0.69
Once a week	0.276	0.280	0.99
Every day	0.213	0.203	1.05

Asterisks indicate*** significance at 1%, ** at 5%. The coefficients for 'poorest' and 'no education' categories have been dropped in this estimation due to collinearity.