ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

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Acronyms

AIDS	Acquired Immuno Deficiency Syndrome
ANRS	Amhara National Regional State
CPR	Contraceptive Prevalence Rate
CSA	Central Statistical Authority
EDHS	Ethiopian Demographic and Health Survey
HIV	Human-Immuno Virus
ICPD	International Conference on Population and Development
ICSMP	International Contraceptive Social Marketing Project
IEC	Information, Education and Communication
MoH	Ministry of Health
OECD	Organization for Economic Cooperation and Development
PAI	Pathfinder International
RH	Reproductive Health
TFR	Total Fertility Rate
UN	United Nations
USAID	United States Agency for International Development
WHO	World Health Organization
ZDH	Zonal Department of Health

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Abstract

The paper has tried to investigate the potency of removing excessive contraceptive subsidy or introducing price on the probability of contraceptive use. Data has been collected from 300 active contraceptive clients in two districts of South Gondar zone using a standardized questionnaire. Clients were chosen through probability sampling technique by employing a hybrid of three stages stratified random sampling, simple random sampling and systematic random sampling tools. The price that couples are willing to pay was drawn with a bidding game elicitation technique. The logistic binary choice model was used for analysis by incorporating all possible explanatory variables such as price, age of the woman and its square (control variables), household income, women education, husbands' agreement, number of children and side effect dummy.

The finding has shown that neither price nor lower income deter the probability of contraceptive use. Couples overlook price and give more value to the continual availability of a range of alternative methods of contraceptives. Injectables and Norplant are more responsive to changes in price than the pill. Large number of children and husband's approval have positive and significant influence on the probability of using contraceptives. Free contraceptive users tend to undervalue the price and worth of contraceptives than those who get the service on payment schedules.

As a result, there is a need to revise the current reproductive health and family panning program implementation scheme. The probability of contraceptive use is a positive function of price implying that the introduction of affordable price in the system and removal of excessive subsidy is vital to ensure better quality, accessibility and sustainability of family planning services. A range of contraceptive supplies should be emanated from the need of the immediate beneficiaries to secure continuity and keep women's reproductive rights. Contemporary IEC materials should give due emphasis for the involvement of men and promotion of free spousal communication in reproductive health matters.

1. Introduction

The Cairo's 1994 International Conference on Population and Development (ICPD) drew the attention of the international community by establishing valuable goals for the expansion of reproductive health and family planning services especially in the developing world. The main theme of the ICPD framework was to create safe and reliable environment so that family planning services would be comprehensive, affordable and accessible to the needy group. The United Nation (UN) program of action indicates that, of the total annual projected cost to meet the proposed goals in developing countries, almost two third of the total budget is expected to be covered by the developing countries themselves while the remainder is to be financed by the international community(UN report, 1994).

Despite the incapability of low income countries to finance a huge portion of ICPD's reproductive health(RH) programs, the commitment and allocation of funds from donor, bilateral and multilateral agencies is essentially unchanging or declining since 1991. For example, aggregate data on the level of funding reveal that the 1996 total of $55.1 billion international support was about 4% lower from the 1995 level. In the news release of the Organization for Economic Cooperation and Development(OECD), particularly the international population fund has shown significant decline of 18% from 1995 to 1996. On the contrary, population in the developing world is still showing tremendous rate of growth widening the gap between the supply and demand for family planning service environment usually called as the unmet need(OECD, 1997).

The question that comes next is that if there remains a miss-mach between the demand as revealed by high unmet need rate of 34%(CSA and ORC Macro, 2006) and supply of

family planning services with a contraceptive prevalence rate (CPR) index of 8% and 16% as of 2000 and 2005 respectively(CSA and ORC Macro, 2001, CSA and ORC Macro, 2006), what policy instruments make the population program accessible, sustainable and convenient as the ICPD declares? full subsidy or under-priced public provision of family planning practice is a common implementation scheme in low income countries where source of financing is heavily relied up on external sources. There are some research outputs that recommend the potential usefulness of certain cost recovery system as a remedial tool for the problem(Akin et al., 1984)

Hence charging affordable user fee for family planning and reproductive health services is a valid instrument, at least in theory, for the growth of capable contraceptive market in poor countries. If clients pay certain fee for the service they receive Ruts et al.(2002) says that "the client should have greater rights and ability to demand higher quality if she/he is 'the payer' or 'partial payer' at least in theory. Even the poor may benefit from the system in which they are required to pay more if the system becomes more predictable and transparent and their decisions about service utilization are based on better information''. Over subsidization is an inefficient use of resources; and overcharging would have an adverse impact on demand and stated program objectives.

The impact of introducing user fees on the demand for contraceptive is not universally conclusive. For instance a study finding from India(Ruts et al., 2002) suggest that the poor are found sensitive to the rise in the price of contraceptives which were provided free of charge even though the study did not show any sensitivity analysis to indicate the significant deterrent of price on demand. On the other hand, empirical evidence from other developing countries dictated that the demand for contraceptives is relatively

inelastic suggesting remarkable cost recovery potential of user fees in family planning services(Lewis, 1996).

The family planning and reproductive health development strategy of Ethiopia is not different from many other developing countries. Contraceptives for couples are provided by and large free of charge sponsored by heavy subsidy financed either from government's own source or any source other than the domestic supply. The unmet demand of the service is as high as 34 %(CSA and ORC Macro, 2006) and the trend of outdoor funding for population programs is exhibiting a modest improvement although vast attention was given towards the HIV/AIDS pandemic. The federal government fund for family planning(FP) and reproductive health(RH) services has increased from 1.78 million Birr in 1996 to 3.22 million Birr in 2002 while the corresponding budget allocated for HIV/AIDS has increased from Birr 2.04 million in 1996 to Birr 3.4 million in 2002. Likewise, donor assistance which was being channelled through the Ministry of Health (MOH) for FP(HIV/AIDS) was Birr 1.1(1.92) million in 1996 and Birr 4.39(7.57) million in 2002(Yared et al.,2005). This shows that the FP/RH programme of the country is heavily relied on external sources. In this context the set up of certain cost recovery policy that can able to strengthen the institutional capacity of FP/RP providers so that demand would be addressed properly may be plausible. One possible strategic intervention could be removal of heavy subsidy and the imposition of user fees on contraceptives.

Then the motivation of this paper is to investigate whether or not the demand for contraceptives in the study area is sensitive to price. The cost recovery potential and quality implications of price are also considerable issues of the thesis. Sample

households which are already in the market for modern methods of contraceptives were selected and asked for price improvement. Though the study area is not representative to make statistical inference about the whole of Ethiopia or Amhara Region, findings of the study would have an importance to provide indicative information for in-depth and extensive diagnosis.

1.1 The Problem Statement

A greater share of population programs of the developing countries is dependent on external sourcing. Population programs focusing on the promotion and expansion of reproductive health projects supply alternative methods of contraceptive mix at zero retail prices. Coming up to Ethiopia, the family planning and reproductive health programme is characterised by high unmet need, lower contraceptive prevalence rate (16% CPR), poor service delivery and logistical system(Yared et al., 2005) and heavy reliance on donor funding. Where as one of the 2015 goals of the national office of population(NOP) is to raise CPR to 44%, which is far from reachable(NOP, 1997). All these issues imply that the country faces serious of challenges both in institutional and financial matters to provide the service adequately. One of the recommended policy tools for better and continued service provision is the introduction of affordable price in the system(Ruts et al., 2002).

The argument continues in such a manner that charging affordable price against contraceptives hardly makes demand elastic and there should be gradual transitions from subsidized program intervention to a new policy that supports cost recovery by forcing adopters to self finance themselves. Self financing of reproductive and family planning programs ensure to keep the reproductive rights of women via creating better alternatives regarding the choice of method of contraceptives. In effect price may have paramount

importance in improving the quality of reproductive health care and ensure program sustainability. In addition to this, unlike zero pricing, charging positive but affordable price for contraceptives create better access to adopters and enable to meet the unmet need by affecting both the demand and supply sides of the contraceptive market. From the demand side better access reduces the opportunity cost and hence the true price of the commodity and on the supply side user fees equip the supplier to come up with better and essential alternatives in the method choice of contraceptives at the right time of demand. Hence among other socio-economic and demographic characteristics of the adopters, verification of the significant effect of price on the demand and method of contraceptive choice is the focus of this study.

1.2 Objectives

The overall objective of the paper is to analyse alternative modes of modern contraceptives use and identify the key factors that influence women's contraceptive utilization for valuable policy recommendation. The specific objectives are:

- to examine the effect of contraceptive price on the probability of using the different mix of contraceptives and its implication to cost recovery programs.
- to investigate whether there exists a difference in the socio-economic characteristics of couples who are currently fee paying and who are not.

1.3 Limitations of the study

It is important to note some of the factors that constrained the study. The time of data collection (during the month of May) was a sensible period for the rural households as they were engaged in farming activities. As a result, in most of the cases, information was collected when respondents were at home (usually late evening and on cultural holidays). To find accurate information when women are tired and engaged in home

activities efforts were made to deploy enumerators pair-wisely. Each experienced enumerator was paired with one community based reproductive health agent who knew the characteristics of randomly chosen households better so that respondents could honestly provide correct information in front of the two enumerators. Besides to that, all the enumerators were females to establish a better communication bridge between surveyors and the responding woman.

The study has also limitations in terms of the scope it covers. Of all methods of birth controlling contraceptives, the study has considered only three (injectables, oral pills and implants) of the most common and available methods of contraceptives. Furthermore, samples of the study are those women who are active contraceptive users from the two segmented markets (fully versus partially subsidized markets). Hence, women whose contraceptive need is not yet met are not considered because of two problems. Firstly, it was difficult to get the list of inactive contraceptive users for sampling. Secondly, the process is costly both in time and money. Difficulty of getting recent economic literature on the field of the study also enforces the investigator to focus on accessible but relatively old scholarly journals. The situation becomes very serious when country contexts were assessed.

1.4 Organization of the Paper

The report has five sections. Following the general introduction, the second chapter has reviewed literature related to the study. Methodological issues were addressed in the third chapter. The fourth chapter is dedicated to the main body of the study, results and discussions. The last and fifth chapter summarizes core findings and forward possible policy recommendations.

2. Literature Review

2.1 Theoretical literature

Is price a deterrent factor to use contraceptive?

The introduction of affordable price for contraceptives is recommended to recover some or all parts of the costs of ensuring family planning program(Lewis, 1986). The role and influence of price in the market for contraceptives can systematically be assessed through the determination and modelling of consumers demand for contraceptives(Shearer, 1983). Such an approach helps to investigate the significance of a pricing policy on the cost recovery potential of family planning programs. As Lewis(1986) stated, the demand for contraceptives is a function of the full costs of the consumer. The essence of full cost include direct monetary outlay to purchase and use, waiting time, travel time and other cost elements the consumer takes into account while deciding to contracept. This implies that consumers consider factors other than direct monetary price such as distance, service convenience etc into their utility maximizing model. Hence, the relative significance of purchase price on demand may depend on not only on the magnitude of the offer (affordability) per se but also on the values the household attaches to other demand shifting covariates. The potential usefulness of access and better service environment are therefore crucial variables comprising the demand function of couples(Alemayehu et al., 2005, Mataria et al., 2002).

In elementary economics it is thought that if demand is proved to be price inelastic, the improvement of an offer to the level where elasticity is unitary helps to generate maximum revenue so as to recover program costs. Over subsidization of contraceptives under such circumstances might be unworthy. If demand is elastic, there needs a

revision of prices downwards both to augment demand and maximize possible program revenue(Varain, 2000).

Why is a family planning program being subsidized?

Family planning programmes of the developing countries are heavily subsidized while available resources for the sector are very limited and the unmet need is still significant (Family Health Division, 1983). Abeywickrema(1983) attached two postulations to explain why low income countries are fully/partially subsidizing contraceptives.

The first assumes that government sponsor family planning services because of its impact on the derivation of social benefits. Although there are people who have the need but not the access to regulate their fertility behaviour because of supply side constraints, they might share the benefit of the positive externality produced by low fertility. Accordingly, under this proposition subsidy is warranted to improve the demand for family planning services as far as fertility is considered to be a net cost of the government.

The proposition that comes in the second place emphasizes on the purchasing power of the consumers. Very low per capita income and low level of monetization exceedingly increases the opportunity cost of pricing contraceptives and seriously constrains couples' ability to buy. Accordingly, given supply side factors constant, income per capita is one of the factors expected to affect demand positively. In other words, the rich control fertility than the poor although the problem on the supply side is demolished.

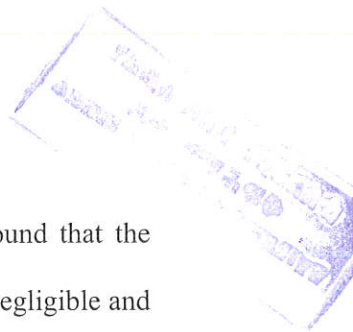
But is heavy subsidy always a viable policy tool to improve the demand for contraceptive? some scholars such as Lewis(1983) hypothesized that zero money prices of contraceptives may produce lower demand than priced outlets. The following are some of the probable explanations given to it. Free offer of contraceptives may create inefficiency in the production side and consequently the supply of the market will be negatively affected. Constrained supply lets consumers suffer from poor service delivery condition in terms of limiting the choice of contraceptives, intermittent supply, requiring long travel and waiting time etc. So if this proposition is true, supply side of the market is better-off in priced outlets than subsidized contraceptive markets. The essence of the proposition is that there needs an improvement in the provision of family planning services via the introduction of user fees against contraceptives and supply would create its own demand. The new tastes and preferences comprising consumers' utility from improved services will make demand inelastic despite the introduction of an offer to contraceptives(Birdsall et al., 1984). Behaviourally, consumers may associate price with value. If government subsidizes contraceptives and helps consumers to pay nothing, the value and significance the users attach to free contraceptives might not be equivalent to similar but priced contraceptives. The influence of such behavioural supposition on the usage level of different forms of contraceptives may be negative or demand may not be improved as the desired level.

In sum, low prices of contraceptives have the potential to discourage use instead of improving the efficiency of the market. Demand below some price level will become non-responsive irrespective of subsequent price reductions. Under such circumstances, the significance of subsidy on the demand for contraceptive may be questionable. Even if partial subsidy would have the influence to improve adoption or keep demand intact, free

offer (full subsidy) would have the potential to backfire demand provided that consumers assume that zero prices deteriorate service quality and influence consumers' perceptions (Chen et al., 1982).

2.2 Cross-country empirical findings

The aim of this section is to review empirical findings of a survey on the correlation between price and the level of contraceptive use. Couples' decision of contraception is the choice between children and other goods. On the demand side there are a multitude of factors that influence consumers' decision and choice of contraception such as income, price, education, family size etc. Keeping other factors constant, price and income are usually the most important variables that create demand differential among consumers (Yigzaw, 2000, Alemayehu et al., 2005, Nowels et al., 2006).



Experimental findings

Controlled experiment studies in some of the countries outlined below found that the difference in demand between free outlets and moderately priced outlets is negligible and in some of the countries price played a role in shifting consumers from priced to non priced contraceptive dispensary.

Gadalla et al.(1980) conducted an experimental research in two identical clinics of Egypt to analyze the demand for contraceptive. One of the clinics provided oral pills free of charge and the other clinic provided the same method by charging moderate prices. Nevertheless, consumers did not react and the number of users in the two clinics was the same implying that moderate price do not depress demand. In Nigeria, Feyisetan and Ainsworth(1996) estimated and found the elasticity of modern methods of contraceptives that lie between 0.07 and 0.12 for some methods of contraceptives and insignificant

coefficients for other methods implying that a 100% rise in the price of a particular method would adversely affect the rate of contraceptive use by 7-12% and which is very low. According to the authors, limited availability of alternative methods of contraceptive methods is the most determining factors that make couples less responsive. Another study conducted by Oliver(1995) in Ghana confirmed that the price elasticity of modern contraceptives is estimated to be 0.28 proving that contraceptive demand is slightly more sensitive to changes in price compared to Nigeria.

A study which was carried out by Morris et al.(n. d) in Brazil yields a mixed result. The urban and rural people respond differently. They did their experiment on the willingness to pay and behaviour of consumers after they have accessed those free contraceptives. At the end of the day although rural people were willing to pay some positive price to contraceptives, they preferred to use free contraceptive outlets. As a result, during the experimental diagnosis 50-100% of the rural clients had shifted from priced to free pill dispensary areas. On the contrary, unlike the rural women only 2% of urban clients were switched to use free contraceptive clinics. When explaining the finding the authors stated that urban people do have higher opportunity cost of using public outlets than the rural people. Similarly the prevalence of commercial outlets is very limited in the rural areas of Brazil. Consequently, the opportunity cost of using private clinics is higher to the rural population.

Whether or not couples prefer priced contraceptives was also examined in Colombia by Bailey and Umaria(1978).They have conducted their experiment by comparing two non-priced government clinics against two other clinics charging $0.10/cycle for oral pills . The output of a one year experimental analysis has proved that the difference in the

number of users in both of the clinics during the year was insignificant. Consumers were reluctant to shifting themselves to free oral pill distributing centres. The price of pill is found neither expensive nor unaffordable even to the poor.

Different from the study made by Howell et al.(1979) in Taiwan and Sri Lanka, a pricing experiment which covered about 14 months was also conducted in Taiwan by Cerenda(1982). The population was segregated into three sub-markets; free pill providers, clinics that charge $0.13/cycle and clinics charging $0.25/cycle. Finally consumers are found to be price sensitive. Even though the difference in the number of users between free contraceptive window and clinics that charge $0.13/cycle is very little, the number of oral pill clients charging $0.25/ cycle was half lower than that of the fully subsidized clinic.

In sum, the above research methodologies suffer from two shortcomings to draw valuable and clear information on the relationship between contraceptive subsidy and demand or on the impact of affordable contraceptive price and demand. Foremost is that the experiment compares the behaviour of clients by taking price as the only variable affecting demand irrespective of the role and significance of other demand shifting variables(Varian, 2000). Secondly the experiment did not take into account the availability of other methods of contraceptives and the influence of relative price on them as the domain of experiment in all cases was oral contraceptive.

Non- experimental research findings

Evidence from Taiwan and Sri Lanka(Howell et al., 1979) suggest that too low prices of contraceptives reduce demand because consumers are likely to consider the commodity

as an inferior good. Mohammed(1969) and Blair(1972) suggested that price and quality of service are strongly and positively correlated. However, their methodology was tending towards employing qualitative tools and did not show how significant price influences quality and consumers perception. On top of price-quality correlation, users distrust commodities being given free of charge and often questioning the motivation of suppliers(Morris, n.d, Burkhart, 1981). These outputs, therefore, imply that the free/over subsidized mode of family planning service provision is a backfire to the demand for contraceptives. If so the demand curve for contraceptives will be backward bending if contraceptives are given at offer rates below some minimum price. Thus, the potency of free offer has nothing to do with improving the market condition of contraceptives. Ineffective use and wastage of contraceptives, long travel and waiting time are some of the revelations of households that use free contraceptive outlets and free offer demotivates suppliers of family planning services.

Akin et al.(1984) conducted a comprehensive study in Philippines and found an impressive result which is in contrary to the predictions of economic theory and supporting the proposition that zero price deteriorates demand. He employed a multivariate logistic regression by incorporating all possible covariates in addition to price. The relative prices and availability of other substitute methods were captured. In conclusion, he found that letting consumers to pay for contraceptives has improved the demand and as the price of one of the methods is improved relative to others, the probability of choosing higher priced contraceptives has been improved. Hence there exists a positive relationship between price and the probability of selection. Here the proposition arguing that consumers behaviourally associate price with value and quality seems valid and true.

An elasticity estimate on the choice of seven methods of contraceptives was calculated by Jensen et al.(1994) in three different provinces of Indonesia. The analysis did not investigate the percentage change in the number of users following a percentage change in price rather they used to investigate elasticity via measuring proportional change in the probability that a particular method of contraceptive is chosen following a proportional change in its price. As the finding discloses, there is a substantial variation by source of marketing. Public sources have found less elastic (elasticity ranges from 0.004 to 0.555) than private sources (elasticity runs from 0.018 to 1.954). Besides, the poor is more sensitive to the change in price than the rich.

A cross sectional study, comprising both qualitative description and estimation of odds ratios, on the use of modern methods of contraceptives was carried out in Southern Wollo Zone of the ANRS. The analysts have used a range of socio-economic and demographic characteristics that influence the adoption and utilization of contraceptives. They found that neither price nor family income deter the use of modern contraceptives. About 89% of the respondents said that the price of contraceptives is negligible relative to the benefit derived from contraception. Age of the woman and level of education are found to be insignificant(Alemayehu et al., 2005). The study also indicated that husband disapproval is found to be a significant variable in the use of contraceptives. However, the study did not investigate the joint or independent influence of the covariates to each method of contraceptives independently.

Another study made by Yigzaw(2000) in Gonder town also found that only 4% of females and none of the male contraceptive users reported that contraceptives are expensive. But, lower income groups were relatively reluctant to regulate their fertility. A related cross-sectional finding from Jimma(Mirgissa, 2000) indicates that, unlike

many study outputs men's approval on the contraceptive decision of the women has no any effect and remain neutral. On the other hand, better educated women were at the forefront line of contraceptive adoption and use.

So the study outputs at different corners of the country have their on similarities and differences. As far the price of contraceptives is concerned, findings from the Amhara region are consistent. However, educational attainment of the contracepting woman has no influence on the use of modern contraceptives in Amhara region where as it promotes contraceptive adoption around Jimma.

Income and the choice of contraceptives

Household (per capita) income of the consumers is one of the crucial determinants that influence their choice behaviour. Rich people are thought to have better purchasing power and demand for a given marketable good assuming that the good in question is normal. The practice of subsidizing contraceptive clients in a number of developing countries is emanated from the observable characteristics that women of the poor countries do not have the capacity to buy and use contraceptives. The premise that low income households tend to use low priced commodities holds true in the market for contraceptives. A cross country study conducted by McBride(1997) using aggregate national figures confirmed that in low income economies, relatively cheaper contraceptives do have higher demand than the industrialized nations. But, in some parts of Ethiopia, the relationship between income and contraceptive use is mixed. The rich are good adopters of contraceptives around Gondar and income remain neutral in a study made in Wollo area(Alemayehu et al., 2005, Yigzaw, 2000).

A number of other studies have been undertaken by many scholars to see the responsiveness of children's demand to changes in income. The methodologies they have used widely differ. Some researchers used wealth proxy to measure income status of the household such as type of house floor, occupation type, wage rate, number of durable goods etc where as others used household expenditure as a measure of income(Feyisetan et al., 1996, Ainsworth et al., 1995).

Accordingly, an empirical investigation from Pakistan using logistic regression witnessed that women having better economic status tend to regulate their fertility than women who are relatively poor(Agha, 1998). A similar result was obtained in Ghana; the effect of income on the use of modern methods of contraceptives is positive and significant(Oliver, 1995, De Vergas , 1998). It is evident that though the poor is likely to use free or low priced contraceptives, they may be spending a larger portion of their income compared to the rich(Bratt et al., 1998).

2. 3 Global environment and the family planning situation of Ethiopia

The global context

The 1994 ICPD family planning & reproductive health initiative is considered to be a breakthrough for global political commitments on population issues(Magadi et al., 2003). Due emphasis was given to helping couples to meet their reproductive health needs. Local governments and the international community are responsible to establish a favourable ground to good quality family planning service and informed method choice of couples(UN, 1994).Quality of health education and need based supply of contraceptives are vital issues in the provision of family planning services. Contraceptives should be affordable, acceptable and accessible to all who need to use them(Sahin et al., 2003). The term affordability calls for the introduction of fair price in

the provision of family planning services. Acceptability and accessibility of the service imply that beneficiaries of the program should be introduced and well informed to all the needy about all forms of fertility regulation tools and reflect their approval and confirmation for use(Birhane et al., 1995). Diversity of contraceptive choices and availability of the service all times at reasonable location are critical factors that help consumers to meet their reproductive health needs and rights(Alemayehu et al., 2005).

Reproductive health is a complete mental, physical and social wellbeing of couples in all maters of reproductive health cases. Hence, the introduction of any method of contraceptive should keep the woman healthy and is not allowed to violate her reproductive right (the right to safe, effective, affordable and acceptable choice for regulation of fertility). To this end, all countries do have greater responsibility to make family planning services more accessible to all of their people until 2015(UN, 1994).

The expansion of primary health care and family planning services require the allocation of adequate financial resource at their disposal. To meet the needs of developing countries in the period 2000-2015 experts have estimated the funding levels for reproductive health and family planning activities. Accordingly, program implementation requires $17 billion in 2000, $18.5 billion in 2005, $20.5 billion in 2010 and $21.7 billion in 2015(UN, 1994). Of this amount, the developing countries themselves have to cover two third of the resource need and the international community is expected to cover $5.7 billion in 2000, $6.1 billion in 2005, $6.8 billion in 2010 and $7.2 billion in 2015(UN, 1994, Sahlu et al., 2000). This implies that developing countries should have strong political will to generate and allocate sufficient and increasing level of resources

domestically to adequately finance family planning and reproductive health programs each year.

There was a conference held in July 1999 to assess the performance of the 1994 Cairo strategies and level of foreign aid to population and family planning activities. According to Nowels et al.(2006), the population assistance of the advanced countries had fallen far short of the financing goal on the average providing only $1.9 billion per year. Different analyses being carried out by Population Action International(2004) suggest that donor countries have donated $2.3 billion as of 2002 and is the largest amount ever. However authors recommend that, the international contribution remains far below the target level set at Cairo. The reason as to why such a fall in funding pattern happens could be exogenous and non- economic.

A snap shot on the family planning situation of Ethiopia

According to the Ethiopian Demographic and Health Survey(EDHS), the fertility index of Ethiopia remains higher with a total fertility rate (TFR) of 5.4 children per woman. Although it had shown a promising declining trend from TFR 6.4 in 1990 to TFR 5.5 in 2000, the average figure kept stable (TFR of 5.4) in 2005(CSA and ORC Macro, 2006). There is a wide variation across region and urban-rural population. The highest fertility rate of 2005 is recorded in Oromia (TFR of 6.2) whereas Addis Ababa has the greatest achievement revealing the lowest TFR of 1.4. Amhara region more or less share the figure recorded at national level averaging TFR to 5.1. Comparing the fertility deferential between rural and urban married woman, there exists a marked difference in TFR. The TFR of urban women (2.4) is much below the national average and that of their rural counterparts having a TFR of 6.0 (CSA and ORC Macro, 2006).

The demand for family planning constitutes the sum of both the actual use of the service and the need which stays unmet. According to the Ministry of Health(2005), unmet need is defined as the proportion of women who either want to limit or space birth for more than two years but could not access the service due to various reasons. Even though the scope of family planning service is increasing overtime, the unmet need did not show any change and kept higher at 34% in 2000 and 2005(CSA and ORC Macro , 2001, CSA and ORC Macro, 2006). The family planning service of the country has the capacity to satisfy only 15% of the need of married women. Hence, the total need of the country as of 2005 is as high as 49 %(the sum of met and unmet needs). Amhara region has 30% unmet need which is not much different from the national average (CSA and ORC Macro, 2006)

The use of modern methods of contraceptives is significantly increasing from time to time. The EDHS report depict that among married women aged 15-49, 16% of them in Amhara region are using modern methods of contraceptives(CSA and ORC Macro, 2006). This figure is slightly higher than the 15% national average in the same year. Notably, the trend of contraceptive use since 1990 has shown tremendous growth. For example, 3%, 6% and 14% growth rates have been recorded in 1990, 2000 and 2005 respectively (CSA, 1993, CSA and ORC Macro, 2001, CSA and ORC Macro, 2006).

There exists a wide differential on the use of modern methods of contraceptives among women with different socio-economic background. As per the 2006 EDHS report there is a positive correlation between use and wealth(CSA and ORC Macro, 2006). The same holds true between women education and the intent to contracept. The report underlines that relatively wealthier families have less number of children (TFR of 3.2) than the poor

(6.0) although the cut-off point for wealth is not clear. Similarly, women who succeeded secondary education or above have less number of children (TFR of 2) than those with no education (TFR of 6.1). Consistently, only 10% of the illiterates but 46% of advanced (secondary and above education) women are active players in the market for contraceptives. About 34% and 4% women in the highest and lower income quartiles respectively are active users of modern contraceptive methods.

3. Methodology and the theoretical framework

3.1 Methodology

Data and Structure of the questionnaire

Analysis of the problem is heavily dependant on primary data. Essential qualitative and quantitative variables were collected using standard questionnaire containing both closed and open ended questions. However, minor essential secondary information that describes the situation of the study area has been gathered from secondary sources. The data was collected in selected six kebeles of Debretabour zuria and Farta woredas of South Gondar Zone. The area is chosen because of two reasons. Firstly, since the last four years both governmental and non-governmental organizations have been intensively undertaking family planning services. Hence, analyzing the behaviour of clients living in similar geographic zone but mixed (non-priced versus priced contraceptives) markets looks the study interesting. Likewise, it is relatively accessible and manageable to the investigator. The survey was conducted from 2- 28 of May 2007 of which the first six days were allotted for enumerators training and pre-testing of the questionnaire.

The survey questionnaire has two sections. The first section embodies general information and relevant socio-economic characteristics of the respondents. The second section of the instrument enclosed the contingent valuation questions. A scenario was constructed so that respondents can reply the continual use or non-use of the service in question and the maximum amount they are willing to pay based on the theme of the scenario. Respondents were asked to answer Yes or No for questions like would you be willing to use the service if the price is so and so much? since the elicitation method employs a bidding game approach for methods other than Norplant, the starting price for

the game was the average of free market price of each type of contraceptive. If she answered yes the next highest bid was forwarded until she said No or encouraged to state otherwise if she is willing to pay more than the maximum amount of bid offered. If the answer to the first question was No (I wouldn't demand the service at the stated price), the subsequent lower bids were given until she said yes. If she was unwilling to pay any positive price, her reason was welcome why she refused to pay very small amount.

The final amount was taken to be the respondent's maximum willingness to pay. Despite some of its limitations (starting point bias, annoying respondents), such a bidding game is iterative and covers relatively a broad range of willingness to pay values(Randall et al., 1974). Nevertheless, Norplant users were not subjected to bidding game elicitation technique and were asked the maximum amount they are willing to pay. This was so because of two observable challenges. In the first place the role of private sector in the insertion of Norplant contraceptive is limited. In the second place conducting pre-survey willingness to pay data from users that would be used as a reference point to frame bid prices was not time and cost-efficient to the examiner.

A total of twelve enumerators who have an experience to collect survey data were deployed to collect the required information after they were trained and well introduced with the tools. After one and half day training and self exercise, the data collecting tool was pre-tested on twenty women before the actual survey was conducted. Based on the feedback obtained from the pre-test, both the gaps of the data collectors and the questionnaire were identified and corrective actions were taken. Two other supervisors and the investigator himself were also giving the required support to the enumerators.

Sampling design and analytical method

The sampling procedure employed a mixture of three-stage stratified random sampling, simple random sampling and systematic random sampling techniques. In the first case households were stratified geographically into urban and rural residents and in the second strata, households were proportioned according to the choice of their method. In the third phase of stratification currently active contraceptive beneficiaries were grouped into payers versus fully subsidized contraceptive users except for Norplant because it is currently given free of charge. There are thirty five rural and fifteen urban kebeles. As per the judgement of the investigator 4 rural and 2 urban (approximately 12% of the total) kebeles were chosen on lottery method. In sum there were 11822(7852 for pills, 2767 for injectables and 1203 for norplant) active contraceptive users during the time of the survey of which non-payers constitute about 56%. To make the sample manageable but large enough to make valuable inference, the investigator has taken a large proportion of sample relative to the population from those methods where the relative number of clients is small and the reverse holds true for those methods having large number of beneficiaries relative to others. Accordingly nearly 5%, 3% and 2% of their population were chosen as sampling elements for norplant, injectables and pills respectively. The systematic random sampling technique was used to select respondents from a list of contraceptive users. Based on their proportion 157 pills, 83 injectables and 60 norplant (a total of 300) users were systematically selected and interviewed.

The analysis has followed both descriptive statistics and the Binary logit model. Area description and sample characteristics are described using common statistical tools such as mean, minimum value, maximum value and the likes. Marginal effect of each explanatory variable on the probability of contraceptive use is analysed and quantified

using the logit model. A competing model to the logit is binary probit which assumes that the distribution of the residual is normal. The choice of one of the two models by scholars is usually decided by the researcher. In most applications, the models are quite similar(Gujarati, 2003). The investigator of this paper has thus used the logit CDF because of the following two reasons. The normality test result of the residual confirms that its distribution if far from normal and besides logit is mathematically simpler and is also commonly used for similar studies. The *stata* statistical package of release nine was employed for the purpose.

3.2 Description of the model and the variables of interest

3.2.1 The theoretical framework

The analytical model emanates from the basic microeconomic theory of utility function where the utility of a representative consumer is a function of a bundle of goods and services he/she enjoys(Varian, 2000). Coming to our point of discussion let us make a simplifying assumptions that the total utility of a given representative household which wants to improve its reproductive health condition depends on the quality of the health status and the consumption of a basket of goods other than health. Microeconomic theory also assumes that there exists a trade-off between competing groups for a given income constraint. As the benefit of investing in health increases, the consumption of other goods and services decreases given household income constant. Thus, the following utility function is constructed. Similar model was also used by Mataria et al. (n.d) to assess the demand for health care in Palestine.

Accordingly, Suppose:

$$Ui(Hi, Ci) \qquad (1)$$

Where H_i stands for (reproductive) investment in health condition of the woman and C_i represents the consumption of goods other than health .It is also true that

$$\partial Ui/\partial Hi > 0 \text{ and } \partial Ui/\partial Ci > 0$$

Let us imply the above framework into the subject of study. As was described above shortly, the expected improvement in health and level of satisfaction of a woman is determined by the accessibility (quality) of the service denoted by q_i, income of the household and many other socio- economic, cultural and demographic characteristics of the household expressed by a vector of X_i. Since our due interest for the moment is the logical derivation of the demand for health care based on the pre-designed hypothetical scenario on the relationship between price and the former we can drop the vector of X_is.

Let the budget constraint of the household is given by

$$Yi = Pi + Ci \qquad (2)$$

Where Yi is household income and Pi is the price of a unit of health service.

The utility function in equation (1) is therefore rewritten as

$$Ui = Ui(Hi(qi), Yi - Pi) \qquad (3)$$

Let us consider two quality levels q_{i1} and q_{i2} for a given contraceptive. Letting q_{i1} is the existing quality level of the service a woman associates and q_{i2} is the perceived and better quality level of the service anticipated from the hypothetical scenario. However, the two quality levels are coupled with different levels of prices. Suppose P_{i1} is the current price level and P_{i2} is the newly proposed price attached with the new quality level where $P_{i2} = P_{i1} + \Delta P_i$. Hence, there are two levels of utility as depicted in equation four below.

$$Ui1 = Ui(H(qi1), Yi - Pi1) and Ui2 = Ui(Hi(qi), Yi - Pi2) \qquad (4)$$

The demand function for better and improved contraceptive service delivery D(.) is defined as a discrete choice function. This enables the analysis to fit with the limited dependent variable models.

$D_i(.) = 1$ if the woman demands the contraceptive service given the hypothetical scenario and the starting bid price.

$D_i(.) = 0$ otherwise

Transforming this concept into the perceived health production function yields a meaningful result. The fact that a woman demands the new service provided that the total utility from the improved service is greater than the existing service. In other words the new service will be demanded if and only if the change in total utility (ΔU_i) is non-negative. Mathematically speaking D(.) = 1 iff

$$MUqi(qi1) * dqi + MUci(Ci1) * dCi \geq 0$$

This implies that

$$MUqi/MUci * dqi \geq -dCi \qquad (5)$$

Here the above equation has shown that the ratio of the marginal utility of the two consumption bundles yield the marginal rate of substitution (MRS). It is the amount of consumption goods a woman should give up to get one unit of improved health condition due to the adoption of family planning programs. When we multiply the MRS by the magnitude of the change in the quality of family planning service *dqi,* we can get the WTP of a woman for the proposed improvement. Hence equation (5) can be rewritten as

$$MRS * dqi \geq -dci \quad \textbf{but } dC_i = C_{i1} - C_{i2} = (Y_i - P_{i2}) - (Y_i - P_{i1}) \Rightarrow \Delta P_i$$

which implies that

$$WTPi \geq -dci \Rightarrow WTPi \geq \Delta Pi \qquad (6)$$

This is to mean that the woman will demand the hypothesized quality family planning service attached with an improvement in the user charges for contraceptives provided that the proposed increment in price is not higher than her WTP. Suppose WTP is a continuous random variable with a probability density function PDF: f(WTP) providing

the probability that the woman has a WTP value of ΔP. The cumulative distribution function can therefore be defined as the probability that a woman has a WTP value of less than or equal to a given user fee increment expressed as:

$$CDF(WTP) = \Pr\{WTP \leq \Delta P\} = \int_{0}^{\Delta P} f(WTP) * dWTP \qquad (7)$$

The above CDF shows the probability that a woman stops to demand the newly proposed quality service if the incremental user fee goes beyond her WTP value. In other words, THE DEMAND FUNCTION- the probability that the woman continues to demand the service, which is currently a function of the improved service fee, is one minus the CDF of equation 7 given by:

$$D(\Delta P) = \Pr(\boldsymbol{WTP} > \Delta \boldsymbol{P}) = 1 - CDF(WTP) = \int_{\Delta P}^{\infty} f(WTP) * dWTP \qquad (8)$$

This shows the probability that demand for contraceptive of a representative woman continues to persist (not to fall) while the change in the service fee, ΔP keeps intact. In effect the demand function which takes the values 0 and 1 as a function of its various covariates is summarised as follows.

D(.) = the probability to demand a given contraceptive given the scenario and the proposed change in the user fee = $D_i(\Delta P, dq, X_i)$ (9)

3.2.2 The -log likelihood function: the logit model

The application of the logit model to estimate response probabilities such as the probability of using a certain method of contraceptive, the probability that consumers are willing to pay more than certain amount, the probability of participating in the labour force, etc is quite common. Competing model to the logit is the probit model which assumes normality in the distribution of the stochastic disturbance term. Due to its wide application in the field of health and health economics to analyse similar behaviour of the

consumers, this research employs logit model to find the relationship between the probability of demanding a given contraceptives and other covariates after the distribution of the residual is proved non- normal.

As a result, the following functional relationship is established to find the empirical result(Wooldrige, 2006). Our objective is to find the probability that a given contraceptive say y_j *where* j stands for 1, 2, 3 is being demanded by woman i given various socio-economic characteristics denoted by x_i. For ease of manipulation let us ignore the subscripts. The dependent variable takes a value Y=1 if the woman demands the service (said yes) at the starting offer of the bid and Y=0 if she is not willing to consume the service (said no) at similar offer.

$$P(y=1|x) = p(y=1|x_1, x_2, ...x_n) \qquad (1)$$

Under linear probability model, the response probability is linear in a set of parameters B_j.

To avoid that limitation, let us consider a class of binary response models of the form

$$p(y=1|x) = G(B_0 + B_1x_1 + ... + B_kx_k) = G(B_0 + xB) \qquad (2)$$

Where G is a function taking on values strictly between zero and one: 0<G(z)<1, for all real numbers z and

$$z = (B_0 + B_1x_1 + ... + B_kx_k), or, (B_0 + xB)$$

Hence,

$$G(z) = G(B_0 + B_1x_1 + ... + B_kx_k) = G(B_0 + xB)$$

Thus, the logistic function G is:

$$G(z) = \frac{\exp(z), or, \exp^z}{1 + \exp(z)} = \Lambda(z) \qquad (3)$$

G(z) is the standard logistic distribution function which results in the logit model.

$$y_i = B_0 + B_1 x_1 + ... + B_k x_k + \varepsilon_i$$

$$= B_0 + xB + \varepsilon_i \qquad (4)$$

If p_i is the probability that $y_i = 1$, then $(1 - p_i)$ is the probability that $y_i = 0$. To construct the likelihood function, we note that the contribution of the i^{th} observation can be written as;

$$p_i^{y_i} (1 - p_i)^{1-y_i}$$

In case where selection of observations follows random sampling techniques, the likelihood function will simply be the product of the individual contributions, as follows;

$$L = \prod_{i=1}^{n} p_i^{y_i} \ (1 - p_i)^{1-y_i}$$

$$= p_i^{y_1} (1 - p_i) p^{1-y_1} * p_i^{y_2} (1 - p_i)^{1-y_2} * ... * p_i^{y_n} (1 - p_i)^{1-y_n} \qquad (5)$$

Thus the log likelihood function denoting the probability that a given contraceptive is being used by the woman is given by:

$$\log L = \sum [y_i \log p_i + (1 - y_i) \log(1 - p_i)] \qquad (6)$$

3.2.3 Empirical model specification and description of variables

As it was depicted in the above theoretical framework, the main objective of the paper is to investigate the response probability. In other words the model would take value of zero and one for responses given as No and Yes respectively for the dependent variable. In view of that, the following functional specification is used for analysis. There are two types of specifications; one is used to see the impact of various covariates on the probabilistic demand for all methods of contraceptives in our domain and the other is

used to examine the response probability for each of the three contraceptive methods. The specification is given by:-

$$P(y=1|x)=G\begin{pmatrix} B0+B1offerprice+B2age+B3agesq+B4\log incm+B5access \\ +B6wedu+B7hagree+B8nchild \end{pmatrix}$$

The specification above is used to estimate the effect of all the regressers on the probabilistic demand of all the three forms of contraceptives. The individual probability on the use of each method of contraceptive is analysed by adding the side effect dummy variable in addition to the variables employed in the specification above. Among other factors the inclusion of this variable in the second equation helps to see the utility derived by current users of each method. Hence:-

$$P(y=1|x)=G\begin{pmatrix} B0+B1offerprice+B2age+B3agesq+B4\log incm+B5access \\ +B6sideffect+B7wedu+B8hagree+B9nchild \end{pmatrix} \quad (1)$$

The analysis assumed that the stochastic disturbance term, ε has a cumulative logistics distribution, that is, G(.) is Λ(.). The logit is given by

$$\log\left[p(y=1)/(1-p(y=1))\right]=\begin{pmatrix} B1offerprice+B2age+B3agesq+B4\log incm+B5access \\ +B6wedu+B7hagreee+B8nchild \end{pmatrix} \quad (2)$$

Taking exponential and rearranging, we obtain the logit functional specification

$$p(y=1|x)=G(xB)=\frac{\exp\begin{pmatrix} B1offerprice+B2age+B3agesq+B4\log incm+B5access \\ +B6wedu+B7hagree+B8nchild \end{pmatrix}}{1+\exp\begin{pmatrix} B1offerprice+B2age+B3agesq+B4\log incm+B5access \\ +B6wedu+B7hagree+B8nchild \end{pmatrix}} \quad (3)$$

Hence the log-likelihood function that maximizes the probability of using a given contraceptive if price is introduced in the system takes the form expressed in equation 6 above. Determination of the cetris paribus marginal effect of the explanatory variables follows the form:

$$\partial p(y=1)/\partial xk = pi(1-pi)Bk \qquad (4)$$

Where,

$p(y=1|x)$= is the probability of using any method of contraceptive given the determining factors, x.

Description of the independent variables and their expected sign

The table below summarizes explanatory variables used in the analysis.

Table 3.1 Definitions and expected sign of the variables

Explanatory Variable	Variable description	Expected sign
offerprice	It is the maximum amount that a contraceptive client is willing to pay for the service in question	negative
age	Age of a woman in years	Positive
agesq	The square of the age of a woman	Negative
wedu	Educational background of a woman. The model employs discrete choices for different levels of woman education. That is 1 for illiterate, 2 for adult/non-formal education, 3 for primary, 4 for secondary and 5 for above secondary(Shapiro et al., n.d)	Positive
logincm[1]	The logarithm form of annual household income	Positive
access	Denotes the total travel and waiting time a woman spends to get contraception service from the nearest service outlet.	Negative
nchild	The total number of children in the household	Positive
hagree	Husband's consensus and approval of wife's contraception decision(Alemayehu et al., 2005)	Positive
sideeffect	It is the dissatisfaction (customer complaints) against the service being in use. It is represented by a dummy variable =1 if the woman has one or more complaints on the quality of the service and is = 0, otherwise	negative

[1] Income is transformed into logarithm form because it is better informative to express the changes in the probability of contraceptive use due to a percentage change instead of a one Birr change in income.

4. Results and Discussions

4.1 Descriptive analysis of survey data

The study area

Debre-Tabor and Farta woredas are found in the Amhara National Regional State located at 100 kilometers northeast of the regional capital along the main highway from Bahir Dar to Dessie. The agro-ecological zone of the areas is grouped in *Dega* and *Woinadega* type with an altitude level ranging from 2440-2884 meters above sea level. Agriculture particularly cereal production is the dominant business for livelihood of the population. More than 90% of the rural and 38% of the urban residents established their livelihood in agriculture. But there are some households who complement their income through other income generating schemes such as petty trading and outsourcing households own labour. The mean land holding per capita of the agrarian community is limited to 0.5 hectares only(Bureau of Rural Development, 2003).

According to the Bureau of Finance and Economic Development statistical abstract (2006), the current aggregate but projected population of the two woredas is estimated to be 316792 of which the proportion of females accounts nearly half of the population (48.4%). Of the total female population, about 41.6% constitute those who are found in the reproductive age group (15-49 years). Under five population comprise 17.5% of the total. These indices generally would imply that the demographic structure of the population is pyramidal requiring due policy direction and efficient population program intervention.

There are different local and foreign development actors involved in family planning and reproductive health program activities including the government. The private oral contraceptive retailers are clustered in urban areas whereas both the government and other non-governmental organizations are playing their role in rural areas too. Actually in the study area, non- governmental organizations such as CARE Gondar, Family Health International and Amhara Development Association have been involved in health and family planning projects since 2004 and the current contraceptive prevalence rate of the area is as high as 27.4% (ZDH, 2006).

Socio-economic characteristics of the respondents

The sample is drawn from current active contraceptive users in the study area. The age interval of men and women ranges from 23 -71 and 17 – 45 years respectively with a mean age of the former (39) is higher than the mean age of the latter (30.2). The average number of children per woman is about 4.01 which is less than the regional(5.1) and national(5.4) mean fertility rate per woman(CSA and ORC Macro, 2006).The maximum number of children per woman recorded during the survey is 9 whilst the minimum is zero. Nearly 32% of the total sample households currently have more than the regional ideal number of children a woman wants to have (4.1 children per woman).The data reveals that there is a fertility differential between urban and rural households; on average urban and rural households have 3.69 and 4.34 children respectively(see Table 1 below).

Table 4.1: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Age Profile				
Age of women	30.21333	6.026238	17	45
Age of men	38.57664	8.001577	23	71
Number of children				
All households	4.01	1.94899	0	9
Urban households	3.69	1.850546	0	7
Rural households	4.34	2.105568	0	9
Household size				
All households	6.32	1.862185	1	12
Urban households	5.51	1.746033	1	7
Rural households	6.79	1.930402	1	12
Household income				
All households	5803.37	2068.28	840	13570
Urban income	5895.10	2476.64	1408	13570
Rural income	5749.50	1828.45	840	9420
Urban i/Pcap.	1069.89	680.20	257	5729
Rural i/pcap	846.76	473.12	168	2884
Couples' Willingness to pay				
WTP<4.29 Birr	1.433333	.731871	0	4
WTP ≥4.29 Birr	14.64198	7.69678	5	100

N.B. i/pcap denotes income per capita

Source: Survey data

Respondents were openly asked to reveal their educational attainment that would enable us to investigate the impact of women schooling on the utilization level of contraceptives. The data in table 4.2 pointed out that for most of the samples, women schooling is skewed to the lower level; only 20% of the women have got the opportunity to join secondary and above education and 57% of the respondents are below primary of

which illiterates constitute the lion share (34%). There is also substantial variation between urban and rural women. The proportion of urban women who have secondary education or above is more than two fold of their rural counterparts at similar level of modern schooling.

Table 4. 2: Educational attainment of women in percentage

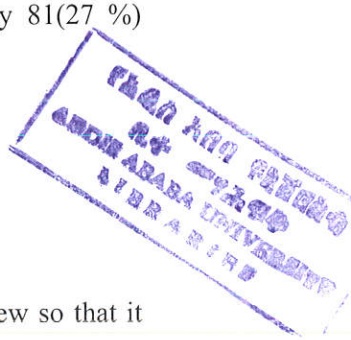
Woman Education	All	Urban	Rural
Illiterates	34.33	16.30	44.92
Non-formal/adult education	22.92	22.31	23.28
Primary education	22.86	29.25	19.10
Secondary education	15.22	23.13	10.58
Above secondary	4.67	9.01	2.12
Total	100.00	100.00	100.00

Source: survey data

Income of the household is one of the variables that are expected to influence the demand of a commodity from two angles. Economic theories and some scholarly research articles in one or the other way validate that the potential influence of household or per capita income on demand emanates from two sources. Foremost is that lower income constrains the purchasing power of the consumer and it is the poor that reduce demand first than the rich. Secondly, better income people have higher opportunity costs relative to low income households to give more births and rear children than the poor.

At the mean value there is no significantly measurable income divergence between urban and rural households(see table 1). The mean annual income of rural households is slightly less than urban households' income. However one can note that, the income gap between these two groups becomes wide when we compare the per capita annual earning estimate. The mean income per capita and the upper bound per capita income of the rural households are much lower than the urban income per capita.

When households were asked whether they are willing to pay the first offer, as high as 36% of the total respondents were not willing to pay the starting bid value. The mean willingness to pay for all methods of contraceptives is approximately equal to 4.29 Birr. [2]The minimum stated price is zero and the maximum amount is Birr 100 being reported among Norplant users. Income constraint and implied trust on government subsidy were the justification given by the respondents for not willing to pay a positive price. Couples who are willing to pay higher than the mean WTP value constitute only 81(27 %) observations(See Table 1 above).



Awareness, informed consent, contraceptive security and reason to pay for

Contraceptive clients were asked to list the types of contraceptives they knew so that it would serve as an indicator to assess users' knowledge of contraceptives. The greater proportion of households (60%) mentioned the two common types of contraceptives namely injectables and pills, and 21% of the respondents, of which most of them are literate, described three or above different forms of modern contraceptives. The remaining 19% could able to list only the type of contraceptive they are actually using.

On top of that, users response on their first choice of contraceptives indicate that 87% of the respondents have firstly chosen the method without getting any advice by the health practioner hence their first choice is decided either by themselves or in consultation with their neighbours. The situation is more pervasive among rural contraceptive users where none of them have the experience of getting medical consultation about the merits and demerits of a range of contraceptive supplies. A Complementary question was also given

[2] Mean willingness to pay is calculated using the formula –[a(s)/b] where a(s) and b are the logistic regression estimates of the intercept times sum of the products of the coefficient & the mean values of each variable and the bid coefficient respectively.

to those households which want to switch their choice to any other form of contraceptives because of some health complications they encountered. That is when they decide to shift, none of them would like to consult skilled health experts.

Table 4.3: Clients' knowledge about contraceptives and informed consent

Number of women who know	Obs.	Percent
1 method	56	18.67
2 methods	181	60.33
2+ methods	63	21.00
Informed choice|		
Not Consulted by an expert	262	87.33
Consulted	38	12.67

Source: survey data

Just as important as the supply of a range of contraceptive services, provision of adequate information is the critical issue which determines the utilization and continuity of family planning services. The above statistical finding is a good picture of how the quality of family planning information is deficient in addressing the needs and problems of clients. The dissemination of proper health related information to potential and actual users about each method of contraceptive would enhance dual benefit. On the one hand it improves the prevalence rate of contraceptives as people are becoming more and more knowledgeable and on the other hand they shall take care of themselves by taking informed decision.

As indicated in table 4.4 below constrained contraceptive insecurity and limited ranges of contraceptive choices are the main reasons which necessitated couples to pay some prices for contraceptive services. When respondents were asked about the availability of contraceptives, about 21%, 34% and 77% of Oral Pills, Depo-Provera and Norplant users respectively claimed that, the supply and contraceptive security is inconsistent and

unsustainable. Comparatively, the supply of birth control pill is better secured than others.

Table 4.4: percentage of women who reported the relative access of contraceptives

Contraceptive availability	pills	Injectables	Implants.
Sometimes Unavailable	21.30	33.73	76.67
Always available	78.70	66.27	23.33

Source: survey data

In Ethiopia, availability of literature is very limited regarding the constrained supply of wide ranges of contraceptives. Some survey reports attempted to explain the situation by pointing out demand and supply side factors(WHO, 1999). On the demand side, the Ethiopian households' context (knowledge, absorption capacity) is believed to hinder the utilization rate of a variety of contraceptives and on the supply side operational feasibility and institutional capability are considered to be the main issues which require proper assessment and analysis.

4.2 Empirical findings and discussion

4.2.1 Price changes and the demand for contraceptives

An important question being raised at the beginning of this research was whether the imposition of user charges in contraceptives reduces the probability of contraceptive usage patterns. The conceptual underpinnings we have seen so far underlined that the influence of price on the use of contraceptive is mixed and not universally conclusive. Despite their limitations, research outputs of some countries attempted to prove that price has an adverse influence on the demand for contraceptives and in others its effect is either neutral or positive and significant. Some of the scholars who did research in similar market argue that even if price may negate demand, extensive subsidy do not

guarantee the increasing utilization rate of contraceptives(Lewis, 1986). For example in Taiwan and Sri Lanka the heavy reduction of contraceptive price resulted in a reduction of demand because consumers behaviourally associate price with quality of the service implying that by the judgment of consumers the lesser the price of the commodity, the more Giffen the good will be(Howell et al., 1979). Hence a positive price has a potential to capture consumers perception and mitigate supply side challenges which in aggregate would improve contraceptive adoption and continuity(ICSMP, 1983). In countries like Nigeria where elasticity estimates were made the price elasticity of demand is inelastic indicating the potency of further price improvement so that substantial cost recovery arrangement shall be put in place(Feyisetan et al., 1996).

Our regression model on the other hand yields a positive relationship between the price of any or each method of contraceptive and the probability of use. This empirical finding does not support the expected sign the paper had hypothesised in the previous chapter. The regression out put is summarized in Tables 4.5 to 4.8 comprising the effect of price and other covariates on the probabilistic demand of all and each method of contraceptive.

Table 4.5 Binary-logit marginal output of all methods

Variable	Marginal effect	P>|z|
offerprice	.124644	0.032**
age	.104369	0.006*
agesq	-.0008241	0.118
logincm	.1488607	0.140
access	-.4091437	0.000*
wedu	.0734402	0.132
hagree	.2411843	0.033**
nchild	.5505134	0.000*
Semi-elasticity	.6231784	0.032**

Wald chi2(8) = 89.20
Prob > chi2 = 0.0000
Log pseudolikelihood = -58.047375
Pseudo R2 = 0.7131
N.B * and ** are significant at 1% and 5% respectively.

The joint significance of the explanatory variables on the probability of contraceptive use in all of the four regression outputs (all methods, pills, injectables and norplant) is sufficiently high which implies that the explanatory variables included in the contraceptive choice of a woman better explain the model of contraceptive consumption. One of the instruments used to describe joint significance is the pseudo R^2 and in all of the cases it is above 71% indicating that more than 71% of the variation in the probability of contraceptive use is explained by the data. The wald statistic also strongly supports the same concept at 1% level of significance and rejects the null hypothesis stated in such a way that none of the explanatory variables have an effect on the probability of contraceptive use. Of all the variables included in the model of contraceptive demand offerprice, age, access hagree and nchild are statistically significant below 5% level of significance. Hence these variables have significant individual influence on the probability of contraceptive use.

Evidently, our regression output demonstrates that introducing non-zero price against contraceptives is an engine to improving the market condition by enhancing the demand side of the contraceptive market. Growing demand has also a potential to augment contraceptive supply that collectively enlarge the reproductive health and family planning situation of the country. Empirical result of the logit model illustrates that keeping other factors constant, mounting the existing price of contraceptives by one Birr increases the probability of using any methods of contraceptives by about 0.12(12%).

Estimating the elasticity coefficient is a more useful tool to draw possible implications of price and program revenue. Furtherance step made from marginal estimation also enabled us to calculate the change in the probability of using contraceptives (dy) due to a

percentage change in the couples willingness to pay, d[log offerprice]. Thus, partial elasticity coefficient denoting the change in the probability of demanding contraceptive for all methods is as equal as 0.62 implying *a cetris paribus* 10 percent increase in the offer price of contraceptives would be associated with a 6 percent improvement in the probability of using contraceptives.

Coming up to each method of contraceptive (Tables 4.6 to 4.8), even if the effect of price on the probability of contraceptive use is positive and significant, the magnitude of marginal contribution and semi-elasticity of price varies across methods. A one Birr improvement in the price of pill contraceptive, *cetris paribus* , increases the probability of its demand by about 0.07(7%). Speaking differently, the partial price elasticity of oral pills is 0.26 which is below the mean elasticity value of all methods. Meaning, holding other factors constant, a 10% improvement in the price of pills would bring about a 2.6% increment in the probability of its utilization. The responsiveness of the change in the probability of consuming pill contraceptive is by far lower than that of injectables and norplant. A 10 percent imposition of user charges in the market for Depo-Provera and implants respectively would be supplemented by an 8 and 7 percent improvement in the probability of their use, *cetris paribus*. Again under the umbrella of cetris paribus assumption a one birr improvement in the price of injectables(implants) changes the probability of injectables (norplant) demand by 0.54(0.22).

Although the responsiveness of consumers to a change in user charges fall below one in all methods (the change in the probability of contraceptive consumption is less than the change in price), the magnitude of the change in the probability of contraceptive utilization varies with changes in birth controlling methods. Relative to injectables and

implants, oral contraceptive is less responsive to price improvements. The introduction of user fees on contraceptives is therefore more rewarding to injectables and norplant as the elasticity of each is almost three fold of the elasticity of pills. The estimated elasticity coefficients indicate that injectables and norplant contraceptives will be the most commonly purchased contraceptive methods if price is introduced in the system. The contraceptive choice behaviour of the consumers in this regard is likely to be influenced by user fees and their choice would be skewed towards relatively long term birth controlling methods such as injectables and implants.

Table 4.6 Binary-logit marginal output of Oral pills

Variable	Marginal effect	P>|z|
offerprice	.0727434	0.012 **
age	.0061915	0.864
agesq	-.0003578	0.580
access	-.0048248	0.676
logincm	.0777149	0.013**
sideeffect	-.0481701	0.047 **
hagree	.0658321	0.003*
wedu	.0278696	0.044**
nchild	.0307414	0.096 ***
semi- elasticity	.257104	0.012**

Wald chi2(9) = 39.54
Prob > chi2 = 0.0000
Log pseudolikelihood = -13.879104
Pseudo R2 = 0.8381

N.B * , ** and *** are significant at 1%, 5% and 10% respectively.

Table 4.7 Binary-logit marginal output of Injectables

Variable	Marginal effect	P>|z|
offerprice	.5356175	0.000*
age	.0686601	0.002*
agesq	-.0007824	0.003*
logincm	.0494685	0.492
access	-.1425043	0.042**
sideeffect	-.2456018	0.081***
hagree	.4407427	0.100 ***
wedu	-.0290758	0.224
nchild	.0985406	0.255
semi-elasticity	.7743868	0.000*

Wald chi2(9) = 37.68
Prob > chi2 = 0.0000
Log pseudolikelihood = -7.3819129
Pseudo R2 = 0.8717

N.B * , ** and *** are significant at 1%, 5% and 10% respectively.

Possible reasons as to why such statistical differences occur are given as follows. One could be due to the nature of the commodity itself. Long-term contraceptives by their very nature do not require monthly futile trips to service providers where it is a unique characteristic of pills. Some women who want to shift their method from pills to injectables also indicate that in addition to the complicated adverse effect of oral pill, injectables are more preferable to protect the woman from husbands' influence. On the other hand, a possible suggestion for the lesser sensitivity of oral pills to price changes is due to the relative side effects it results to. For example of the total quality complaints the proportion of women who reported adverse health complications comprises 58.6%, 26.4%, and 14.9% for pills, injectables and norplant respectively.

Table 4.8 Binary-logit marginal output of Norplant

Variable	Marginal effect	P>|z|
offerprice	.2237156	0.038**
age	.1476869	0.382
agesq	-.005255	0.133
logincm	.0994666	0.275
access	-.4201911	0.001*
sideeffect	-.4181243	0.035**
hagree	.4771888	0.221
wedu	.2702006	0.070***
nchild	.425778	0.034**
semi-elasticity	.702467	0.038**

Wald chi2(9) = 18.83
Prob > chi2 = 0.0267
Log pseudolikelihood = -10.840335
Pseudo R2 = 0.7162

N.B * , ** and *** are significant at 1%, 5% and 10% respectively.

Why is the influence of price indeed positive?

The positive influence of price on couples demand for contraceptives is not special to this paper though the finding is in contrary to the theory of demand. A range of qualitative and quantitative findings and explanations have been given by some scholars who dictated and hypothesized similar relationship between the two variables. Some are consistent with the findings of this paper and some are not(Cerenda, 1982, Akin et al., 1984). In a nutshell, the possible contextual and analytical explanations given to such a reverse outcome are narrated hereunder.

Firstly, while considering the price of contraceptives one need to consider that users cost of contraceptives is not only a function of monetary price of the commodity in question but also is a sum of other indirect costs being valued and incorporated by the consumer. Opportunity costs of accessing and using the service are duly considered by a

contraceptive user while deciding to contracept(Alemayehu et al., 2005). Our regression output in this context seems self explanatory at least partially. Service access hours have substantial influence to reduce the demand for and use of contraceptive services. The longer the access time a client suffers, the lesser is the probability of using the family planning service implying that the monetary price (as far as it is moderate) attached to a range of contraceptive choices is not a deterrent factor for the downward spiral of its consumption. Respondents were asked to rate their problems regarding the affordability and availability of a variety of contraceptives and the overwhelming majority (about 61%) said that contraceptive inaccessibility is the first problem of the service. A study conducted in South Wollo Zone and Gondar town(Alemayehu et al., 2005, Yigzaw, 2000) also reported that the price of contraceptive is neither expensive to depress demand nor constitutes a barrier to the income of users.

Secondly individuals' fertility decision denotes couples preference for children and other goods which causes a trade-off between the demand for children and a basket of commodities in their utility function (Mataria et al., n.d). Therefore, the contraception choice of a rational household would go through provided that the net benefit of contraception is greater than the net benefit of children or the cost of bearing and rearing children outweighs the cost incurred to get family planning and reproductive health services. A number of demographic and cultural studies made in Ethiopia stated that more number of children is believed to have substantial benefit both to generating household income and ensure an old age security benefits(Yetnayet, 1995, Alemayehu et al., 2005). This situation is very common and generally true especially in the rural community of the country. However, fertility reduction and contraceptive prevalence rates of the country have shown a promising trend and family planning services are

supplied under heavy subsidy. Efforts were made to collect couples opinion on how the household values having more number of children in ones household. There exists a clear behavioural difference between urban and rural communities. Hence, 76% of the urban households reported that having more children is undesirable because of the implied cost and adverse effects on the health of mothers, but 54% of the rural women stated that unlimited number of children would be still worthy if we were wealthy enough. All these issues imply that regardless of the urban-rural behavioural variation, households have rationally estimated and accepted the premise that contraception is less costly than the cost of having over the optimal level of children.

In the third place, supply side constraints possibly are other workable explanations for couples' willingness to pay positive nominal price to consume the same type of contraceptives than otherwise be. Due to certain health complications in connection with some of the methods, women are in need of alternative and suitable contraceptive brands. About 40% of the respondents reported that their choice of contraceptive has brought about different forms of ill health complications (such as chronic headache, unwanted/ abnormal body fattening, disruption /continual flow of menstruation, loss of appetite, collapsing wanted pregnancy etc) that were not happening before. These problems are more pervasive in pill users predominantly followed by injectables contraceptive customers. In fact, the aforementioned percentage of quality complaints look as if below the average level(less than 50%). Nevertheless, a thorough look at of the health and social implications of 40% of the sample would imply that the issue of contraceptive quality needs thorough attention and follow up. The sign of the variable sideeffect also consolidates the statement because it negates the probability of contraceptive use significantly. Hence deficiency in the variety and quality of reproductive health services

including proper counselling, treatment etc have a place in the mind of customers more than the monetary price they pay(Alemayehu et al., 2005).

4.2.2 Interpretation and discussion of other covariates

Household income

Household (per capita) income is likely to influence consumers demand for contraceptive from two angles. On one hand the poor are constrained by low purchasing power of the good under consideration and on the other hand the opportunity cost of child bearing is higher for the rich than for the poor. Although the sign of income variable is found as it was expected, the annual income of households in our case is statistically insignificant except for pill clients. This is consistent with the finding of Alemayehu and his colleagues(2005) where about 89% of the respondents reported that neither price nor income constrains contraceptive use. This indicates that the economic status of households is not a determining factor to evolve demand differential among couples. It is true that the sign and significance of household income on the choice of pills is statistically meaningful. However, the cetris paribus effect of a 10 percent improvement in the annual income of households on the probability of pills choice is even less than 1% and indeed economically negligible. Hence it is possible to say that the role of household income on the choice and use of possible options of contraceptives is trivial.

Service accessibility

In some contraceptive market studies, waiting and travel time were used as credible indictors to measure the access and availability of contraceptives to potential and actual users of the service. The supply of services closer to the vicinity of the client is expected to improve the number of women who want to contracept(De Vergas, 1998). Here the waiting and travel hours are used as determinant factors for contraceptive use in the

study area. Instead of applying the two variables as separate regressers in the model, it is found more reasonable to aggregate the total waiting and travel time estimate in one regresser called access.

In the third chapter of the thesis, inaccessibility of the contraceptive services at a reasonable location and time was expected to depress the probability of contraceptive use and the empirical finding is consistent with this hypothesis. Lack of service access at a reasonable distance and service hours in general has a significant influence on the use and choice of contraceptives. Except for oral pill users, the other two methods of contraceptives are very sensitive for a unit change in the time of service access. A cetris paribus effect of a one hour taking contraceptive service is associated with a decline in the probability of contraceptive demand by 0.42(0.14) for norplant(injectables).

Obviously, the supply side of our family planning and reproductive health program is characterized by factors such as asphalt (urban) biasedness, poor quality of information and education, limited choice and brands of contraceptives and contraceptive insecurity. Despite all quality defects, the unmet need of the country is still higher and the service coverage is quite lower in rural areas (CSA and ORC Macro, 2006). Hence, holding other factors constant the role of creating conducive environment by taking the service closer to their villages would boost the use of contraceptives.

Number of children in the household

The number of live children in the household is expected to influence the fertility decision of couples positively. The sign of the variable nchild is found as it was expected. Earlier we have seen that there exists behavioural difference between urban and rural households regarding how they socially value being the owner of more number

of children. But, in aggregate a lion share of households reported in such a way that having children more than the ideal size is not worth paying. In our model the number of children in sample households was added as a variable to compare whether or not there exists a variation in the probability of contraceptive demand between households having more number of children.

Our finding therefore supports the proposition in which higher number of children in the household promotes couples decision of contraception. As expected, it has a positive and statistically significant in both cases except for the choice of injectable users. Under cetris paribus condition, large family size encourages the probability of contraceptive demand by approximately 0.03 for pills and 0.42 for Norplant. Of all the variables the demand for less number of children is the main determinant factor for the overall use of contraceptives. The finding of this paper is therefore in harmony with the previous research outputs.(Alemayehu et al., 2005, Yigzaw, 2000). Keeping other factors constant the effect of having one more child among norplant users is higher than short-term birth control pills. The difference in the magnitude of consumption responsiveness between pills and norplant imply that households who have more than their optimal number of children tend to skew their contraceptive choice towards long term contraceptive methods.

Husband's consensus and approval of wife's contraception decision

In a situation where lack of spousal communication about fertility and reproductive health issues are existent, women's ability to pass contraception decision is likely to be subjugated. In some parts of the country cultural traditions allow men to control the reproductive rights of women and in other parts, the economic dependence of women on

men restrains them not to use contraceptive by fearing or assuming that the husband shall disapprove it.

Therefore, as expected, the participation and involvement of men on the fertility decision of women puts an upward pressure on the probability of contraceptive adoption and use. This finding is consistent with the work done by Alemayehu et al.(2005) and Yigzaw(2000) around Wollo and Gondar town respectively. So we can observe demand inequality between groups of women where their spouse is involved in the fertility decision making and those who shoulder the burden only on themselves. If a spouse is being involved in the reproductive health of a woman, *cetris paribus,* the acceptance and utilization probability of contraceptives would be enhanced by 0.24, 0.06 and 0.44 respectively for all methods, orally taken pills and injectables. Thus the more the husband is involved, the greater is the likelihood for the women to shift from pills into a three month contraceptive injectables. Although the role of the husband in supporting the norplant choice of his wife is economically meaningful, it is statistically insignificant that would indicate the importance of other variables such as the number of children which most determine the choice of norplant.

Women education

The educational attainment of women is believed to influence the likelihood of her modern contraceptive use and fertility behaviour. Broader Knowledge about modern contraception is an increasing function of women's education. Adding up, better educated women are likely to work for pay either in the modern sector or work for profit. Related to better education clear and understandable spousal communication, collective action, valuation and comparison of the full costs of contraception versus the full costs of child birth would be rationally accounted. In line with this conceptual framework,

women who have better access to modern schooling is expected to regulate fertility and are likely to be at the forefront line of contraceptive use(Shapiro et al., n.d).

The finding of our model however, shows that the linkage between overall contraceptive use and the level of woman schooling is weak. This output, therefore, supports the finding of Alemayehu et al.(2005) where formal educational attainment of a woman is not found to be a significant variable to influence contraceptive adoption. Here is to mean that above the formal educational background of the woman there are other most important factors which push fertility decision forward such as transparent spousal communication, the size of children, service quality and informed consent. The effect of formal education among injectable clients is found to be neither economically meaningful nor statistically significant. Addressing as to why such unexpected results occur in a single research is sometimes difficult (Wooldrige, 2000).

Regarding method choice, educational level of women has a positive and meaningful influence on the choices of norplant. The variable wedu for norplant is significant at 10% level. Hence, better educational profile of a woman contributes more to the choice of norplant. A cetris paribus effect of each level of schooling on the probability of its choice is tabulated below.

Table 4. 9 Marginal effect of Women Education on the choice of Norplant

Method	Marginal effects of being:				
	Illiterate	Traditional/adult education	Primary education	Secondary education	Above secondary education
Norplant	0.27	0.54	0.81	1.08	1.35

The table clearly depict that when the educational attainment of a woman is getting up so does the probability of norplant contraceptive use. If we consider extreme values, there is, for example, a wider variation in the probability of contraceptive demand between a representative woman who has not any education and another woman having secondary education or above. Given other factors constant the probability of norplant contraceptive utilization is 0.27 for the former while that of the latter is 1.4.

One of the claims reported by respondents against pill contraceptive was that it requires regular attendance and punctuality of time in daily use which is a challenge of many women. In this regard better educated women will be at a better position to follow intake procedures and instructions. Similarly, the insertion of norplant requires minor clinical operation and the method is used to regulate fertility for five years. So the decision of choosing implants is heavier than others in a complex and broad socio-cultural spectrum that capture the behaviour of couples. Consequently, better educated women are expected to be at the frontline of fertility technology adoption than those who are less educated(Yigzaw, 2000).

4.2.3 Composite market analysis: the Chow- type statistic

So far, we have seen that the domain of our analysis involves two groups of households. Those who get contraceptives at extensive (full) government subsidy and those who share at least part of the program cost. Because these two groups are involved in different market scenario it looks plausible to investigate whether there is a behavioural difference between the two.

The Chow type log-likelihood ratio test statistic is a good tool to test such joint hypotheses of the two disjoint groups. The null hypothesis states that there is no difference in the characteristics of couples between the two groups. The chow-type log-likelihood composite hypothesis test is computed based on the usual log-likelihood estimation techniques[3]. Following is the test result of the hypothesis.

```
LR chi2(8)   =    26.26
Prob > chi2 =     0.0009
Assumption: (all) nested in (sponsored, payer)
```

Hence it is evident that the LR chi2 test with eight degrees of freedom is sufficiently large at 1% significance level to reject the null hypothesis. Hence we can conclude that fully subsidized and payers behave differently in the probability of contraceptive use. This conclusion further enforces us to investigate the characteristics of the groups in which the two market players vary each other. Extending the chow-type test to compare whether there is a difference in the coefficients of each explanatory variable between the two disjoint groups enables us to identify areas where substantial variation occurs. The test statistics is tabulated below and the theoretical framework is attached in appendix 2.

Table 4.10 the Chow statistic for joint hypothesis testing

	Difference in					
	price coefficients	logincm coefficients	access coefficients	wedu coefficients	hagree coefficients	nchild coefficients
Chi2(1)	9.50	0.57	7.04	3.46	9.56	0.89
Pro>chi2	.0021*	.4522	0.008*	.0628**	.0020*	.3453

[3] *LR =2(Lu – Lr)* where Lr and Lu stand for log-likelihood estimates of the pooled and sum of likelihood estimates of the non-nested logit models respectively.
* and ** are significant at 1% and 10%

The test statistic in the above table has shown that some of the beta coefficients namely offerprice, access, hagree and wedu are dissimilar at 1% level of significance for the first three variables and 10% level of significance for wedu. In terms of other variables, such as the coefficients in the number of children and the logarithm form of household income, there is no significant difference and we fail to reject the null hypothesis (which states that there is no difference in the coefficients of the two estimates at all). A cetris paribus partial effect of payers offer price improves the probability of contraceptive use by about 0.058 more than that of the partial effect of non-payers offer price. This implies that households which are currently familiar with priced contraceptives respond slightly better than the reaction of fully subsidized contraceptive clients. Looking at descriptive findings of the study the mean offer price value of those households who are currently getting the service through payment schedules is about three and half fold of those households who are fully sponsored. This is a good indicator that the value of contraceptive by the two groups of households is different. Payers have recognized that contraceptive is supplied below the market price and is under priced. On the other hand heavily subsidized households have given lesser weight to contraceptives as far as they are willing to pay a smaller proportion of their better income to contraceptives.

In terms of the total hours required to get the service contraceptive customers of the free outlets depress the probability of contraceptive use by about 10% more than clients of the priced outlets, cetris paribus. This is to mean that free contraceptive sources are characterized by longer waiting and travel hours that constrain the probability of contraceptive use compared to priced outlets. Similarly, the cetris paribus effect of husband's involvement and support in the contraception decision of a woman has differential impact on the probability of contraceptive use between the two service provision strategies. The contraceptive decision of a woman being approved by the man

in the priced market outweighs the probability of free contraceptive users by 0.06(6%). So this is an indicator that free spousal communication and collective responsibility on issues related to fertility and family management empowers women to choose easily accessible service providing centres.

5. Conclusion and Recommendation

In conclusion, it was demonstrated that the imposition of user fees is not a deterrent factor in the utilization of alternative methods of contraceptives. Couples rationally value both the benefits and monetary costs of contraceptives. Relative to the benefit derived from contraception, price is neither expensive nor constitutes a barrier to their household income. About 61% of the total respondents reported that service inaccessibility is their foremost problem than affordability. Norplant and injectable contraceptives are more responsive to a one percentage change in prices implying that if prices are introduced, clients are likely to choose these methods compared to birth controlling pill.

Of all the total quality complaints 45.2% constitute oral pill users. Men's disapproval of women's contraception decision is a significantly influencing factor in the probability of contraceptive use. As mentioned above, inaccessibility of contraceptive services is the main significant factor that adversely influences both the use and method choice of contraceptives. Even if the quality is not desirable, due to lack of a range of alternative contraceptive types, women are forced to choose the available method of contraceptive in proximity to their surrounding.

Higher household size is one of the major determining factors that lead women to contracept and regulate unwanted pregnancy. Family planning and reproductive health information is deficient to capacitating clients on pre and post contraception decision. Majority of the women do their choice of contraception without the consultation of health professionals. As a result, quality complaints are persistent problems which backfire the continual use and adoption of modern contraceptives.

Couples give value for contraceptives differently. This has been seen while examining the heavily subsidized and priced contraceptive markets. Households in the priced market are willing to pay more than fully subsidized households. It is to mean that free contraceptive users ascribed lower value for freely given contraceptives than those who are not. In a nutshell, low priced contraceptives are considered to be inferior by the consumers and demand in the zero priced markets might not be higher than markets where nominal price is charged. Therefore, from this study, the following policy implications are drawn.

Removal of excess subsidy

The finding that price introduction and reduction of excessive subsidy in the contraceptive market is associated with a greater likelihood of contraceptive use. Contraceptive are heavily freely given with the assumption that subsidy encourages greater use. In this view, results of the survey indicate that more than the monetary price, contraceptive security and availability of wide ranges of contraceptives have the key factors to determine the use of modern contraceptive methods. In connection with pricing contraceptives, due consideration has to be given on how to price contraceptives equitably with out negating the utilization and continuity of the service.

Need based supply of contraceptives

It is important to understand the need and method choice of a contraceptive client. Accessing poor quality and unwanted mix of contraceptives to the woman may cause discontinuity and ill health complications. This is also in contrary with the global reproductive rights of a woman. Therefore, there is a need to carry out demand analysis and understanding the reasons of each is paramount important to supply a range of

contraceptive types. It is clear that the family planning programme of the country is extensively donor based and this could be the challenge on the supply side. However, diversifying resource envelops and finding potential alternatives is crucial.

Redesign the health information and communication system

We have seen that the weakness of health education and communication system is reflected by women's complaints, inadequate counselling during contraception etc. Thus there are two issues that would be duly considered. The first is evaluating the existing information, education and communication (IEC) materials and revising in such a way that society's information demand is to be met. In the second place the technical capabilities of health information providers should be examined and up-graded. Clear and open spousal communication is proved fundamental on contraceptive use rates and women's health. In this regard IEC strategies should target and consider men equally with women.

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Appendix A: Test statistics

Normality Test

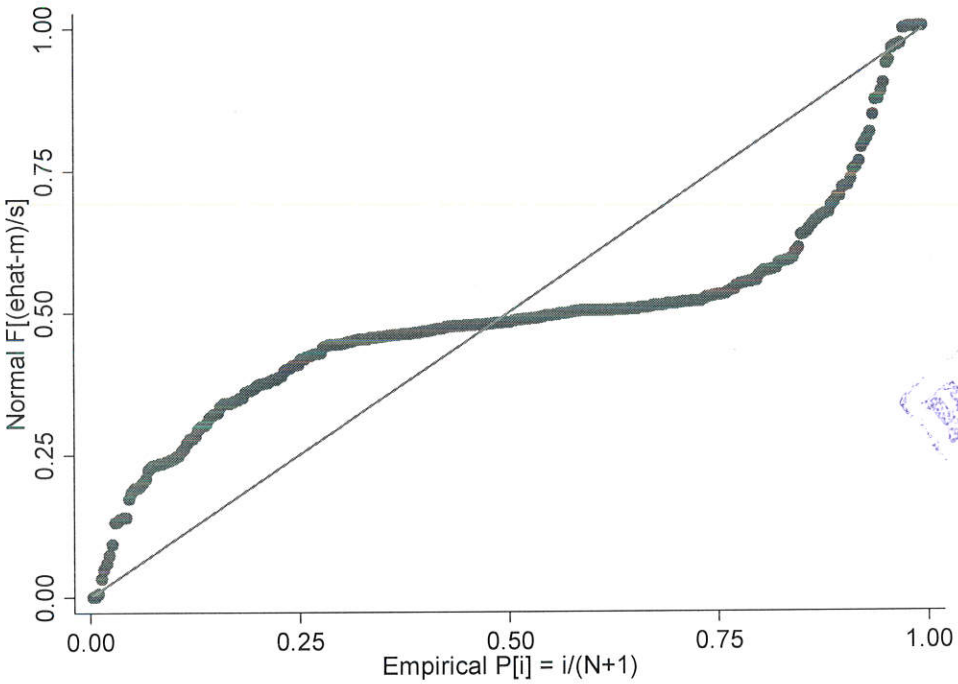
From the onset of our model specification we have assumed that the distribution of the stochastic residual is non- normal departing us from the use of probit regression. A normally distributed Pearson residual is symmetrically distributed around the mean which is zero. Testing the distributional assumption employs the measure of skewness and kurtosis of the residual.

The normality test statistic

Pearson residual

	Percentiles	Smallest		
1%	-1.708116	-6.345446		
5%	-.6943348	-2.948512		
10%	-.5418773	-1.972801	Obs	300
25%	-.1760018	-1.443431	Sum of Wgt.	300
50%	-.0390923		Mean	-.0048223
		Largest	Std. Dev.	.7727108
75%	.0500868	2.772629		
90%	.4210807	3.580093	Variance	.5970819
95%	.9562682	3.955373	Skewness	.0783523
99%	3.176361	4.799505	Kurtosis	27.20162

The test statistic indices (see the table above) of skewness and kurtosis ensure that the distribution of the residual is departed from the normal. The stochastic disturbance term is slightly positively skewed with high kurtosis value (usually >6) is a measure of the peakness of the distribution relative to the normal. Hence the residual has a distinct peak near the mean and decline rapidly.. The graphical picture of the distribution is presented below along with the 45^0 normal curve superimposed on it. If the distribution of the residual is more of normal, the graphical sketch would be linear and follow the pattern of the 45 degree line.



Testing multiple exclusion restrictions- the Wald statistic

Wald statistic test is one of the test procedures used in maximum likelihood estimation models. It is computed based on the ratio of the difference in the residual sum of squares of the restricted & unrestricted models to the mean residual sum of squares of the full

model. The stata statistical package will automatically give the Wald statistic along with the p-value when robust standard errors are used. So the Wald statistic tabulated below rejects the null hypothesis that none of the explanatory variables have a partial effect on the probability of contraceptive use at 5% level of significance for implants and at 1% significance level for others and all methods.

	All	Pills	Injectables	Implants
Wald chi2(8) (9) df.	89.20	39.54	37.68	18.83
Prob > chi2	0.0000	0.0000	0.0000	0.0267

The chow-type framework for comparative diagnosis

Letting the difference in the coefficients of each explanatory variables ψ_j the model subject to the test is reformulated as:

Accordingly the null hypothesis is expressed in the following short form.

H_0: $\psi_1 = \psi_2 = \psi_3 = \psi_4 = \psi_5 = \psi_6 = \psi_7 = \psi_8 = \psi_9 = 0$

$$p(y=1|x) = G(xB) = \frac{\exp\begin{pmatrix}\Psi 1 offerprice + \Psi 2 age + \Psi 3 agesq + \Psi 4 \log incm + \Psi 5 access \\ + \Psi 6 wedu + \Psi 7 hagree + \Psi 8 nchild\end{pmatrix}}{1+\exp\begin{pmatrix}\Psi 1 offerprice + \Psi 2 age + \Psi 3 agesq + \Psi 4 \log incm + \Psi 5 access \\ + \Psi 6 wedu + \Psi 7 hagree + \Psi 8 nchild\end{pmatrix}}$$

Few extra descriptive statistics

Table 1: percentage of women who reported that accessibility is the foremost problem than affordability

Method	obs.	Percent
All methods	184	61.3
Pills	65	41.4
Injectables	66	79.5
Norplant	53	88.3

Table 2: households' perception regarding being the owner of more number of children

Response category	Percent		
	Urban	Rural	Total
Desirable	24.3	53.8	43.0
Not desirable	75.7	46.2	57.0

Appendix B: Questionnaire for Household Survey

Name of the Respondent _____ **Code** _____

Kebele _____

Enumerator's Name _____ **Signature** _____

CBRHA's Name _____ **Signature** _____

Supervisor's Name _____ **Signature** _____

A. General information

1. Marital status ☐ Single ☐ Married ☐ Divorced ☐ widowed

2. Age of husband--------- Age of wife----------

3. Total number of children in the household--------- total household size--------

4. Additional number of children the household wants to have---------- Desired year of child spacing----------

5. Educational level of the husband---------- and that of the wife----------

6. Religion ☐ Orthodox ☐ Islam ☐ Protestant ☐ other

7. Area of residence ☐ Urban ☐ Rural

B. Awareness, spousal communication and accessibility

1. How the husband approved your contraception decision?

☐ He agreed fully ☐ He agreed but with some reservation

☐ He disapproved it completely ☐ He is unaware of it

2. Do you want to keep your contraceptive use quite secret?

☐ I don't bother whoever knows ☐ I want to keep it secret

3. Would you please mention the types of contraceptive you already know?

1. ---------- 2. ----------

3. ---------- 4. ----------

4. How long are you taking to get the following services?

Contraceptive type	Total waiting and travel time(round trip) in hours
Oral pills	
Depo-Provera	
Norplant	

C. Household income

1. Source and level of income

Which one of the following is the source of your income?(Put √ mark on the space provided)	Monthly salary	Own business	Casual labour	Farming	Rental income	other(specify)

2. If your means of subsistence is not farming, please answer question numbers 2.1 – 2.3?

2.1 Which one of the following income category best describes your monthly household income?

Monthly income	≤300	301-500	501-700	701-900	901-1100	1101-1300	1301-1500	>1500
put√ mark								

2.1 What is your **Monthly** expenditure on?

1) Food items----------
2) House rent---------
3) Utilities (telephone, water, electricity) --------
4) transport----------
5) Fire wood (Kerosene) ----------
6) Idir and Equib--------
7) Saving----------
8) other (specify) ----------

2.2 What is your **Annual** expenditure on

1) durables---------- 2) health and clothing--------- 3) school fee----------
4) Other (specify) ----------

3. If you are a farmer please answer the questions in the table below

Total farm size(in *Qada*,)	No of oxen	**Amount of yield harvested in quintals during the last cropping season**						
		Teff	Barley	Bean/ peas	Maize(corn)	Wheat	Potato	other

4. In addition to the above earnings, how much income have you got from the following sources during the year?

Animal husbandry	poultry	outsourced labour	Sell of forest products	Remittance

D. Family planning and contraceptive behaviour

1. Why are you using contraceptives? 1) to limit birth 2) to space birth

2. Which method of contraceptive are you using to protect pregnancy? ----------

3. Did you consult health experts when you choose your preference in the first time? ----------

If your answer is No, how did you choose the method? ----------

4. Do you have a future plan to shift into other alternatives? 1) Yes 2) No

5. If yes to which method have you planned to shift? ----------

6. why are you doing that?----------

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7. Have you got any medical consultation when you plan to switch into other method? ------

8. What health complications have you encountered in connection with your contraception? -

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9. Where are you getting contraceptives? 1) from priced outlets 2) from free outlets

3) from both sources

10. If you are priced contraceptives user:

10.1 Why don't you go to free contraceptive outlets? ----------

10.2 Is the supply always available at the service outlet? 1) Yes 2) No

10.3 If your answer is no, what measures do you take to meet your need? ----------

---

10.4 Is the fee affordable to you? ----------

11. If you are using non- priced contraceptives:

11.1 Do you have the experience of using priced contraceptive? 1) Yes 2) No

11.2 If yes why you did that? ----------

11.3 What do you do when the stock is empty? ----------

12. Which one of the following is your foremost problem?

12.1 The price of contraceptives in priced outlets is expensive and couldn't much with the purchasing power of households

12.2 The service is not provided at the required level in the right time and the right place

12.3 Both are equivalent problems

12.4 Both are not problems

13. In general, in our community large number of children in ones household was considered as a blessing of God and indicator of wealth at least in the past few years. On the other hand some households judge that from many angles, having more number of children over the optimal level is undesirable. What is your view in this regard? ----------

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14. Do you have sufficient resource/wealth/ to bear and rear more children? ----------

15 .If yes, why are you protecting further pregnancy? ----------

16. If no, would you drop your contraception decision and bear more children if you were rich?

Contingent Valuation

The Scenario

The expansion and dissemination of family planning services to the needy population has valuable contribution particularly in keeping the reproductive health condition of the women and creating manageable family size. Despite its significance role both in the rural and urban households of Ethiopia, to date only one third of the needy women are getting family planning services and a greater proportion of women are suffering from problems that are related to unwanted/unlimited pregnancy. Besides to that, the population of your surrounding is continually increasing without tangible improvements in the livelihood of the community.

There are observable facts that may explain the problems of family planning services. On the side of the government, there is no adequate resource/budget/ to finance such a huge demand while contraceptives are mainly supplied free of charge. On the other side, most of the family planning and contraceptive supplies are being assisted by few donor countries which is characterised by poor sustenance and other contraceptive quality problems. If the problem and source of finance continues in such a manner, it may be less likely to address the current quality and supply problems. Suppose these actual and potential problems may call for the imposition of affordable prices on contraceptives by eliminating free provision. In other words couples will be asked to pay reasonable price for the method they choose. The revenue to be generated shall be used to expand a wide range of family planning services consistently.

Given this information you, a client for one of the methods of contraceptive, are kindly requested to deal with us; answer the following questions regarding your contraceptive use and the willingness to pay for contraceptives.

1. Would you be willing to use the service if the price of:

	Amount in Birr	**Yes**	**No**	If **Yes** go to question No 2 if **No**, go to question No 6
Oral pills is	1.50			
Injcetable(Depo-Provera) is	6.00			

2. Would you continue to use the service if the price of:

	Amount in Birr	**Yes**	**No**	If **Yes** go to question No 3
Oral pills is	2.25			
Injectable(Depo-Provera) is	9.00			

3. Would you demand the service if the price of:

	Amount in Birr	**Yes**	**No**	If **Yes** go to question No 4
Oral pills is	2.65			
Injectable(Depo-Provera) is	10.5			

4. Would you be willing to purchase the service if the price of:9

	Amount in Birr	**Yes**	**No**	If **Yes** go to question No 5
Oral pills is	3.00			
Injectable(Depo-Provera) is	12.00			

5. State the maximum amount you are willing to pay if you demand the service even at higher prices----------

6. Would you be willing to consume the service if the price of:

	Amount in Birr	**Yes**	**No**	If **NO** go to question No 7
Oral pills is	0.75			
Injectable(Depo-Provera) is	3.00			

7. Would you be willing to demand the service if the price of:

	Amount in Birr	**Yes**	**No**	If **NO** go to question No 8
Oral pills is	0.40			
Injectable(Depo-Provera) is	1.50			

8. Would you be willing to use the service if the price of:

	Amount in Birr	**Yes**	**No**	If **NO** go to question No 9
Oral pills is	0.15			
Injectable(Depo-Provera) is	1.00			

9. Would you continue to use the service if the service in question is given free of charge?

1) YES 2) NO

10. If your answer for question number 9 is no would you tell me the reason?_____

11. If your answer for question number 9 is yes, why you are you unwilling to pay?_____

For Norplant users

12. If the government restricts free provision of birth control norplant and enforce clients to pay some price, are you willing to use the method by purchasing it from clinics.

1) Yes 2) No

13. If yes, what is the most you are willing to pay? ----------

14. If no, are you willing to use the service if norplant is give to you free of charge?

1) Yes 2) No

15. If your answer for question number 14 is no, please reason out? ----------

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16.If your answer for question number 15 is yes, why you are you unwilling to pay?_____

Declaration

The thesis, my original work, has not been presented for a degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

Declared By:

Surafel Melak _____

Confirmed By:

Wassie Berhanu, PHD _____