Thinking Beyond the Individual in Reproductive Health: Evaluating the Determinants of Fertility through an Analysis of the 2011 Uganda Demographic and Health Survey

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Abstract

Fertility rates continue to increase and pose a serious threat to economic development. Uganda, the third fastest growing country in the world has a population of 29.6 million people, of which six million are women of reproductive age who on average will give birth to 6.7 children. Coupled with high fertility and 50% of the population under 15 years, Uganda faces numerous challenges in achieving a decline in fertility. Achieving a decline requires a better understanding of proximate and socioeconomic variables that directly or indirectly affect fertility. Using the Determinants of Fertility framework, this study aims to understand modern contraceptive use in Uganda with a particular focus on differentials due to individual, cultural and programmatic level factors. This study analyzed a nationally representative sample of 8,674 women of reproductive age (15-49 years) from the 2011 Uganda Demographic and Health Survey (UDHS). Manipulation of the UDHS using study inclusion and exclusion criteria, created a total sample of 6,401 women. Multivariable logistics regression with crude/adjusted odds ratios with 95% confidence intervals were obtained. Results reveal that factors such as age (OR=2.11, CI 95% 1.70, 2.62), education (OR=2.28, CI 95% 1.79, 2.92), wealth (OR=2.45 CI 95% 1.86, 3.21), number of children (OR=2.62, CI 95% 1.96, 3.52) and exposure to family planning programs (OR=1.50, CI 95% 1.28, 1.74) impact modern contraception use. These results showcase the need for interventions that are designed at the individual and household level and highlight the need for additional research on community contextual factors that impact contraceptive use.

Introduction

There are almost 201 million women in the world who have an expressed need for safe and effective family planning methods and yet do not have the means to obtain them (Bhutta et al., 2010). This unmet need for family planning is likely to increase as the world population is projected to reach 9.3 billion by 2050, surpassing the seven billion mark from October 2011 (The Population Division, 2011). Lack of access to family planning is a major cause of unnecessary death for more than half a million women a year of which 74,000 die each year from unsafe abortions (Center for Health and Gender Equity, 2009).

Recognizing the need to protect women and girls around the world, Uganda and 179 other governments pledged to make reproductive health care universally available "as soon as possible and no later than 2015" at the 1994 International Conference on Population and Development (ICPD) (Cates, 2010). This same goal was reiterated once again when Uganda joined with other international partners to sign the United Nation General Assembly's Millennium Development Goals (MDG). Progress on most MDGs is on track; however, progress on goal five addressing maternal health has been slow (Bhutta et al., 2010; Cates, 2010; Ministry of Finance, Planning and Economic Development, 2010). This is of concern because within goal five is the objective to achieve universal access to reproductive health by 2015 (United Nations, 2000).

Achieving universal access to reproductive health is important as Uganda is the third fastest growing country in the world, with a high unmet need for family planning methods and a low prevalence of contraceptive use (Uganda Bureau of Statistics (UBOS) & ICF International, 2012). The population of Uganda is 29.6 million people, of which six million are women of reproductive age who on average will give birth to 6.7 children (Nalwadda et al., 2010; Khan, 2008). Coupled with the high total fertility rate, an annual growth rate of 2.7%, and with 50% of the population under 15 years of age Uganda faces numerous challenges in achieving a decline in fertility. (UBOS & ICF, 2012; Nalwadda et al., 2010).

Theoretical Frameworks

As defined in various theoretical frameworks, a decline in fertility is necessary for economic development or as a precursor for economic development (Hirschman, 1994). The Demographic Transition Theory (DTT) posits that in order to achieve economic development, fertility rates must decline. DTT states that a decline in mortality is due to increasing living standards (nutrition and sanitation) and medical advances, which leads to an industrial economy that is incompatible with large families. As a result, fertility decline will follow economic advances (Hirschman, 1994). The ideational theory posits the opposite, that fertility decline will lead to economic development. The theory moves the discussion to cultural and linguistic lines and states that ideas about ideal family size and birth control practices spread more quickly in culturally homogenous populations or that all people want to control family size but do not know how and once someone figures it out, the idea spreads like wildfire (Hirschman, 1994). Both theories look at economic development as the end point. A different way of approaching fertility decline is to look at fertility to understand what aspects directly or indirectly impact it. In a landmark paper, John Bongaarts (1978) provided an analytical model for measuring in surveys

the most important determinants that affect fertility. This framework remains as one of the most widely used tools for analyzing fertility and fertility change (Stover, 1998).

Analytical Framework

The determinants of fertility are behavioral factors that affect biological processes controlling fertility (Bongaarts et al., 1984). The determinants are split into two categories; Proximate Variables and Socioeconomic & Environmental Variables. Proximate variables are biological and behavioral factors through which background variables operate. Proximate variables directly influence fertility and consist of proportion of women in sexual unions, use of contraception, post-partum amenorrhea, induced abortion, frequency of intercourse, sterility, miscarriage and duration of fertile period. Of the eight factors, the first four are the most important in determining fertility (Bongaarts et al., 1984). Socioeconomic and environmental factors that indirectly affect fertility consist of, social (education, income, work, status of women); cultural (marriage practices, religion, postpartum abstinence); health (prevalence of STD, Malaria); political (policy about family planning and women's education); and programmatic (availability of contraceptive information and services) (Bongaarts et al., 1984). A representation of the analytical framework is provided in Figure 1.

[INSERT FIGURE 1]

Using the Determinants of Fertility, this study aims to understand modern contraceptive use in Uganda with a particular reference to differentials due to proximate and socioeconomic variables. Specifically, the questions being investigated include: How do women who use modern contraception compare to women who do not use modern contraception in Uganda and what individual/cultural/program level characteristics are associated with modern contraceptive use. Modern contraception as defined includes oral pill, IUD, Condoms, female/male sterilization, implant and injectable (UBOS & ICF, 2012).

Methods

Data

The 2011 Uganda Demographic and Health Survey (UDHS) provided the data for this study. The 2011 UDHS was implemented by the Uganda Bureau of Statistics from May to December 2011. This was the fifth installment of the survey with previous implementations taking place in 1988, 1995, 2000, and 2006. The survey collects information on fertility, family planning, maternal and child health and information on demographic and socioeconomic indicators.

For the purposes of this research study a set of inclusion and exclusion criteria were developed. Since the UDHS consists of three questionnaires (household, woman and man), the woman's questionnaire was selected to answer this research question. The inclusion criteria are women of reproductive age (15-49 years), who are currently sexually active. An exclusion criteria used is not currently pregnant. The UDHS sampled a total of 9,247 women of reproductive age with a response rate of 94% (n=8,674). Manipulation of the UDHS sample using the study inclusion and exclusion criteria created a total sample of 6,401 women.

Analysis

The dependent variable is use of modern contraceptives (female sterilization, male sterilization, Intrauterine device, injectable, implants, oral pill, condom, and female condom). The UDHS categorizes this variable as use of modern contraceptive, traditional methods or folkloric. For purposes of this analysis, the variable was made binary with modern contraceptive representing 1 or yes and all other values as 0 or no.

To understand the influence of various factors on the use of modern contraceptives a number of independent variables are used, divided into three categories, Table 1.

[INSERT TABLE 1]

Further manipulation of the independent variables was not needed due to standardized nature of the UDHS. Three variables that were manipulated or transformed include age, total number of children and exposure to family planning messages. Age and total number of children was separated into four categories (Table 1). The other variable was transformed was exposure to family planning. The variable was measured based as a yes, no response to questions on radio, television, newspaper, or video/film. Exposure to family planning was quantified as a yes on any one or more of the four categories.

Due to the nature of the study, use of secondary data sets, an Institutional Review Board (IRB) approval was not required. Analysis was performed in SAS 9.3 (SAS Institute, Cary, NC). Multivariable logistics regression was used and crude and adjusted odds ratios with 95% confidence intervals were ascertained.

Results

Descriptive Analysis

Table 2 presents the percentage of non-pregnant, sexually active women using modern contraception or other forms of contraception.

[INSERT TABLE 2]

The association between age of woman and contraceptive use aligns with the period of time when the woman is most fertile. Modern contraception use is higher for age groups 20-29 (11.8%) and 30-39 (9.2%). Other contraception methods follow a similar pattern. A unique aspect is that the older age group of 40-49 for the other methods uses contraception far higher than the modern contraception group. This could be a result of older population, which is more traditional and may have not had exposure to family planning messaging and modern contraception. Around 70% of the population resides in a rural setting and of that group 53% use traditional or folkloric methods for contraception. Interesting finding in line with literature on the positive association between education level and contraception use, is that primary education increases the use of modern contraception (14.4%) and other methods (40.3%) (Koc, 2012). The

total number of live children was 3+ for over 60% of the sample. Of this group, 56% would like to have additional children, while 43% would like to stop having additional children. The trend in the use of contraception either modern or other increases as the number of children increases, which illustrates that individuals are either trying to space or limit children using some sort of family planning method.

Low contraception use is often associated with specific religions and this was the case in Uganda (Clements, 2004). Majority of the population is Catholic (43%), followed by Protestants (29%). Overall, modern contraception use was less for all religious categories. Around 87% of the sample is married or in a live in type of union. The remaining 13% are never married. The incidence of divorce and separation was negligible in the sample. Overall, around 72% of the sample has been exposed to family planning messaging in some manner.

Multivariable Analysis

Table 3 presents the results of the logistic regression analysis of predictors of modern contraceptive use and other methods. Most models contributed significantly to the explaining pattern of contraceptive use, however, marriage, region of residence and ethnicity were removed from the model. Marriage did not contribute significantly to the model. Region of residence consisting of 10 categories and ethnicity, consisting of 19 categories considered multiple comparisons at the same time and the value of the data to the overall explanation was deemed not meaningful. Furthermore, both variables were not found to be significant.

It is well established that socioeconomic variables impact contraceptive use and fertility and the results from this study add to the literature (Acharya, 1998). Age is a strong and significant predictor of contraceptive use. The odds of using modern contraception peak during the 20-29 years of age (OR = 0.473, CI 95% 0.381, 0.588), when women are more likely to use them than the reference group of 40-49. This peak continues for age 30-39 (OR = .499, CI 95% 0.415, 0.600). These finding indicate that the use of modern contraception decreases as a woman ages. Also, the findings show that while 15-19 (OR = 0.646, CI 95% 0.471, 0.886) are more likely to use modern contraception than 40-49 year old, that they are still not as high as 20-39 year old women, who are at their peak reproductive period (Gupta et al., 2003).

Education is thought to change a person's attitudes and knowledge thereby impacting their behavior. Analysis from this research study reveals that with higher education that the odds of using modern contraception increase. A Ugandan woman is two times more likely to use modern contraception, if she has a secondary or higher education (OR = 2.282, CI 95% 1.786, 2.916) verses no education. This association decreases in magnitude at primary verses secondary (OR=1.380 CI 95% 1.187, 1.603); however a woman is still 1.4 times more likely to use modern contraception than her counterpart.

Another predictor of modern contraception use is wealth as measured by the quintiles of richest, richer, middle, poor and poorest. Wealth is a strong and significant predictor of modern contraception use. A woman, quantified as highest (OR = 2.445, CI 95% 1.860, 3.213) is 2.45 times more likely to use modern contraception than a woman quantified as poorest. The trend continues, in that the more wealth one has the more likely they are to use modern contraception.

The total number of children one has is another predictor of modern contraception use. The odds of using modern contraception increase with increasing number of children. In the analysis the association was found to be greatest for 5+ children (OR=0.381, CI 95% 0.284, 0.510), however, giving birth to 1-2 children (OR=0.555, CI 95% 0.440, 0.702) increases the likelihood of using modern contraception as well. Along with the total number of children another predictor is the desire for additional children. Women who do not want any more children are less likely (OR=0.698, CI 95% 0.600, 0.813) to use traditional methods in favor of modern methods.

Program influences on behavior was another predictor that was evaluated. It was found that a woman who has been exposed to family planning programming (OR=1.490, CI 95% 1.279, 1.737) is 1.5 times more likely to use modern contraception verses a woman who had not received any exposure.

Discussion

To decrease fertility rates programs and interventions need to addresses proximate and socioeconomic determinants of fertility. This study sought to answer this question by using the determinants of fertility framework and evaluating whether individual, cultural and programmatic variables predict or impact modern contraception use. Based on the analyses the most significant predictors include age, education, wealth, number of children, desire for children and exposure to family planning programs. The results obtained align with existing literature on the influence of socioeconomic factors in the selection and use of modern contraception (Acharya, 1998; Gupta et al., 2003; Martin, 1995).

The use of secondary data introduces some limitations that may have impacted the design and analysis of this study. Since the data was not primary, a level of bias may be introduced by using existing data to fit the desired research questions. Another limitation includes non-sampling errors, which may have resulted during data collection and data processing. The strengths of the study reside in the use of the Uganda Demographic and Health Survey. The survey has been implemented multiple times in many countries around the world. The systematic nature of implementation and the manner in which the data is collected, processed and disseminated is a tremendous strength. Each process for the survey is written about in great detail and the survey team takes great pains to follow the protocol. Strength of the study is the large sample size and the sampling frame that is used. The two-stage cluster sampling helps with randomization and helps with the internal and external validity. The generalizability of the results is a major strength of this survey.

Results from this study show that individual and household level factors have a profound impact on modern contraception use. However, the decision to use modern contraception cannot be interpreted at the individual level since many community level factors contribute to the decision and interact with individual characteristics and desires (Stephenson, 2007). A better understanding of family, neighbors, social networks, and community-level contextual factors is necessary to see how they influence the use of modern contraception (Stephenson, 2007; Gupta, 2003). Research in this area is limited; as a result, the next steps for this study will address community contextual factors that address community level approval of family planning,

community level educational attainment, community household wealth, community religious composition and the community average for total number of children or community understanding of ideal family size. All these factors add another layer of complexity to how women make decisions about contraception. This community layer is a necessary component in developing a more comprehensive strategy in advocating and promoting modern contraception.

A greater understanding of contextual factors associated with modern contraception use, could lead to the development of community-level programs that advocate for contraceptive use and target programs based on the needs of the community (Stephenson, 2007). For policy makers this implies that family planning services should be designed to address local priorities, rather than global priorities dictated at the national level. Implications for policies of this nature state that local governments look at the dynamics of each district, based on age, education, wealth and number of children to design interventions that address the needs of that community (Stephenson & Tsui, 2002).

The convention in Public Health has been to treat political boundaries as markers for characteristics of the population (Amin, 2002). This analysis has shown that communities vary at the individual and household level and that more attention needs to be focused on well thought-out, targeted interventions.

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Figure 1: The Determinants of Fertility

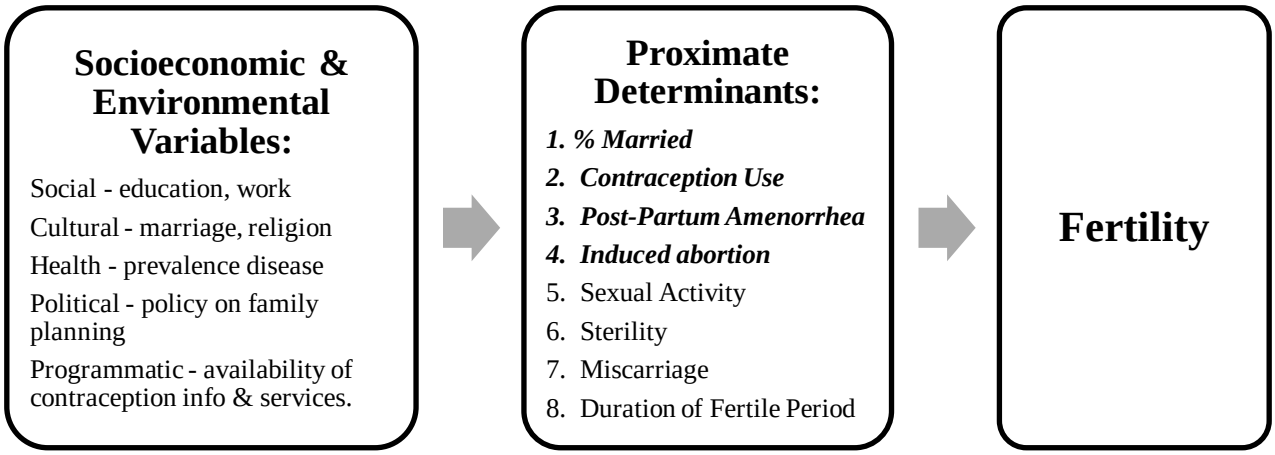

Table 1: Independent Variables for Modeling of Women's Use of Modern Contraceptives in Uganda: 2011

Variable Name	**Operational Definition**
Individual Level	
Age	Self-reported age of respondent at time of survey: 15-19, 20-29, 30-39, 40-49
Residence Status	Current place of residence: Urban, Rural
Wife Education	Highest level attained: None, Primary, Secondary/Higher
Wealth Index	Households cumulative living standards: Poorest, Poorer, Middle, Richer, Richest (Quintiles)
Fertility	
Total Number of Children Born	Number of children ever born: 0, 1-2, 3-4, >5
Fertility Preference	Wants to have another children in the next 12 months, does not want another child
Cultural Level	
Type of Marriage	Currently Married or non-marital union, Formerly married, Never married,
Religion	Catholic, Protestant, Muslim, Pentecostal, SDA, Other
Ethnicity	Muganda, Munyankole, Musoga, Mukiga, Ateso, Other
Program Level	
Exposure to Family Planning message	Respondent has been exposed to family planning messages through radio, television, newspaper, video: Yes, No

Table 2: Percentage of non-pregnant, sexually active women (N=6401) using Modern Contraception or Other (traditional, folkloric)

	Modern Contraception User			Other Method	
Characteristic	**%**	**N**		**%**	**N**
Individual Level					
Age					
15-19	2	125		10	618
20-29	11.8	752		28.8	1843
30-39	9.2	588		19.3	1238
40-49	3.9	252		15.4	985
Residence					
Urban	10.7	687		20.2	1290
Rural	16.1	1030		53	3394
Education					
No Education	2.2	140		14.9	954
Primary	14.4	922		40.3	2578
Secondary or Higher	10.2	655		18	1152
Wealth Index					
Poorest	2.3	146		17.6	1126
Poorer	3.8	240		12.6	807
Middle	4.3	277		11.8	755
Richer	5.6	357		12	771
Richest	10.9	697		19.1	1225
Number of living Children					
None	2.2	141		10.1	647
1-2	7.2	458		19	1210
3-4	7.1	451		15.4	983
5+	10.4	667		28.8	1844
Fertility Preference					
No	13.2	845		30.7	1965
Yes	13.6	869		42.4	2714
Cultural Level					
Marriage					
Never Married	2.9	186		10.3	657
Currently Married	23.9	1528		63	4026
Religion					
Catholic	10.3	662		32.4	2075
Protestant	8.9	568		19.7	1259
Muslim	3.9	252		10.1	645
Pentecostal	2.9	187		9.2	587
SDA	0.59	38		1.2	74

Other	0.16	10		0.69	44
Program level					
Exposure to Family Planning Messages					
No	4.7	300		23.1	1479
Yes	22.1	1415		50	3202

Table 3: Crude Odds Ratio (OR) and Adjusted OR for a women's use of modern contraception

	Crude Odds Ratio (95% CI)	**Adjusted Odds Ratio (95% CI)**
Individual Level		
Age (40-49)		
15-19	1.265 (0.998, 1.603)	0.646 (0.471, 0.886)*
20-29	0.627 (0.533, 0.737)*	0.473 (0.381, 0.588)*
30-39	0.539 (0.455, 0.638)*	0.499 (0.415, 0.600)*
Residence (Urban)		
Rural	1.755 (1.563, 1.971)*	1.142 (0.968, 1.347)
Education (Secondary, Higher)		
No Education	3.874 (3.167, 4.740)*	2.282 (1.786, 2.916)*
Primary	1.590 (1.407, 1.796)*	1.380 (1.187, 1.603)*
Wealth Index (Richest)		
Poorest	4.387 (3.607, 5.337)*	2.445 (1.860, 3.213)*
Poorer	1.913 (1.612, 2.271)*	1.472 (1.164, 1.862)*
Middle	1.551 (1.313, 1.831)*	1.306 (1.051, 1.623)*
Richer	1.229 (1.051, 1.437)*	1.095 (0.904, 1.325)*
Number of living Children (None)		
1-2	0.576 (0.466, 0.711)*	0.555 (0.440, 0.702)*
3-4	0.475 (0.384, 0.588)*	0.429 (0.330, 0.558)*
5+	0.602 (0.492, 0.738)*	0.381 (0.284, 0.510)*
Fertility Preference (Yes)		
No	0.745 (0.666, 0.832)*	0.698 (0.600, 0.813)*
Cultural Level		
Religion (SDA)		
Catholic	1.610 (1.078, 2.403)*	1.173 (0.769, 1.790)
Protestant	1.138 (0.760, 1.704)	1.074 (0.703, 1.640)
Muslim	1.314 (0.866, 1.995)	1.370 (0.881, 2.130)
Pentecostal	1.612 (1.055, 2.464)*	1.605 (1.028, 2.505)*
Program level		
Exposure to Family Planning Messages (Yes)		
No	0.459 (0.400, 0.528)*	1.490 (1.279, 1.737)*
Notes: (Ref) - Reference category used, *****-P value <.05		