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The Cost Effectiveness of Family Planning Services in Uganda

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ABSTRACT

Although Uganda has devoted an increasing amount of resources to health interventions, funding for reproductive health services as well as general health sector remains inadequate. This study examines the cost effectiveness of four family planning interventions, namely, oral contraception, female sterilization, injectables, and condoms. Using the 2006 Uganda Demographic and Health Survey and the Uganda National Household Survey data we estimate cost effectiveness ratios in relation to the number of births averted for women aged 15-49 years. We find that only one out of five women using some form of contraceptive and a quarter of the women using contraceptives rely on traditional methods that are less effective in preventing child births. With regard to efficiency, we find that injectables are the most cost effective intervention. Nonetheless, we do not recommend solely targeting women in the reproductive age category with this particular method of contraception without due regard to differences in physiology and socioeconomic characteristics.

Keywords: Cost effectiveness Analysis, Family Planning, Uganda, Africa

JEL Classification: D61, H51, I11, I15

1. Introduction

There seems to be a consensus among the policymakers and politicians that innovative interventions have to be put in place to reduce the population growth rates in Uganda. The population growth rate of 3.2% per annum is extremely high for a low income country. High growth rate is believed to hinder economic growth and development and has serious consequences on the service provision including, education, health, water and housing. Evidence based on the Uganda Demographic and Health Survey (UDHS) data suggest that the total number of birth per woman in Uganda was 7.1 in 2001, 6.7 in 2006, 6.2 in 2011 and 5.7 in 2016. While family planning programs are not new in Uganda, the pace of fertility reduction

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has been slow. There seems to be little agreement among policy makers on what has to be done to achieve fertility reduction. Furthermore, they are hardly any empirical investigation on the relative efficiency and significance of the various family planning services. Put differently, given the current fiscal constraints and in particular inadequate public spending on health, it is important to understand which family planning services provide the greatest result at the least cost. This paper is an attempt to fill this gap.

Issues of reproductive health remain a huge challenge to the health systems of developing countries. According to the World Health Organisation (WHO), sexual and reproductive health problems account for 18% of the global burden of disease, but most importantly, they account for a much larger share of burden of disease among women of reproductive age—about 32% (WHO, 2006). As a result, policymakers and researchers are increasingly concerned with the high reproductive health burden of diseases in the era of increased spending on reproductive health. They have realized that management of reproductive health conditions has serious consequences on a country's economic and social development. At the individual level, the type and nature of reproductive services has important implications not only on the rate of unwanted pregnancies but also general maternal health. Due to divergence in cultural and religious affiliation in many developing countries, a number of strategies/interventions are used to deliver reproductive health services. Furthermore, due to paucity of data, there is limited information on the efficiency of the various family planning services.

Sexual and reproductive health issues are central to Uganda's human development agenda. There are highlighted in the Government of Uganda (GoU) five year revolving Health Sector Strategic Plan (HSSP-1, HSSP-2 and HSSP-3). All the plans recognize the need of increasing a variety of family planning methods available to couples who need them. Partly as a result of the global initiatives to combat certain diseases, Uganda has devoted substantial resources to the health sector. For example, in the 2012/13 financial year, at least 8% of the national budget was earmarked for proving health care services (Background to the Budget, 2013/14). This represents increased public spending on health from 4% in the 1990s (World Bank, 1996). However, starting in the mid-2000s, the health sector in Uganda has faced financial constraints even as donors expressed willingness to provide additional resources to the sector. Although reproductive health services command a significant share of health budget in Uganda, majority of the funds go towards activities focused on combating HIV/AIDS—to the detriment of other reproductive interventions (Kasirye, 2016).

A unique characteristic of the present study is the availability of a nationally representative Demographic and Health Survey (DHS) that can be linked to the regular national household survey. The DHS surveys captures information on sexual activities of women in the reproductive age category 15-49 years. The 2006 Uganda Demographic and Health Survey (UDHS III) was undertaken by the Uganda Bureau of Statistics (UBoS) and ORC Macro International as part of the global effort supported by the US government to track changes in the health status of women in developing.[2] On the other hand, the 2005/06 Uganda National Household Survey (UNHS) captures household socioeconomic status of some of the women covered in the UDHS; consequently, for some women, we have information on both their reproductive health indicators as well as their poverty status. Both surveys contain most of the information needed on the demand side. Nonetheless, both the UDHS and UNHS do not contain the relevant costs information. Instead, we use the information on the cost of providing reproductive health services from the UNFPA (2005) reproductive health costing model. The

[2] The latest UDHS survey—the 2011 UDHS also captures reproductive indicators as well; however, this particular UDHS cannot be linked to a UNHS survey (UNHS surveys capture household consumption expenditures—routinely used as an objective measure of household welfare status).

database for this model was collected as part of a global effort to estimate the costs of meeting the reproductive health MDGs.

It is against the above background that this paper examines the cost effectiveness of four family planning interventions in Uganda in 2006 namely: oral contraception, injectables, condoms, and female sterilization (see Mugo and Muriithi (2017) for a cost effectiveness analysis of family planning programs and facilities). Specifically, our paper sought to establish which of the above methods of contraceptive use yields the highest returns in terms of pregnancies averted once costs of service provision are considered. First, we estimate the number of births averted (proxy outcome measure of family planning interventions) by using any of the above methods for women who were sexually active during the past 12 months prior to the survey. Second, in conjunction with the personnel and supplies costs of the above methods, we estimate cost effectiveness ratios. We find that injectables are the most cost effective intervention in comparison to oral contraceptives, female sterilization or condoms.

The rest of the paper is organized as follows—the next section provides a brief background on reproductive health and in particular family planning services in Uganda. It discusses the policy framework under which such services are provided. The section that follows provides a brief discussion of cost effectiveness analysis in relation to other methods of economic evaluation of health care. Next, the datasets, the methods used, and some estimation issues are discussed, after which descriptive statistics and estimations for cost effectiveness ratios are presented. The last section contains conclusions and implications of the study.

2. Reproductive Health Services in Uganda

With an annual Gross National Income (GNI) per capita of US$ 440 (World Bank, 2013), Uganda remains one of the poorest countries in SSA. Indeed, the 2013 Human Development Report (HDR) by UNDP places Uganda among the "low human development" category, and the country is nonetheless ranked 161 out of 186 countries (UNDP, 2013). Furthermore, due to the predominance of informal activities and weak tax administration system, the country collects only 13.5 % of its GDP in taxes (GoU, 2013). As such the amount of funds available for financing health services as well as other social services are limited. There is competition for public budget across and within sectors. In addition, poverty remains the most pressing challenge faced by the country despite the recent improvements in household welfares status. For example, although the poverty headcount index reduced from 56% in 1992/93 to 24% by 2009/10, the actual population poor only reduced from 9.9 million to 7.5 million during the same period (Uganda Bureau of Statistics, 2010). As earlier mentioned, the high population growth rate—a result of traditional fertility preferences as well as limited choice of contraceptive methods, is held as the main driver of the large population of poor persons (GoU, 2006). As such issues of reproductive health in general and family planning services in particular have taken centre stage in the Uganda national health policy.

Despite Uganda achieving significant improvements in household welfare, it is still far from achieving the goal of reduced fertility. Average number births per woman as measured by the Total Fertility Rate (TFR) have remained high—substantially above levels observed elsewhere in sub-Saharan Africa (SSA). For example, based on the 2006 Human Development Report, between 1970 and 1975, the average number of birth per woman in Uganda was 7.1; however, by 2004 the corresponding rates remained unchanged. The recently concluded UDHS V estimate the TFR to be 5.7 births per woman (UBoS and ICF International, 2017)—which again remains higher than the SSA average of 4.9. Furthermore, in the regional context, Uganda performs worse than its regional neighbours within the East African Community

(EAC). As a consequence of Uganda's high fertility, the country's population growth rate increased from 2.2 % between 1980-1991 to 3.2% between 1991-2002 (GoU, 2005c). This implies that Uganda may be able to double its population about every two decades.

Historically, the GoU through the Ministry of Health (MoH) has provided a number of family planning services including: intra-uterine devices (IUD), injectables, oral contraceptives, condoms, nor plant, and sterilizations. However, in the recent past, attentions have focused more on the condom—due to its duo role of preventing contraception and at the same time the spread of sexually transmitted infections (STI). Partly as result of the fixed health care funding basket alluded to earlier, their have been renewed calls to increase the efficiency of current reproductive health programs (MoH, 2005). Overall, there is limited information regarding the cost effectiveness of the various family planning services in relation to outcomes such as number of birth averted, number of unsafe abortions averted, and general improvement in maternal health—due to paucity of the data. This is partly explained by large expenditure outlays required to collect information on costs of health services, household reservation towards collecting detailed personal data on sexual relations, and also the challenges of incorporating reproductive health questions in complex survey designs.

3. Cost Effectiveness Analysis

According to Neumann (2005), cost effectiveness analysis in health refers to a broad evaluation of the relative costs and outcomes of two or more interventions. Unlike cost benefit analysis—which appraises the desirability of a particular intervention to determine whether the benefits outweigh the costs, CEA appraises competing interventions. The costs and outcomes and CEA are measured in different units. This is also another advantage of CEA over CBA in health evaluation in that ethical issues of attaching a monetary value to any one's health are avoided.

For health a system, within CEA, there also exists cost utility analysis (CUA) where the outcome can be measured in terms of years of full health lived. Specific measures of CUA include quality adjusted life years (QALFs) and disability adjusted life years (DALFs). On the other hand, the results for CEA are expressed in form of cost effectiveness ratios (CERs). Formally, this can be expressed as:

$$\frac{Costs_1 - Costs_2}{Effects_1 - Effects_2} \tag{1}$$

As such, a ratio exists for every pair of options/interventions. For example, faced with a health intervention with 3 options, one can obtain 3 ratios. Once, the CERs are obtained, there are either compared with a predefined standard or the most desirable option.

4. Measuring Cost Effectiveness Ratios

As earlier mentioned, our proxy outcome variable for family planning interventions is the number of births averted by using a particular contraceptive choice. To estimate this number for Uganda, following Kahn *et al*. (1999), we aggregate the weighted reduction in risk of pregnancy by using any contraceptive method as expressed in Eq. (2):

$$R = P_0 - P_1 \tag{2}$$

where R is reduction in the likelihood pregnancy given by the difference in probabilities of conceiving for a woman without using any contraceptive P_0 and that when using a particular

method P_1. The number of births averted (B*) is given by the weighted sum of risk reduction as expressed in Eq. (3):

$$B_* = \sum_{i=1}^{n=weights} R = (T_o F_o - \sum_{i=1}^{n=weights} t f_i) \tag{3}$$

where T_o is the proportion of the year in which no method is used; F_o is the failure rate for using no contraception, t_i is the proportion of the year using a particular method and f_i is the failure rate for a specific method, and the rest of the variables are as defined before. The weights aid in recovering the total number of births that would be averted in one year. Since, we do not have accurate information of proportion of the year a woman has been or not using a particular method, we assume full annual use and also consider only women who have had sex over the past 12 months prior to the survey. We estimate the number of birth averted for every woman using any form of contraception but our cost effectiveness analysis is based on only four interventions. The choice of the four contraceptive methods is based on both the frequency of use of the particular method and the availability of cost information relating to its use. Consequently, although some traditional methods of contraception are extensively used (e.g. withdrawal, periodic abstinence); the inability to attach a monetary cost of service provision for such methods eliminates them from our selection. Once we have estimated the number of births averted, we estimate the cost effectiveness ratios (CER) as expressed in Eq. (4):

$$CER = \frac{\bar{C} - C_t}{\bar{B} - B_t} \tag{4}$$

where $\bar{C}$ are the costs of the base option e.g. oral contraception, C_t represents the costs of the comparator e.g. injectables, condoms, or sterilization. On the other hand, $\bar{B}$ is the number of births averted for the base option while B_t corresponds to the comparison option. The above methodology has been utilized by earlier studies such as Vlassoff *et al*. (2004) that investigated the cost effectiveness of various family planning interventions at the global level.

5. Data

The data used in this study is from three sources. First, we use is the 2006 Uganda Demographic and Health Household Surveys (UDHS) conducted by the Uganda Bureau of Statistics and Macro International. The UDHS survey is part of global effort supported by the United States government, to monitor and evaluate population, health and nutrition programs in developing countries at intervals of five years. The survey is nationally representative covering 9,864 households with 8,531 eligible women (aged 15-49 years). Furthermore, the survey is based on a two-stage cluster sampling design. In the first stage, clusters are the principal sampling unit and at the second stage, 25-30 households are randomly selected from each cluster.

Also, the survey captures information relating to marriage, fertility, family planning and household reproductive characteristics using: the household questionnaire, the women's questionnaire, and the men's questionnaire. The household questionnaire covers the characteristics of the household as well as anthropometric information of children (age, weight, and height) and women (body mass index) aged 15-49 years. The women's questionnaire covers the woman's background characteristics (e.g. education, religious affiliation and ethnicity), contraceptive use, child health characteristics, and background characteristics of the husband. On the other hand, the men's questionnaire covers the employment status and reproductive history of eligible men in the household.

Specific to our exercise of measuring the effectiveness of family planning interventions, the survey collects the following information: sexual history, current pregnancy status, fertility

preference, reasons for not using contraception, source of information and supplies for family planning services. In addition, the survey capture information relating to the decision to use contraception—whether it is decided by the woman or jointly with the husband, and the year of starting to use contraception.

The second dataset is the 2005/06 Uganda National Household Survey (UNHS) also conducted by the UBoS. The UNHS survey, also based on a two stage stratified random sampling design, had a sample of 7,426 households from 750 clusters or EAs. The UDHS and UNHS were designed to be linked—so as to generate a sub sample of households with both health and poverty indicators. Indeed, there are about 4,500 households common in both surveys. Furthermore, at least 2,688 women in UDHS survey have information on their socioeconomic status as captured in the UNHS survey. In our analysis, we use this particular sub-sample of women to examine how contraceptive use varies with poverty status.

As earlier mentioned, for the cost of providing the four selected services, we use the 2005 UNFPA reproductive health costing model database. This database, part of the UN Millennium Project, was designed and assembled to assist countries better estimate the resources required to meet reproductive health MGDs by 2015. The key sources of information in the databases are the regular DHS data, the Ministries of Health of the individual countries and World Health Organisation country offices. With regard to the cost information, the UNFPA database captures the population requiring the services, the total costs (drugs, supplies, and personnel), and the staff required to provide a service annually. The database captures the annual salary costs in US$ for the following key reproductive health staff: auxiliary attendants, nurses/midwives, general physicians, obstetricians, anaesthetists, and lab technicians. The combination of personnel costs, drugs, and supplies provides the cost per care per intervention we utilise in our study.

Furthermore, the UNFPA database has a unique feature—a user driven interface where more up to date information can be integrated. Consequently, we updated our costs and demographic information based on the 2006 UDHS and the 2006 Annual Health Sector Performance report of the Ministry of Health. Table 1 provides a summary of the costs of providing family planning services in Uganda from the updated database.[3]

Finally, the last source of secondary data we use relates to the contraceptive failure rate. This refers to the chances of conceiving while utilising a particular method. We utilise the contraceptive failure rate (per 100 episodes) from Cleland and Ali (2004) based on data from 19 developing countries. Although the use of cross-country averages may mask country specific use and effectiveness rates of contraception, as mentioned by Khan et al. (1999), contraceptive failure rates are fairly stable worldwide—regardless of income level of the country.

6. Results and Discussions

In Table 2 we estimate the number of births averted based on the number of women using a particular type of contraception and the effectiveness of the method. It is estimated that the use of contraception results into 862,000 births averted annually. This is no mean achievement in a country with a population of 28 million and annual population growth rate of 3.2%. Regarding the types of contraceptive methods, Table 2 shows that injectables account for

[3] One limitation of this particular costing framework is that it only considers the recurrent costs of interventions (i.e. costs of inputs and salaries for health personnel); consequently, fixed costs e.g. the cost of health facility construction are excluded. As such, our estimated costs for Uganda should be interpreted with this limitation in mind.

Table 1: Cost per case per family planning intervention in Uganda, 2005 (US$)

Short-Term Methods	Drugs/Supplies	Personnel	Total
Oral Contraceptives (Pill)	$5.09	$1.01	$6.10
Injectables	$3.85	$1.16	$5.01
Condom-Male	$2.85	$1.01	$3.86
Condom-Female	$118.10	$1.01	$119.12
Long-Term Methods			
Intrauterine Device (IUD)	$1.24	$1.45	$2.69
Implant/Norplant	$25.89	$1.45	$27.34
Sterilization-Female	$4.73	$4.74	$9.47
Sterilization-Male	$0.88	$2.09	$2.97
Other Methods			
Emergency Contraceptives (EC)	$0.29	$0.58	$0.87

Source: UNFPA (2005) RH Costing Model.

Table 2. Estimated number of births averted by contraception method in Uganda, 2006 ('000).

	All Contraceptive Methods	Method of contracertion						
		Female Sterlization	Pill	Injectables	Condoms	Periodic Abstience	Withdraw	Other Methods
All Women (15–49 years)	862	34	112	388	149	77	56	47
Urban	246	5	42	98	64	12	15	9
Rural	616	27	70	289	84	64	41	39
Subregions								
Central 1	130	2	28	47	23	12	10	6
Central 2	107	6	11	54	18	4	6	8
Kampala	129	2	24	48	37	5	9	6
Eastern Central	82	4	17	30	15	7	3	11
Eastern Central	95	7	2	62	10	11	2	1
North	62	4	3	32	9	11	1	2
West Nile	26	0		15	5	4	1	0
Western	128	2	18	52	20	16	7	6
South Western	108	5	11	51	5	7	16	7

Source: Author's calculations from the 2006 UDHS

Notes: Other methods include: Intra-Uterine Device, Norplant, Male sterlization, and traditional herbs and strings.
The nunbers are for only women who have been sexually active over the past one year and are not diagonsed as pregnant at the time of the survey.

45% of the total births averted and this is a result of its predominant use as well as above average effectiveness.

Having established the costs and the outcomes of contraceptive use, we next examine their effectiveness. In order to estimate the ratios described by Eq (4), we rank our 4 interventions in ascending order by number of births averted. This allows us to easily determine which intervention dominates or is dominated by another. Table 3 shows the cost effectiveness ratios between female sterilization, oral contraceptives, condoms and injectables. The interpretation of these ratios is as follows. First, the negative ratios have no economic meaning—they merely

Table 3. Estimated Costs of providing selected Contraceptive interventions in Uganda.

				Ratios		
Contracertive option	Births Averted	Annual Cost (US$)	Number of users	2	3	4
1 Female Sterlizations	34,000	1,013,290	145,000	−1.65	−2.06	3.96
2 Oral Contracptives	112,000	884,500	482,000		−2.94	5.54
3 Condoms	149,000	775,860	201,000			6.86
4 Injectables	388,000	2,414,820	107,000			

Source: Author's calculations.

indicate which interventions dominate or are dominated by another. Second, the positive CER indicates that the reference intervention results in more births per unit cost. Thus, table 3 shows that oral contraceptives dominate female sterilization while condoms dominate either female sterilizations or oral contraceptives. On the other hand, injectables are the most cost effective intervention when compared to any of the other three interventions. Consequently, in Uganda, injectables result in the most number of births averted at the least cost.

However, the results in table 3 should be interpreted with caution—especially as a target intervention. First, despite injectables resulting into the best outcome, they may not work for every woman—due to physiological differences. Two, as earlier mentioned, the particular method of contraception used sometimes depend on the fertility preferences of the women as well as the life cycle stage of the woman i.e. whether the woman wants any more children or not. In this regard, although permanent methods of contraception may be costly in terms of cost per case per intervention, they may be cheaper in the long term due to limited requirement of reapplication. Thus, although our results point to injectables as the method of choice, targeting women with this particular intervention cannot be undertaken in isolation due to concerns of other complementary factors.

7. Conclusions

This study examines the cost effectiveness of four family planning interventions in Uganda namely: oral contraception, female sterilization, injectables, and condoms. Using a nationally representative survey of 8,531 women, we estimate cost effectiveness ratios in relation to number of births averted for women aged 15-49 years. We find that use of contraceptives still limited with only one out of five women using some form of contraceptive. Worse still, at least a quarter of the women using contraceptives rely on traditional methods that are less effective in preventing child births. We regard to efficiency, we find that injectables are the most cost effective intervention. Nonetheless, we do not recommend solely targeting women in the reproductive age category with this particular method of contraception without due regard to differences in physiology and socioeconomic characteristics.

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