Excess Fertility and Family Planning in Rwanda

Understanding the Shift to a High Contraceptive Prevalence Country

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Excess Fertility and Family Planning in Rwanda

Understanding the shift to a high contraceptive prevalence country

Gewenst Kindertal en Gezinsplanning in Rwanda: een onderzoek naar de snelle toename in het gebruik van anticonceptie
(met een samenvatting in het Nederlands)

Proefschrift

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Contents

List of tables

List of figures

Preface

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Dieudonne N. Muhoza
Utrecht, November 2014.

1 Introduction

1.1 Introduction

Rwanda has experienced an impressive increase in contraceptive use during the last several years. While it was one of the lowest contraceptive use countries in 2005, five years after it has become one with the highest contraceptive prevalence rate (CPR) in Sub-Sahara Africa. Between 2005 and 2010, the CPR has risen from 17 % to 52%. Unmet need dropped by half and the total fertility rate (TFR) by 25% from 6.1 to 4.6 births per woman ((National Institute of Statistics of Rwanda [NISR] et al., 2012). These achievements have gone far beyond the national objectives for 2010, which were fixed at 26.3% for the CPR and 5.5 births for the TFR (Ministry of Health [MOH], 2006). This dramatic increase which is uncommon in Sub-Sahara Africa has drawn attention and has raised curiosity after the mechanisms that have driven the change in demographic behaviour and outcomes.

Which barriers to contraceptive use have been removed? Did the demand for modern contraceptive change as well? To what extent were the conditions for this change specific for Rwanda, and could other countries learn from the Rwandan experience?

To respond to these questions, this thesis examines the demand for and the barriers to family planning in Rwanda in 2005, a period of low contraceptive use and high unmet need, and analyses the progress made thereafter between 2005 and 2010 with the aim of informing and guiding the policymakers to design and implement efficient future family planning policies enabling to sustain and accelerate the ongoing change. The research has the following objectives:

- *To understand the level and structure of the demand for family planning in Rwanda in 2005 and to identify the barriers to meet that demand.*
- *To uncover the factors which have contributed to the contraceptive increase between 2005 and 2010, to the drop in unmet needs and to assess whether these factors vary across communities and regions within the country.*

To understand the context of this research, we present the background of Rwanda and the evolution of its population in the last five decades. We also describe the problems resulting from high density and brush the strategies undertaken to control population growth. Finally, we present the theoretical framework and introduce the analytical questions that will be answered in the successive chapters.

1.2 Background: a country in distress

Rwanda is a small, landlocked, and very densely populated country in Africa. With more than 10 millions of people in 2012, residing on an area of 26,338 square kilometres, the average

population density is 400 people per square kilometre, the highest in Africa, compared to a continental average of 32 people per km^2. Called a *"country of thousands hills*", reference to the predominance of hills in its landscape, Rwanda is a rural country (83% of the population) and economically dominated by agriculture (72% of active population) (NISR, 2012). However, the ongoing process of urbanization is rapid (4% per annum) and Kigali is a dominant urban centre with nearly half of the total urban population. Rwanda is among the poorest countries in the world. On the UNDP Human Development Index list, it ranks 167 out of 186 countries leaving only 19 countries behind. The National Gross Product per capita is low, ranking at the 141th position. More than 50% of the population lives under the poverty line (UNDP, 2013).

Rwanda is a country with a painful history resulting from secular ethnic conflicts over land. Since the independence in 1962, several socio-ethnic and politico-ethnic confrontations have occurred, which pushed many Rwandese into exile in neighbouring countries (Olson, 1995). The ethnical problem has been exacerbated by the problem of land scarcity due to high population density. The cumulative effects of those social conflicts combined with economic deprivation and environmental deterioration culminated in mass population movements, a civil war and the 1994 genocide. The 1994 Genocide devastated the Rwandan economy as well as its population: the gross domestic product was halved in a single year, and eighty percent of the population was plunged into poverty (Ministry of Finance and Economic Planning [MINECOFIN], 2000). The genocide also exacerbated a number of development constraints, which existed before 1994.

However, since 1995, the government strives to overcome the legacy of this burdensome history and reconstruct the devastated country. Priorities were reconciliation, building a new society, and to deal with the resulting generalized poverty. In its 2020 vision plan, the government sets ambitious objectives aiming to lift the country from poverty and to transform it into a middle-income country. The aspiration is to become a modern, strong and united nation, without discrimination between its citizens. The main challenges are poverty reduction, investment in human capital (education and health), improving gender equality, reducing population growth, and modernisation of the economy (MINECOFIN, 2000).

Underlying Vision 2020 is a debate on the relation between economic and population growth. The plan described a vicious cycle of high population growth diluting economic resources and exacerbated poverty which leads to high fertility. The debate is about the way this cycle can be broken, through economic development that would lead to new quantity/quality trade-offs in deciding on the number of children, or through family planning programs that could help to reduce resources dilution. In 2005 the results from the Demographic Health Survey made clear that Rwanda could not wait for economic progress to redirect population growth.

1.3 Population trends in the last half century

Since independence in 1962, the Rwandan population has increased from approximately 2.6 million to 10.5 million in 2012, averaging an annual population growth rate of 2.2%.

Although there has been an improvement in the use of contraceptive methods leading to the decline of fertility (Table 1.1), the annual population growth remains high, at 2.6% in the last inter-census period 2002-12 (NISR, 2014). A look at the population growth curve between 1960 and 2010 (Figure 1) shows that population increase has been interrupted by an episode of decline due to the 1994 genocide deaths and the subsequent mass emigration towards neighbouring countries. Several estimates exist on the number of people killed in the 1994 genocide with figures varying from 500,000 to 1,000,000. Prunier (1995) averages these estimates to 850,000 deaths representing 11 % of the population.

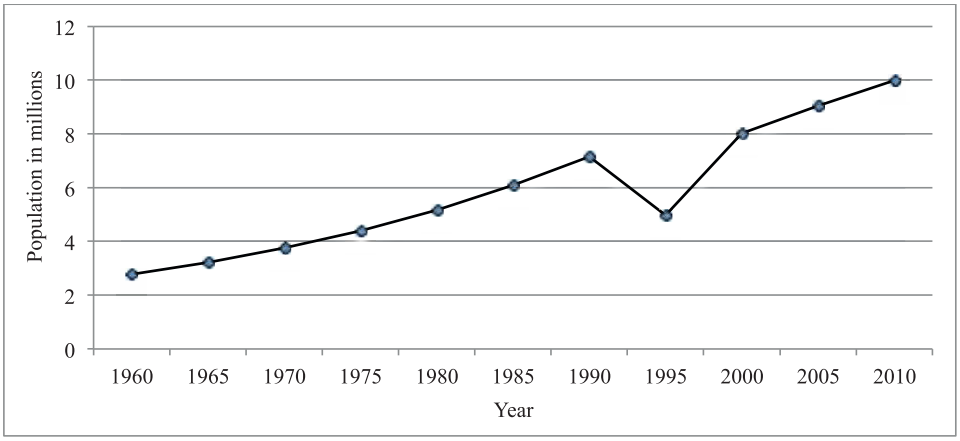

Figure 1.1 Rwanda population trends between 1960 and 2010
(Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision)

Reliable data on fertility in Rwanda go back to the first population census held in 1978, which showed a total fertility rate of 8.6 (Table 1.1). As in many other countries in Sub-Sahara Africa fertility declined after 1985. However this decline stalled after 1992 only to resume after 2005.

Table 1.1 Total fertility rate for Rwanda between 1978 and 2010

Year	TFR	Source
1978	8.6	1st Population and Housing Census
1983	8.5	National Fertility Survey
1991	6.9	2d Population and Housing Census, adjusted data
1992	6.2	Demographic and Health Survey
1996	6.5	Socio-Economic Survey
2000	5.8	Demographic and Health Survey
2002	5.6	3d Population and Housing Census
2005	6.1	Demographic and Health Survey
2007-8	5.5	Interim Demographic and Health Survey
2010	4.6	Demographic and Health Survey
2012	4.0	4th Population and Housing Census

Rutayisire et al. (2014) have shown that the stall in fertility decline is related to the genocide. Increased widowhood and separation due to forced migration accounted for lower fertility, but this was offset by the decrease in the use of contraceptives and the high level of replacement fertility among those that lost children in (the wake of) the hostilities. Ideal family size was also higher in 2000 than it was in 1992. Even though this ideal family size dropped after 2000, fertility remained high and even increased in the period 2000-2005, indicating that unmet need might have become a more dominant cause of high fertility than pro-natalist attitudes.

1.4 Problems resulting from high population density and continued rapid population growth

For many people, talk about Rwanda suggests a country with high human concentration and serious overpopulation. If the national parks and water areas are excluded, the whole country is like one continuous city. High population density and rapid population growth exert a strong pressure on natural resources and are at origin of several socio-economic problems. Agricultural land and water are subject to competition and scarcity which generate a generalized poverty especially in rural areas and which are source of many land and social conflicts.

Describing the environmental problems caused by the population issue in Rwanda, Thaxton (2009, p. 2) reports that "*the rapid population growth and the resultant dwindling landholdings, for example, have pushed more people onto landscapes poorly suited for agriculture, grazing, and settlement, such as steep hillsides and urban watersheds. As a result, an increasing number of households are vulnerable to food shortages and water scarcity and are more susceptible to disease and poor health*". Environmental problems are worsened by the mountainous topography of the country. Soil erosion from cultivation of steep slopes, pollution and sedimentation of water sources, loss of forests protected areas, and biodiversity to new human settlements, represent some of the manifestations of those environmental problems.

Rwanda's high population growth is not only one of the major causes of the depletion of natural resources; it is also the major cause of poverty and hunger and a handicap to development. In a country already overpopulated, the continued rapid population growth becomes a big challenge for the socio-economic development. The number of people in need of health, education, economic, and other services is large and increasing, which, in turn, means that the amount of resources, personnel, and infrastructure required is also increasing depleting the limited resources of the country, reducing investments and hampering efforts for the development.

The small plots due to high population density provide a limited production that cannot feed a family resulting in the spectra of permanent famine and poverty. This has been predicted twenty years ago by James Gasana, former Minister of Agriculture and Environment in 1990-92, when he warned about the hunger and predicted a social disaster

caused by the population growth that "*without profound transformations in its agriculture, Rwanda will not be capable of feeding adequately its population under the present growth rate*" and added that he did not see how Rwanda would reach 10 million inhabitants without social disorder unless important progress in agriculture, as well as other sectors of the economy, was achieved (Brown, 2009). More recently, in 2010, Rosen (2010) has backed Gasana by comparing the situation of Rwanda to Malthus's hypothesis that *"global population would eventually outpace food production capacity and population size would thereafter be limited by war, disease and famine".*

The persistence of high population growth is raising concerns within the Rwandan government and among development partners that—should the current population growth rate continue —economic growth, political stability, and ongoing recovery and reconciliation will be undermined. As land and water have become scarce, competition for these vital resources intensifies within societies, particularly between the wealthy and those who are poor and dispossessed. The shrinkage of life-supporting resources per person that comes with population growth is threatening to reduce the living standards of millions of people below the survival level leading to potentially unmanageable social tensions (Brown, 2009).

Moreover, literature indicates that the population pressure may be a factor of political destabilization. Throughout the world political stability appears to be greater in countries with slowly growing populations than in those with rapid growth. Rapid population growth creates enormous political tensions especially when profound ethnic divisions exist, and it complicates problems of government by encouraging rapid urbanization (Tallon, 1993).

It is this reasoning that led researchers to link the genocide against Tutsi in Rwanda to the country's high population density and its pressure on land. Prunier (1995) and Pottier (2006) have argued that the competition for land was at the heart of the genocide or at least aggravated it. Pottier (2006, p. 510) states: "*ordinary people killed for economic gain, often for access to a victim's land*." In one chapter of his book *'Malthus in Africa: Rwanda's Genocide'*, Diamond (2005) argues that the genocide can be understood, in part, as a society-wide response to high fertility rates coupled with land scarcity. For him, too many people and limited fertile land were key variables in decoding the Rwandan disaster and land scarcity coupled with low agricultural productivity actually drove people to murder. Analysing the causes of the Rwandan genocide, Van Ginneken & Wiegers (2005) concluded similarly to previous ones that population pressure and overpopulation are the main cause of the 1994 genocide and earlier episodes of violence.

Understanding the root causes of population growth and identifying humane ways to curb this growth is clearly an urgent issue for Rwanda and this research wants to contribute to these objectives.

1.5 Brief history of the population policy in Rwanda

The population pressure on land and its implications for the socio-economic living conditions have been noted in Rwanda since the colonial period. Compared to neighbouring countries, DR Congo, Uganda and Tanzania, Rwanda was having higher population density. To reduce

this pressure, the colonial leaders encouraged and organized migrations towards these countries, in absence of a family planning strategy. Even if such a strategy had been available, one might wonder whether the Colonial Administration which was a collaborater of the Catholic Clergy would have been in favour of family planning as a means to control high fertility.

Family planning activities started later, in 1981 with the creation of the "Office National de la Population" (in French ONAPO), a coordination office attached to the Presidency of the republic to supervise the implementation of population policies and programs. Between 1981 and 1992, ONAPO ran a sensitization campaign on the problems caused by excessive population growth, trained staff in family planning awareness and conducted research on the population issue. By 1991, educational programs for specific target groups and school-based population education programs were estimated to have reached 85% of the population. Contraceptive prevalence increased from 0.9% in 1983 to 11% in 1991 (Kabagwira & Tallon, 1991).

With the 1990-1994 civil war and the 1994 genocide, family planning activities lost all priority as the government was to rebuild the country and to reunify dislocated families. In 2000, ONAPO was dissolved. In this period, Rwandan officials were reluctant to promote population control because many families had lost their relatives and were willing their replacement. As said by Anicet Nzabonimpa, Coordinator of family planning-HIV integration service: "*It was very difficult to talk about family planning after the genocide ... People wanted to replace those who had died"* (Rosen, 2010). The 2000 DHS has shown that the desired fertility has increased based on the will to restore families and compensate lost family members.

However, after the 2002 census results revealed a high population growth, the issue of population control resurfaced but with a strategic focus on socio-economic improvements which would respond to the needs of the population at that moment rather than on limiting family size. The aim of the 2003 National Reproductive Health Policy was in that line, to improve the living conditions of the population and to ensure sustainable development (MOH, 2003). It was only in 2006 that a new family planning policy aiming to curb the high fertility was elaborated with clear targets. By 2010, the contraceptive prevalence should reach 26.3% from 17% and the TFR should have dropped to 5.5 births (MOH, 2006). Population growth is then officially recognised by the government as a major cause of poverty and depletion of natural resources, and an obstacle to socio-economic development (MINECOFIN, 2007).

From 2007, the government decides to commit to family planning as it appeared to be a determinant factor of success of socio-economic programs. A new era characterized by various and intensive family planning activities starts. The government actions combined two approaches. First, the increasing and strengthening of the demand for family planning through a public campaign promoting smaller families and educating on the use of contraceptive means. Second, the reinforcement of family planning services by increasing access to and improving the quality of family planning services to respond to the expected increased demand. Particular innovations have been the community health workers positioned at village level and the mass mobilization using the monthly community service meetings, called '*Umuganda'* in national language, to raise awareness.

1. 6 Theoretical framework

Theoretically, the phenomenon of unwanted or excess fertility is directly related to lower fertility preferences which create a gap between the wanted or desired fertility and the achieved one. It appears in the transitional phase of the demographic transition when couples desire to limit their family size but have not yet done so. In the pre-transitional phase and in the post-transitional phase, there is no excess fertility or it is limited because for the first phase both the demand for and the supply of children are high and in the second both are low. The situation of excess fertility is then an issue of change in wanted fertility (Bongaarts, 1997).

Literature indicates that the level of desired fertility, main driver of excess fertility, is a function of economic factors and socio-cultural considerations. Economic theories of fertility behaviour indicate that the decrease of the desired fertility is due to socio-economic development which increases the costs of children but diminishes their benefits (Becker, 1991; Bongaarts, 2008). During the process of development, socio-cultural factors that value children conflict with socio-economic ones which devalue cultural norms and traditional beliefs. While the socio-cultural factors sustain high fertility, the socio-economic factors undermine it. The mechanism is that the expected benefits from many children (investment, insurance, etc.) are replaced by other compensatory modern systems that play the same role. By balancing the costs associated with many children against the expected gains from them, couples tend to desire fewer children than they are potentially able to do.

However, this general theory does not apply to all settings. Various studies have found an adverse relationship between poverty and desired fertility in settings of economic crisis and personal hardship (Egerö, 1996; Orbeta, 2005; Alonzo et al., 2004; Odusola, 2002). In Philippines for instance, women from poorer households have reported lower demand for children relative to women in the richer group. The process is that the desired family size is influenced by the perception of economic opportunities which may be pessimistic for poor people in dire straits. This situation has been dubbed '*poverty Malthusianism'* (Cosio-Zavala, 1995 mentioned in Kothari & Krishnaswamy, 1998) and has been observed in Latin America and Asia. It is therefore not self-evident that poor women in Rwanda would have a preference for larger families. The fact that many households do not have sufficient land to feed a family might very well mean that limiting the number of children is a necessary condition to be able to support them. Having more children would further deplete resources at household level, just as population growth depletes resources at national level.

Whatever the reason for the gap between desired and actual fertility, excess fertility can be conceived as unmet need for contraception. It can be interpreted as a lack of access to family planning due to barriers for the use of contraceptive means. Four groups of barriers are commonly distinguished: inadequate access to family planning services; social opposition to contraceptive use either by the woman alone, by the couple, or the community; lack of necessary knowledge about contraceptive methods; and health concerns about possible side effects (Casterline & Sinding, 2000; Bongaarts & Bruce, 1995). Previous researches (Haider & Sharma, 2012-2013) and DHS surveys have shown that in developing countries the barriers - health concerns and fear of side effects - are much stronger among lower educated

and rural residents. Social and community opposition and negative perception of family planning is often related to religious norms (Williamson et al., 2009). In some countries, access in terms of geographic distance and a limited range of contraceptive methods were also a serious problem (Pullum, 1991; Tsui & Ochoa, 1992; Magnani et al., 1999). Often, those different barriers are associated and interdependent. Their effects are combined, and a solution to one may mitigate the rest (Mroz, 1999).

The existence of excess fertility may therefore result from all those barriers or some of them. An efficient family planning program is the one which removes existing barriers. The implication is that each country should identify which barriers to family planning it is facing before elaborating an effective program, and analyse in retrospect which barriers have been lifted or still remain after implementing programmes. This study will contribute to this knowledge for Rwanda.

The expected success of a family planning program is dependent upon the responses brought to those obstacles. Researchers have highlighted the role of sensitization and public campaigns, which are much more efficient if conducted by (community) leaders, to remove the barriers associated with social opposition, fear of side effects and health concerns. The improvement of access and quality of family planning services require an augmentation of family planning services delivery, training of family planning staff and availability of a large range of contraceptive methods.

For the case of Rwanda, the 2005 DHS (NISR & ORC Macro, 2006, p.63) has revealed that the two main reasons for not intending to use contraception were religious and couple opposition and fear of side effects. Moreover, the period after the 1994 genocide against Tutsi was marked by the destruction of many infrastructures including family planning services. The restoration and reinforcement of these services is probably a determining factor of family planning success.

Lesthaeghe & Vanderhoeft (2001) developed a more unified framework to explain the success or failure of family planning programmes across countries, using Coale's (1973) necessary preconditions for the use of contraceptives: readiness, willingness and ability. Readiness refers to the (acknowledged) need to limit or to space the number of children, usually as a result of socio-economic development. Yet as we argued before a lack of resources and prospects might also lead to this readiness. Willingness refers to the attitudes towards contraceptives or the use of them. Ability refers to the availability of and access to family planning services. The reasoning is relatively straightforward, without readiness and willingness, improving the access to services will be fruitless.

Yet, as Bongaarts (2014) recently reiterated, a family planning programme in itself could paradoxically widen the gap between desired and actual fertility by raising the demand for family planning. Dissemination of knowledge on the benefits and availability of contraceptive methods will not only lead to higher uptake among those who want to limit their fertility, but might also change the attitudes (or willingness) of the ones that had not considered limiting the number of their off-spring before. The controlled experiments in the MATLAB programme provide a solid evidence base for this phenomenon. Another paradox he identifies in the same paper is that wider availability and use of contraceptives to space births might reduce the demand for limiting births as women take longer to arrive at their desired number of children. Both paradoxes have far-reaching consequences for research on

unmet needs. It does not suffice to retrospectively analyse the share of unwanted or mistimed pregnancies as this share is determined by the shifts in both demand for and actual use of contraceptives and will therefore have be to estimated simultaneously. This is even more the case for Rwanda where raising the demand for family planning was an explicit goal of the programmes.

To contribute to the understanding of the recent increase in contraceptive use and the decline of fertility, this study will assess the level and structure of excess fertility in Rwanda in comparison with neighbouring countries, will identify barriers that were hampering the use of contraception sustaining high unmet need, and will analyse the impressive success of the family planning program made thereafter, using the theoretical framework described above. The analysis is designed chronologically as it covers a period of low contraceptive prevalence and high unmet need, in 2005, and a period of high contraceptive prevalence and low unmet need, in 2010. The Rwandan family planning program success seems to be an exceptional case since many other African countries were still experiencing a stall in fertility decline. To find out the factors that explain this progress that might constitute a lesson to others countries and challenge the conviction/perception that the Sub-Sahara region is beyond hope to deal with rapid population growth.

1.7 Thesis outline and research questions

The study starts with a comparative analysis of the level and structure of excess fertility in four East African countries: Rwanda, Uganda, Tanzania and Kenya. The objective is to determine the variations in desired fertility and excess fertility with reference to religion, education, and economic status. The comparative approach will help to understand and interpret the factors associated with excess fertility in Rwanda. The research question to be addressed is:

1. *To what extent do the desired fertility and excess fertility vary between East African countries and between different communities within those countries?*

Chapter 2 addresses this question. First, it displays the variations in desired fertility by socio-economic and cultural factors, namely religion, educational level and economic status measured by a wealth index. Second, it analyses the correlates of excess fertility using a binary regression model. The study will use the latest suitable Demographic and Health Surveys data collected in the period between 2005 and 2011 for those different countries. The data on Rwanda will be given for both 2005 and 2010, showing the effect of the shift in desired family size on the level of excess fertility, despite the wider availability of contraceptives.

After the description of the level and identification of the determinants of excess fertility, the next step will be to look for the reasons of this excess fertility. As said before, excess fertility may be conceived as unmet needs for family planning. We will separate the analysis of unmet need for family limitation and unmet need for birth spacing as the purposes of using contraception are different. The research questions read:

2. *Which factors drive the demand for family limitation in Rwanda and what are the barriers to meet that demand?*
3. *Which factors drive the demand for birth spacing in Rwanda and what are the barriers to meet that demand?*

The analysis aims to provide explanations on why unmet need was high in 2005. Family size limitation has been the major element of the Rwandan family planning program since the beginning. Birth spacing was less a priority initially. However, the malnutrition among children and the high child mortality which are associated with shorter intervals have generated a new interest in spacing. Data for these research questions are drawn from the 2005 Demographic and Health Survey datasets. The paper (chapter 3) on limiting was published in 2009 and the paper on spacing (chapter 4) has only recently been submitted, using the opportunity to also include the 2010 data and to simultaneously estimate the shifts in both demand and unmet need.

The next chapter analyses the shifts in contraceptives use in the period 2005 - 2010. The contraceptive prevalence rate has tripled in the five years between 2005 and 2010. Improved education, more extensive exposure to information on family planning, shifts in attitudes (among the husbands) might all have contributed, apart from the fact that people might have simply taken the opportunity to use contraception now that is has become more readily available. The latter raised the question which segments of the population show more behavioural change in the use of contraceptive means. Thus, our fourth research question reads:

4. *To what extent is the increase in contraceptive use associated with change in the composition of the population or with behavioural change within the segments of the population?*

Using the 2005 and 2010 Demographic and Health Survey data, chapter 5 will decompose the increase in two components: the increase due to population composition change ("change in *endowments*") which result mostly from socio-economic and attitudinal developments and the increase attributable to changes (improvement) in contraceptive behaviour (*"change in coefficients*").

Despite the overall improvement in contraceptive uptake, the disaggregation of this increase at regional level has revealed striking variations. Studies have indicated that the regional differences in behaviour may be due either to differences in individual characteristics or to particular regional factors. Given the social interactions between neighbour individuals, there may be similar pattern among these people. Even in a small country like Rwanda the regional variation in the preconditions that define the success of family planning programmes may be wide. This generated the last research question:

5. *Which factors account for the regional variations in contraceptive prevalence in Rwanda in 2010 and why do some regions lag behind others?*

Three explanatory factors - readiness, willingness and ability - make a difference in contraceptive behaviour at the higher level (Kimani, 2007, Cammack, 2001). The socio-

economic development level; the culture and tradition considerations; and the implementation of family planning policies, all operate on the higher level of the region. According to the socio-economic theory, the variations in contraceptive prevalence are due to the differences in the levels of socio-economic development between regions. The cultural explanation suggests that across societies, tradition and culture respond differently to contraception adoption and then to difference in contraceptive use. The third explanation is related to differences in family planning program's implementation. Some regions may run stronger and more efficient program than others, creating a difference in access, costs and acceptability of contraceptive services, and therefore a difference in contraceptive uptake. Such programs not only help to satisfy unmet needs for contraception (Bongaarts & Watkins, 1996), but can also create a new demand (Mahmood & Ringheim, 1997). All those factors are analysed in chapter 6 using a multi-level model. The objective is to identify, beyond individual characteristics, regional factors that differentiate regions and explain the lower contraceptive prevalence in some regions.

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2 Variations in desired family size and excess fertility in East Africa

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Abstract

This contribution studies the variation in desired family size and excess fertility in four East African countries by analyzing the combined impact of wealth, education, religious affiliation, and place of residence. The findings show an enormous heterogeneity in Kenya. Wealthy and higher educated people have fertility desires close to replacement level, regardless of religion, while poor, uneducated people, particularly those in Muslim communities, have virtually uncontrolled fertility. Rwanda is at the other extreme: poor, uneducated people have the same desired fertility as their wealthy, educated compatriots, regardless of their religion – a case of 'poverty Malthusianism'. The potential for family planning is high in both countries as more than 50% of the women having five children or more would have preferred to stop at four or less. Tanzania and Uganda have an intermediate position in desired family size and a lower potential for family planning. Generally, the main factor that sustains higher fertility is poverty exacerbated by religious norms among the poor only.

2.1 Introduction

The demographic developments in sub-Saharan Africa continue to puzzle population experts. After the turn of the millennium the stalling of the fertility decline in many countries gave new food for thought (Bongaarts, 2006, 2008; Westoff & Cross, 2006; Shapiro & Gebreselassie, 2008), while besides the debates continued on differential fertility change within countries (Westoff & Cross, 2006; Mason & Jensen, 1995; Nauck, 2007; Ezeh et al., 2009) as well as that on the unfinished family planning agenda (Cleland et al., 2006).

This chapter investigates the levels and determinants of excess fertility in East Africa, using data from the latest Demographic and Health Surveys (DHSs), with two exceptions. As the demographic development of Rwanda is the focus of this thesis, we included for this country two measure points, the one of 2005 and the one of 2010 to investigate changes over

time. For Tanzania we used not the latest, but the 2005 DHS data as in the latest information was missing on variables we wanted to include in our analyses. The study links up with the debate on variations at the national and the community levels and aims at identifying the community contexts in these countries that shape both actual and desired fertility and then determine excess fertility and at finding possible target groups for future family planning programs.

To provide a better understanding of the regional background a condensed picture of the socio-economic and demographic position of the countries concerned is presented in section 2, along with a sketch of the family planning policies and performance. In section 3, the theoretical background to the analysis is elaborated by building upon relevant literature. Section 4 concerns the materials and methods used. The empirical analyses and results are presented in section 5. This is followed by the conclusion of results (section 6).

2.2 Background

The four countries under study are members of the East African Community (EAC). The countries differ in many ways, but they all have still a predominantly rural-based society and share a modest position on the UNDP Human Development Index list (UNDP, 2013). Kenya occupies the relatively best position on the 2013 list, ranking 145 out of 186 countries. Rwanda ranks the lowest (167th), while Tanzania and Uganda come in at 152 and 161, respectively. Kenya owes its better position to a higher Gross National Product per capita and a more diversified economy, combined with a better educated population. Tanzania appears to be the society with the least inequality of the four countries: it has the lowest income Gini coefficient next to the highest life expectancy at birth. Rwanda stands out for its enormous population pressure: the population density (400 people per square kilometre in 2012 – the highest density in Africa) is 8 times that of Tanzania (51people per square kilometre). All countries witness a process of urbanization but the urbanization rates diverge.

Thus, although the structural socio-economic changes that are traditionally linked to changes in demographic regime are occurring in all four countries, the pace and the extent of change are not uniform. The fertility transition is on its way with a moderate to substantial decline (Hinde & Mturi, 2000; Blacker, 2002; Garenne & Joseph, 2002). With a Total Fertility Rate (TFR) of 4.6 births, Kenya and Rwanda have just entered the mid phase and Uganda (6.2 births) is still in the early phase of the fertility transition. Tanzania (5.4 births) is at the boundary between the early and early/mid phase (Table 2.1)[1].

Looking at the desired fertility (Table 2.1), Rwanda has the lowest average preference followed by Kenya. Uganda and Tanzania with one more wanted child than Kenya and one and half more than Rwanda still favor large families. The gap between the actual fertility and the desired family size is significant in all four countries, and particularly so in Rwanda and

[1] Ranges are taken from Bongaarts 2003: early phase (6-6.9); early/mid (5-5.9); mid (4-4.9); mid/late (3-3.9); late (2.1-2.9).

Uganda. Despite the recent impressive decline of fertility in Rwanda, this gap still exists, because of a similar decline in desired fertility.

Table 2.1 Total fertility rate and desired family size for all women (year of survey)

Indicator	Kenya	Tanzania	Uganda	Rwanda
Total fertility rate	4.6 (2008/9)	5.4 (2010)	6.2 (2011)	4.6 (2010)
Total fertility rate (previous DHS)	4.9 (2003)	6.1 (2004/05)	6.7 (2006)	6.1 (2005)
Desired family size	3.8 (2008/9)	4.9 (2010)	4.8 (2011)	3.3 (2010)
Desired family size (previous DHS)	3.9 (2003)	5.0 (2004/05)	5.0 (2006)	4.3 (2005)

Source: DHSs reports

The family planning programs vary in duration, government support, approach and objectives. The oldest program is that of Kenya. It received more real support from the government during the 1980s and 1990s than the programs in other countries. The program was among the best in sub-Saharan Africa (Caldwell & Caldwell, 1987; Caldwell & Caldwell, 2002). In contrast, in Tanzania there was no support from government and the programs were exclusively focused on birth spacing in order to improve child and maternal health (Oliff et al., 2003). In Uganda, there was little government commitment to family planning programs (Cleland et al., 2006), and until 1995 family planning services were limited to urban areas and to married women who were accompanied by their husbands. In Rwanda, an explicit family planning policy was adopted in 1990 in order to curb the high population growth.

After the 1994 genocide, the population policy was seen in a new light, and it focused on improving the quality of life and rebuilding dislocated families. In the new millennium, a new general policy was developed and issued by the Ministry of Health (Solo, 2008). This new program, like those in the neighboring countries, is more holistic in its goals for reproductive health and sustainable development (Ross & Stover, 2001; Vimard, 2008). Starting in 2006, Rwanda launched a large 'sensitizing' campaign to promote having three children as the ideal family size. This may account for the fact that, although the drop in TFR was substantial between 2005 and 2010, excess fertility is still very high in 2010, because desired family size went down just as fast (Table 2.1). Contraceptive prevalence is still limited in all four countries. The percentage is higher in Rwanda (51.6 %) and Kenya (45.5%) and lower in Tanzania (34.4%) and Uganda (30.0%) (National Institute of Statistics of Rwanda et al., 2012; Kenya National Bureau of Statistics and ICF Macro, 2010; Tanzania National Bureau of Statistics ICF Macro, 2011; Uganda Bureau of Statistics and ICF International, 2012).

2.3 Literature review

2.3.1 Desired fertility theories

According to the dominant economic interpretation of fertility behavior, the main driving forces that reduce the desired fertility are structural socio-economic transformations in societies, which lead to increasing expected costs for and diminishing benefits from children (Bongaarts, 2008). In modernizing societies, there appear new forms of investment and insurance that replace the initial function of having a large number of offspring and erode the expected benefits from children. The monetization of the economy increases awareness of the costs of raising children in terms of food, clothes, health and education. It also creates increasing employment prospects outside the home for women (Andorka, 1978; Cleland & Wilson, 1987).

In this explanatory framework, fertility is seen as the outcome of a couple's rational and conscious decision-making. Irrespective of the type of society, couples balance the costs of having children against the expected economic, social and psychological gains they could obtain through them. The wide application of this framework in numerous studies of fertility change, however, did not stop the debate on the driving forces of fertility decline. The first issue is whether the cost-benefit approach is equally valid in every phase of the demographic transition (Robinson, 1997; Ezeh et al., 2009). The second is the role of the social and cultural determinants of reproductive behavior. The value that couples attach to children is influenced by the norms and attitudes of their social surroundings, and the impact of those sociocultural determinants appears to change in character and force during the demographic transition (Easterlin et al., 1980; Bongaarts, 2002; Hakim, 2003; Pollak & Watkins, 1993; Nauck, 2007). Some therefore state that economic and cultural approaches should be combined (Bongaarts, 2008). We will follow this approach in our analysis.

Particularly in the early to mid-phases of the transition, couples are expected to conform to their community's norms and attitudes concerning reproductive behavior, because familial and social networks are important in a context where formal social security systems are absent and trust in state institutions is weak. People rely on their familial and social networks for access to resources and support in the case of need and will therefore not deviate strongly from the shared values and norms of their community (Smith, 2004, Caldwell, & Caldwell, 1987). New ideas about reproductive behavior will be picked up not from modern media but from interaction within family and community networks (Bongaarts, 2002).

Several socio-economic factors changing with socio-economic development or family planning campaign affect the demand for children (and then excess fertility). Educational level that slows down traditional beliefs seems to be the most important. A substantial amount of empirical literature demonstrates that there is a strong negative correlation between educational level and fertility preferences and behavior (Martin, 1995; Basu, 2002; Cleland, 2002; Bongaarts, 2002). Religion, generally, operates in reverse direction, but this depends on the demographic transitional phase and varies with socio-economic positions (Chamie, 1977; Chaudhury, 1984). The religious effect is higher among lower socio-economic groups and lower and even absent among wealthy people. Residence has shown a different pattern in both desiring and achievement. Compared with rural area, urban environments offer their residents more varied opportunities in terms of labor and education for their children, and are associated with cultural diversity and openness to new ideas (Garenne & Joseph, 2002), contribute to the weakening of traditional norms and values, such

as the system of sharing resources making them more tolerant of small families and more in favor of family planning (Gurmu & Mace, 2008).

Regardless of the indicator used, studies show that the desired family size is negatively associated with economic position: couples with a low position desire and have more children than those with a higher position (Hyatt & Milne, 1993; Gwatkin et al., 2007). However, in some contexts that reasoning won't stand up. An adverse relationship is observed in settings of economic crisis or personal hardship (Egerö, 1996). In some Asian countries, women from poorer households have reported lower demand for children relative to women in the richest group (Orbeta, 2005; Alonzo et al., 2004). A study conducted in Nigeria during a period of crisis showed that respondents who stated that poverty had affected their economic expectations had lower fertility preferences than those who were indifferent or held opposing views (Odusola, 2002). This finding indicates that the negative impact of poverty on desired family size occurs when people are aware that they lack economic opportunities or are unable to support many children. The latter is sometimes referred to as 'poverty Malthusianism' in relation to Latin American and Asian cases (Cosio-Zavala, 1995 mentioned in Kothari & Krishnaswamy, 1998).

Finally, the level of child mortality plays an important role to determine the desired family size and the decision to use contraception to achieve the desired one, through the mechanisms of insurance and replacement mechanisms (Mturi, 1989; Sanderson, 2001). We expect that women who have lost some children desire more children than women who have not lost children, other things being equal.

2.3.2 Excess fertility and demographic transition

The phenomenon of excess fertility is directly related to lower fertility preferences, because a lower desired fertility can be achieved only by limiting the number of births. This requires adaptations in sexual behavior and access to and trust in contraceptive means. Unless these conditions are fulfilled, the ultimate family size will probably surpass the desired one.

According to the classical demographic transition theory, the desired fertility generally declines and excess fertility increases in the early and mid-phases of the transition, following an inverted U-shaped curve (Easterlin et al., 1980; Bongaarts, 1997). In the pre-transitional phase, fertility is considered 'natural' and both socio-cultural and economic determinants favor high fertility. Excess fertility does not occur in this phase. This situation changes as soon as the transition process takes off and the mortality risks decline. At the start, a small group in society (particularly the wealthier urban segment of the population) experiences fertility excess and a few innovators start to use contraception, but most people, even though they desire fewer children, do not practice contraception because the social and economic costs of fertility control outweigh the benefits. For an increasing number of couples, in this phase socio-economic factors start to conflict with those related to social and cultural ones. Excess fertility rises, because couples do not stop childbearing after the desired family size is attained.

In the mid and late transitional phases, reproductive change spreads rapidly as more population groups profit from socio-economic development and the diffusion of new ideas through social interaction processes reinforces rather than inhibits demographic change.

Traditional socio-cultural factors gradually lose their influence, leading to less resistance to having a limited number of offspring and to a drop in the social costs of contraception. Hence, excess fertility peaks before it starts to diminish substantially. In those phases, fertility behavior is more consistent with the expectations of most demographic and economic theories of fertility (Becker, 1991) and cultural factors play a more limited role. In the higher socio-economic stratum of the population, excess fertility tends to disappear, but it remains high among lower socio-economic and rural communities. This situation has been found all over the world in countries where the fertility transition is more advanced (Rahman et al., 2002; Hakkert, 2001).

Excess fertility could be conceived as unmet need for contraception. Apart from limited access to services, four constraints influence the use of effective modern family planning methods: insufficient knowledge, fear of social disapproval, fear of side effects and perception of husband's opposition (Cleland, 2006). Fear of social disapproval is a constraint that refers to the community level. The other constraints concern the individual level and relate partly to the same determinants that shape the decline in desired family size (Njogu, 1991; Guilkey & Jayne, 1997; Cleland, 2006), although the line of reasoning differs at some points. Urban residence coincides with less excess fertility, not only because of the tolerance towards the use of contraceptive means, but also because of the better access to reproductive health facilities. Higher education is thought to contribute to the use of contraceptives, as mothers are expected to combine demanding jobs with reproductive duties; education also has an impact on the capability of the people in these groups to meet their need for contraceptives. It is also thought that educated women are less fearful of side effects and encounter less opposition from their husbands.

Most African societies are marked by gender inequities and a patriarchal social system (Van de Walle & Meekers, 1992). As a consequence, women have a lower status and fertility decision-making is controlled by their male partners (Chege, 2005), who often do not experience the burdens of rearing many children because they leave that task to their wives. However, in family settings with a high level of inter-spousal communication, a desire for smaller families appears (Isiugo-Abanihe, 1994; Gebreselassie, 2008). We expect that if the male partner wants more children or the woman does not know her partner's preference, a woman is likely to be in excess fertility.

2.4 Materials and Methods

2.4.1 Data

The data for this research are drawn from the Kenya 2008/9, Tanzania 2005, Rwanda 2005, 2010 and Uganda 2011 Demographic and Health Survey data sets (National Institute of Statistics of Rwanda et al., 2006 & 2012; Kenya National Bureau of Statistics and ICF Macro, 2010; National Bureau of Statistics of Tanzania and ICF Macro, 2011; Uganda Bureau of Statistics and ICF International, 2012). The data are collected by means of nationally representative samples of households, and are readily comparable because the standard DHS questionnaire was used. As this study was restricted to married women or

women living in a consensual union who have at least one child and reported numerical responses to the question about ideal family size, the analysis included 4,356 women from Kenya, 6,022 from Tanzania, 5,287 and 6,337 respectively from Rwanda, and 4,868 from Uganda.

2.4.2 Dependent variable

This study is focused on excess fertility. Excess fertility is a situation in which actual fertility exceeds desired fertility. Because of this definition, women without children were removed from this analysis. Actual fertility is the number of living, not ever born, children a woman had at the moment of interview. Desired fertility is obtained from the question on the ideal number of children, a question that aims to measure fertility preferences of the population. Excess fertility is also called unwanted fertility (Easterlin et al., 1980).

The dependent variable is a binary variable with value zero if the actual number of children is less than or equal to the desired number, and one if otherwise. As the outcome variable is binary, having excess fertility or not, we will be using the logistic regression model that converts the outcome into a logit function, the log-odds of being with excess fertility or not.

Binary regression estimation model

In this research, excess fertility is assessed as a function of a various socio-economic and socio-cultural factors that shape both the desired and actual fertility from which excess fertility is drawn. The logistic regression establishes a linear relationship between the logarithm of p / 1-p called logit and independent variables. The logistic regression model is written as follows:

$$\text{logit}(P) = \text{Ln}(P/(1-P)) = \beta_0 + \beta_1 X_1 + \beta_2 Y_2 + \beta_3 Z_3 + \varepsilon_i,$$

Where p is the probability of having excess fertility, Xi represent independent variables and βi their estimated coefficients. ε_i represents error term.

Issues related to desired fertility

To obtain data about the desired number of children, two questions were used in the DHS questionnaire. The one for women with children was: 'If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?' Although responses to these questions should be integer values, between 1.1 and 7.3 % of respondents gave non-numerical answers, such as 'It depends on God', 'As many as I can support' or 'As many as my husband wishes'. These respondents were removed from the data set, although it is acknowledged that this exclusion may have distorted the results. However, considering the limited number of excluded respondents, the bias is acceptable.

These questions about the ideal number of children are aimed at measuring the reproductive norms in the population and providing a quantitative basis for assessing

variation in desired and actual fertility. The desired fertility also enables the calculation of excess fertility through the comparison of desired and actual fertility. Despite this important objective, responses to the question about the ideal number of children, as an indicator of the desired fertility, have been criticized regarding their validity and reliability (Casterline & El-Zeini, 2007), particularly for the African context (Johnson-Hanks, 2007).

The first criticism relates to the survey questions themselves and the answers they elicit. The answers could be misleading, as they reflect unformed, ephemeral views that change during the life course, and the effects of child mortality risks are not explicitly taken into account in the questions. Respondents presumably do not include possible child deaths in their ideal family size and may need to bear additional children in order to achieve that size. Thus, the total number of births in a marriage may exceed the desired family size without any child being unwanted (Bhushan & Hill, 1995). To meet this objection we included mortality experiences in the model.

The second criticism is that there could be a rationalization of the desired family size to the actual family size. Despite the likelihood that some rationalization occurs, many respondents report ideal sizes that are lower or higher than their actual number of surviving children, also in East Africa (Tables 2.1 and 2.2). Only between 11 and 25 % of all women reported their actual number of children as ideal, and between 12 and 36 % reported their actual fertility as exceeding their desired fertility. Some 21 to 72 % of women with 5 children reported excess.

Table 2.2 Percentage of women with two children or more whose desired fertility is greater than, equal to or less than their actual fertility

Country	Category of desired fertility	Number of living children							
		2	3	4	5	6	7	8+	Total
Kenya	Greater	72.7	59.3	33.1	29.7	25.9	22.8	18.3	47.7
	Equal	24.7	24.0	41.5	16.5	21.2	11.1	13.9	24.8
	Less	2.6	16.7	25.4	53.8	52.9	66.3	67.8	27.5
Tanzania	Greater	96.2	92.0	72.1	59.9	42.9	42.8	26.1	77.3
	Equal	3.7	6.4	21.6	19.0	29.0	13.0	15.0	10.8
	Less	0.2	1.6	6.3	21.2	28.2	44.3	58.9	11.9
Uganda	Greater	93.2	87.3	59.5	55.4	32.0	31.5	15.4	60.8
	Equal	5.7	6.3	32.0	13.0	26.0	8.1	7.7	14.2
	Less	1.0	6.4	8.5	31.6	42.0	60.4	76.9	25.0
Rwanda 2005	Greater	90.5	83.7	41.3	28.1	12.5	8.6	4.0	62.9
	Equal	9.0	10.7	47.5	21.8	17.0	6.7	6.3	14.8
	Less	0.5	5.6	11.2	50.1	70.5	84.7	89.7	22.3
Rwanda 2010	Greater	82.3	55.8	23.6	16.6	11.0	10.6	6.1	41.5
	Equal	17.0	33.6	39.2	11.7	10.7	4.0	6.5	22.1
	Less	0.7	10.6	37.2	71.7	78.3	85.4	87.4	36.4

Source: *computation from the datasets*

This figure rises to 59 to 87 % for women with 8 or more surviving children. Even if there is rationalization in some cases, this does not apply to the majority of the respondents who had a high number of surviving children. The correlation coefficients between the number of surviving children and the ideal number show a weak relationship: the values range from 0.32 for Rwanda (2010) to 0.34 for Kenya, 0.43 for Tanzania and 0.31 for Uganda.

The third criticism is that responses from women alone may not describe the real norms that guide fertility decisions. The attitudes of other family members, especially husbands or partners, may exert a great influence on reproductive decisions, particularly in sub-Saharan Africa where stronger unbalanced gender relations prevail. In practice, however, the importance of this criticism is doubtful. The evidence from surveys in which both husbands and wives were interviewed suggests that there is no radical difference between the views of the two sexes (Rutstein & Rojas, 2006). In East Africa, the evidence is mixed: in Rwanda, men desire fewer children than women, but in the other three countries their preference is higher than that of women. In this study we address this specific problem by including the husband's desire in the model of excess fertility reported by the women.

2.4.3 Independent variables

Excess fertility was modelled as a function of various socio-economic and sociocultural variables that define communities which are the focus point of this research. We have restricted the analysis to socio-economic and cultural variables, because they are exogenous to the dependent variable. Demographic factors, like mortality, have been excluded from the analysis since they operate through the components of excess fertility, namely actual and desired fertility. Only the number of living children is used as it is an important variable of control. Also, in order to avoid the problem of endogeneity, such proximate determinants as knowledge of contraception and approval of contraception were not included in the analysis.

We shall note that socio-economic and socio-cultural factors operate differently. While the first group leads to desire lower fertility, the second is expected to reflect a pro-natalist attitude. To check the effect of communities on the excess fertility, an interaction effect of the religious affiliation with educational level was included. For more details about independent variables and their categories see the table in the appendix.

2.5 Results

As stated early, this study is focused on excess fertility which is defined in reference to desired and actual fertility. To understand the existence of excess fertility, our analysis starts with descriptive statistics on desired fertility that show the variability of demand for children between and within countries. Descriptive statistics are presented with respect to the two important socio-economic and socio-cultural factors that define communities of interest, mainly educational level and religion.

2.5.1 Economic and religious differentials in desired fertility

According to table 2.3 displaying the variations of desired fertility in terms of ideal number of children, it appears clearly that East Africa countries do not have the same attitude toward fertility and within the same country different communities have different aspirations regarding family size.

Table 2.3 Mean ideal number of children by country according to religion, education and wealth

	Kenya		Tanzania		Uganda		Rwanda 05		Rwanda 10	
National level	4.3		5.7		5.3		4.4		3.6	
	Christ	Musl	Christ	Musl	Christ	Musl	Christ	Musl	Christ	Musl
Educational level										
No education	5.9	8.3	5.8	7.0	6.8	6.5	4.7	4.0	4.0	4.0
Inc primary	4.1	5.6	5.4	6.1	5.3	5.3	4.4	3.9	3.6	3.2
Comp primary	3.7	5.1	4.9	5.1	4.7	5.1	4.2	4.4	3.5	3.1
Secondary and +	3.2	3.9	3.6	5.7	4.2	4.4	3.8	3.7	3.5	3.5
Wealth index										
Poorest	4.9	8.3	5.8	6.3	6.3	6.0	4.5	5.0	3.6	3.4
Poorer	4.0	7.4	5.5	6.3	5.1	5.7	4.5	4.3	3.7	3.6
Middle	4.0	5.9	5.3	6.4	5.2	5.4	4.5	4.4	3.6	2.6
Richer	3.6	5.4	4.9	6.2	5.3	5.1	4.4	3.9	3.8	4.0
Richest	3.1	4.5	3.9	5.1	4.3	4.7	4.1	3.7	3.5	3.2
Total Religion	3.8	6.7	5.1	6.0	5.3	5.2	4.4	3.9	3.6	3.4

Source: *computation from the datasets*
Christ: Christian; Musl: Muslim

Kenya exhibits the largest diversity of fertility preferences according to either religious communities or socio-economic ones. Rwanda has the lowest diversity. In Kenya, Muslims desire nearly twice the number of children desired by Christians (6.7 versus 3.8) whereas in Rwanda they desire slightly less than Christians; but the difference is small (3.4 versus 3.6). In 2005 this difference was a larger (0.5). The homogeneity between religious communities is also a feature of Uganda, yet with higher preferences than in Rwanda: 5.2 children for Muslims and 5.3 for Christians. Tanzania occupies an intermediate position: Muslims prefer one more child than Christians, respectively 6 and 5 children.

The differences in fertility preferences appear also when considering educational or economic communities. With regard to education, irrespective of religion; the differences are clear and straightforward in all countries. The desired fertility decreases progressively with the level of education. However, there are large variations across religious communities. The gap between women with no education and those who have reached the secondary school or more is strikingly different for Christians and Muslims in Kenya only where the gap is 2.7 for Christians and 4.4 for Muslim. In all other countries the educational gap is of the same magnitude for Christians and Muslims.

For Rwanda we see that between 2005 and 2010 the desired fertility decreased for all religious groups regardless of their educational level with exception of Muslims without education. Their mean ideal family size remained unchanged at 4.0 children.

With reference to economic status measured with wealth index of households, the pattern is similar to education, but the differences are less pronounced, except for Muslims in Kenya where the lowest quintile desires 3.8 more children than the highest. Everywhere else, the gap is lower than 2.0 children.

Considering the variations between religious communities in the same socio-economic stratum, the table 2.3 indicates that the differences are substantially important only among the lower stratum (non-educated or poorest). Among higher educated or wealthier, the differences are limited and even vanish. Among non-educated women, the differences between Christians and Muslim vary between 0.0 children in Rwanda and 2.4 children in Kenya; while among higher educated the differences are insignificant (less than one child) except in Tanzania where they remain at 2.1 children. An identical pattern is observed with regard to the wealth index. This results indicate that the religious conservatism remains among less educated communities while among the higher educated and richer it disappears.

2.5.2 Level of and factors associated with excess fertility

The differentiation in excess fertility is demonstrated through a graph that indicates the level of excess and a regression analysis which identify the determinants.

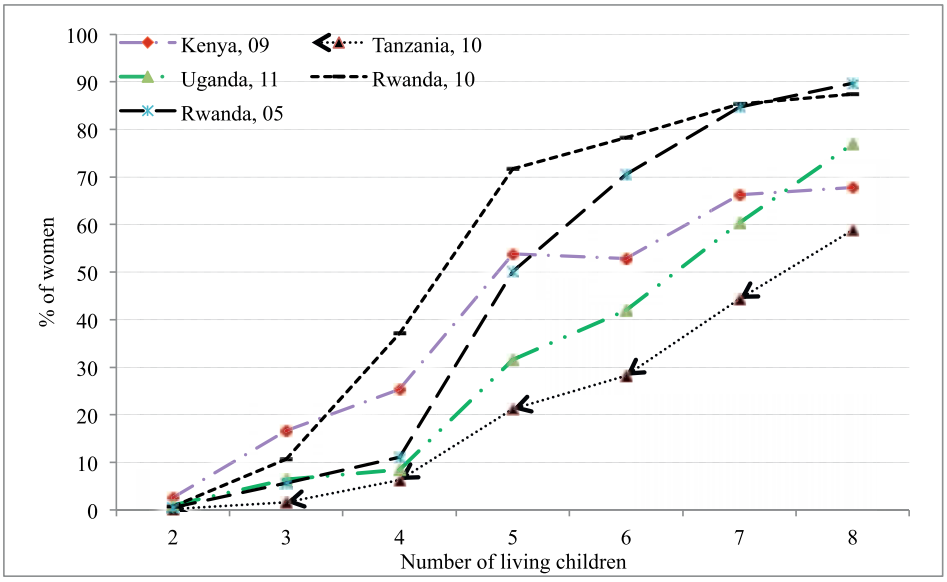

Figure 2.1 Percentage of women having excess fertility according to the number of living children
(Source: Table 2.2)

Figure 2.1 shows for each country the proportions of women with excess fertility according to their actual number of children. The graph clearly illustrates that excess fertility starts at different parities and changes at varying paces. In Kenya and Rwanda, some of the women with three or four children already reported having excess fertility, while this commences after parity 4 in the other countries. The graph shows a gradual increase in the proportion of women with excess fertility in all countries, except Rwanda where a sharp increase is to be seen after parity 3. For parity 4 and higher, Rwanda has the highest proportions of women with more children than desired, while their Tanzanian sisters show the lowest percentages. Among Tanzanian women with five children, less than 20% of the women reported excess fertility. At parity 9, 90% of the women in Rwanda are in excess fertility as opposed to only 50% in Tanzania.

These results indicate that a very substantial number of Rwandan and Kenyan women would want to limit their childbearing earlier than women in the other countries. In Kenya and Rwanda, we even find a category that would have preferred to stop at three children.

The results of the binary logistic regression are shown as log-odds ratios in table 2.4. The most dominant factor is the number of children, which has a very strong positive effect. Even after logarithmic transformation the relation between the number of children and the odds of being in excess fertility is not linear. The effect of an extra child on excess fertility is much higher if a woman has three to five children than if she has six or more. To capture this effect we included in the model the square of the number of children. The effect of an extra child is much stronger in Rwanda than in the other countries, indicating that excess fertility there starts at a lower number. The reference category of poor, uneducated rural Catholics in this country with 5 children has a log-odd of 0.809 (=-9.511+3.029*5+-0.193*25) meaning 69% would prefer to have fewer children. For Kenya this is 17% and for Tanzania and Uganda it is as low as 9% and 5% of these women respectively. Again it is found that the other variables hardly enter the equation in Rwanda. This country is very homogeneous in terms of both the desired number and the awareness of excess fertility. The poor are just as aware of having too many children as the wealthy.

Looking at the other factors, again it turns out that the heterogeneity in the awareness of excess fertility is most prominent in Kenya. The effects of education of the woman and her partner are highly positive, as is the effect of increasing wealth. The higher socio-economic classes in this country not only want fewer children, but are also more aware of having too many. Muslims provide a special case again. Given the actual number of children they have, few of the uneducated indicated that they would have preferred fewer (-2.35). However, this is offset by the interaction effect of the higher educated Muslims (+2.19), meaning that this group is just as aware of excess fertility as higher educated Catholics or Protestants.

In Tanzania, the role of education is less pronounced and the women's educational level is not even significant. The effect of increasing wealth is stronger than it is in Kenya. Even the better educated Muslims are less aware of excess fertility than their Christian counterparts. Tanzania is the country in which religious affiliation has an impact on fertility preferences for all socio-economic strata. Uganda resembles Kenya in the role of education, of both women and their partners, but the effects of wealth and religion are completely different: the poor are more aware of having too many children than the Ugandan middle and

Table 2.4 Log odds of being in excess fertility from the binary logistic regression

Variable	Kenya		Tanzania		Uganda		Rwanda 05		Rwanda 10	
Constant	-8.236	***	-10.138	***	-9.610	***	-10.440	***	-9.511	***
No living children	1.809	***	2.064	***	1.715	***	2.674	***	3.029	***
No living children sqd	-.096	***	-.100	***	-.073	***	-.138	***	-.193	***
Residence (urb vs rural)	-.078		.153		.316	**	.221		-.020	
Woman's religion (ref. cathol)										
Protestant	-.124		-.180		.441	**	-.190		-.036	
Muslim	-2.352	***	-1.182	***	.085		.125		-.649	
Others	-1.374	***	-.782	***	.555		.393		.155	
Woman education (ref. none)										
Inc primary	.481		.075		.756	***	.303	*	.145	
Com primary	1.053	***	.162		1.173	***	.304		.331	
Secondary and +	.697	*	.279		1.404	***	.604	**	.790	***
Husband education (ref. none)										
Inc primary	.799	***	.270	*	.875	***	.154		.074	
Com primary	.898	***	.292	*	.796	***	.074		.232	*
Secondary and +	.629	***	.140		.950	***	.021		-.083	
Woman occupation (ref. cult)										
Craftswoman	-.932	***	.049		(-)		-.423		.121	
Worker in service	-.126		.590	**	.170		.087		-.019	
Others	-.299	**	-.126		-.146		.023		-.303	**
Wealth index (ref. poorest)										
Poor	.475	***	.273		.133		-.101		-.190	
Middle	.361	**	.331	**	.090		-.081		-.080	
Richer	.548	***	.656	***	.001		.255		-.378	***
Richest	.531	**	1.125	***	.042		.063		-.180	
Husband desire for children (ref. same)										
More	.852	***	.261	**	.434	***	.195		-.017	
Fewer	.303		.172		-.379	**	.020		-.133	
DK	.212	*	.146		.115		-.008		-.174	
Interaction effects										
Protestant/ education (ref. none)										
Inc primary	.169		-.078		-.418		-.206		-.033	
Com primary	-.391		.289		-.737	**	.130		-.433	
Secondary and +	.324		.855		-.599	*	-.177		-.532	*
Muslim / education (ref. none)										
Inc primary	1.327	**	.463		-.579		.768		.776	
Com primary	.793		.923	***	-.523		-.255		1.247	
Secondary and +	2.194	***	-.132		-.840	*	-.101		-1.352	
Other relig /Educ (ref. none)										
Inc primary	.464		.168		-.725		-.411		.524	
Com primary	-1.100		-.025		.188		-.095		.745	
Secondary and +	1.819		(-)		(-)		-.260		-.679	
Pseudo- R^2	0.513		0.493		0.527		0.664		0.631	
N	4365		6022		4868		5287		6337	

* Significant at 10% level ** Significant at 5% level *** Significant at 1% level.

(-) indicates that there are insufficient cases in this category to calculate a coefficient.

richer classes even if the results are not significant. Just as in Rwanda, this could be interpreted as a form of 'poverty Malthusianism'. Women are aware that they do not have the means to support large families. Religion does not play a significant role in this awareness.

A striking outcome for all countries, except Uganda, is that the effect of the urban/rural divide disappears after controlling levels of education, occupational structure, wealth and religious composition. The urban/rural dichotomy is a container concept that captures the socio-economic and sociocultural differentiation of the population rather than being an explanatory factor in itself. Table 2.5 summarizes the differential role of religion and socio-economic well-being in the four countries, by showing the estimate of the number of children at which a majority of the women indicate they would have wanted fewer children.

Table 2.5 Parity (mean number of children) at which excess fertility starts to be dominant (>50%) within women for highest and lowest socio-economic classes by religion

Religion	Catholic		Protestant		Muslim	
Country	Highest category	Lowest category	Highest category	Lowest category	Highest category	Lowest category
Kenya	5	8	5	8	6	UF*
Tanzania	5	8	5	9	7	UF*
Uganda	6	9	6	8	7	9
Rwanda 05	5	6	5	6	5	6
Rwanda 10	4	5	5	5	5	5

* Uncontrolled fertility, meaning that at no parity are the majority of the women in excess fertility

Source: *computation from the results of the model in table 2.4.*

It confirms the conclusion that in Kenya and Tanzania there is a large contrast between the wealthiest and best educated part of the population on the one hand, and the poor, uneducated part on the other. In these countries, even at parity 12 or higher, fewer than 50% of the poor uneducated Muslim women are estimated to be in excess fertility. Given the fact that they also want many children, this means that the preferences of these women are near to uncontrolled fertility. Uganda does not show any signs of religious differentials but Kenya and Tanzania exhibit important social-economic contrasts. In Rwanda, having more than four or five children is problematic in all strata of society.

2.6 Discussion and Conclusion

There are remarkable differences in desired and excess fertility between the four East African countries and between certain communities in those countries. The differences are largest in Kenya and smallest in Rwanda, while Tanzania and Uganda occupy intermediate positions.

Our outcomes also contribute to the understanding that both socio-economic and socio-cultural factors should be taken into consideration when studying the fertility behavior and that relations that hold for one community in a country are of no or less importance for another. New attitudes to desired family size diffuse along different paths within the various communities in a specific national context.

The effect of education – which is known to be one of the most important determinants of change in fertility attitudes and behavior – differs widely between the religious communities in a country. This difference probably relates to the minority status of these communities, and perhaps also to the strong social cohesion and control within them. The large communities of poor/uneducated Muslims in Kenya and Tanzania in particular seem to differ in reproductive norms from the Christian communities. The proportion of Muslims in Rwanda is very small, and the difference between religions communities is absent. The variation within religious subgroups undermines the role ascribed to religion. To get a clear picture of the significance of religion, a more precise categorization of religious communities would be preferable in future research.

The finding that the variation in desired family size and excess fertility according to religion within the socio-economic strata in every country is limited supports the conclusion that the main factor that sustains the higher demand for children in sub-Saharan Africa is poverty rather than religious norms. However, the most remarkable outcome of our analysis is the consensus among Rwandan population groups regarding desired fertility and excess fertility. This country shows homogeneity in desired family size for the various communities with only a few determinants displaying some significant impact. Contrary to the other East African countries, the awareness of being in excess fertility is found among all Rwandan communities. This limited differentiation can be understood if the current land problems are taken into account. The desire for fewer children might be a result of population pressure on the land and a lack of labor opportunities outside agriculture, which negate any current or future benefits from children's work. Instead, children are seen as a burden in terms of extra mouths to feed and extra outlay on school fees, clothes and health care. These findings confirm the assumption that the desired fertility is the outcome of parents' assessment of the costs and benefits of their offspring, besides the future opportunities of their children. Land problems would also explain why in Rwanda excess fertility is higher among agrarian and poorer communities than it is among similar communities in neighboring countries. It indicates that Rwanda is likely to be undergoing a type of demographic transition that in Latin America and Asia is called 'poverty Malthusianism'. Its fertility decline does not depend on socio-economic development, but is induced by poverty and a lack of income-generating activities.

The last implication of our findings is that low desired fertility is a necessary but not a sufficient condition to bring down actual fertility; unmet need is also a major determinant. Rwanda provides a good example. The sensitizing campaign brought about a sharp decrease in desired family size from 4.3 in 2005 to 3.3 in 2010. The expansion of reproductive health services was therefore welcomed by the population, leading to a very large drop in actual fertility from 6.1 to 4.6 in 2010. Without this decrease in ideal family size, excess fertility would have decreased in Rwanda. As it now stands, excess fertility is still prominent and the

potential for further reduction by improving access to services is still high. In other countries the situation is more complex.

In Kenya, there is a need to orient the campaign towards specific communities that are still in a pre-transitional phase of fertility transition. Without a reduction of desired fertility, family planning programs will not be effective. In Tanzania, the high desired fertility and low access to family planning are both determinants of the high fertility. Therefore, family planning programs should focus on both aspects, that is, they should aim at reducing higher desired fertility and at meeting the need for family planning. Family planning programs should be more oriented towards certain groups, such as rural Muslims and poorer people.

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Appendix

Percentage Distribution of respondents by background characteristics

Variable/ Categories	Kenya	Tanzania	Uganda	Rwanda 05	Rwanda 10
Woman's education					
No education	15.0	28.9	19.3	28.7	19.6
Inc primary	29.3	16.5	46.0	50.4	54.5
Comp primary	26.5	45.4	11.2	10.9	14.7
Secondary and +	29.3	9.2	23.5	10.0	11.2
Woman's occupation					
Cultivator	26.5	70.6	52.9	71.6	76.5
Craftswoman	4.9	11.4	-	1.9	4.1
Works in service	30.9	4.4	27.5	7.4	9.2
Others	37.6	13.6	19.6	19.1	10.2
Woman's religion					
Catholic	19.4	23.3	43.8	44.8	42.4
Protestant	62.8	23.6	41.3	50.8	54.2
Muslim	13.7	42.6	13.8	2.1	1.6
Others	4.1	10.5	1.0	2.4	1.9
Partner's education					
No education	11.2	19.4	11.3	26.1	19.5
Inc primary	18.7	18.9	36.7	44.4	50.9
Comp primary	28.2	48.7	15.8	15.5	16.2
Secondary and +	41.8	13.0	36.2	12.8	13.4
Wealth index					
Poorest	20.2	18.7	23.0	19.8	19.5
Poorer	16.4	19.4	18.7	19.5	19.9
Middle	18.0	19.2	17.1	19.0	19.7
Richer	19.4	23.0	16.4	21.4	20.3
Richest	26.0	19.6	24.8	20.3	20.5
Place of residence					
Urban	27.8	20.2	24.2	18.9	14.8
Rural	72.2	79.8	75.8	81.1	85.2
Partner desire for children					
Same	51.0	39.0	28.3	37.5	58.0
More	18.6	32.4	28.6	13.0	10.5
Fewer	6.3	4.5	8.8	19.3	17.9
Don't know	24.1	24.1	34.4	30.1	13.6
No living children: Mean (SD)	3.4 (2.1)	3.6 (2.3)	4.03 (2.3)	3.4 (2.2)	3.5 (2.0)
Total	100.0	100.0	100.0	100.0	100.0
N	4365	6022	4868	5287	6337

3 Demand and Unmet Need for Means of Family Limitation in Rwanda

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Abstract

Context: Rwanda is the most densely populated country in Africa, with substantial annual population growth. The current government seeks new policies for family limitation as a way to facilitate more sustainable development.
Methods: Data from the 2005 Rwanda Demographic and Health Survey were used for a two-step analysis; binary logistic regression was used to identify factors associated with desiring to stop childbearing and having unmet need.
Results: Eighty-seven percent of women aged 15–49 approve of family planning, but only 64% believe that their partner approves of it. There is a high level of unmet need for family limitation; 58% of women who want to stop childbearing do not use modern contraceptives. Demand was lower among women who did not approve of family planning, those who did not know their partner's attitude toward family planning and those who had discussed family planning with their partner fewer than three times. Unmet need was higher among women who did not approve of family planning, those who believed their partner did not approve of family planning or who did not know his attitude, and those who had never discussed family planning with their partner or had done so only once or twice.
Conclusions: Negative attitudes toward family planning and failing structures of provision are the dominant constraints on the use of modern contraceptives in Rwanda. Community-based family planning services could greatly expand access, especially in underserved provinces.

3.1 Introduction

Rwanda faces serious development problems. A high population growth rate—2.5% a year in the period 2000– 2005—is one of them. The vast majority of the country's nine million inhabitants live in rural areas, and 90% of the population work in agriculture. The country has the highest population density in Africa (360 people per square kilometre in 2008) and, with a

gross domestic product of US$250 per capita in 2005, it belongs to the group of very low-income countries (UNDP, 2007).

The country's high population growth contributes to continuing pressure on natural resources, particularly land, which is thought to be one of the underlying causes of the ethnic tensions that contributed to the killing of 800,000 Rwandese in 1994 (Verwimp, 2003). The country achieved an impressive economic growth rate (6%) in 2000–2006; however, during the same period, the number of poor people increased by half a million (UNDP, 2007).

Population issues have been on the government's agenda since 1981, when the National Office of Population (ONAPO) was created. Between 1981 and 1990, ONAPO focused on improving access to family planning services and promoting family planning through trained communicators known as *abakangurambaga* ("awakeners of the people") (Hakizimana, 1988). In 1990, ONAPO's activities were intensified when it began to provide modern contraceptives throughout the country; at this time, family planning became part of a broader national development policy that was aimed at increasing agricultural production, improving public health, and promoting the education, employment and empowerment of women. Development efforts in these fields were expected to create an environment favorable to behavioral changes that would result in lower fertility (NISR & ORC Macro, 2006); the aim was to reduce the total fertility rate from 8.6 to 4.0 and to raise the contraceptive prevalence rate from 2% to 48% by 2000 (Advance Africa, 2002). Implementation of the various policies facilitated a significant increase in the use of contraceptives: In 1983, only 11% of the population used contraceptives, while in 1992 the figure was 21% (Table 3.1) (May et al., 1990; May, 1995; Westoff & Bankole, 2000; NISR, 1994).

Table 3.1 Trends in fertility and demand for contraception among all fecund women in Rwanda, 1983, 1992, 2000 and 2005

Indicator	1983	1992	2000	2005
Total fertility rate	8.5	6.2	5.8	6.1
Ideal no of children	6.3	4.4	5.0	4.5
Demand for family planning (%)	na	61.6	48.8	55.3
Desire for family limitation (%)	18.6	30.4	17.5	23.3
Unmet need as a % of the desire for family limitation	88.7	74.7	66.3	57.5
Total practicing contraception (%)	11.2	21.2	10.5	17.3
% of users limiting births	25.1	51.9	44.7	56.9

Note: na=not available. *Sources:* **1983**—Westoff & Bankole, Trends in the demand for family limitation in developing countries, *International Family planning Perspectives*, 2000, 26 (2):56–62. **1992**—Office National de la Population, *Rwanda Demographic and Health Survey 1992,* Calverton, MD, USA: Macro International, 1994. **2000**—Office National de la Population, *Rwanda Demographic and Health Survey 2000,* Calverton, MD, USA: ORC Macro, 2001. **2005**—reference 4.

After the genocide in 1994, the population policy shifted toward reuniting dislocated families, and although ONAPO remained in existence, no activities related to slowing population growth were undertaken. Eight years later, ONAPO was dissolved and all population matters were transferred to the Ministry of Health. In 2003, the government formulated a new national population policy plan aimed at curbing demographic growth, managing natural

resources, ensuring food security, providing all children with access to primary and secondary education, realizing equal opportunity, and engaging both men and women in development (NISR & ORC Macro, 2006). Family planning was not mentioned in this plan; the assumption was that improved education and higher levels of wealth would stimulate the demand for and use of means for family limitation.

In February 2007, the government of Rwanda announced that it was considering new legislation to limit the size of Rwandan families: It proposed that three children per woman should become the standard (SIECUS, 2007). However, forced family planning is a sensitive issue in Rwanda, given cultural attitudes and the losses experienced during the genocide. The plan was never presented to parliament and the president later characterized it as a family planning "sensitization" campaign[1]. This is indicative of the current administration's ambivalence toward family planning.

Although the government acknowledged in the 2007 Human Development Report that high population growth hampers the country's economic growth and contributes to environmental degradation, policy has been focused on sustainable economic and human development as means to limit population growth, rather than on a comprehensive family planning program. Community mobilization and gender empowerment have been seen as important factors in reducing the total fertility rate (UNDP, 2007; MINECOFIN, 2007). However, provision of reproductive health care could be more effective in slowing population growth because unmet need for family limitation is high. This article explores some aspects of that potential.

3.2 Fertility decline and structures of provision

In Rwanda, the onset of the fertility decline was disturbed by civil war (Table 3.1). Although data for the period immediately following the genocide in 1994 are lacking, the Demographic and Health Survey data show that the ideal number of children rose from 4.4 in 1992 to 5.0 in 2000 and that the demand for family limitation decreased from 30% to 18% (a figure even lower than that for 1983) during that period. By 2005, the ideal number of children had returned to the level of the early 1990s. The demand for family planning services to limit family size had also increased, but not to the level of 1992. What had improved was the degree to which this demand was being met. The percentage of women considered to have an unmet need for family limiting dropped from 89% in 1983 to 58% in 2005[2]. However, Rwanda still lags behind other countries. If unmet need for means of spacing and limiting births are both taken into account, Rwanda has one of the highest levels of unmet need in the world—35% of fecund women in a union want to avoid or postpone their next child but are not using contraceptives (not shown) (UN, 2005).

As a result of the conflict of the early 1990s, Rwanda has reverted to the early phase of the demographic transition. Previous research shows that in this phase, socio-economic variables such as wealth and education are not related to demand for family planning, although they are related to the ability to obtain proper family planning services (Bongaarts, 2005). Instead, sociocultural values—such as attitudes toward the use of contraceptives and

the gender power balance in households—are hypothesized to have a strong effect on both the demand for and the actual practice of contraception.

Religion in Rwanda plays a double role in regard to fertility. The first role is in shaping the attitudes of the population. Most Rwandese claim a religious affiliation—in 2002, 50% of the population was Catholic, 27% Protestant and 13% Adventist (National Census Service, 2005).

The second role is in the provision of social services (particularly education and health care), which has been dominated by religious institutions since colonial times. Of the 406 public health facilities—37 hospitals and 369 health centers (including dispensaries)—in 2003, 40% had a religious affiliation. Because 60% of facilities with religious affiliations (25% of all facilities) do not offer modern methods of contraception (NISR, 2008), women living in the areas they serve may have great difficulty obtaining such methods.

To fill these gaps in care, starting in 1980, the government began to open secondary posts in which modern methods of family planning could be obtained. By 2003, there were 34 secondary posts. Creating these posts was an important step, because 73% of women using contraceptive methods receive them from government services (Solo, 2008). The private sector is not very well developed in Rwanda, especially in rural areas, and accounts for only 14% of the women receiving contraceptive services. The other 13% obtain methods from a variety of other sources. The main private organization involved in family planning is the Association Rwandaise pour le Bien-Être Familial (ARBEF), a non-profit organization established in 1986 that focuses primarily on family planning and sexual and reproductive health. ARBEF has permanent stations in the cities of Kigali, Butare, Ruhengeri and Gisenyi. In 2004, it provided 8% of all the contraceptives issued in Rwanda.

To inform Rwanda's population policy debate, we first set out to identify factors associated with the desire to limit family size. Our second step was to determine the individual and contextual constraints associated with non-use of contraceptives by women who want no more children.

3.3 Methods

Data for this study were drawn from the 2005 Rwanda Demographic and Health Survey (RDHS) (NISR & ORC Macro, 2006)[3,4]. We selected from the larger data set the group of fecund women in the age-group 15–49 years. A woman is assumed to be fecund unless she declares that she is infecund, has had a hysterectomy or is menopausal. Women are also considered infecund if they are neither pregnant nor experiencing postpartum amenorrhea but have not menstruated for six or more months, or are married, have not practiced contraception during the previous five years, have not given birth and are not currently pregnant. The sample was further limited to the 4,817 women living with partners, whether or not they were married. This is the population most at risk of having an unmet need for some form of family planning.

In our analyses, we draw extensively from the literature on factors associated with the use of family planning. We selected four sets of variables that we expected, given the results

of previous research (Westoff, 2006), to be relevant for explaining the demand or unmet need for family limitation.

The first set concerns the characteristics of a woman that are expected to influence her demand for and practice of birth control, such as age at the time of the survey, educational level, occupation, religion, place of residence (rural or urban) and province of residence (Kravdal, 2002; Agyei & Migadde, 1995; Ainsworth et al., 1996; Agadjanian, 2001; Dodoo & Tempenis, 2002)

Fertility behavior is also a function of the characteristics of the woman's partner and the socio-economic status of the household (Cohen, 2000; Talnan & Vimard, 2003; Becker, 1999). These factors can strengthen or weaken the impact of variables on individual women. Thus, the second set of variables includes the partner's education level and occupation, agreement with the partner on the desired number of offspring and the level of household wealth.

Because we were interested in the contribution of current family planning program activities to building and meeting the demand for methods of limiting births, the third set includes variables measuring exposure to information about and access to family planning facilities, such as the number of contraceptive methods known and information about family planning received through the media, a family planning worker or a visit to a health facility (Westoff & Rodriguez, 1995).

The fourth set of variables was used to measure attitudes toward the use of contraceptives—the woman's attitude, her perception of her partner's attitude and how often they discussed family planning (DeRose et al., 2004; Wolff et al., 2000).

We first examined descriptive statistics to identify possible links between these variables and the demand and unmet need for means of family limitation. We then used multivariate models to identify the significance and relative weight of each of the variables. The analysis consisted of two parts. In the first, we calculated the proportion of women who wanted to limit family size; in the second, we analyzed the level of unmet need among these women. Binary logistic regression was used to estimate the odds of desiring to stop childbearing and the odds of having unmet need[5].

3.4 Results

Among all fecund women living with a partner, 27% wanted to stop having children (Table 3.2). Thus, 1,321 women were considered to have a demand for family limitation; of this group, 57% were not practicing contraception and therefore were classified as having an unmet need for permanent methods of family planning.

Women's educational level is related to demand, though the relation is U-shaped rather than linear. However, there is a very clear linear relation to unmet need, which ranged from 69% among those who received fewer than three years of education to 27% among those who received at least 10 years of schooling. In keeping with findings from earlier studies, women who worked in agriculture had the lowest demand (26%) and the highest

level of unmet need (61%). Protestants had lower levels of demand and a higher level of unmet need than Catholics or others.

Table 3.2 Selected characteristics among fecund women, by desire for family limitation and unmet need, Rwanda Demographic and Health Survey, 2005

Variable	No.	Desire family limitation (%)	Have unmet need (%)†
ALL	4,817	27.4	57.3
Education			
0–2 yrs.	1,836	30.1	69.4
3–6 yrs.	1,998	23.8	56.4
7–9 yrs.	656	26.5	42.5
≥10 yrs.	327	36.7	26.7
Occupation			
Agriculture	3,402	26.2	61.4
Not working	940	27.7	59.6
Salaried	475	35.8	32.4
Religion			
Catholic	2,125	30.1	53.2
Protestant	2,477	24.8	62.3
Other	215	31.2	50.7
Locality			
Urban	935	35.6	44.7
Rural	3,882	25.5	61.5
Province			
Kigali	447	39.1	38.3
East	1,100	29.7	55.4
North	820	27.7	56.4
West	1,290	24.9	64.8
South	1,160	23.4	63.8
Household wealth index (quintiles)			
Poorest	947	24.7	68.4
Poorer	937	26.3	58.5
Middle	924	25.9	65.3
Richer	1,003	24	63.5
Richest	1,006	35.6	39.9
Partner's education			
0–2 yrs.	1,665	27.4	65.2
3–6 yrs.	1,931	27.6	60.4
7–9 yrs.	619	22.8	46.8
≥10 yrs.	480	32.9	31
Don't know	122	26.2	68.8
Partner's occupation			
Agriculture	3,519	25	63.9
Craftsman	655	33	48.6
Mid-salaried	322	32.3	44.2

High-salaried	221	37.1	29.3
Don′t know	100	41	51.2
Partner's desired no. of children			
Same	1,856	26.5	45.9
Fewer	939	27.5	53.9
More	628	29.9	70.7
Don′t know	1,394	27.5	67.6
Visited by family planning worker in previous 12 months			
Yes	278	27.7	53.2
No	4,539	27.4	57.6
Told about family planning at health facility			
Was told	865	30.9	42.7
Was not told	1,370	25.5	54.7
Was not at facility	2,582	27.3	64.1
Heard about family planning via media			
Yes	2,313	29.5	46.6
No	2,504	25.5	68.8
Approves of family planning			
Yes	4,192	28.4	53.9
No	447	20.6	91.3
No response	178	21.9	82.1
Partner approves of family planning			
Yes	3,084	29.1	43.6
No	729	26.5	86
Don't know	1,004	23.1	86.2
Discussed family planning with partner			
≥3 times	2,149	31.2	40.8
Once or twice	1,300	23.6	67.1
Never	1,267	23.1	83.6
No response	101	49.5	64

†Among those with a desire for family limitation. *Note:* Figures are percentages unless otherwise noted.

The first of our two geographic indicators, which distinguished between urban and rural residence, yielded the expected results. Given that the provision of family planning services is much better in urban areas than in rural areas, the level of unmet need found in urban areas is lower (45% vs. 62%). The second geographic indicator, the province of residence, also turned out as expected. Because both Kigali province and East province have a large population of displaced persons, we assumed that, in keeping with the theory of fertility migration (Brockerhoff & Yang, 1994) that population would want to have fewer children than people in other provinces and would act to achieve this aim. The level of unmet need was lower in Kigali province as expected (38%), but less so for East province (55%).

The variables for household wealth and the education and occupation of the partner, like the individual characteristics of the women, could be expected to show higher levels of demand and lower levels of unmet need in the wealthier subgroups. However, only the richest

20% of households and the partners with the most education and the highest salaries had levels of unmet need substantially lower than those in other subgroups. Demand was higher and unmet need lower among women who received information about family planning at health facilities than among those who received no information at these facilities or those who did not attend such a facility.

Although the vast majority of women (4,192 out of 4,817) approved of family planning, about one in five did not know whether their partner approves and about one in seven reported that he disapproved. In both instances, the levels of unmet need were extremely high. Slightly more than 50% of the women said they had discussed family planning with their partner only once or twice, or had never brought up the subject. Levels of unmet need were particularly high among these groups.

3.5 Demand for family limitation

The first model in table 3.3 includes the individual characteristics of the women and the two geographic factors. The second model adds the characteristics of the household, the third adds exposure to family planning services and the fourth adds attitudes toward family planning.

Women's socio-economic factors played a negligible role in their demand for means of family limitation (Model 1). There were no significant differences except in terms of the woman's occupation: Salaried women were significantly more likely to have a demand for family limitation than those working in agriculture (odds ratio, 1.4). Contrary to our expectations, religious affiliation did not influence the demand for means of family limitation. In contrast, regional variables were associated with women's desire to limit family size. The odds of desiring to limit family size were significantly lower among women living in South, West or North provinces than among those living in Kigali or East province (0.4–0.6 vs. 0.9–1.0). Also, rural women were less likely than urban woman to have a demand for family limitation (0.7).

When we included the household context variables (Model 2), the overall picture changed somewhat. Province of residence maintained its significance, but rural residence became only marginally significant and women's occupation lost its significance. Among the household context variables, only household wealth and partner's occupation were related to the desire for family limitation. Women from the wealthiest households and women who were married to craftsmen or men with mid-level salaries were more likely than women from poorer households or women married to cultivators to have a desire for family limitation (odds ratio, 1.4–1.6).

Among variables measuring exposure to information about contraception and access to family planning facilities (Model 3), not being informed about family planning at a health facility was negatively associated with the desire to limit family size.

Table 3.3 Odds ratios from a binary logistic regression model to identify characteristics associated with the desire for family limitation

Variable	Model 1	Model 2	Model 3	Model 4
Age (mean, 31.3 yrs.)	1.19**	1.20**	1.20**	1.20**
Education				
0–2 yrs. (ref)	1.00	1.00	1.00	1.00
3–6 yrs.	1.10	1.05	1.02	1.00
7–9 yrs.	1.00	0.89	0.83	0.80†
≥10 yrs.	0.98	0.77	0.67*	0.66*
Occupation				
Agriculture (ref)	1.00	1.00	1.00	1.00
Not working	1.21†	1.10	1.15	1.18
Salaried	1.38*	1.06	1.07	1.04
Religion				
Catholic (ref)	1.00	1.00	1.00	1.00
Protestant	0.92	0.89	0.91	0.94
Other	0.96	0.90	0.90	0.91
Locality				
Urban (ref)	1.00	1.00	1.00	1.00
Rural	0.67**	0.79†	0.80†	0.79†
Province				
Kigali (ref)	1.00	1.00	1.00	1.00
East	0.90	1.04	1.07	1.06
North	0.64**	0.70*	0.68*	0.67*
West	0.53**	0.61**	0.62**	0.62**
South	0.43**	0.49**	0.50**	0.50**
Household wealth index				
Poorest (ref)	na	1.00	1.00	1.00
Poorer	na	1.00	0.98	0.98
Middle	na	1.03	1.02	1.03
Richer	na	0.96	0.93	0.94
Richest	na	1.38*	1.30†	1.32†
Partner's education				
0–2 yrs. (ref)	na	1.00	1.00	1.00
3–6 yrs.	na	1.05	1.04	1.05
7–9 yrs.	na	1.17	1.14	1.16
≥10 yrs.	na	1.18	1.13	1.17
Don't know	na	0.94	0.94	0.92
Partner's occupation				
Agriculture (ref)	na	1.00	1.00	1.00
Craftsman	na	1.59**	1.54**	1.51**
Mid-salaried	na	1.64**	1.59**	1.56**
High-salaried	na	1.11	1.07	1.07
Don't know	na	1.61†	1.58†	1.56†
Partner's desired no. of children				

Same	na	1.00	1.00	1.00
Few	na	0.93	0.93	0.95
More	na	0.88	0.88	0.97
Don't know	na	0.92	0.98	1.16
Visited by family planning worker in previous 12 months				
Yes (ref)	na	na	1.00	1.00
No	na	na	1.06	1.06
Told about family planning at health facility				
Was told (ref)	na	na	1.00	1.00
Was not told	na	na	0.71**	0.74*
Was not at facility	na	na	0.79*	0.85
No. of known family planning methods (mean: 6.3)	na	na	1.06**	1.05**
Heard about family planning via media				
Yes (ref)	na	na	1.00	1.00
No	na	na	0.99	1.07
Approves of family planning				
Yes (ref)	na	na	na	1.00
No	na	na	na	0.66**
No response	na	na	na	0.98
Partner approves of family planning				
Yes (ref)	na	na	na	1.00
No	na	na	na	0.99
Don't know	na	na	na	0.77†
Discussed family planning with partner				
≥3 times (ref)	na	na	na	1.00
Once or twice	na	na	na	0.76**
Never	na	na	na	0.69**
No response	na	na	na	2.12**
Constant	0.04	0.03	0.02	0.02
Pseudo R^2	0 .340	0.349	0.356	0.367
Predication % correct	79.2	79.1	79.3	79.8

*p<.05. **p<.01. †p<.10. *Notes:* ref=reference group. na = not applicable.

Finally, when the variables on attitudes toward and perceptions of family planning were added (Model 4), the level of significance of almost all factors included in earlier models remained unchanged. Among the newly added variables, women's disapproval of family planning was negatively associated with desire for family limitation, as could be expected. This finding, however, may indicate that those who did not want to limit their family size were more liable to disapprove of contraception. Women who had little to no communication with their partner about family planning had lower odds of wanting to limit family size than those who had discussed the topic with their partner at least three times (0.7–0.8).

3.6 Unmet need for family limitation

As the first model in table 3.4 shows, the odds of having an unmet need for means of family limitation were negatively and strongly associated with a woman's educational level. Compared with women with 0–2 years of schooling, those with more education had significantly lower odds of having unmet need (odds ratios, 0.3–0.6). Protestant women had a significantly higher level of unmet need than Catholics (1.4). Surprisingly, there was no significant difference between rural and urban women in the odds of having an unmet need for permanent methods of contraception.

These findings remained similar with the addition of the household context variables (Model 2). Of the four new variables included in this model, only the partner's perceived desire for children was significant. Compared with women who believed that their partner's desire matched their own, those who believed that their partner desired more children than they themselves did and those who did not know their partner's desire were more likely to have an unmet need for means of family limitation (2.8 and 2.0, respectively).

When variables measuring exposure to contraceptive information and access to family planning services were added (Model 3), the odds of having unmet need were higher among uninformed women. Compared with women who had been told about contraception at a clinic, those who had not been told and those who had not visited a clinic were significantly more likely to have an unmet need for permanent methods (1.9 and 2.0, respectively). In addition, the odds of unmet need declined with each additional method known (0.8). Finally, women who had not heard of family planning methods through the media were significantly more likely than those who had to have an unmet need (1.4).

In the final model, all three measures of attitudes toward family planning were associated with unmet need. Other things being equal, the odds of having an unmet need were higher among women who disapproved of family planning (odds ratio, 2.9), those whose partners disapproved of family planning (4.1) and those who discussed family planning issues with their partners rarely or not at all (odds ratios, 1.9–3.0).

When the attitudinal variables were added, however, the significance of some of the variables included in earlier models changed (i.e., education, religion, partner's desire for children, and having obtained knowledge about family planning through media campaigns), suggesting that attitudinal variables drive these factors. In particular, the effect on women who indicated that they did not know their partners' desired number of children is striking: the odds changed from significantly positive (1.9) to negative but not significant (0.7), which suggests that discussion of family planning and knowing the partner's opinion about it may contribute to a lower risk of unmet need, even if the woman is not sure about her partner's desired number of offspring. The pseudo R^2 values show that all models contributed to the explanation of unmet need; however, the contribution of Model 4 was more substantial than that of Models 2 and 3.

Table 3.4 Odds ratios from a binary logistic regression model to identify characteristics associated with the unmet need for means of family limitation

Variable	Model 1	Model 2	Model 3	Model 4
Age (mean, 37.0 yrs.)	1.02*	1.01	1.02†	1.01
Education				
0–2 yrs. (ref)	1.00	1.00	1.00	1.00
3–6 yrs.	0.63**	0.68**	0.71*	0.67*
7–9 yrs.	0.40**	0.50**	0.66*	0.69
≥10 yrs.	0.25**	0.41**	0.66	0.70
Occupation				
Agriculture (ref)	1.00	1.00	1.00	1.00
Not working	1.22	1.27	1.08	0.91
Salaried	0.65†	0.74	0.69	0.67
Religion				
Catholic (ref)	1.00	1.00	1.00	1.00
Protestant	1.44**	1.46**	1.46**	1.22
Other	1.03	1.21	1.28	1.34
Locality				
Urban (ref)	1.00	1.00	1.00	1.00
Rural	1.22	1.08	1.07	1.17
Province				
Kigali (ref)	1.00	1.00	1.00	1.00
East	1.00	0.91	0.84	0.73
North	1.32	1.24	1.32	1.40
West	1.59†	1.33	1.14	1.10
South	1.63†	1.45	1.38	1.27
Household wealth index				
Poorest (ref)	na	1.00	1.00	1.00
Poorer	na	0.77	0.82	0.83
Middle	na	1.10	1.12	1.16
Richer	na	1.02	1.13	1.22
Richest	na	0.68†	0.82	0.91
Partner's education				
0–2 yrs. (ref)	na	1.00	1.00	1.00
3–6 yrs.	na	1.01	1.06	1.07
7–9 yrs.	na	0.89	1.01	1.05
≥10 yrs.	na	0.81	0.93	0.86
Don't know	na	1.94	1.89	1.77
Partner's occupation				
Agriculture (ref)	na	1.00	1.00	1.00
Craftsman	na	0.76	0.92	0.90
Mid-salaried	na	0.76	0.83	0.83
High-salaried	na	0.59†	0.56†	0.52†
Don't know	na	0.90	0.97	0.85
Partner's desired no. of children				
Same (ref)	na	1.00	1.00	1.00

Fewer	na	1.22	1.27	1.24
More	na	2.81**	3.18**	1.62*
Don′t know	na	2.03**	1.85**	0.74
Visited by family planning worker in previous 12 months				
Yes (ref)	na	na	1.00	1.00
No	na	na	1.05	1.00
Told about family planning at health facility				
Was told (ref)	na	na	1.00	1.00
Was not told	na	na	1.87**	1.63*
Was not at facility	na	na	2.00*	1.59*
No. of known family planning methods (mean: 6.9)	na	na	0.83**	0.83**
Heard about family planning via media				
Yes (ref)	na	na	1.00	1.00
No	na	na	1.39*	1.17
Approves of family planning				
Yes (ref)	na	na	na	1.00
No	na	na	na	2.89*
No response	na	na	na	0.93
Partner approves of family planning				
Yes (ref)	na	na	na	1.00
No	na	na	na	4.11**
Don't know	na	na	na	4.35**
Discussed family planning with partner				
≥3 times (ref)	na	na	na	1.00
Once or twice	na	na	na	1.88**
Never	na	na	na	3.00**
No response	na	na	na	1.10
Constant	0.81	0.83	1.1	0.96
Pseudo R^2	0.132	0.187	0.266	0.384
Predication % correct	65.4	67.1	69.3	74.7

*p<.05. **p<.01. †p<.10. *Notes:* ref=reference group. na=not applicable.

3.7 Discussion

Rwanda can be characterized as a country in which modernization processes have not yet resulted in a substantial differentiation among women regarding the desire for family limitation. Preventing pregnancy becomes an option for women only as they advance in years or when their actual number of children approaches the desired number, regardless of their level of education, the type of work they perform or their religious background. A pronatalist attitude prevails, which makes family planning a low-priority issue at present.

However, some of our findings indicate a change in this attitude. For example, the proportion of women who want to limit their family size is higher in urban areas than in rural

areas, and the proportion of women who desire to limit their family size is highest among women in the wealthiest households.

In most countries, the education of women is an important trigger for fertility decline. In Rwanda, however, a woman's level of education is not strongly associated with her desire to end childbearing. In our results, women with 10 or more years of education had lower odds of desiring to limit their families than women with less education.

More important than stimulating the desire to limit the number of children is tackling the unmet need for means of family limitation. The vast majority of women approve of family planning, but more than 50% of those who want to stop having children have an unmet need for modern contraception. Education and wealth seem to play roles in reducing unmet need, but the effects are limited. Talking about family planning is a taboo in many Rwandan households; the majority of women have never discussed family planning with their husband or have done so only once or twice, and many are not sure whether their partner approves of it. This turns out to be the major obstacle in the use of modern contraceptives. Health centers rarely inform their female clients about the opportunities for reproductive health care that are available, and some do not offer the services. Negative attitudes toward family planning and failing structures of provision are the dominant constraints on the use of modern contraceptives.

The present policy aimed at empowering women in Rwandan society is therefore important in the attempt to reduce excess fertility. There is, however, a long way to go. In the age group 15–49 years, 40% of all women had received fewer than three years of education. Primary school attendance among females is increasing in Rwanda (net enrolment in primary school has risen to 86%), but the quality of education is poor and many girls drop out early; enrolment in secondary school is extremely low (about 10%) (National Census Service, 2005). Both observations indicate a real obstacle to making progress in the field of fertility control (Ainsworth et al., 1996)[6].

The political climate in Rwanda now seems ripe for a more visible and persistent population policy that is geared to improving reproductive health and facilitating couples' desire to space or limit births. Our research suggests a variety of leverage points for both public- and private-sector social and programmatic interventions to reduce Rwandan fertility to levels found elsewhere in the developing world, including more successful African settings.

Our first recommendation is that interventions aimed at increasing contraceptive use should be targeted toward women with low levels of education. In the long run, the increasing education and empowerment of women will lead to a higher level of demand for and practice of family planning. Until then, providing all women with full access to family planning services will be instrumental in improving their position.

Our second recommendation is that interventions target the negative attitudes toward family planning that are an important cause of unmet need. Women's disapproval of family planning was strongly associated with unmet need, as were partners' desire to have more children and their disapproval of family planning. In present-day Rwanda, male attitudes are a major constraint on women's wish to limit the size of their families.

Providing examples influences the behavior of others in the household and the community, even among uneducated women living in unfavorable economic conditions

(McNay et al., 2003). It is important to uncover the reasons for negative community attitudes toward family planning in order to involve these communities in discussions and programs on reproductive health.

Our third recommendation concerns the impact of family planning efforts and the way in which women and men can be best informed. Research in Malawi (Paz Soldan, 2004) revealed gender differentials in orientation on family planning issues, which stresses the importance of a separate approach. As our findings show, the dissemination of information about family planning through personal contact at health centers contributes to a higher level of desire for family limitation and a substantially lower level of unmet need.

Our final recommendation concerns access to family planning services. Although overall health expenditure has risen sharply, investments in reproductive health have remained relatively stable. Family planning services should become standard in all health centers in Rwanda. In addition, community-based family planning services could greatly expand access, especially in underserved provinces. Such services have been introduced in many parts of Africa and Asia, and have played a major role in increasing the access to and the supply of contraceptives (Korra, 2002; Shelton, 1999).

Notes

1. Remarks by His Excellency Paul Kagame at the African Climate Change Forum, London, Nov. 11, 2008.

2. Women are considered to have an unmet need for means of family limitation if their last child or current pregnancy was unwanted or if they do not want to have additional children but are not using contraceptives.

3. See reference 4 for full details of the sampling methodology employed in data collection.

4. The questionnaire used in Rwanda contains all common variables, with one exception: As a result of the trauma experienced during the genocide in the early 1990s, ethnicity is no longer recorded on identification papers or in registers, censuses or surveys.

5. We preferred this two-step approach to a multinomial regression because wanting to stop childbearing is different from having an unmet need: To those who do not want to limit births, unmet need is irrelevant. From a statistical point of view, this implies that running a multinomial model would violate the assumption of the independence of irrelevant alternatives. The more substantive reason to divide the analysis into two parts is that policies aimed at influencing. The more substantive reason to divide the analysis into two parts is that policies aimed at influencing desire for smaller families will take a different form than policies aimed at easing restrictions and constraints on contraceptive use.

6. Ainsworth and colleagues show that the first three years of primary schooling are not related to fertility; thus, the relation between fertility and education is nonlinear (Ainsworth et al., 1996).

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4 Demand and Unmet need to space births in Rwanda: A two-step analysis of determinants

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Abstract

Rwanda has recently experienced an impressive success in family planning leading to less unmet need and a lower fertility rate. Despite this achievement unmet need remains a demographic and health issue. Because the interval between births has a strong effect on infant and maternal morbidity and mortality and because long intervals lead to a further fertility decline, this study seeks to identify the barriers to the use of contraceptives by women who want to space births.

The study uses a pooled dataset from the 2005 and 2010 RDHSs which enables an assessment of changes in both demand for and use of family planning. In order to take into account the latent demand in the analysis of unmet need, we applied the Heckman probit model that simultaneously estimates two probit equations: one for demand, another for unmet need.

The results show that the demand to postpone the next birth is correlated with the desired family size, the health status of the index child and the experience of infant mortality. Socio-economic factors have a limited role in the demand for spacing. The level of unmet need has dramatically declined between 2005 and 2010, especially among lower educated and cultivators. Bio-demographic factors such as being in amenorrhea and cultural factors, especially religious attitudes, still hamper the use of contraception.

The strong commitment of the government to reproductive health may have been the main factor in increasing the uptake of contraception. To further increase contraceptive prevalence, continued advocacy is needed.

***Key words**:* unmet need, family planning, birth spacing, heckprobit, Rwanda

4.1 Introduction

Rwanda has recently experienced an impressive success in family planning (National Institute of Statistics of Rwanda [NISR], Ministry of Health [MoH] & ICF International, 2012; Westoff, 2013). The contraceptive prevalence rate has tripled from 17% in 2005 to 52% in 2010. As a consequence, unmet need for family planning has halved from 37% to 19%, and the total fertility rate (TFR) declined from 6.1 to 4.6 births. Despite this achievement unmet need remains a matter of concern; the actual fertility is still higher than the average ideal family size of 3.6 births and much more, the current median birth interval of 32.7 months is substantially lower than the preferred median interval of nearly 54 months and this gap is widening because in 2005 these indicators were 31.3 and 45 months. The prevalence of short birth intervals can be harmful to the health and nutritional status of the children, exposes mothers to greater risks of pregnancy complications and is associated with high cumulative fertility (Gipson, Koening & Hindin, 2008; Rutstein, 2003; Conde-Agudelo & Belizan, 2000).

Reproductive health programs that facilitate women to meet their spacing desires may therefore contribute to lower infant and maternal mortality or morbidity and to the achievement of some of the Millennium Development Goals by the Rwandan government (USAID-Rwanda, 2008; Singh, Sedgh & Hussain, 2010; Rafalimanana & Westoff, 2000). The achievement of effective reproductive planning is expected also to be helpful for Rwanda in other ways. It can contribute to improving the living conditions in this poor and highly densely populated country (400 people per sq.km) by slowing down the population growth both in the short and long run and by accelerating development. When more women are able to space their births according their desire, it will lower the demand for limiting as it takes a longer period before they achieve their desired number of children. Rafalimanana and Westoff (2000) found that if the preferred intervals were realized, the TFR in Rwanda could potentially decline by one third compared to its level in 1998.

To further target these programs one needs to identify the barriers to the actual use of contraceptives by women that want to postpone the next pregnancy. Most studies that examine the driving factors of the demand for family planning and the level of unmet need (Ojakaa, 2008; Westoff, 2001) treat these two concepts separately, restricting the analysis of unmet need to those that express the desire to postpone births. From a methodological point of view this might cause sample selection bias. To some extent the same factors that drive the demand will also influence the decision to use contraceptives to satisfy that desire. Ignoring those without explicitly stated demand might underestimate the levels of unmet need. From a substantive point of view restricting the analysis to manifest demand, ignores the latent demand that is important in the further up-scaling of reproductive health programs. Both demand and unmet need must be analysed simultaneously.

The objective of this article is to identify the factors that still sustain the unmet need for spacing among Rwandan women after the introduction of the successful family planning program, while including the latent demand for reproductive services. Using a combined dataset from the Rwandan Demographic and Health Surveys (RDHS) 2005 and 2010 we

show which factors have become less strong and which are still pertinent in explaining the unmet need in 2010. By applying a Heckman probit model we include latent demand in the selection model and unmet need in the outcome model.

4.2 Socio-cultural aspects of birth spacing in Rwanda

Despite the existence of short intervals, better planned births have been a concern of Rwandese women for a long time. Shorter intervals were judged to hamper the health of infants and toddlers. Women with close births are blamed by the community and receive a pejorative qualification *(Umugore w'indahekana*) in Rwandan language, meaning women with births too close to 'back' the younger sibling. They are held responsible for the poor health status of their babies (Ilinigumugabo, 1989). The desire for long intervals has been confirmed by the four consecutive demographic and health studies. In 1992 the first RDHS revealed a median preferred interval of 47 months while the achieved interval was only 33 months (Office National de la Population [ONAPO], 1994). The 2010 RDHS reports a median preferred interval of 54 months while the actual interval is still 33 months. Seen the preference for long birth intervals and the cultural values that support a reproductive attitude to achieve these long and healthier intervals, one could expect that the demand for spacing should be met more easily now access to family planning methods improved substantially. This raises the question which barriers still exist in 2010.

For a long time, the Rwandan family planning programs have focused more on birth limitation (NISR & ORC Macro, 2006, p.4; May, 1995, p.330) than on birth spacing, which - in the context of an overpopulated agrarian country – makes some sense. Even today, birth spacing is less emphasized during sensitization and advocacy campaigns. Crystal (2008) has shown that in Rwanda few women associate close births with maternal health risks and many are unaware that using contraception could extent the time between two consecutive births. Instead, people believed that the use of contraception aims exclusively at family limitation. The current reproductive health program does link birth spacing to health outcomes by integrating family planning with immunization programs. Yet, the discrepancy between preferred and actual intervals persisted after the introduction of the more recent family planning programs, requiring a better insight into unmet need.

4.3 Factors driving the demand and unmet need for birth spacing

The existing literature on demand and unmet need (Rafalimanana & Westoff, 2000; Magadi, 2003) indicates that the demand for family planning to postpone births is globally consistent with demographic and health factors while socio-economic and cultural factors vary across countries. The desire to postpone births is negatively correlated with the death of the previous child and the age of the mother; but positively associated with the number of living children, the birth order of the last child as well the women's levels of family planning knowledge and approval of contraceptives. By contrast, the association between the demand and socio-

economic factors displays a variety of effects. The exposure to family planning messages from the media, the extent of discussion on family planning by couples, the level of education of the mother and place of residence are positively associated with preferences in some countries but not in others. For Rwanda, Ndaruhuye, Broekhuis and Hooimeijer (2009) have shown that the relationship between the demand for FP and socio-economic factors was very limited. Poor, less educated were as desiring FP as rich and better educated.

Unmet need is also consistently related to demographic factors but not to socio-economic factors, which showed different outcomes across countries including positive, negative or no relations (Mills, Bos & Suzuki, 2010; Magadi, 2003; Bongaarts & Bruce, 1995). Unmet need for spacing decreases with woman's age and increasing length of the preceding birth interval, but increases with parity and birth order. The variety in relations between socio-economic factors and unmet need seems to be due to the differences in fertility transition. The relation is positive in pre-transition countries and negative for those in the mid-transitional phase. During the transition unmet need increases with modernization and appears first in the higher stratum of the population that desires fewer children without using contraceptives accordingly. In the lower strata, fertility preferences are still high and match fertility behaviour. In that case, there is no unmet need. In a later stage, the convergence of desired and actual fertility by using contraceptives among the higher stratum reduces the unmet need, while unmet need widens among the lower strata that are just starting to want smaller families without actually controlling births yet. As Rwanda is in the mid-transitional phase a strong effect of socio-economic factors is to be expected.

To understand the drivers of the demand and barriers to contraception that sustain unmet need, it might be helpful to look at the three preconditions for the adoption of contraception as developed by Coale (1973) and Lesthaeghe and Vanderhoeft (2001): readiness, willingness and ability. Readiness refers to the need to postpone births or cease childbearing altogether, usually as a result of socio-economic development (Cleland, Ndugwa & Zulu 2011). However, lack of resources and prospects may also lead to readiness. Ndaruhuye et al. (2009) found evidence for so-called poverty-Malthusianism in Rwanda. Even among the poor the readiness to limit the number of off-spring turned out to be large, which they relate to the land pressure in the country. Willingness is the attitude towards contraception or certain contraceptive methods grounded in traditional beliefs, culture, ethical considerations, codes of conduct, religious prescriptions, and legitimacy. Bawah, Akweongo, Simmons & Phillips (1999, cited in Cleland et al., 2011, para. 3) have indicated that in Africa the use of modern contraception is limited despite the awareness of the need indicating a lack of willingness. Ability refers to the knowledge of contraceptive methods, the supply of services and access to these services. Readiness, willingness and ability are obvious preconditions to use contraceptives.

In this paper, readiness is measured by the demand to postpone the next birth. However, not all women that are ready are also willing to adopt contraception as a means to achieve their reproductive preference. Different barriers, particularly socio-cultural, may make them to be reluctant about the methods to be used. Westoff (2013) and Ndaruhuye et al. (2009) and have found that religion was developing such resistance. For these women, ability in terms of access or availability of contraceptives does not overcome their barrier. They are in position of unmet need despite their readiness. Furthermore, some women may be unable

to get family planning means, for various reasons including geographic distance, limited knowledge, social opposition, etc. That category will be in unmet need, just as for the women without willingness.

Based on this literature and the specific situation in Rwanda we have formulated the following hypotheses. The desire for longer intervals depends primarily upon the bio-demographic factors that determine actual intervals: the duration of postpartum amenorrhea, level of fecundity, and the duration of the previous birth interval (Wolfers, 1968). We therefore expect negative effects of longer amenorrhea, the previous birth interval and the age of the mother on demand. Because women are aware of their reduced fecundity we also expect that these factors will be positively related to not using contraception even if there is a desire to postpone the next birth. Education is a resource that provides knowledge and therefore triggers demand and it also enables meeting this demand. Better education is therefore expected to be positively associated with demand for family planning and negatively with unmet need. Other socio-economic variables, like wealth and occupation are not related to demand in Rwanda, but are expected to be negatively related to unmet need (Ndaruhuye et al., 2009). We expect that women with a higher income, or residing in urban areas compared with rural dwellers, will be more able to achieve their preferred birth intervals than their counterparts. Child mortality and child morbidity will have opposing effects on the desire to postpone the next birth. Mortality leads to rapid replacement, in particular of the index child. In contrast, reduced health of the current children will lead to the desire to wait longer in having a next child. A preference for larger families will have a negative effect on postponement.

4.4 Data and Methodology

4.4.1 Data

The study uses pooled data from the 2005 and 2010 RDHSs. Since this study focuses on birth spacing, the sample has been restricted to married/partnered women who have at least one child and want another. The reason not to include women without a partner and women that have no children yet is that these are bound to have specific reasons and constraints in avoiding or postponing the (first) pregnancy. Intercourse before marriage is still a taboo in Rwanda and the statutory age at marriage of 21 year is high. Few women without children in our data set were (willing to) expressing a desire to use contraception. The combined sample has 6460 respondents (Table 4.1)

4.4.2 Model of analysis: selection bias and bivariate probit with sample selection

In this paper, we consider the decision of using contraception as a two-step process. The first step is the need to postpone births and the second the adoption of contraceptives to achieve the desired interval. These two steps might not be independent from each other, as the decision to use contraceptives builds on the need to postpone births. A correlation between the two is thus to be expected. Women at risk of unmet need are those who have a demand

for spacing. Consequently, the sub-sample of women with demand that can be used for assessing unmet need is not randomly drawn from the total survey population.

To control for this potential selection bias and to get an accurate estimation of parameters of unmet need, we use the Heckman (1979) sample selection model. As the dependent variables are dichotomous, we applied Bivariate Probit Regression which involves two probits in simultaneously estimating two equations: the first is to estimate the probability to postpone the next birth (selection or demand equation) and the second estimates the probability that no method is used to avoid the pregnancy (outcome or unmet need equation) despite the desire to postpone the next one. The equations are presented as follows:

Outcome equation

$Y = \beta X + \varepsilon$ where Y is observed only if $Y' = 1$

Selection equation

$Y' = \beta' X' + \eta$ where $Y' = 1$ if $(\beta'X' + \eta) > 0$, and $Y' = 0$ if $(\beta'X' + \eta) \leq 0$

Correlation $(\varepsilon, n) = p$

Where:

Y is the log of the dependent variable and X a set of independent variables of the outcome equation (unmet need); Y' is the log of the dependent variable and X' a set of independent variables of selection equation (demand); β & β' reflect the impact of independent variables; ε & n are the residuals of the equations and p is the coefficient of correlation between the errors of the two equations.

The response variable for the outcome equation is the unmet need for contraceptive means to space births taking the code 1 for women with unmet need and the code 0 for women who have met their need. In the selection equation, the dependent variable is the demand to postpone the next birth, coded 1 if a woman reports this desire and 0 if not. A woman is considered to be in demand for spacing when, using contraception or not, she wants to wait two years or more before having the next birth. Unmet need is defined as not using contraception despite the desire to postpone the next pregnancy. It includes pregnant and postpartum amenorrheic women whose pregnancy or last birth was mistimed, fecund women who are neither pregnant nor postpartum amenorrheic who are not using any method of family planning and say they want to wait two or more years for their next birth, or are undecided about the timing of the next birth, or are undecided whether to have another child.

There are two reasons not to use a retrospective approach in defining unmet need for spacing which limits the analysis to women who have mistimed the previous birth as is done in other research. First, one of the objectives of this study is to identify groups of women that want to space births but still are not willing or able to use contraceptive means to achieve their reproductive plan despite the increased access and availability of family planning services after 2005. Secondly, as was mentioned recently again by Bongaarts (2014) family planning programs could paradoxically widen the gap between wanted and achieved fertility resulting from changes in reproductive attitudes which could cause a rise in demand between 2005 and 2010. A study of unmet need has to include both the change in demand (attitude)

and the change in use of contraceptives (behaviour). These changes after 2006 are best measured by the desire to postpone a next pregnancy and the use of contraceptives in 2005 and 2010 (Table 4.2). A retrospective approach would not capture the effects of the family planning policy on the demand.

4.4.3 Independent variables in the demand and outcome equation in 2005 and 2010

The independent variables are a set of factors covering various aspects associated with birth intervals and/or contraceptive use (Table 1). All variables are derived from the questionnaires of the RDHS 2005 and 2010. Some variables of potential interest, like the attitudes of the partner or the degree of independent decision making by the women, had to be dropped because they were not (consistently) measured in each data set in Rwanda. The table shows the variables and the categories that we used but also the shifts in the distribution over time for both samples.

Table 4. 1 Percentage distribution of respondents by selected variables, in 2005 and 2010

Demand sample				Unmet need sample			
Variable	2005	2010	Both	Variable	2005	2010	Both
All (N)	3221	3239	6460	All (N)	1694	2273	3967
All (%)	100.0	100.0	100.0	All (%)	100.0	100.0	100.0
Woman's age				**Woman's age**			
15-24	23.1	23.2	23.2	15-24	23.7	24.2	24.0
25-34	55.6	63.6	59.6	25-34	59.3	65.1	62.6
35+	21.2	13.2	17.2	35+	17.0	10.7	13.4
Woman's education				**Woman's education**			
No education	25.6	15.0	20.3	No education	22.1	13.2	17.0
Primary	65.3	74.0	69.6	Primary	66.8	75.4	71.7
Secondary	8.5	8.9	8.7	Secondary	10.2	9.4	9.7
Higher	0.7	2.1	1.4	Higher	0.9	2.0	1.6
Time since last birth (months)				**Place of residence**			
0-11	38.4	30.1	34.2	Urban	19.7	15.4	17.2
12-23	32.5	25.2	28.9	Rural	80.3	84.6	82.8
24-35	18.0	20.2	19.1	**Partner's occupation**			
36-500	11.1	24.5	17.8	Agriculture	72.9	66.7	69.4
Amenorrhea duration (months)				Man.Skill/Unskd	16.4	19.5	18.2
0-5	13.3	27.1	20.2	Services	10.7	13.8	12.5
6-17	21.0	25.6	23.3	**Household wealth index**			
18-50	9.6	8.6	9.1	Poorest	18.5	19.4	19.0
Still amen <6	19.5	12.8	16.2	Poorer	18.3	20.3	19.5
Still amen >6	36.6	25.9	31.2	Middle	19.7	20.6	20.2
Previous birth interval (months)				Richer	22.3	19.2	20.5
9-23	19.4	16.5	18.0	Richest	21.2	20.5	20.8
24-35	36.5	28.8	32.7	**Religion**			
36-213	27.0	25.4	26.2	Catholic	40.4	40.5	40.4
First birth	17.1	29.3	23.2	Protestant	40.5	42.0	41.3
Mortality experience				Adventist	14.9	14.7	14.8
No death	61.3	78.0	69.7	Muslims	2.2	1.5	1.8
Last birth+	4.6	2.1	3.3	Others	2.0	1.4	1.6
One death	20.7	13.8	17.2	**Amenorrhea duration** (months)			
Two+	13.5	6.1	9.8	0-5	19.0	32.3	26.6
Child's underweight index				6-17	29.6	30.8	30.3
<1000	19.5	14.6	17.0	18-50	10.5	9.2	9.8

1001-4000	11.9	16.0	14.0	Still amen <6	14.9	7.7	10.8
4001-9980	11.7	14.6	13.2	Still amen >6	26.0	20.0	22.6
Not weighted	56.9	54.8	55.8	**Previous interval** (months)			
Child is ill				9-23	24.1	18.4	20.8
No	45.4	54.8	50.1	24-35	40.7	29.9	34.5
Yes	54.6	45.2	49.9	36-213	20.5	22.9	21.9
Woman's ideal # of children				First birth	14.7	28.9	22.8
0-3	16.5	52.8	34.7	**Heard FP message in media**			
4	41.7	30.7	36.2	No	48.5	31.6	38.9
5-6	31.8	12.6	22.2	Yes	51.5	68.4	61.2
7+	10.1	4.0	7.0	**FP worker visits**			
				No	93.5	68.9	79.4
				Yes	6.5	31.1	20.6

In the demand sample, most of the respondents (60%) are aged 25-34 years and the majority (70%) has only a primary educational level. This proportion has slightly increased from 65% in 2005 to 74% in 2010. At the time of interviews, more than a third (37%) of the population was already at healthy intervals of two years and more since their last birth. Over time, that category has increased from 29% to 45%. In addition, nearly half of the respondents (47.4%) were still in the amenorrhea period, a proportion which has significantly declined from 56% in 2005 to 39% in 2010, showing that the proportion of women who gave birth recently has declined.

Table 4.1 shows that the large majority of the respondents (70%) had not yet lost any child and among the 30% who had lost some of their children, 20% had lost one child, and only 3% had lost the last child. Half of the index children have been ill during the three weeks preceding the interview and the half other were not. All these health indicators have improved in 2010. Similar to mortality, fertility preference has also changed overtime. The proportion of women desiring small families (<=3 children) has increased dramatically from 17% in 2005 to 53% in 2010 while those preferring large families (7 children and more) dropped from 10 to 4% respectively.

The population in subsample of unmet need was in majority (63%) aged 25-34 years, and 72% have a primary educational level. Only 11% have been at secondary school or more. Most of them (69%) were married to cultivator men and more than 80% were Catholic (40.4%) or Protestant (41.3%). A third of the sampled women were still in the amenorrhea period at the time of interview. This proportion was 41% in 2005 and 28% in 2010. Nearly a quarter of the women in need of postponing were at first birth. Short intervals (< 2 years) and longer intervals (> 3 years) were experienced by 20% of the women. More women (68%) had heard about family planning from the media in 2010 than in 2005 (52%). No less than 31% of the women that want to postpone the next birth were visited by a family planning worker in the year before the interview in 2010, as opposed to only 6.5% in 2005. Both the sensitizing campaign to limit family size to three children and the improvement of family planning programmes show their mark in the figures on ideal family size and the visits by FP workers.

4.5 Results

4.5.1 Changes over time in demand and unmet need

The effects of the above policies are reflected in the shift in both the demand for family planning and the levels of unmet needs. Table 4.2 shows the landslide in both for each independent variable.

Table 4. 2 Percentage of women with demand and unmet need for birth-spacing by selected variables in 2005 and 2010

	Demand			Unmet need	
Variable	2005	2010	**Variable**	2005	2010
All (N)	3221	3239	All (N)	1694	2273
All (%)	52.6	70.2	All (%)	76.2	31.8
Amenorrhea duration (months)			**Amenorrhea duration** (months)		
0-5	75,1	83.8	0-5	63,4	20.4
6-17	74,0	84.5	6-17	69,1	26.1
18-39	57,6	75.0	18-39	75,3	37.1
Still amen < 6	40.1	42.1	Still amen < 6	94.8	72.6
Still amen > 6	37.4	54.1	Still amen > 6	83.4	40.7
Previous interval (months)			**Previous interval** (months)		
9-23	65,2	78.3	9-23	70,8	29.2
24-35	58,6	72.7	24-35	81,3	38.7
36 +	40,1	63.3	36 +	75,6	36.2
First birth	45,2	69.1	First birth	71,9	22.9
Woman's age			**Woman's age**		
15-24	53,8	73.1	15-24	77,3	27.8
25-34	56,1	71.8	25-34	75,1	31.6
35 +	42,1	57.0	35 +	78,5	42.2
Woman's education			**Woman's education**		
No education	45,4	61.6	No education	87,2	40.7
Primary	53,8	71.5	Primary	76,7	31.9
Secondary	63.0	74.1	Secondary	55.2	22.4
Higher	72.7	68.7	Higher	12.5	13.0
Time since last birth (months)			**Residence type**		
0-11	47,1	57.7	Urban	62.2	28.9
12-23	59,6	79.9	Rural	79.6	32.4
24-35	60,2	78.6	**Partner's occupation**		
36-263	38,8	68.6	Agriculture	80.9	33.9
Infant mortality experience			Man skil/unskil	73.7	27.4
No loss	55,7	72.6	Services	48.3	28.0
Lost last child +	35,4	36.8	**Household wealth index**		
One loss not last	51,9	68.1	Poorest	86,3	41.3
Two or + loss	45,4	55.6	Poorer	81,6	37.9
Child's underweight index			Middle	76,9	28.9
0-1000	59.2	78.0	Richer	78,2	27.5
1001-4000	50.0	73.9	Richest	59,9	23.9
4001-9980	50.5	65.2	**Woman's religion**		
Not weighted	51,3	68.3	Catholic	72,8	28.3

Child is ill			Protestant	82.5	35.5
No sick	49.6	68.4	Adventist	71.5	29.3
Sick	55.1	72.3	Muslim	68.4	42.4
Ideal # of children			Others	60.6	38.7
0-3	56.2	71.7	**Heard about FP in media**		
4	53.2	69.1	Yes	69.0	28.2
5-6	53.2	69.0	No	83.8	39.6
7+	42.1	62.5	**FP worker visits**		
			Yes	79.1	34.4
			No	76.0	30.7

The share of women that want to postpone the next birth has increased from 52.6 to 70.2. Looking at the various categories it looks as if this rise has occurred across the board, yet there are a few notable exceptions. Women that are in amenorrhea for less than 6 months, show the same desire to postpone the next birth in both 2005 and 2010. And women that lost their index child are keen on getting pregnant again (only 37% wants to postpone in 2010, the same as in 2005). Another striking figure is that even the ones that are at a healthy interval of more than two years, also want to postpone more in 2010.

Even more spectacular is the decrease in unmet need which dropped from 76.2% in 2005 to 31.8% in 2010. Education, occupation and wealth seem to have lost a large part of their effects on unmet need. Socio-economic inequality is still reflected in the level of unmet need in 2010 but far less than in 2005. This raises the question which factors have changed significantly over time, which can only be answered using a multivariate model.

4.5.2 The Heckman model

The family planning sensitizing and advocacy campaigns were aimed at limiting families to three children, but as people have been made more aware of contraceptive use, the demand for spacing has also increased (Table 4.2). We included year of the interview as a main effect in the demand equation and tested all the interaction effects to check which specific factors changed over time in their effect on demand. The mainstreaming of reproductive health is bound to have effects on the unmet need for spacing in particular for those that experienced barriers to access of contraceptives before. We included year of the interview in the unmet need equation and tested explicitly the interaction effects with the socio-economic variables (Table 4.3).

For the demand we do find a positive main effect for the year of the interview (0.429) which indicates an overall increase of the demand for each category of the independent variables as long as there are no interaction effects, which only show up for mortality experience and the ideal family size. For our reference category, the highly positive constant in the model (1.229) shows that a large majority wants to postpone the next birth. For the ones that had their last child between 12 and 24 months ago the effect is the same. But even women who are at healthy intervals often want to postpone the next birth. Women whose last birth has occurred two to three years ago have a coefficient of -0.331.The coefficient drops to -0.672 if the period exceeds three years. This nevertheless means that also among these a majority does not want another child within two years.

At the time of the interview, a substantial proportion of the respondents (37%) were already at an interval of two years or more since the last birth (Table 4.1). As expected this has a negative effect (-0.331) on the demand for further spacing which is obviously even stronger (-0.672) after an interval of three years or more. A negative relationship is also found with the previous birth interval. Women who had an interval longer than three years before their last birth have a coefficient of -0.491. In addition, nearly half of women in the sample (47.4%) are still in postpartum amenorrhea (Table 4.1), a period in which women believe to be at a lower risk of getting pregnant. This shows up in the probit model in the negative coefficients (-1.385 and -1.238) of the categories of being in amenorrhea for less than six or more than six months. The difference between the two is significant. Women in the first half year after giving birth consider postponing the next birth less.

The demand for contraception decreases with the desired family size. Women who want more than six children are less inclined (coefficient is -0.370) to postpone compared with those wanting fewer (less than 4). Poor health of children measured as the most recent born being ill and underweight raises the desire to postpone the next birth by 20%. Infant and child mortality have the expected negative effect on postponement. Women who lost their latest child are less likely (a coefficient of -1.053) to postpone the next pregnancy. This rapid replacement effect occurs less when it concerns the loss of one or more non-index children. High educated women are more likely (coefficient is +0.307) than those with no education to desire to postpone the next birth.

Losing the index child has a stronger effect in 2010 than in 2005 (the coefficient moves from -1.053 to -1.528) and losing two or more children also decreases the desire to wait with the next (only significant at 0.10). Infant and child mortality have been reduced in Rwanda between 2005 and 2010, but the ones that experienced mortality are now more eager in replacing the children lost. The only other shift over time is the increased desire to space among the women that want to have more than six children (the coefficient moves from -0.370 to –0.016 (-0.370+0.354), meaning that the effect of wanting many children on the spacing of births has disappeared.

Table 4. 3 Heckprobit coefficients of the demand/unmet need to space births

Demand Equation			Unmet need equation		
N Observations = 6460			N Observations = 3967, Censored = 2493		
Variable *(ref category)*	β	SE	Variable *(ref category)*	β	SE
Constant	1.229***	0.113	Constant	0.956***	0.137
Year (2010 vs 2005)	0.429***	0.072	Year (2010 vs 2005)	-1.477***	0.122
Amenor duration (0-5 months)			Amenor duration (0-5 months)		
6-17	-0.030	0.060	6-17	0.108*	0.057
18-50	-0.295***	0.075	18-50	0.404***	0.080
still amen < 6	-1.385***	0.073	still amen < 6	1.508***	0.088
Still amen >6	-1.238***	0.057	still amen > 6	0.797***	0.072
Previous interval (<24 months)			Previous interval: (ref <24 months)		
24-35	-0.109**	0.053	24-35	0.164***	0.061
36-248	-0.491***	0.055	36-248	0.227***	0.067
First birth	-0.835***	0.063	First birth	0.208***	0.072
Time since last birth (0-11 months)			Residence (rural vs urban)	-0.014	0.068

12-23	-0.013	0.053	Partner occupation (agriculture)		
24-35	-0.331***	0.063	manual skilled	-0.029	0.094
36-500	-0.672***	0.062	Services	-0.481***	0.109
Woman's age (ref. 15-24)			Woman's age (ref. 15-24)		
25-34	-0.018	0.048	25-34	0.055	0.056
35+	-0.108*	0.065	35+	0.237***	0.082
Education (no education)			Education (no)		
Primary	0.137***	0.044	Primary	-0.315***	0.092
Secondary	0.307***	0.073	Secondary	-0.576***	0.133
Higher	0.307**	0.160	Higher	-1.473***	0.386
Mortality experience (no death)			Wealth index (poorest)		
last birth+	-1.053***	0.119	poor	-0.081	0.066
one death	-0.130**	0.061	Middle	-0.233***	0.067
two deaths+	-0.210***	0.074	Richer	-0.218***	0.068
Child is ill (yes vs no)	0.203***	0.036	Richest	-0.326***	0.083
Child underweight index (1000-4000)			Religion (catholic)		
0-1000	0.176***	0.062	Protestant	0.258***	0.047
4000-9980	-0.002	0.066	Adventist	0.056	0.061
Not weighted	0.104**	0.051	Muslims	0.488***	0.158
Ideal # children (1-3)			Others	0.047	0.158
			Heard about FP message in		
4	-0.109	0.069	media (yes vs no)	-0.274***	0.070
5-6	-0.087	0.072	FP worker visits (yes vs no)	0.056	0.053
7+	-0.370***	0.095			
Interaction effects			Interaction effects		
Mortality experience in 2010 (no death in 2005)			Heard FP message in media in 2010 (2005)	0.091*	0.089
last birth+	-0.475**	0.190	Education in 2010 (no educ 2005)		
one death	-0.030	0.092	Primary	0.212*	0.118
two deaths+	-0.214*	0.120	Secondary	0.289	0.177
Ideal # children in 2010 (1-3 in 2005)			Higher	0.996**	0.442
4	-0.026	0.088	Partner occupation in 2010 (agric in 2005)		
5-6	0.005	0.104	manual skilled	0.018	0.114
7+	0.354**	0.153	Services	0.585***	0.136
rho	-0.627323				
LR test of independ eqns	0.000				

Despite the higher demand in 2010, the levels of unmet need have dropped dramatically as table 4.2 already showed. The constant in the unmet need model in table 4.3 reflects the log odds for our reference category (young, poor, uneducated women whose partner is a cultivator). In 2005 the constant is 0.956. In 2010 this coefficient becomes 0.956-1.477= -0.521. This obviously raises the questions which barriers to the use of contraceptives have been removed. Looking at the combined main effect and interaction effect of the occupation of the partner, we find that this distinction has become irrelevant. Adding the coefficients for the ones that work in the service sector (-0.481+ 0.585=0.104) indicates that the ones in the service sector had the same or even a slightly higher level of unmet need in 2010 compared to the ones in agriculture. The effects of education show a similar course. The combined main effect of 2005 and the interaction effect of 2010 exhibits smaller educational differences in

unmet need in 2010. For primary educated the coefficient becomes -0.103 (-0.315 + 0.212), for secondary educated -0.287 (-0.576+0.289) and for higher educated -0.477 (-1.473+0.996), meaning that people without education have nearly caught up with the ones with better education, even though the difference with the ones with secondary and higher education are still significant.

The other variables did not give any significant interaction effects with the year and the relative differences have remained the same over time, yet at an overall lower level of unmet needs. The wealthiest 60% of the population still has lower levels of unmet need (-0.22 to -0.33). The effect of religion has also remained unchanged. Protestant (0.258) and Muslims (0.488) are still lagging behind Catholics when it comes to controlling the spacing of births. Lack of information regarding family planning through media increases the propensity to be in unmet need (coefficient -0.274) while the visits of a family planning worker to individuals do not show any independent effect.

Looking at the other factors, unmet need for delaying a birth is positively correlated with the previous birth interval and the duration of amenorrhea period. Women whose last birth occurred three years or more after the preceding, are more likely (0.227) to not using contraception even if they want to postpone the next birth. Primiparous women display a similar pattern to those with longer previous intervals. Experienced women seem to place trust in their previous experience while primipara do not yet know their natural birth-spacing behaviour. By believing in the protecting role of an amenorrhea status, women in that category have higher risk of unmet need, especially in the first six months, the so-called lactation amenorrhea (coefficient of 1.508). In the category of more than six months, the risk of unmet need declines substantially but remains high (coefficient of 0.797) indicating that some women have started using contraceptive methods because they don't yet totally trust the protective effect of the late amenorrhea.

The results from our model confirm the existence of selection bias. The coefficient rho (-.627) of the test for independence of equations is statistically significant at 0.01. The negative sign of the coefficient indicates that error terms in the demand and unmet equation equations are negatively correlated. The selected cases for the unmet need equation tend to be those with lower probability of being with unmet need compared to those which have not been selected. This means that women that did not express a manifest demand would have had higher level of unmet need if they were to space the next birth.

4.6 Discussion and Conclusion

The preference for longer birth intervals has always been a concern of Rwandan women and they still prefer to space their births. Despite that propensity, many women do not use contraceptives to achieve their reproductive plan. The objective of this research was to identify factors driving the demand for birth spacing and those sustaining unmet need. We also assessed the recent progress in meeting this demand, and identified the factors that are still pertinent to unmet needs in 2010.

Our results confirm this desire for very long intervals between births. In 2005 two thirds of the women that had their last child more than three years ago, still wanted to wait another two years before having the next. In 2010 this share increased to three out of four. More generally, the share of women that want to wait for more than two years before having another child increased by more than half. The structure of this demand hardly changed over time. Bio-demographic variables like age, the time since last birth, the duration of the period of amenorrhea, and the previous intervals between births showed the same effects in 2010 as they did in 2005. This is in line with research on other countries which showed a consistent negative relation between reduced fecundity and the demand for contraceptives (Magadi, 2003). As infant mortality decreases, replacement fertility increases. In particular the loss of the index child strengthened the desire to become pregnant again in 2010.

More impressive than the raise in demand, is the decline in unmet need. The situation in 2005 is consistent with the literature on fertility transition theory. In the second phase of the transition, the demand for contraceptives is common among all strata of the population, but only the higher socio-economic strata are able to actually acquire the means to control their reproduction (Bongaarts, 1997). We found strong effects of education, occupation and wealth indeed. However we also found that between 2005 and 2010 many of these effects diminished substantially, what is surprising seen the short period of time. The effect of occupation disappeared completely and the effect of education diminished to a magnitude of a 10% difference between the uneducated and the higher educated. Controlling for these variables the effects of wealth remained. The poorest 40% of the population still showed substantial higher levels of unmet need in 2010, which could point at other costs involved in using contraceptives than the costs of the means as these are supplied free of charge.

This finding is in line with other studies (Westoff, 2013; Budervoet, 2014) confirming that Rwanda is undergoing a fertility transition which is unlikely to stall. Not only fertility preferences for larger families have dropped, but also having close births has become unpopular. The desire for longer intervals may have been one of the motivations of the increase in contraceptive use recorded in 2010 and then the fertility decline. The existence of a substantial demand to postpone the next birth among women who already have achieved healthy intervals is in line with what Timaeus and Moultrie (2008) have called “perpetual postponers”, a phenomenon which often leads to family limitation. As Westoff and Koffman (2010) argue, many women that are limiting child births have started by being spacers. The potential effect of birth postponement on fertility is to accelerate the fertility decline in a way that birth spacing to healthy intervals does not.

Although reproductive attitudes and behaviour are changing quickly in Rwanda (Habimana & Jensen, 2009), cultural factors like religion still matter, as was also found in other studies (Westoff, 2013; Muhoza, Broekhuis & Hooimeijer, 2014). Religion represents a non-negligible factor that makes part of the population reluctant to use contraception. In particular Muslims and Protestants continue to show a lower propensity to use contraception than other groups. The group of Protestants is not homogenous; it comprises various denominations that may have different attitudes. Pentecostals are well-known to be more adverse to family planning (Twizeyimana, 2005); but among Anglicans, Presbyterians and others there is more acceptance. Note that the proportion of Protestants is growing in

Rwanda: they represented 37% of the whole population in 2012 while they constituted only 19% in 1992 and 15% in 1978 (NISR, 2014).

The impressive decline in unmet need may mainly be attributed to the government commitment to strengthen family planning services through sensitizing and advocacy campaigns, and improvements in service provision. It is important to maintain these efforts in order to pursue and accelerate the on-going fertility transition. It has been demonstrated elsewhere (Da Vanzo & Adamson, 1998; Bulatao, 1998) that short term programs produce short results, and that a reduction of efforts slows down the on-going changes.

The current policy in Rwanda of mainstreaming reproductive health services, of mandatory community health insurance schemes, and of introducing community based health workers is geared to the socio-economic barriers that we found still existed in 2010. With an almost universal acceptance among the women in Rwanda that one needs to space births, bringing services closer to the poor and less educated in the community is bound to be effective in further reducing the barriers to modern contraceptives. Continued advocacy might be called for to also increase the willingness among the population that does see the need to space births but refrains from using methods for religious reasons.

Limitations

Using the Heckman model allowed us to more precisely identify the factors that determine the level of unmet need and to include the latent demand for contraceptive use. The fact that we found significant selection effects shows that this not superfluous. Yet dropping the selection model has only limited effects on the coefficients in the outcome model. In a context were the need for family planning is almost universal, latent demand becomes less important and selection effects might be ignored without too much loss of explanatory power.

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5 Measuring the Success of Family planning Initiatives in Rwanda: A Multivariate Decomposition Analysis

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Abstract

Rwanda has experienced a dramatic increase in contraceptive use and fertility decline between 2005 and 2010. The contraceptive prevalence rate has increased from 17 per cent to 52 per cent. During this period, Rwanda was strongly promoting family planning and making socio-economic progress. Using data from two Demographic and Health Surveys, this study identifies factors that contribute to the increase in contraceptive use by applying the Blinder-Oaxaca decomposition technique.
Results indicate that the increase is mainly attributable (78%) to changes in effects of women's characteristics. Factors showing a significant contribution are women's education, experience of child mortality, and place of residence. Regarding the compositional differences between the samples, effects are relatively higher for exposure to family planning messages and husband's desire for children compared to that of his wife's. Findings are discussed with reference to Rwanda's recent family planning initiatives.

5.1 Introduction

Rwanda has experienced an impressive increase in contraceptive use during the last several years. The contraceptive prevalence rate (CPR) increased three-fold, from 17% in 2005 to 52% in 2010. The increase in CPR was accompanied by a large decline in unmet need for family planning, from 38% to 19%, and a decline in the total fertility rate (TFR), from 6.1 to 4.6 births per woman (NISR and ORC Macro, 2006, NISR et al., 2012). These achievements went far beyond Rwanda's national objectives. According to the national family planning policy, contraceptive prevalence in 2010 was projected to reach 26.3% (MOH, 2006), but it nearly doubled. However, the Rwandan vision 2020 had set a much higher target: 70% of

contraceptive prevalence by 2012 (MINECOFIN, 2007). The TFR that was expected to decrease by 10% dropped by a much higher percentage of 25%. Such success is noteworthy. No neighboring country has had a comparable achievement (Table 5.1). Elsewhere, a rapid increase in contraceptive use similar to that in Rwanda has occurred in only a few countries, including Cuba, Iran, Mauritius, Spain, and countries of East Asia (Madsen, 2011).

Table 5.1 CPR, Unmet need and TFR in Rwanda, Uganda, Tanzania, and Kenya

Indicator	Rwanda 2005 to 2010	Uganda 2006 to 2011	Tanzania 2004/05 to 2009	Kenya 2003 to 2008/09
CPR (%)	17.1 – 51.6	23.7 – 30.0	26.4 – 34.4	39.3 – 45.5
Unmet need (%)	37.4 – 19.2	40.6 – 34.3	21.8 – 25.3	24.5 – 25.6
TFR	6.1 – 4.6	6.7 – 6.2	5.7 – 5.4	4.9 – 4.6

Source: http://statcompiler.com/, accessed 28 November 2012

The increase in contraceptive use occurred in a context of remarkable socio-economic progress and family planning promotion. Enrolment in education at all levels were increasing especially for girls. At higher education level, for instance, the number of students grew by 37% per year between 2002 and 2011. The proportion of girls represented 43% of the students (MINEDUC, 2012). Similar improvements were noted in the health sector with a significant decline in infant and maternal mortality (NISR et al., 2012) resulting in a faster achievement in this field in accordance with the Millennium Development Goals formulated in the Vision 2020 strategy report of the government. Parallel to these improvements, Rwanda experienced a steady economic growth. The GDP per capita nearly doubled between 2005 and 2010 and the percentage of extreme poor people dropped by 48%, from 35.8 to 24.1% in the same period (NlSR, 2012).

As an essential condition to poverty reduction and overall socio-economic development, family planning has been declared as a national priority program not just in talks but in implementation. In order to respond to the greater potential number of clients due to high level of unmet need (37%) reported by the 2005 DHS, both demand and supply interventions were adopted through a massive and public education campaign to remove social barriers enabling community adherence and the strengthening of the capacities of health facilities to deliver a high quality of services.

Literature indicates that an exceptional increase in contraceptive use may result from rapid socio-economic change modifying the structure of the population in favor of the categories of people more likely to adhere to family planning. This change may increase the contraceptive prevalence without (much) change in behavior. This is the socio-economic theory of population behavior change. The second explanation relates to behavior change due to family planning program activities through a strong sensitization-campaign using various channels such as the media, community based distribution of contraceptives, etc.

Using the extensive data on family planning in the 2005 and 2010 DHS datasets, this chapter describes levels and changes in contraceptive use in Rwanda and investigates factors that have contributed to the dramatic increase in CPR between the two periods. Findings from this study will contribute to understanding the drivers of success of the Rwandan family planning that may guide policymakers and planners to further improve the program in Rwanda and in other countries with a similar context.

5.2 Background

5.2.1 Renewed family planning attention in Rwanda

Despite the fact that rapid population growth, with its unfavorable effects on the economy and living conditions of the population, was recognized as a problem in Rwanda since the colonial period, family planning activities did not start until 1981, with the creation of the *Office National de la Population* (ONAPO) (Ndaruhuye et al., 2009). The fertility level declined slightly in the first decade following the ONAPO creation. This was probably also as a result of severe economic deterioration and environmental stress in the 1980s, as the level of contraceptive use remained very modest. During and after the 1990s civil war and genocide which resulted in mass population movements, family planning activities were suspended, and ONAPO was dissolved in 2000. The issue of rapid population growth did not resurface until after the results of the 2002 census and the 2005 DHS. Restoring peace, reconstruction of the society and rebuilding the country's infrastructure had higher priority. The results of the 2002 census and 2005 DHS revealed an increase of fertility from 5.8 births per woman till 6.1 between 2000 and 2005 and a further increase of population density, the highest in Africa. This awareness triggered a renewed attention for the population issue among policy makers. The measured high level of unmet need for family planning (37%) in 2005 and an actual fertility of 1.5 child above the wanted number of children indicated that responding to the high unmet need for family planning could contribute to fertility decline.

In accordance with the international development debate on the Millennium Development Goals, a significant campaign against population growth and improvement of reproductive health services began in 2005 with the creation within the Ministry of Health of a Unit for Maternal and Child Health. This unit had to develop policy measures to respond to the issues of high infant and maternal mortality rates and to the low level of contraceptive use, which were presented and implemented from 2006 onwards.

5.2.2 Strategies to promote family planning

Recognizing that population growth is the major barrier to achieve the ambitious 2020 Rwandan vision[1] for development, the Rwandan Government has supported and encouraged family planning with a high level of commitment[2] (Madsen, *2011)*. To translate this commitment in fact, various actions have been taken (MOH, 2006) including a massive public family planning campaign to raise and strengthen the demand for family planning, an

improvement of the quality of services and an increase of access to family planning services through the augmentation of delivery points.

Strong political commitment with a massive family planning campaign

Since 2007, family planning has been stated a priority program to help reduce the high rate of population growth that compromises government development efforts. Thus, an intensive public education campaign was launched to raise awareness of the necessity to reduce the population growth rate. All key personnel and leaders including local administrators and health staffs were sensitized (MOH, 2008). The Rwandan Parliamentarians' Network on Population and Development, created in 2003, has played a determinant role by going up to lower administrative units. Various media channels were used including television and radio, monthly talks after *Umuganda*[3], etc. In order to increase family planning coverage, the Rwandan Government increased the budget for family planning activities and extended the number of partners, initially represented only by USAID and UNFPA (MOH, 2008).

Providers' capacity strengthened and quality of family planning services improved

To ensure the quality of services and to expand at health facilities level the use of long-acting contraceptive methods requiring expertise, a systematic training of providers was performed. Furthermore, in 2010 a programme was started to train selected medical doctors as master trainers on how to perform non-scalpel vasectomy (MOH, 2010-11). Also in the same year, a scheme was initiated to train trainers in community-based distribution of contraceptives, a new approach aiming to reach more people. For instance, in 12 out of the 30 districts constituting the country, 1258 family planning providers were trained (USAID-Rwanda, 2008).

In addition to staff training, great efforts were made to increase the availability of a range of modern contraceptive methods and to promote long-acting methods, including male sterilization. Access to condoms was increased by making them more available in public areas and workplaces, as well as in family planning clinics and health facilities. By 2008, the distribution of family planning commodities had reached 96% of health facilities and 92% of district hospitals with differences mainly in some faith based health facilities. However, sterilization was performed by only 27% of district hospitals. Between 2005 and 2009 the percentage of district hospitals offering long-acting methods grew from 7% to 76% for implants, 1% to 36% for IUDs (MOH, 2008; USAID-Rwanda, 2009).

Geographical barriers reduced and community mobilisation

A particular challenge of the Rwandan health system in regard to family planning is that many health facilities (40% in 2001) are 'faith-based' and as a consequence do not offer modern contraceptives. To overcome this barrier, the government decided to construct "secondary posts" not far from religious-affiliated health facilities to meet the needs of clients in those areas. By reducing the geographic distance, this innovative solution has increased access to health facilities for many clients. To serve other regions that had been without

services, five new hospitals and 15 new health centres were constructed between 2005 and 2011 (USAID-Rwanda, 2011).

In addition to direct initiatives towards family planning support, family planning program implementation has beneficiated from various system reforms that may have had indirect effects on family planning success. This includes the 2006 Administrative Decentralization reform that permitted community mobilization and participation, partnership with religious and traditional leaders, whose support is valuable for the success of a program, Performance-Based Financing system of health facilities and Performance-contracts system of staff, as well as universal health insurance scheme that have increased health facilities utilisation.

5.3 Conceptual framework

According to the research literature, the increase in contraceptive use is a result of two types of intervention: demand and supply programs. In other words, women adopt contraception either because they strongly need contraceptives (demand side) or because contraceptives are easily accessible (supply side). Regarding the demand side, three main interventions can be mentioned: mass media, interpersonal communication, and development approaches (Mwaikambo et al., 2011; Vahidnia, 2007). These interventions raise awareness of the adverse consequences of high fertility and the benefits of having fewer children, thus creating demand for fertility control means. On the supply side, programs improve access to family planning services through availability of a wide range of contraceptive methods and multiple service-delivery channels (Richey & Salem, 2008). This approach also focuses on improving quality of care and on reducing direct costs related to contraceptive use. The supply side approaches ensure that women and couples are able to practice family planning effectively.

A debate exists on which approach is more efficient in increasing contraceptive use and reducing fertility. Some researchers, like Pritchet (1994), emphasize the demand approach, arguing that once there is demand, whatever the provision services, more people will adopt family planning. In contrast, other researchers (Bongaarts et al., 1990; Phillips et al., 1995; Freedman, 1997) highlight the predominant role of supply policies in increasing contraceptive use. An excellent case is Bangladesh, where the family planning program has promoted the distribution and sensitization for family planning by women themselves, overcoming the cultural norms that subordinate women (Schuler et al., 1995). Contraceptive use has increased substantially among women with little education, as well as women of higher socio-economic status.

Other studies argue that both approaches are complementary (Gertler & Molyneaux, 1994). Without an increase in demand, the impact of supply programs is limited. Also without family planning programs, latent demand may not result in actual contraceptive use. For instance, Lapham & Mauldin (1985) found that the contraceptive prevalence was highly associated with socio-economic conditions, but also that the association was much stronger if there have been organized family planning programs. In a review of findings from many studies, Mwaikambo et al. (2011) found that family planning programs have been most

successful when they have used a variety of approaches, mixing those that improve the quality of services with those that address sociocultural barriers or that focus on winning community and social support for family planning use. It is in this approach that we may include the successful family planning programs in Malawi, Ghana and Zambia (Solo et al., 2005),

This study seeks to answer the question in relation to what may have been the key factors that explain the recent dramatic increase in contraceptive use in Rwanda. Rather than choose one or another side, whether demand or supply, we would like to have a full framework representing all potential factors. However, information regarding supply side factors is very limited in our datasets. We therefore present the following framework, mainly restricted to the demand side, as it includes both socio-economic factors and factors related to family planning.

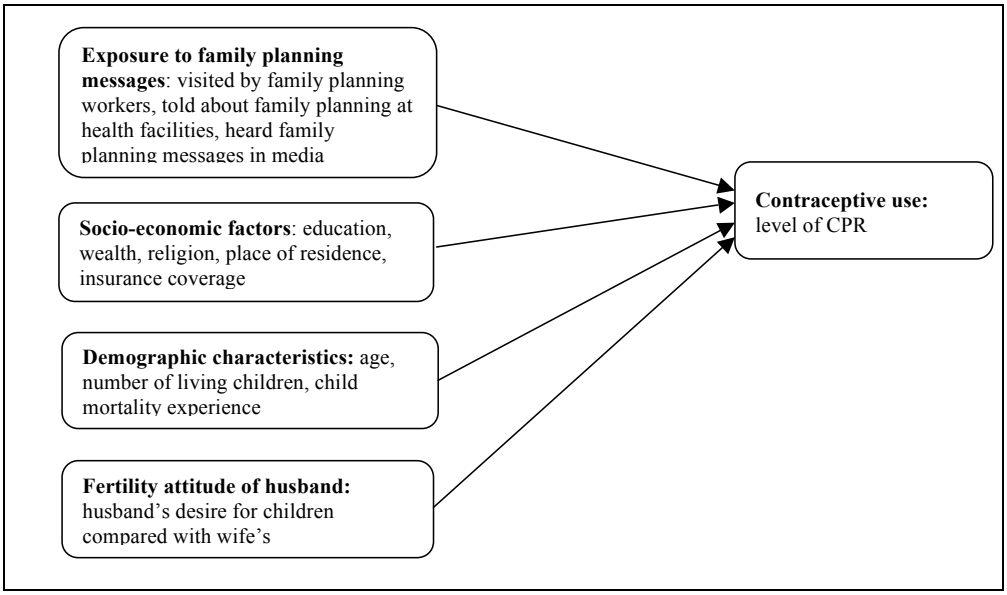

Figure 1.1 Conceptual Framework

5.4 Data and Methods

5.4.1 Data

This research uses the 2005 and 2010 Rwanda DHS (RDHS) women's datasets. The study population concerns all women in union interviewed, as used in the calculation of CPR. The RDHS sample of women in union was 5,510 women in 2005 and 6,897 in 2010. The two datasets were pooled together for the decomposition analysis. The outcome variable is

"current use of contraception," with two categories: y*es* if the respondent is using any method of contraception, and *no* if otherwise. Explanatory variables are grouped in four categories:

- Demographic variables: age, number of living children, child mortality experience
- Socio-economic factors: education, wealth, religion, place of residence, health insurance
- Exposure to family planning messages: visited family planning worker, told about family planning at health facility, media messages (radio, television or newspapers)
- Husband's fertility attitude: husband's desire for children compared with his wife's.

5.4.2 Statistical analysis

To evaluate the contribution of each part and each characteristic of the factors, both descriptive and multivariate analysis will be applied.

Descriptive analysis

We start the analysis with descriptive results. First, in table 5.2 we provide the frequencies of respondents for each independent variable and each survey, from which we show, in percentage points, the changes between surveys indicating improvements or not of characteristics of the sample population. In tables 5.3 and 5.4 we indicate the contraceptive method mix and the distribution of respondents according to whether or not they use contraception, showing the differences in contraceptive practice between 2005 and 2010.

Multivariate decomposition model

Widely known as Blinder-Oaxaca (Oaxaca-Blinder) decomposition (Blinder, 1973; Oaxaca, 1973), or as multivariate decomposition, decomposition techniques, component analysis, shift-share analysis or regression decomposition as detailed by Powers and Yun (2009), this approach provides a method of analysing the outcome of two different groups. The differences between two groups could be explained either in the composition or characteristics of the groups (endowments) or by the effects of those characteristics (coefficients). This means that the Oaxaca-Blinder technique will allow displaying the real contribution of each independent variable in the total difference in characteristics or the effects of characteristics. The multivariate decomposition techniques were used in the 1970s by many researchers for linear regression models and later extended to nonlinear models with an in-depth discussion on how to address the related weaknesses (Fairlie, 2005; Powers & Pullum, 2006).

We have chosen to use the decomposition technique for this study for two main reasons. The first is related to the study, which compares two time periods, 2005 and 2010. The second is that this technique allows a distinction of the difference in contraceptive use between 2005 and 2010 partitioned into components attributable, first to the changes in composition, second to the changes in effects of the selected explanatory variables, and third to the interaction between them.

The model can be presented as follows:

$$\Delta Y^{2010\text{-}2005} = (X^{2010} - X^{2005})\,\mathbf{b}^{2010} + X^{2005}(\mathbf{b}^{2010} - \mathbf{b}^{2005}) + [(X^{2010} - X^{2005})(\mathbf{b}^{2010} - \mathbf{b}^{2005})]$$

ΔY: difference in mean prediction between 2010 and 2005, $X_i \ldots X_k$: different characteristics and $\mathbf{b}_i \ldots \mathbf{b}_k$: estimated regression coefficients

$(X^{2010} - X^{2005})\,\mathbf{b}^{2010}$: represent the difference due to endowments

$X^{2005}(\mathbf{b}^{2010} - \mathbf{b}^{2005})$: represent the difference due to coefficients

$[(X^{2010} - X^{2005})(\mathbf{b}^{2010} - \mathbf{b}^{2005})]$: represent the difference in interaction between endowments and coefficients.

The Blinder-Oaxaca decomposition outputs provide details on endowments, coefficients, and interaction between the two time periods.

- Endowments: part of the changes in contraceptive use due to differences in characteristics.
- Coefficients: part of the changes in contraceptive use due to effects of explanatory variables.
- Interaction: part of the changes due to interactions between characteristics and effects of characteristics

5.5 Results

5.5.1 Descriptive results

Table 5.2 presents the percentage of women included in each category of selected variables in 2005 and 2010, and the changes between the two periods. Overall, there were few changes in women's characteristics, such as place of residence, current age, or number of living children. There was a small decrease in the percentage of younger women, women with many children, and urban residents compared with older women, women with fewer children, and rural residents. Women's educational attainment increased between 2005 and 2010, particularly for some education (primary) versus none. The category of Protestant religion slightly increased, while Catholics, Muslims and others decreased. Child mortality decreased. The percentage of women without experience of a dead child rose by 11.2 percentage points compared with a decline among women who experiences the loss of some children. A convergence of fertility attitudes between spouses occurred over the survey period. Couples who wanted the same number of children rose by 21 percentage points, while the percentage of couples with different views or who did not know the other's fertility preferences declined. The percentage of women exposed to family planning messages, regardless of the source of message, increased significantly, by 25 to 30 percentage points.

Table 5.2 Percentage distribution of married women by selected variables and changes in these variables, in 2005 and 2010

Variable	Category	2005	2010	Change in % points
Woman's age	15-24	19.0	15.8	-3.2
	25-24	42.9	46.8	3.9
	35+	38.1	37.4	-0.7
Number of living children	0-1	21.6	22.8	1.2
	2	18.5	19.3	0.8
	3	17.1	16.3	-0.8
	4	14.4	14.6	0.2
	5	10.0	11.5	1.5
	6+	18.4	15.5	-2.9
Woman's educational level	No education	29.8	19.7	-10.1
	Primary	61.5	69.8	8,3
	Secondary	8.1	9.0	0.9
	Higher	0.6	1.5	0.9
Residence	Urban	13.5	13.4	-0.1
	Rural	86.5	86.6	0.1
Religion	Catholic	46.1	41.9	-4.2
	Protestant	36.5	40.4	3.9
	Adventist	13.2	14.3	1.1
	Others	4.2	3.4	-0.8
Woman's mortality experience	No child death	50.7	61.9	11.2
	Last child died	7.0	3.7	-3.3
	One death, not last	20.8	17. 8	-3.0
	Two or more deaths	21.5	16.6	-4.9
Husband desire for children compared with wife's	Same number as wife	36.8	57.9	21.1
	More than wife	13.0	10.2	-2.8
	Fewer than wife	18.5	17.2	-1.3
	Don't know	31.7	14.7	-17.0
Visited by family planning workers	Yes	5.3	30.9	25.6
	No	94.7	69.1	-25.6
Told about family planning at health facility	Not told	26.2	27.1	0.9
	Told	15.5	44.8	29.3
	Not been at HF	58.3	28.1	-30.2
Heard family planning message on radio, television, or newspaper	Yes	46.1	70.4	24.3
	No	53.9	29.6	-24.3
Have health insurance	No	53.4	24.0	-29.4
	Yes	46.6	76.0	29.4
Total		100.0	100.0	-
Total number of women		5,510	6,897	-

Table 5.3 shows current contraceptive use among married women. Between 2005 and 2010, contraceptive use greatly increased, by 34.2 percentage points, for use of any method. The increase was exclusively for modern methods, with a 34.8 percentage point increase, while use of traditional methods declined by 0.7 percentage points. Irrespective of year, the modern methods most commonly used are injections and pills, with implants at third place in 2010. While contraceptive use increased among all women between 2005 and 2010, the increase varied by women's characteristics.

Table 5.3 Percentage distribution of married women by contraceptive method used, RDHS 2005 and 2010

Contraceptive method	2005	2010	Change in % points
Any method	17.4	51.6	34.2
Any modern method	**10.3**	**45.1**	**34.8**
Injections	4.7	26.3	21.6
Pills	2.4	7.1	4.7
Implants	-	6.3	6.3
IUD	-	0.5	0.8
Female sterilization	0.5	0.8	0.3
Male condom	0.9	2.9	2.0
LAM	0.8	0.5	-0.3
Any traditional method	**7.1**	**6.4**	**-0.7**
Periodic rhythm	4.2	2.9	-1.3
Withdrawal	3.0	3.5	0.5
`otal	100.0	100.0	-
Number	5,510	6,897	-

Table 5.4 indicates that the increase was higher in rural than urban areas, among less educated than more educated women, and among women with fewer children than women with many children. The difference is striking with regard to women's experience with child mortality. While the percentage of women with no child deaths using contraceptives rose by almost three times, from 20% to 57%, between 2005 and 2010, contraceptive use among women who lost their last birth was lower and increased less, from 13% to 29%. Contraceptive use was also most common if a husband desired fewer or the same number of children as his wife. Women exposed to family planning messages in the mass media were more likely to use contraception than women with no exposure, but the difference narrowed between 2005 and 2010.

Table 5.4 Percentage of married women using contraception in 2005 and 2010, by selected variables

Variable	Category	2005		2010	
		%	N	%	N
Woman's age	15 – 24	12.1	1,045	43.5	1,087
	25 – 34	18.7	2,366	55.2	3,230
	35 +	18.4	2,098	50.4	2,579
Number of living children	0 - 1	8.6	1,189	36.1	1,572
	2	16.2	1,020	56.6	1,333
	3	20.4	940	57.8	1,125
	4	21.7	794	58.6	1,006
	5	20.3	553	56.0	791
	6+	20.9	1,011	51.7	1,066
Place of residence	Urban	31.6	743	53.1	926
	Rural	15.2	4,766	51.4	5,970
Woman's educational level	No education	10.8	1,639	43.3	1,354
	Primary	17.3	3,391	52.6	4,815
	Secondary	38.8	448	60.1	621
	Higher	60.0	30	61.0	105
Wealth status	Lowest	11.0	1,136	43.2	1,351
	Second	15.1	1,123	47.4	1,387
	Middle	15.7	1,111	52.8	1,394
	Fourth	14.8	1,144	57.2	1,415
	Highest	31.8	995	57.1	1,348
Woman's religion	Catholic	19.4	2,539	55.8	2,891
	Protestant	13.8	2,013	47.1	2,784
	Adventist	18.1	728	52.2	985
	Others	23.2	228	51.1	235
Woman's mortality experience	No death	20.2	2,791	57.4	4,270
	Last birth died	13.0	386	28.6	259
	One death other than last birth	19.1	1,148	54.4	1,225
	Two or more deaths	10.3	1,184	31.5	1,142
Husband's desire for children compared with wife's	Same number	22.2	2,027	55.0	3,990
	More than wife	12.4	718	47.0	705
	Fewer than wife	22.1	1,017	57.0	1,185
	Don't know	11.0	1,746	34.8	1,014
Heard FP messages on radio, television, or newspaper	No	11.5	2,972	45.2	2,038
	Yes	24.2	2,537	54.5	4,838
Visited by FP workers	No	17.2	5,217	48.9	4,765
	Yes	20.9	292	57.5	2,132
Told about FP at health facility	Not told	20.0	1,446	46.4	1,869
	Told	26.1	852	57.3	3,088
	Not been at HF	13.9	3,211	47.4	1,939

Have health insurance	No	15.3	2,938	51.4	1,665
	Yes	19.7	2,571	51.6	5,231
Total		17.4	5,510	51.6	6,897

Source: Computation from the 2005 and 2010 RDHS

5.5.2 Regression-based decomposition results

Table 5.5 reports the mean prediction of contraceptive use in 2005 and in 2010 and also shows how much of the difference is attributable to changes in women's characteristics (endowments), variation attributable to the effects of these characteristics (coefficients), and their interaction.

Table 5.5 Mean values of contraceptive use predicted for 2005 and 2010

Mean prediction 2010	0.516***
Mean prediction 2005	0.174***
Total Difference	0.342***
Difference due to Endowments	0.0567***
Difference due to Coefficients	0.265***
Difference due to Interaction	0.020

*** p<0.01

Overall from 2005 to 2010, there was an impressive increase in contraceptive use. The mean prediction increased three times, from 0.174 to 0.516, resulting in an increase in prediction of 0.342. It is clear that part of the increase explained by the effects of selected explanatory variables is more important (0.265, representing 77.5% of the total coefficients change) than the part explained by the changes in these characteristics (0.0567; 16.6%). The interaction term (0.020) is not significant at 0.05.

However, even though the overall increase explained by the coefficients is higher than the increase explained by the endowments, the contribution of independent variables varies substantially from one variable to another and, according to categories of within variables (Table 5.6).

In regard to the total increase in contraceptive use between 2005 and 2010 attributable to the changes in coefficients, the most important independent variables that provide significant contribution are women's education level, mortality experience, and place of residence, accounting for 16.5%, 10.6% and 9.0% respectively.

The contribution of changes in effects of education is the most important, accounting for 21.3% of changes due to coefficients[4]. This change is mainly explained by the categories

of women with no education and those with primary education, at 9.8% and 12%, respectively. The categories of better educated women display negative and no significant results at the level of 5% relative to the average increase.

The second factor that displays significant contribution to change in family planning use is women's experience with child mortality (13.7%). Women with all their children alive are most likely to have increased contraceptive use (10.9%), followed by women who lost only one child, at 3.5%. In contrast, women who lost the last child or those who lost more than one child have progressed slower than the average with respectively -2.7% and -1% reducing the overall increase.

Table 5.6 Contribution of explanatory variables to the difference in contraceptive use between 2005 and 2010

Variable /Category	Endowment		%	Coefficient		%
Woman's age						
15 - 24	-0.0004389		-0.1	0.000189		0.1
25 - 34	-0.0002233		-0.1	0.003534		1.1
35 +	0.0000551		0.0	-0.00351		-1.1
S/Total	**-0.0006071**		**-0.2**	**0.000208**		**0.1**
Number of living children						
0 - 1	-0.00143		-0.4	0.006454		2.0
2	-0.00022		-0.1	0.005362		1.7
3	-0.00014		0.0	-0.00068		-0.2
4	0.0000523		0.0	0.001155		0.4
5	0.000624	**	0.2	-0.00087		-0.3
6+	-0.00161	***	-0.5	-0.00995	***	-3.1
S/Total	**-0.0027195**		**-0.8**	**0.001469**		**0.5**
Place of residence						
Urban	-0.000018		0.0	-0.00534	***	-1.7
Rural	-0.000018		0.0	0.034188	***	10.6
S/Total	**-0.0000366**		**0.0**	**0.028852**		**9.0**
Woman's educational level						
No education	0.010305	***	3.2	0.024498	***	7.6
Primary	-0.00443	***	-1.4	0.029764	**	9.3
Secondary	0.000176		0.1	-0.00058		-0.2
Higher	0.001328	***	0.4	-0.00068	*	-0.2
S/Total	**0.0073784**		**2.3**	**0.053005**		**16.5**
Wealth index of household						
Lowest	0.000256		0.1	-0.00427		-1.3
Second	0.0000502		0.0	-0.00463		-1.4
Middle	0.00000109		0.0	0.003097		1.0
Fourth	0.000452		0.0	0.013146	***	4.1
Highest	0.00067	*	0.2	-0.00637	*	-2.0
S/Total	**0.00102148**		**0.3**	**0.000977**		**0.3**

Woman's religion						
Catholic	-0.00052		-0.2	0.009912		3.1
Protestant	-0.00108	**	-0.3	0.004249		1.3
Adventist	-0.000017		0.0	0.000334		0.1
Others	-0.00013		0.0	-0.00148		-0.5
S/Total	**-0.0017447**		**-0.5**	**0.013014**		**4.0**
Heard family planning messages in the media						
No	0.008465	***	2.6	0.016757	***	5.2
Yes	0.008465	***	2.6	-0.01431	***	-4.5
S/Total	**0.016929**		**5.3**	**0.002448**		**0.8**
Visited by family planning worker						
No	-0.00065		-0.2	-0.01423		-4.4
Yes	-0.00065		-0.2	0.000798		0.2
S/Total	**-0.0012946**		**-0.4**	**-0.01343**		**-4.2**
Told about family planning at health facility						
Not told	-0.000015		0.0	-0.00512		-1.6
Told	0.009836	***	3.1	-0.00186		-0.6
Not at health facility	0.009572	***	3.0	0.018358	***	5.7
S/Total	**0.0193923**		**6.0**	**0.011382**		**3.5**
Have health insurance						
No	-0.00013		0.0	0.003792		1.2
Yes	-0.00013		0.0	-0.00332		-1.0
S/Total	**-0.0002536**		**-0.1**	**0.000474**		**0.1**
Husband's desire for children						
Same	0.00898	***	2.8	-0.00435		-1.4
More	0.001311	***	0.4	0.006792	***	2.1
Fewer	-0.00048	*	-0.1	-0.00054		-0.2
Don't know	0.005733	***	1.8	-0.01184	**	-3.7
S/Total	**0.0155465**		**4.8**	**-0.00994**		**-3.1**
Woman's mortality experience						
No death	0.00180	*	0.6	0.03492	***	10.9
Last birth died	-0.00055		-0.2	-0.00690	***	-2.1
One death other than last birth	-0.00039		-0.1	0.00870	**	2.7
Two or more deaths	0.00224	***	0.7	-0.00263	***	-0.8
S/Total	**0.00311**		**1.0**	**0.03409**		**10.6**
Change in intercept				*0.142301*		
Total	**0.056674**		**16.6%**	**0.264852**		**77.5%**

*** p<0.01**p<0.05 *p<0.1

In regard to urban-rural residence, results exhibit substantial positive changes among rural women (13.7%) compared with the average, but small and negative changes among urban women, as they contributed less than the average (-2.2%). The gap between rural effects and urban effects is 15.9%.

It should be noted that the intercept (0.142301) accounts for more than half of the change due to coefficients (0.2648520). This suggests that the model fit presented some limitations in explaining the increase in contraceptive use between 2005 and 2010. Others factors would exist that contribute also to the success of family planning program.

The compositional differences in sample groups also provide interesting results in that exposure to family planning messages in the media or at health facilities, husband's desire for children compared with his wife's, woman's education, and the woman's child mortality experience have significant positive contributions. It appears that most (68%) of the contribution of endowment is attributable to the compositional differences for women exposed to family planning messages in the media (31.9%) or at health facilities (36.1%). Factors related to family planning are followed in endowment contribution by the fertility attitude of husbands (29.5%), particularly for women whose husbands' desire the same number of children as the women desire (16.9%), and women who do not know the fertility preferences of their husbands (10.8%).Although statistically significant, the compositional effects related to women's educational level and women's mortality experience are less important, at 13.9% and 6.0%, respectively.

5. 6 Discussion and Conclusion

Contraceptive use in Rwanda had increased by far more than the Ministry of Health projection for the year 2010. Moreover, other reproductive health indicator progresses, such as women delivering in health facilities and reduction in infant and maternal mortality, had also exceeded expectations.

Comparing the 2005 and 2010 RDHS, this study has described the Rwandan family planning initiatives and identified factors that have contributed most to the increase in contraceptive use between 2005 and 2010. The study used the Blinder-Oaxaca technique to decompose the contribution of changes in women characteristics and changes in effects of these characteristics.

Results from the multivariate decomposition technique show that the increase in contraceptive use between 2005 and 2010 is attributable mostly to the changes in effects of characteristics (coefficients) than to the changes in sample population composition (endowments). Significant contributions in coefficients have occurred for rural women, women with lower educational level, and those who have not experienced the death of a child. The contribution of changes in endowments, of course little compared with the one resulting from changes in coefficients, is due to the augmentation of the proportion of women exposed to family planning messages in the media or at health facilities, and that of women having the same view as their husbands regarding the number of children they want or who do not know their husband's position.

By showing a predominant contribution of changes in coefficients, our findings (could) reflect the impact on contraceptive behavior change of the family planning initiatives that the government and other stakeholders embarked on since some years back. This is supported by the fact that women in the lower socio-economic stratum of the population (less

educated and rural women) show a larger change than their counterparts in the higher stratum. Family planning sensitization effect is also observable in the fact that variables related to family planning messages contribute the most to the compositional component.

Of the different factors analyzed in this research, education level which displays the greatest contribution to the contraceptive increase shows striking effects. In fact, contraceptive use has always been positively associated with women's education. However, our results indicate that women with a lower level of education exhibit a larger than average uptake than those with a higher education level. This result would suggest that with a strong family planning program, the positive relation between education and family planning use may vanish as less educated women may use contraception to the same extent as higher educated. Evidently, lowly educated women were at far lower level in the 2005. Like for education, an increase in contraceptive use improved more among rural women than among urban ones.

Striking also are the results from factors related to family planning messages in the media. They show a limited and reversed contribution in the coefficients component. Contrary to our expectation, women who had heard family planning messages in media show a lower change in contraceptive use than average, while those who did not exhibit an above average change. This could mean that women who were not exposed to family planning messages in the media may have been reached through information by other means. Because of the massive campaign, communication channels may have been much diversified. For instance, the monthly meeting at the "Umudugudu" level, and social network channels between peers could have been a key source of contraceptive information for many women (Behrman et al., 2002). Otherwise, supply side factors[5] not measured in the RDHS (increased access to family planning services, for example) have been more important determinants of increased contraceptive use. This may be linked to what is described in the background section reporting remarkable improvements in terms of contraceptives provision, increasing of number of health facilities and a massive training of providers. All these efforts may have contributed to the increased contraceptive use.

The result that factors related to family planning messages show an apparent limited contribution indicates a limitation for these variables to capture the full channels of family planning initiatives which *generate a whole arsenal of institutions, programs, and infrastructure designed to have multiple effects on contraceptive use*" (Gertler & Molyneaux, 1994, p. 34). On the other hand, bearing in mind that, since factors related to family planning message influence others factors, part of their effects may have been driven by socio-economic and demographic variables. The fact that poor women made much more progress than the richer supports this assumption.

The contribution of this study is to provide further evidence on the effects of political commitment for the contraceptive uptake. It shows that with a large and strong family planning program, socio-cultural and economic barriers so far important among poor people and rural residents may be removed. This study supports the recent declaration of African leaders at the 2012 London summit on family planning to renew their commitment to family planning (Osotimehin, 2012) as a determinant factor of success.

Limitations of the Study

Yet these outcomes do not mean that the results from Rwanda can be transported directly to other or even neighboring countries. As stated in the introduction the level of unmet need was very high in Rwanda in 2005 and the gap between actual and desired fertility of 1.5 children was exceptionally large in this period. Perhaps more important is that women from the lower wealth brackets and with limited education showed ideal family sizes comparable to the more wealthy and better educated. Muhoza et al (this volume) showed this to be very different from Kenya and Tanzania and refer to the low ideal family size among the poorer strata as a case of 'Poverty Malthusianism'. In analysing the socio-economic and socio-cultural determinants of unmet need (this volume) they found no evidence of differentiation in demand for family planning, but large differentiation in access to modern means. Many women just started using these means, the moment they were made available also in rural areas. The sensitizing campaign met with exceptional fertile soil to plant the seeds for an increase in uptake of contraceptives. Sensitizing will certainly help but will only be effective if the population is ready to acknowledge the benefits of having less children. The analysis is limited for not being able to measure many other important factors, for example, those related to family planning service availability and quality, which also affect contraceptive use. Also, by pooling datasets, the study could not analyse some important variables that were not available in both datasets. While decomposition analysis is a promising tool to analyse contributions of various factors to changes in outcome, our model is constrained by limited availability of data to explain the difference. Further research is needed including alternative methodology to the decomposition analysis.

Notes

1. The general objective of the 2020 vision is to transform the country into a middle-income country by the year 2020 (MINECOFIN, 2000).

2. In 2007 the President declared family planning a national priority. Created in 2003, the Rwandan Parliamentarians' Network for Population and Development engaged several ground campaign at districts and Sectors level.

3. *Umuganda* means community service done every last Saturday of the month.

4. This is the percentage of the variable education in the total percentage due to coefficients (16.2/77.5).

5. Even though progress in access to contraceptives is not demonstrated in this analysis, reports from the Ministry of Health indicate an increase in the number of health facilities, an improvement in the quality of service through staff training and provision of health facilities (MOH, 2008 and 2010)

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6 Regional variations in contraceptive use in Rwanda: A multilevel analysis of Readiness, Willingness, and Ability

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Abstract

Rwanda has made an impressive increase in contraceptive use between 2005 (17%) and 2010 (52%). The overall increase hides, however, striking regional differences. This study aims to assess the role of regional-level factors in order to identify persistent barriers to the further up-scaling of contraceptive use

The research uses the Coale/Lesthaeghe framework that identifies three's preconditions for the use of contraception: readiness, willingness and ability. These preconditions are measured at district level using the 2010-Rwanda Demographic and Health Survey enriched with information on service availability from the 2007-Rwanda Service Provision Assessment. A multilevel logistic model is applied to regress the use of modern contraception on these factors.

The analysis shows that the overall regional variance is substantial and can be attributed for more than 50% to the combined effects of readiness, the need to limit or postpone births, and willingness, the norms and attitudes toward contraception use. Regional variation in ability, access to reproductive health services, does not add to the explanation. In all models, the effects of individual factors remain stable after inclusion of regional factors.

The conclusion is that the regional differences in contraceptive use are due to the differences in readiness and willingness for family planning. Full geographical coverage of programs for reproductive health services has been instrumental in enlarging the uptake at national level, but fails to address the regional variations. Both regional economic development and focused sensitizing campaigns could be the next step to raise the contraceptive prevalence in regions that are still lagging behind.

6.1 Introduction

Rwanda has made an impressive increase in contraceptive use in the last decade. The contraceptive prevalence rate (CPR) of 10 % in 2000 has risen to 17 % in 2005 and 52 % in 2010. However, this national success hides substantial regional differences. The CPR ranges between 29 % in the District of Rubavu to 76 % in that of Muhanga. Regional variations are not limited to contraceptive uptake, other demographic indicators show similar patterns. The Total Fertility Rate (TFR) varies from 2.9 births in Nyarugenge to 5.4 births in Nyaruguru (NISR et al., 2012). Unravelling the causes of these regional differences could help to improve family planning program's performance.

Literature indicates that the differences in contraceptive use may result from three explanations (Kimani, 2007, Cammack, 2001). The socio-economic explanation stipulates that the differences in contraceptive behavior are due to differences in socio-economic status of the population. The process of development, by raising the costs associated with children and reducing their benefits, induces couples to desire fewer children and to use contraceptives to achieve smaller families (Bongaarts, 1997). Bongaarts & Watkins (1996) also argue that development opens up social networks and channels of communication that promote contraception. The cultural explanation suggests that across societies tradition and culture take different stands to contraception adoption. The third explanation is related to differences in family planning program's implementation. Some regions may run stronger and more efficient program than others, creating a difference in access, costs and acceptability of contraceptive services, and therefore a difference in contraceptive uptake. Such programs not only help to satisfy unmet needs for contraception (Bongaarts & Watkins, 1996), but can also raise the demand for contraception (Mahmood & Ringheim, 1997).

The three explanations can be linked to Coale's preconditions for using contraception: readiness, willingness and ability (Coale, 1973; Lesthaeghe & Vanderhoeft, 2001). Readiness measures effects of socio-economic development, willingness would translate the sociocultural weight and ability could be linked to family planning program capacities and accessibility. The three preconditions are sequentially hierarchical. Readiness is the first condition that should be present to be able to evaluate the two others. Also, ability can only operate if there is willingness.

The aim of this research is to test the role of these preconditions in explaining the regional variations in modern contraceptive use in Rwanda using a multilevel model that captures both individual-level and regional-level effects. Much research has shown that the variation in contraceptive use is due to both individual-level and regional-level factors (Elfstrom, 2012; Stephenson et al., 2007). People are nested within their region. The specific objectives of this chapter are:

1) To measure the relative extent to which individual and regional factors determine the differences in the use of modern contraceptives in Rwanda.
2) To assess the share of regional variance attributable to each regional-level factor: readiness, willingness and ability.
3) To identify the barriers which cause some regions to lag behind others in contraceptive use.

Identifying the regional-level predictors of contraceptive use will help to explain why family planning programs are less successful in some areas and might indicate ways to improve their performance.

6.2 Family planning program in Rwanda

The 2006 Rwanda Family planning Policy is part of the 2003 National Health Reproductive policy for Sustainable Development aimed at improving the general social and economic welfare of the population (MOH, 2003). Its inspiration comes from the Human Development Program Vision 2020 and the 2005 Economic Development and Poverty Reduction Strategy (EDPRS), two policies aiming to lift Rwanda from poverty and become a middle-income country (MINECOFIN, 2000, 2007). As curbing population growth has been recognized as a condition for poverty reduction, improving the quality of life and implementation of the Millennium Development Goals, family planning has been declared a priority. The expectation of the government is that family planning will "streamline population growth with the country's economic development and suppress the main causes of mortality" (MOH, 2006, p. 8).

The goals of the family planning policy are based on the 2005 DHS results, which indicated an increase in fertility and a high unmet need for family planning (37%, the highest in Africa). Targets included a CPR of 26 % and a TFR of 5.5 for 2010 (MOH, 2006 p. 15). The 2010 targets were surpassed with a TFR of 4.6 in and a CPR of 52%.

Strategies to achieve these targets include: to carry out advocacy with all potential actors to promote awareness of family planning, to mobilize communities, and to mainstream family planning programs in all health services providing access to the full range of methods (MOH, 2006).

Advocacy was launched by the President of the Republic in February 2007 when he suggested three children as a number that should be convenient to a Rwandan family (Ndaruhuye et al., 2009). The Parliamentarian's Network for Population and Development took leadership in the advocacy by taking family planning down to district and sector level. District and sector leaders were made responsible in their respective administrative units, to put into action the "number one program". Family planning was included in their performance contracts. The objective of the public campaign was to raise or reinforce the readiness and willingness by addressing social and cultural barriers. This sensitization produced results as the reported ideal family size dropped from 4.3 children in 2005 to 3.3 in 2010 (NISR et al., 2012).

The community mobilization aiming to raise the willingness of the population was reinforced through the following activities: (1) increasing knowledge and changing attitudes about modern contraception, particularly among youth; (2) increasing men's active roles in reproductive health and family planning; and (3) a dialogue with religious leaders.

Mainstreaming family planning was done by strengthening the capacity of health facilities through a massive training of family planning providers, and the provision of a full range of contraceptive methods, especially those with long term effects such as injections, implants, IUDs. Besides efforts to improve the quality of services, special attention was given

to areas covered by faith-based health facilities that do not offer modern methods. To overcome this problem, secondary posts were constructed near Faith-Based health facilities (information provided by Thomas Nsengiyumva, Responsible of family planning at the Ministry of Health). The improvement of service provision was expected to increase the ability of the population measured by access, affordability, and credibility. The future step is to implement community-based family planning services and local distribution of contraceptive commodities to relieve pressure on district health facilities.

All these initiatives benefited from a strong coordination of efforts headed by a national committee, the *Family Planning Technical Working Group* (FPTWG), a large partnerships with donors that contributed to the necessary financial resources, from the decentralization reform that brought service delivery closer to the population and from the introduction of a community based health insurance scheme that has facilitated access to health facilities (MOH, 2006).

6.3 Framework and hypothesis

Applying the Coale (1973) and Lesthaeghe & Vanderhoeft (2001) framework of readiness, willingness and ability to the regions of Rwanda we have formulated a number of hypotheses:

Readiness is subjective need to postpone births or cease childbearing altogether (Cleland, 2011). The assumption is that couples balance benefits against costs ascribed to the *nth* child to determine whether they want this child. The use of contraception must be advantageous to couples. This is generally linked to a higher level of economic development and a higher level of urbanization. However, previous studies have shown that in Rwanda the demand for family limitation is not very different between urban residents and rural dwellers or between rich and poor. Poverty Malthusianism has been put forward as an explanation (Ndaruhuye et al., 2009). Given the lack of land, having an extra child would dilute rather than strengthen household's resources, and rural regions provide few other labour opportunities apart from farming. That is why we expect an equal desire for family planning in poor and rural regions compared to urban and more developed regions.

Willingness is the attitude in favour of contraception or certain contraceptive methods grounded in traditional beliefs, culture, ethical considerations, codes of conduct, religious prescriptions, and legitimacy. Much research in Africa (Bawah, 1999; Castle, 1999; Hulton, 2000) has documented resistance to the use of modern contraception, despite the awareness of the need to limit childbirths indicating a lack of willingness. In Rwanda, legitimacy will not be a problem as the legislation is the same throughout the country. However, religious opposition may occur, particular among some Protestant communities (Ndaruhuye et al., 2009; Westoff, 2013).

Ability refers to the knowledge of contraceptive methods, the supply of services and access to these services (Cleland, 2011; Lesthaeghe & Vanderhoeft, 2001). Knowledge about contraceptives is almost universal in Rwanda with 99% of married women knowing at least one method (NISR & ORC Macro, 2006; NISR et al., 2012) and therefore less likely to be a constraint. Access in terms of distance to the nearest health facility also seems to be a minor problem, given the high density of the population (400 people per square kilometre).

Contraceptive means are almost free of charge, except in private clinics and few NGOs, but their share in supply is very limited. About 94% of contraceptive users have got their contraceptives in public facilities (NISR et al., 2012). The last component of ability is availability and quality of reproductive health services. These are still different across regions, despite the improvement since 2007 in terms of security of commodities, and staff training. We hypothesize a positive relation between the availability and quality of services and contraceptive prevalence.

Readiness, willingness and ability are obvious preconditions at the regional level for the use of contraception at the individual level. In Rwanda, regional poverty will raise the demand for family planning due to the lack of employment opportunities. Religious communities may stand in the way of acceptance by members of their congregation. Building the health infrastructure is on its way, but is more advanced in some regions than in others.

6.4 Data and methods

6.4.1 Data and variables

This research uses data from the 2010 Rwandan Demographic and Health Survey (DHS) and the 2007 Rwandan Service Provision Assessment (RSPA) (NISR et al., 2012, 2008). The study population is restricted to women in a union, fecund and not pregnant at the moment of survey, i.e. women exposed to risk of becoming pregnant. The DHS individual file provides information on contraceptive use and individual characteristics while the inventory file of RSPA offers information on service provision in terms of availability of contraceptive methods and service quality.

The dependent variable is the current use of modern contraceptive methods. Condom use is excluded because women may obtain their condoms from shops or other sources that are not included in SPA surveys. *Independent variables* are of two groups: individual characteristics and regional-level factors. We limited individual level variables to demographic and socio-economic characteristics: woman's age, number of living children, woman's education and wealth index of the household.

Regional-level factors are presented according to the three conditions as mentioned in the framework section. Readiness is measured by the regional total demand for family planning and the regional percentage of women desiring larger families (four children or more). Willingness is measured by the percentage of women approving family planning[2] and the percentage of Protestant Christians in the region.

Ability is assessed by two indexes computed from the 2007 RSPA inventory file. The first is the regional average number of modern contraceptive methods provided in the health facility and available on the day of survey. A contraceptive method is considered to be provided and available in a facility if the facility reports providing this method and also has the product in stock. As mentioned, condoms and rare methods (foam, female condom) are excluded from these totals. The second is the regional average score based on the responses

[2] *This indicator has been computed from the 2005 DHS because the question was not asked in 2010 DHS.*

to eight items on reproductive health services. It is only computed for health facilities that provide family planning services. A facility is given one point for reporting yes to each item and zero if not. The sum of those scores gives the total score of a facility ranging from zero to eight and the average of the total score of all health facilities in the region provides a regional family planning service score. The eight items are selected on their relevance to promoting family planning and providing reliable and good-quality family planning services:

Family planning counselling
1. Auditory and visual privacy in the family planning counselling areas
2. Family planning visual aids
3. Individual cards or records for clients
4. Written family planning guidelines

Pelvic examination
1. Auditory and visual privacy in the examination room
2. Spotlight for pelvic exam
3. Exam table/bed
4. Vaginal speculum

6.4.2 Multilevel models

We have three reasons to use the multilevel regression model. First, multilevel models deal with hierarchical data structures like the one we are using in this study. Individuals are nested within regions. They not only share customs, but more importantly also various services including family planning services, and health facilities are organized at district level. Second, the dependent variable, current use, is measured at the individual level while key independent variables are measured at the regional level. Multilevel modelling is appropriate approach that takes into consideration both individual and regional effects on individual behaviour. Third, the multilevel modelling provides information on the proportion of total variation explained by regional-level factors. The modelling allows for random intercepts across regions and assumes fixed effects of individual variables across regions.

In this study, the higher level is the administrative district. Rwanda has 30 districts, which might be too small for predictive accuracy, but large enough for explanatory analyses (Hox, 2010).
The model is presented in two equations: one at the individual level and another at the regional level.

Individual level:

$$\textbf{logit}\ (C_{ij}) = \alpha j + \beta X_{ij} + e_{ij}$$

Regional level:

$$\alpha_j = \gamma 0 + \gamma Z_j + u_j$$

$$u_j \sim (0, \mathbf{f}_{00})$$

Where:

logit (C_{ij}), the dependent variable, is the logarithm of the odds C_{ij} for the *i*th individual in the *j*th region to use a modern contraceptive method. X_{ij} represents individual level variables and $_{\gamma}\boldsymbol{Z}_j$ represents regional level factors. $\boldsymbol{\alpha}_j$ is a random intercept, which varies across regions, and $\boldsymbol{\beta}$ a vector of fixed coefficients for individual-level factors. The error term $\boldsymbol{u}_j$ is the regional variance and is assumed to have a normal distribution with mean zero and variance $\mathbf{f}_{00}$. It reflects regional differences that are not explained by variables in the model. In order to assess changes in outcome from the different subsets of regional variables, especially the contribution of each factor or category of regional factors in the variation in contraceptive use, we examine six models sequentially (Table 6.3). The models show the percentage of regional variation attributable to each category of regional factors.

6.5 Results

6.5.1 Descriptive results of individual-level variables

Table 6.1 shows the percentage of women age 15–49 currently using a modern method, by women's background characteristics. In general, women at middle age 25–34 have a higher level of current use of modern contraception than younger or older women. Women who have three to four children are more likely to use a modern method of contraception than women with fewer children or with more than four children. Women with no children are the least likely to report current use of a modern method. Education appears to have the most significant and consistent relationship with the level of current use of modern methods. The percentage of contraceptive use increases progressively with education, from 37.5 % among no educated to 56.6 % among higher educated. The level of current contraceptive use of modern methods increases with wealth quintiles, but the differences are smaller than usually observed. The gap between the richest and the poorest quintiles is only 11 %. There is almost no difference between the two highest wealth quintiles.

Table 6.2, column one shows the current contraceptive use of modern methods of women in a union as reported in the Demographic and Health Survey report. The contraceptive prevalence varies from 23.4 % in Rusizi to 62.0 % in Muhanga compared with a national average of 51.6 %. Nearly half of the 30 regions, recorded less than the national average and 15 have more. One has exactly the national level. All Kigali regions exceed the national average; in the Southern province, four out eight are over the national level; in the West all regions are under the national level; in the North all districts are over or at the national level. In the Eastern province, four out seven have more than the national level.

The table 6.2 also displays the variations by region of the different regional-level variables and the correlation coefficient of each variable and the contraceptive prevalence.

Table 6.1 Percentage distribution of married women using modern contraceptive methods by selected background characteristic (source: 2010 RDHS)

Variable	%	n
Woman's education		
No education	37.5	1318
Primary	46.8	4736
Secondary	51.0	651
Higher	56.6	129
Wealth index		
Poorest	39.2	1323
Poorer	41.8	1353
Middle	47.5	1352
Richer	49.3	1375
richest	49.9	1431

Variable	%	n
Number of living children		
1-2	48.9	2454
3-4	52.6	2120
5+	43.6	1834
0	1.2	426
Woman's age		
15-24	41.6	1057
25-34	50.4	3214
35+	41.2	2563
Total	**45.61**	**6834**

Overall, the demand for family planning (column 2) is relatively high in Rwanda (72.4 %) representing three women in four who want to cease childbearing or to delay their next birth for more than two years. Across regions, the demand varies between 62.3 % and 85.9%. It is particularly high in the Southern and Northern provinces where in some regions the percentage of women in demand exceeds 80%. Surprisingly, all regions of the Kigali City have a demand below the national average. The demand is especially low in the Western province. The percentage of women desiring four children or more (column 3) varies widely between 25.8 % and 65.9 %, with a national average of 48.0%. Larger proportions of those women are found in the provinces of West (54.0%) and East (51.3%) explaining, may be, the relative lower demand for family planning. The percentage of Protestant among the population (column 4) ranges from 18.5 % in Nyanza to 56.3 % in Nyamasheke. Although approval of family planning (column 5) has become a general attitude among Rwandese, important variations subsist. With a national average of 85 % of women approving family planning, the minimum and the maximum are 68.5 % and 97.6 % respectively.

The table 6.2 shows the index of contraceptive methods availability and the index of service quality. As shown in column 6 and 7, the average number of contraceptive methods varies between 2 in Rulindo and 4.3 in the region of Huye out of a maximum of 8 methods. The family planning service index ranges between 3.8 in Nyagatare and 6.2 in Huye out of eight items.

Apart from the quality of family planning service score, all regional-level variables are significantly correlated with the use of modern methods and have the expected signs. The total demand for family planning is positively associated with the prevalence contraceptive while the percentage of women desiring many children is negatively correlated with the use of contraception. The use of contraceptives decreases with the proportion of protestant in the population but increases with proportion of women approving family planning. Unexpectedly, the CPR tends to decrease with the number of available contraceptive methods and does not show a correlation with the quality of family planning service score.

Table 6.2 Descriptive statistics of selected regional variables

Province / Region	CPR	Readiness		Willingness		Ability	
		% Total demand	% women desire 4+	% of protestant	% appr FP	# contr method	Quality of FP service
Rwanda	**45.1**	**72.4**	**48.0**	**40.1**	**86.2**	**3.0**	**5.1**
Kigali	**48.3**	**71.4**	**41.2**	**46.8**	**85.0**	**2.8**	**4.9**
Nyarugenge	52.3	71.6	47.2	46.8	91.7	3.1	4.6
Kicukiro	47.3	71.5	46.0	46.5	85.2	2.3	5.3
Gasabo	45.2	71.0	30.5	47.3	78.2	3.0	5.1
South	**48.5**	**74.0**	**45.5**	**32.7**	**90.1**	**3.4**	**5.2**
Muhanga	62.0	85.9	30.1	19.9	87.8	3.3	5.9
Kamonyi	59.5	81.4	25.8	46.2	92.3	3.3	5.6
Ruhango	52.3	75.7	37.9	20.4	86.1	2.9	5.1
Nyanza	48.1	74.4	48.2	18.5	94.5	3.3	4.7
Gisagara	43.7	70.3	55.2	24.5	95.1	4.0	4.2
Nyaruguru	42.0	68.7	65.7	48.5	88.0	3.3	5.4
Huye	41.1	64.8	62.1	30.1	94.5	4.3	6.2
Nyamagabe	39.4	71.4	37.6	49.1	86.6	2.9	4.1
West	**35.5**	**69.7**	**54.0**	**46.3**	**78.5**	**3.1**	**5.1**
Ngororero	44.6	73.9	50.8	41.6	68.5	3.2	5.4
Rutsiro	41.4	73.2	39.8	47.7	76.4	3.2	4.1
Nyabihu	41.3	77.4	59.2	44.7	78.7	3.1	4.9
Karongi	40.4	66.4	39.3	46.3	87.6	2.4	4.9
Rubavu	29.2	62.3	64.1	45.5	64.3	3.4	6.0
Nyamasheke	27.9	68.5	61.0	56.3	82.9	3.6	5.2
Rusizi	23.4	65.0	65.9	42.4	83.3	3.3	5.2
North	**51.7**	**73.8**	**43.3**	**34.0**	**92.1**	**2.9**	**5.4**
Gicumbi	57.5	81.9	39.7	41.8	95.1	2.8	5.4
Gakenke	55.9	78.6	38.1	29.3	91.9	3.5	5.5
Musanze	50.6	70.1	38.2	32.5	91.1	3.5	6.1
Rulindo	49.4	72.2	34.9	23.1	93.2	2.0	5.3
Burera	45.1	66.1	65.6	42.5	88.0	3.2	5.0
East	**46.1**	**73.7**	**51.3**	**42.5**	**87.2**	**2.6**	**4.9**
Rwamagana	50.1	75.5	35.9	46.7	90.4	2.4	4.4
Gatsibo	49.7	72.1	44.7	43.0	91.2	2.1	4.3
Kayonza	48.1	75.0	50.0	49.1	97.6	2.8	5.0
Ngoma	45.8	70.6	60.7	33.7	90.7	2.8	5.5
Nyagatare	43.2	72.7	63.3	43.3	76.7	2.4	3.8
Bugesera	43.1	70.2	44.0	42.2	86.4	2.8	5.3
Kirehe	42.8	80.0	57.9	39.2	91.4	2.8	5.2
Correlation with contraceptive use		0.114	-0.115	-0.081	0.101	-0.039	0.008
P.Value		0.000	0.000	0.000	0.000	0.004	0.561

Source: Computation from the 2010 RDHS dataset

6.5.2 Multilevel regression results

In this study, the most interesting aspect is the regional variation. With only a constant term included (model 1), the regional error variance is 0.356. This value has no direct substantive meaning because the error variance is arbitrarily set to 1.00 in the multilevel model. Rather, our attention is focused on how much this variance changes by inclusion of explanatory variables in the model. The model including individual variables reduces the error variance slightly to 0.350, indicating that the regional variance is independent from individual factors.

Looking at the individual factors, the results are consistent with prior research. As is expected, contraceptive use is more likely among women more educated, or who live in richer households. Women with higher educational level are as two times (β=0.711) more likely to use modern contraception than the uneducated. A significance difference appears between poor and richer women: the first two groups display similar pattern as do the three higher quintiles. Younger women are more inclined to use contraception than older women. The number of living children exhibits a curved pattern with contraceptive use. Contraceptive use is higher among women with three to four children than those with fewer or more children.

We present the results sequentially from the first precondition to the last because of the hierarchical order. There is no need to test availability if there is no willingness and much less without readiness.

The readiness indicators exhibit significant coefficients after controlling for individuals variables. The coefficient is negative for the percent of women desiring larger families (4 or more) indicating that the presence of a high proportion of women wanting larger families reduces the likelihood to use modern contraceptive methods. In contrast, the presence of a great number of women in the region desiring either to limit their family size or to space births increases the log odds of adopting contraception. Readiness appears to be a substantial differential factor. Controlling for readiness, the remaining regional variance drops to 0.225. Readiness captures about 36% of the total regional variance. The effects of individual factors remain stable.

The willingness factors are also significant. The coefficient is negative for the percentage of Protestant and positive for the percentage of women approving family planning. The parameters of individual factors are not affected by the inclusion of the regional willingness variables. The regional variance declines by 31 % to 0.245. This means that the regional differentiation is partially due to differences in willingness.

The inclusion of variables related to ability hardly changes the regional variance, which declines only from 0.356 to 0.344, indicating that indicators of family planning supply do not play a differentiating role in contraceptive use. The effects of individual factors do not change.

By combining both readiness and willingness in the same model, ability indicators being excluded because they are not significant, the results of individual variables and regional factors remain unchanged compared with the previous models. However, the combination of readiness and willingness in the same model diminishes the regional variance

by more than half, from 0.356 to 0.151 = 58%. This means that the lower contraceptive use level in some regions is due to lower readiness and lower willingness.

Table 6.3 Multilevel random coefficients of selected variables on current use of modern methods

Variable	Mod 1	Mod 2	Mod 3	Mod 4	Mod 5	Mod 6
Constante	0.289***	-0.027	-1.678*	-1.230	-0.167	-1.920**
Regional-level factors						
Readiness						
Desire 4 child + (%)			-0.012**			-0.010***
Demand FP (%)			0.031***			0.022**
Willingness						
% women app FP				0.021***		0.014***
% of Protestant				-0.014**		-0.011**
Ability						
Aver. Cont. Meth					-0.110	
FP Enviro index					0.093	
Individual-level characteristics						
Woman's education *(ref. No educ)*						
Primary		0.185**	0.181**	0.173**	0.186**	0.165**
Secondary		0.251**	0.248**	0.244*	0.252**	0.237*
Higher		0.711***	0.687***	0.717***	0.710***	0.685***
Wealth index *(ref. Poorest)*						
Poor		0.168*	0.156*	0.175*	0.165*	0.163*
Middle		0.487***	0.473***	0.495***	0.483***	0.481***
Richer		0.585***	0.571***	0.592***	0.581***	0.577***
Richest		0.543***	0.528***	0.566***	0.538***	0.552***
Woman's age *(ref. 15-24)*						
25-34		-0.098	-0.104	-0.106	-0.097	-0.116
35 +		-0.391***	-0.400***	-0.401***	-0.391***	-0.416***
N# children *(ref. 1-2)*						
3-5		0.144*	0.150**	0.142*	0.144*	0.151**
6+		-0.097	-0.087	-0.094	-0.096	-0.081
No child		-3.918***	-3.911***	-3.919***	-3.917***	-3.911***
/lnsig2u	-2.064	-2.102	-2.983	-2.814	-2.135	-3.780
Sigma_u	**0.356**	**0.350**	**0.225**	**0.245**	**0.344**	**0.151**
rho	0.037	0.036	0.015	0.018	0.035	0.007

* p<0.10 ** p<0.05 *** p<0.01

6.6 Discussion and Conclusion

The family planning policy in Rwanda has undoubtedly been a success. Previous research has shown that unmet need has decreased between 2005 and 2010 in particular among the segments of the population with high levels of unmet needs, like the (rural) poor and the less educated (Muhoza et al., 2013). In this chapter we looked at both individual and regional determinants of contraceptive use in 2010, and tried to identify the barriers that cause some regions to lag behind others in contraceptive use.

Our results at the individual level show that, despite the improvement since 2005, wealth and education are still important determinants of not using modern contraceptives in 2010. A further reduction of barriers is called for and the new policy on community based health care might bring services closer to the disenfranchised part of the population.

The joint investment of the Rwandan Government and NGO's in mainstreaming reproductive health may have reduced the differences in the supply of a range of contraceptive products and have raised the quality of the services after we measured these in 2007. The fact that the regional differences in supply do not exert any role in explaining the regional variation in contraceptive uptake may be due to this improvement. Further improving access to these services might help the uneducated poor to satisfy their unmet need but will not raise the uptake in districts where family planning is less supported.

It is no coincidence that the policy is much wider than just putting into place reproductive health services. In their 'sensitizing' campaigns both the president and the Parliamentarians' Network on Population and Development have not only advocated the use of modern contraceptives but also tried to establish a new norm of three children as the ideal family size. Looking at the national average ideal family size of 3.3, again we should conclude that the effort has been successful. Yet we found that in 8 of the 30 districts in our analysis, more than 60% of the women still want to have 4 or more children. In all these 8 regions the demand for family planning is below the national average. It might take time and more effort before the population in the west and the south of the country in particular will be ready to adopt the desired behaviour to limit their off-spring.

Even if the national consensus on three children as the ideal family size would grow, approval of the use of modern contraceptives might remain an issue in several districts, in particular in those with large protestant communities. The larger majority of women in Rwanda do approve of the use of modern contraceptives, yet resistance is still strong in some protestant communities, which over the last decades together with the Catholic Church have established many faith-based health institutions. Opening up secondary posts that provide reproductive services is not enough to counterbalance these effects.

We did not aim to test the effectiveness of specific family planning interventions using controlled experiments. In fact it would have been very hard to come up with an experiment that would measure the effectiveness of the sensitizing campaigns and of community mobilization, as all communities in Rwanda have been covered by these campaigns. Instead we have tried to identify relevant aspects of the regional context that may account for the differences in the contraceptive prevalence in the country. Our more formal test using a multilevel model based on the Coale/Lesthaeghe framework of readiness,

willingness and ability confirms again that improving access is not helpful as long as communities are not ready to reduce the number of children or are not willing to use modern methods to do so even if there is a need.

This finding suggests that increasing contraceptive use in those regions may increase the national contraceptive use. If the problems of readiness and willingness were addressed, fertility could drop further. Pritchett (1994) has shown that a CPR of 52% projects a TFR of 3.9 births. If the regions lagging behind could increase their CPR to the national level, the national TFR would decline to below 3.8 births as the CPR would be higher than 52%.

The study has some limitations. As we used sample data, their aggregation at regional level may provide less robust results. The regional sample size varies between 192 and 285 individuals. Secondly, our indicators measuring the three conditions (readiness, willingness and ability) may fall short in capturing the complexity of the phenomena. Each condition is more complex than we have presented in just two dimensions. However, they provide consistent results with other reports.

Despite these shortcomings our results might be helpful in deciding on the future course of the family planning policy in Rwanda. Advocacy in regions that lag behind might me more effective than extending the range and quality of services.

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7 Conclusion

7.1 Introduction

The relationship between the level of fertility and socio-economic development has been detailed in a wide scientific literature. This evidence was at the basis of the 1994 Cairo conference linking poverty in developing countries to high population growth which was identified as a barrier to socio-economic take-off. The UN MDGs and the 2012 London conference back the Cairo conference outcomes by emphasizing the role of family planning in the achievement of the MDGs and poverty reduction.

Aware of this relation, the Rwandan government has declared the rapid population growth as a strong barrier to its development process. Since 2006, it has recognized family planning as an important strategy to combat poverty and to enable socio-economic development. The strategy has been successful. As a result of this government commitment in FPP, the CPR increased dramatically, unmet need diminished and fertility dropped. Rwanda surprised the world not only with the magnitude of this change but also with the speed at which this took place, within three years after the start of the programmes.

This thesis has examined this shift from a low to a high contraceptive prevalence country by identifying the demand for FP and drivers of unmet need in the first period, and by uncovering the factors that drove the changes between 2005 and 2010, hoping that this will help decision-makers to design efficient family planning programs for further uptake and sustainable high contraceptive prevalence.

7.2 Overview of research questions

To entangle the 'miraculous' progress, five research questions guided the analyses in this study. The first question examined the variations in desired and excess fertility between and within four East African countries: Rwanda, Uganda, Tanzania and Kenya. The comparative approach was adopted to gain insight about the factors that shape fertility preferences and excess fertility in various socio-economic and socio-cultural contexts, and to assess the Rwandan position vis-à-vis its neighbouring countries. The question was formulated as:

1. *To what extent do the desired fertility and excess fertility vary between East African countries and between different communities within those countries?*

The next two research questions pertain to the causes of unmet need for family planning distinguishing between the factors that stimulate the demand for family planning and the barriers to meet that demand. As these factors and barrier may vary depending on the purpose of the use of contraceptives, one question was related to family limitation and the other to birth spacing.

2. *Which factors drive the demand for family limitation in Rwanda and what are the barriers to meet that demand?*
3. *Which factors drive the demand for birth spacing in Rwanda and what are the barriers to meet that demand?*

The fourth question addressed the change in contraceptive uptake after the government repositioned its family planning programmes. As the 2010 Demographic and Health Survey revealed a sharp rise in contraceptive use compared with the level in 2005, the question raised was which barriers have been addressed by the renewed family planning programmes and for whom have these programmes contributed to the increased contraceptive use. The analysis has distinguished factors related to change in socio-economic and cultural composition of the population and identified shifts in contraceptive behaviour within these segments. Thus, the research question was:

4. *To what extent is the increase in contraceptive use associated with change in the composition of the population or with behavioural change within the segments of the population?*

The fifth and last question analysed the regional differences in contraceptive use observed in 2010, in order to explain why some regions have recorded so much uptake and why some others lag behind. The analysis went beyond individual characteristics by focusing on regional-level factors. The question was:

5. *Which factors account for the regional variations in contraceptive prevalence in Rwanda in 2010 and why do some regions lag behind others?*

The research has used data from the Demographic and Health Surveys. For the first question that compares the four East African countries, we have analysed data collected between 2005 and 2011. The remaining questions have used either the 2005 or the 2010 Rwanda Demographic and Health Survey data, or combined both.

7.3 Summary of findings

Key results are summarized according to the five research questions that constitute the analytical framework as specified above.

7.3.1 Variations in desired and excess fertility in East Africa

Theories on desired fertility indicate that fertility preference is a function of socio-economic factors competing with cultural norms (Bongaarts, 1997; Bongaarts, 2008; Hakim, 2003; Nauck, 2007). The decline in desired fertility is consecutive to modernization processes that increase the costs of children and decrease their benefits for parents. Excess fertility appears because of the decline in the number of wanted children without a practise of family control to match the actual with the wanted fertility. As a result, actual fertility becomes higher than the desired one. Excess fertility disappears when the use of contraceptive means prevents

unwanted births. This theory was tested on data from four countries: Rwanda, Uganda, Kenya, and Tanzania.

The research shows large differences in desired and excess fertility between the four countries and between their respective communities. For this analysis we distinguished religious communities, and socio-economic communities combining education, wealth, occupation, etc. The overall desired fertility was lower in Rwanda and Kenya, and higher in Uganda and Tanzania. Consequently, excess fertility was higher in Rwanda and Kenya, and lower in Uganda and Tanzania. Intra-country differentiation showed that the differences between communities were largest in Kenya and smallest in Rwanda. Both socio-economic and cultural factors contribute to these differences and showed important interactions. In all countries except Rwanda, the desired fertility varies between religious communities among the lower educated population only. Religious differences in fertility vanish among the higher educated. This finding indicates that education reduces the effect of religion on reproductive attitudes and behaviour.

The study revealed an amazing homogeneity in the desired family size for the various communities in Rwanda. Contrary to the other three countries, all socio-economic and religious communities desire a relatively small and almost equal number of children. The awareness of being in excess fertility is found among all Rwandan communities regardless of their educational level, religious affiliation, and place of residence. This striking finding has been linked to the problem of land scarcity that Rwanda faces, which is forcing even the lower socio-economic strata of the population to desire the same fertility as their peers in higher strata. In Rwanda, high population density has led to extreme land scarcity negating the benefits from children's work. Instead, children are seen as a burden.

These results still corroborate with the finding that the desired fertility is the outcome of parents' assessment of the costs and benefits of their offspring (Alonzo et al., 2004), yet indicate that in Rwanda fertility decline does not depend on socio-economic development, but is induced by poverty and a lack of income-generating activities.

7.3.2 Factors associated with the demand and unmet need for family limitation

The answer to the first research question showed that Rwanda can be characterised as a country with high excess fertility due to low benefits expected from having many children. In other words, many women had more children than they wanted and were in need of effective methods to control their fertility. In the subsequent chapter, the research question dealt with the demand for family limitation and the barriers to meet that demand. The objective was to identify the factors that stimulate the desire for small families and the barriers that prevent women in need to achieve their fertility preferences. From the theoretical perspective, the gap between desired and achieved fertility may happen either because people lack the means for family control, or because they face barriers (physical, social, religious, etc.) that hamper their access to family planning services (Cleland et al., 2006).

The analysis was based on the DHS data set of the 2005, as we were interested in the situation at the beginning of the period of interest for this thesis (2005-2010). The results of the analyses have indicated that, besides fertility related factors, such as the desired fertility and actual fertility, which are directly correlated with family limitation, the demand for

family limitation was driven mostly by factors related to exposure to and attitudes toward family planning. The demand was higher among women exposed to family planning messages, among those who have positive attitudes toward family planning, or who discussed family planning with their partners. Socio-economic factors such as education or wealth hardly shaped the demand for family limitation in Rwanda.

Contrary to the demand, unmet need was associated with socio-economic factors on top of cultural factors and with elements of exposure and attitude to family planning. Unmet need was more likely to occur among women with low educational level, living in poor households and among Protestant believers. It was also higher among women who did not approve of family planning themselves, and among those who had never or rarely discussed family planning with their partners.

In 2008 (the paper was published in 2009) we concluded that in Rwanda high unmet need in 2005 was due mostly to negative attitudes towards family planning, but also to the failing structures of provision in particular for women from poorer households and having limited education.

To increase the contraceptive use and further meet the demand for family limitation, these results suggested three policy interventions:

- Target women with low levels of education and those living in rural areas in the short run. In the longer run, increasing the educational level and the empowerment of women will lead to a higher level of demand for and practice of family planning.
- Target the negative attitudes toward family planning which are an important cause of unmet need by an efficient advocacy, and involve men in family planning discussion.
- Improve access to family planning services in all health centres by using community-based family planning services.

In the following analyses we could rely on the latest DHS data and the results of the new reproductive health policy could be tested.

7.3.3 Factors associated with the demand and unmet need to space births

Not only family limitation, but also birth spacing contributes to slowdown the population growth and to stimulate socio-economic development. Additional to these effects, it contributes especially to health improvement of children and mothers (Gipson et al., 2008; Conde-Agudelo & Belizan, 2000). In Rwanda, despite the traditional propensity to large birth intervals, many women were continuing to have close births. The research objective was to find the factors associated with the demand for birth spacing and the barriers that women in need face to achieve their reproductive plan. For the analyses we used a pooled dataset from the 2005 and 2010 Rwanda Demographic and Health Surveys, with year of the survey as a control variable. Only women in a union who had at least one child and wanted another were sampled from the set. In order to take into account the latent demand in the analysis of unmet need, we applied the Heckman selection model that simultaneously estimates two probit equations: one for demand, another for unmet need.

Our results have indicated that the demand for contraception to postpone births was associated with health related factors including infant mortality experience and health status of the index child, mother's education, and her desired fertility level. Women who had lost a

child, in particular if it was the last born, wanted to become pregnant soon. Women who were better educated and those desiring few children wanted to postpone longer than others. Women with sickly children and those aware of the health risk to get another child soon, preferred to wait. Bio-demographic and cultural factors- being in amenorrhea, previous birth interval and religious attitudes - still hamper the use of contraception for spacing in 2010.

Unmet need for birth spacing was very high in 2005 and has significantly diminished in 2010. The decline has been attributed to the government's commitment to family planning that increased access to reproductive services and improved their quality, enabling a massive contraceptive uptake. Despite this progress, unmet need to space births remained important in 2010. It was more frequent among less educated, poor people, or among the protestant population.

These results pointed out that factors related to health are more important reasons for the postponement of births than to stop giving birth. Yet they also indicated that the barriers to family planning for birth spacing were globally the same as for family limitation, namely the negative attitude to contraceptive means associated with low level of education or with poverty. The current Rwanda family planning policy which integrates immunization programs with education for birth spacing is expected to be successful. This link is an efficient way to reach many women in reproductive ages and is expected to increase the demand by yielding awareness among women about the need for longer intervals. It is also an opportunity to increase the knowledge about contraceptive methods and improve the perception on them.

The findings support the conclusion that the policy on birth spacing should combine socio-economic reasons with health related ones to convince women to practice family planning.

7.3.4 Factors contributing to the increase in contraceptive use between 2005 and 2010

Between 2005 and 2010, Rwanda has experienced a rapid contraceptive increase. Theoretically, the increase in contraceptive use is a result of either a better access to improved family planning services, or a rise in the demand for family planning associated with socio-economic development, or both (Mwaikambo et al., 2011; Vahidnia, 2007; Richey & Salem, 2008).

Our methodological approach using a decomposition technique splits the change in uptake into increase due to change in population structure and increase due to changes in contraceptive attitudes and behaviour. Results indicated that the increase is mainly attributable to behavioural change. Contraceptive uptake improved mostly in rural areas and among the less educated population. The contribution of changes in population structure was limited.

The changes have been linked to the strong family planning program marked by an intensive and public campaign conducted by both national politicians and local leaders, which changed the views of many women regarding family planning and promoted discussion between spouses, one of the barriers to contraceptive use identified in the previous chapters.

This result provides support for the role of political commitment to family planning in improving attitude and behaviour of the population toward family planning. It highlights how the government's commitment is an important factor of family planning program success, especially among the low socio-economic stratum of the population. It suggests that with a strong family planning program supported by higher political leaders, the positive relation between education and family planning use may vanish as less educated women may use contraception to the same extent as higher educated.

7.3.5 Regional variations in contraceptive prevalence

Despite the dramatic overall increase in contraceptive use, striking differences in contraceptive use have appeared between regions. According to many researches (Elfstrom, 2012; Stephenson et al., 2007), intra-country contraceptive differences result from individual characteristics and/or regional specificities. Thus, this thesis has been interested to find out which factors explain this difference. The aim has been to look beyond individual characteristics and test the regional-level factors by considering the three preconditions for the adoption of contraceptives as defined by Coale (1973) and Laesthaeghe & Vanderhoeft C. (2001): readiness, willingness, ability.

Results confirmed the hypothesis that the regional differences in contraceptive use in Rwanda are due partially to regional factors, especially those related to readiness and willingness conditions. Our results did not show any evidence regarding effects of ability. Contraceptive uptake was lower in regions with higher proportion of women desiring many children, with higher proportion of protestant believers or a higher proportion of women disapproving family planning. These regions are situated in the Western and Southern part of the country. The presence of many Protestant in those regions is due to the fact that Protestant missionaries started their evangelization there.

The conclusion is that the persistence of pro-natalist attitudes and the weak willingness to use contraception associated with social barriers are the most common issues that prevent women from using family planning services. Access and availability of family planning services are not sufficient conditions for contraceptive adoption.

7.4 Discussion and Future Development

7.4.1 Scientific contribution of the research

The classical demographic transition theory indicates that excess fertility is a result of the modernization process which increases the costs of children and lowers their benefits. It occurs when people desire fewer children than what they are actually achieve. It disappears when, by using contraception they adjust actual fertility to desired fertility. The decline of fertility preferences is due to the costs associated with children's education, health care, etc. and/or to the lower benefits real or perceived from children. Both factors may push families to change their mind set in regard to their offspring.

However, the results from this research have shown that excess fertility, rather than depending on development, can also be due to poverty conditions. In the case of Rwanda, land scarcity has lowered the benefits expected from children making them less valuable. Rather than as a workforce contributing to the household income as it is known in other rural African areas, children are seen as extra people to feed, to bear, to educate, etc. The decline of fertility preferences does not depend on socio-economic development, but is induced by poverty and a lack of income-generating activities. Rwanda is likely to be undergoing a type of demographic transition similar to what has been observed in Latin America and Asia, called '*poverty Malthusianism'*. This finding reveals that even in a context of poverty and privation, fertility transitions may happen and that poverty and resources scarcity may be a stimulus of family planning adoption. This implies that societies do not necessary need a significant socio-economic development before the fertility transition starts. This finding nuances the existing knowledge according to which the change in desired fertility is universally a result of socio-economic development process. It offers additional evidence that the desired family size as well the contraceptive increase can vary by context.

Because of this poverty Malthusianism, the sensitization campaign on family planning in Rwanda found fertile soil to grow a large uptake of contraceptive means, as the need to limit and space birth existed in all layers of society. The Rwandan family planning program, strongly supported by the political leaders at all levels and relayed by community leaders, has greatly affected the willingness to use contraception. More people, men included, approve of modern means to limit or space births. The sensitization was coupled with an extension and improvement of reproductive health services, enabling women to effectively control their fertility. Rwanda has nearly closed the gap in unmet between the poor population and rural residents on the one hand and the richer and urban residents on the other. Three lessons can be learnt from these findings.

The first is that the conceptual framework of readiness, willingness and ability deserves more attention in the study of family planning. Readiness and willingness are clearly preconditions for the actual use of contraception and studies on the uptake should not only include cultural barriers (willingness), but also consider the need (readiness) to limit or space births.

The second is that the practice in Rwanda might not be readily transportable to other countries. Poor rural communities in other countries might have the opportunity to further extend their agricultural holdings, having no need to limit their off-spring. Sensitizing campaigns and improved services might even be counterproductive as they do not coincide with the real needs of the poor. Our analyses for Kenya and Tanzania bear witness to situations of low unmet needs in communities with high fertility.

The third is that countries should not be regarded as homogeneous when it comes to analysing the trajectories of the demographic transition. Not only did we find enormous differentiation between communities within East-African countries, but even in a small and surprisingly homogeneous country as Rwanda, we found substantial regional variation and could tease out the variation in willingness that caused the differential success of the family planning programme in the country. The regions with better wealth index and better score in education had experienced the same CPR as those which are poor and with lower education level. It was the cultural and reproductive norms factors which showed a significant

difference between regions, irrespective of the economic status and educational level. Even in cases of poverty Malthusianism, improving access does not always lead to outcomes that correspond to ambitious goals of curbing population growth.

7.4.2 Future development

The recent success in family planning in Rwanda has been recognised worldwide as one of the most impressive achievements in contraceptive history. With an annual increasing rate of 6.9%, no other sub-Sahara African country has made similar progress. The two countries which recorded also important progress in the same period, Malawi and Ethiopia, scored less than half of Rwanda's achievement, respectively 2.4% and 2.3% (USA/Africa Bureau et al., 2013). This accomplishment, although noteworthy, is not the whole story. The Rwandan family planning program is a "*success story still in the making*" (USAID/Africa Bureau et al., 2013). The family planning policy goal projects a CPR of 70% by 2016 (MOH, 2012), well above the 52% recorded in 2010. This ambitious projection is in accordance with the 2020 Rwanda vision aiming to lift the country out of poverty, but also needs substantial investments. Yet unsatisfied demand is still high. About one in four women was in unmet need for family planning in 2010, and the population in need of contraceptive means will be rising at least in the coming years as a result of the registered decrease in ideal family size. There still is a need for further uptake to eliminate unwanted births and accelerate the socio-economic development that the government aspires for.

However, some obstacles persist that prevent some women to meet their needs. This includes the persistence of myths, rumours and misperceptions about contraceptive methods and their supposed negative side effects and the persistence of socio-cultural and religious opposition to contraceptive use. The regional concentration in pro-natalist attitudes and lower demand for family planning could be a powerful barrier to further upscaling the programmes.

To overcome these barriers and respond to the increasing demand efforts are needed in various aspects. First, there is need of continuity in the widening of family planning service delivery systems in public and private sectors in order to sustain the supply side. As the demand has increased in parallel with contraceptive use, unmet need remains. To fill this gap more and improved services are needed. In addition, as the international donors may have diminished attention, the private sector should take over an important part of reproductive health services. Second, there is a need for strategies to maintain and even increase the demand. Given the sharp increase in 2010, there is risk of stall or decline in demand. Third, to be successful, a family planning program needs building a supportive socio-cultural and political community to make family planning more acceptable. Given the persistence of misconceptions and rumours about the side effects of contraceptive methods, and the continuous religious opposition, correct information and family planning counselling by religious and community leaders have to be reinforced.

In the end, the efficiency and continued success of the future Rwandan family planning program will depend on the answers that the government will provide to the above challenges. Meanwhile, the lessons learned from the progress made in Rwanda can provide a roadmap of sorts for other similar countries.

7.5 Final remarks

An important limitation of this research is that the results concern mainly Rwanda, a case study with its particularities such as high population density, high unmet need for family planning, rural poverty, etc. which contribute to the success of the family planning program, but which can acts as barriers elsewhere. Therefore, the generalization of our results to other cases should be done with caution. In addition, we emphasized the role of political commitment as the determinant factor of the successful family planning program in Rwanda. While this is clearly true, we recognize that the government efforts have beneficiated from existing latent demand for family planning and that the sensitization campaign found fertile soil because of poverty. In settings less poor or having different characteristics, the same political factor may have a different impact. Another issue regarding the results of regional variations in contraceptive use is that we used sample data. As so, their disaggregation at regional level may provide results which are less robust due to small cases. A census data could correct this limitation.

This thesis has assessed the level and factors of excess fertility (unmet need) in Rwanda and analysed how the repositioning of family planning increasing the contraceptive use has reduced unmet need and lowered fertility substantially. However, there are areas that have not been analysed by our research that would be useful to be addressed by future research:

- The extent to which the population may continue to use contraception without government and donors support;
- In-depth analysis of the reasons why the western part of the country lags behind other regions in the practice of family planning.
- Further unravelling the causes of resistance among specific socio-cultural groups.

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Nederlandse samenvatting

Gewenst Kindertal en Gezinsplanning in Rwanda: een onderzoek naar de snelle toename in het gebruik van anticonceptie

Nog geen tien jaar geleden was het gebruik van anticonceptie in Rwanda buitengewoon laag, maar tussen 2005 en 2010 steeg het aantal gebruikers onder vrouwen in de vruchtbare leeftijd van 17 tot 52 procent. Als gevolg hiervan daalde het totale vruchtbaarheidscijfer in dezelfde korte periode met 25 procent van 6,1 tot 4,6 kinderen per vrouw. Hiermee lijkt Rwanda op weg de doelen van de overheid op het terrein van bevolkingsontwikkeling veel eerder te bereiken dan aanvankelijk werd ingeschat. De Rwandese regering ziet de snelle bevolkingsgroei - 2,6 procent per jaar (NISR, 2012) – als een hindernis voor armoede bestrijding en economische vooruitgang en formuleerde het terugdringen van die bevolkingsgroei als één van haar demografische beleidsprioriteiten naast het bereiken van de Millennium Ontwikkelingsdoelen zoals het verminderen van kinder- en moedersterfte. Sinds 2006 is het stimuleren van gezinsplanning dan ook een essentieel onderdeel van het overheidsbeleid op het terrein van de gezondheidszorg.

Rwanda is een land met een zeer hoge bevolkingsdichtheid (400 inwoners per km2) waar het overgrote deel van de bevolking leeft van zelfvoorzienende landbouw. De druk op de natuurlijke hulpbronnen, met name landbouw grond, is dientengevolge hoog. Na de burgeroorlog in de eerste helft van de jaren negentig en de genocide in 1994 was beperking van de bevolkingsgroei een onbespreekbaar onderwerp in het publieke debat. Nadruk lag op verzoening, herstel van vertrouwen, gemeenschapsvorming en wederopbouw. Maar na de publicatie van Vision 2020, het lange termijn ontwikkelingsplan van de regering, waaraan een intern debat over de relatie tussen economische en bevolkingsgroei ten grondslag lag, werd de bevolking rijp gemaakt voor een nieuw bevolkingsbeleid gericht op daling van de bevolkingsgroei.

Deze studie wil bijdragen aan het verkrijgen van meer inzicht in de achterliggende factoren van de opmerkelijk snelle vruchtbaarheidsdaling en acceptatie van gezinsplanning in de periode 2005-2010 in Rwanda. Nevendoel is het identificeren van eventuele belemmeringen die een verdere snelle stijging in de vraag naar gezinsplanning in de weg zouden kunnen staan en die van nut kunnen zijn om het gevoerde bevolkingsbeleid aan te passen. Centrale concepten in deze studie zijn het gewenst en gerealiseerd kindertal, waaruit in combinatie met het al of niet gebruiken van anticonceptiemiddelen, de vervulde of onvervulde behoefte (vraag) aan gezinsplanning alsmede een eventuele kloof tussen gerealiseerd en gewenst kindertal (*excess fertility*) kan worden afgeleid. Een dergelijke kloof ontstaat met name tijdens de overgangsfase van hoge naar lage vruchtbaarheid van het alom bekende demografische moderniseringsproces.

Gewenst kindertal is een functie van economische factoren en sociaal-culturele beweegredenen. Economische theorieën over vruchtbaarheidsgedrag stellen dat een daling

van het gewenst kindertal voortkomt uit sociaaleconomische ontwikkeling waardoor de kosten van het hebben van kinderen stijgen en de baten ervan voor ouders dalen (Becker, 1991; Bongaarts, 2008). Tijdens dit ontwikkelingsproces conflicteren sociaal-culturele beweegredenen die leiden tot een hoog kindertal, met de sociaaleconomische die de voorkeur voor een lager kindertal in de hand werken. Hierdoor komen traditionele waarden en normen met betrekking tot vruchtbaarheidsgedrag onder druk komen te staan. Aanpassing van vruchtbaarheidsgedrag verloopt niet voor alle groepen in de samenleving op dezelfde manier of in hetzelfde tempo. Demografische verandering zo wordt verondersteld, begint eerder onder beter gesitueerden, met betere opleidingen en wonend in de stad. Ook religie en mate van religiositeit kunnen van invloed zijn.

Deze algemene theorie verklaart de daling van het gewenst kindertal niet in alle omstandigheden. De literatuur laat ook zien dat er een relatie bestaat tussen armoede en lager gewenst kindertal, bijvoorbeeld tijdens crises situaties (Egerö, 1996; Odusola, 2002; Alonzo et al., 2004; Orbeta, 2005). Het gewenste kindertal wordt beïnvloed door de economische verwachtingen, die voor arme ouders pessimistischer kunnen zijn dan voor rijkere. Een laag gewenst kindertal in samenhang met armoede, o.a. gevonden in Latijns-America en Azië, wordt wel aangeduid met de term *poverty Maltusianism* (Cosio-Zavala, 1995, geciteerd in Kothari & Krishnaswamy 1998). Het is daarom niet vanzelfsprekend dat arme vrouwen in Rwanda een voorkeur zouden hebben voor een hoger kindertal in vergelijking tot beter gesitueerde vrouwen.

Ongeacht de achterliggende redenen, een lager gewenst kindertal dan het gerealiseerde aantal wordt beschouwd als een onvervulde behoefte aan anticonceptiva (*unmet need*). Er zijn kennelijk belemmeringen die de toepassing van contraceptie in de weg staan. Vier groepen belemmeringen worden in de literatuur onderscheiden: onvoldoende toegang tot voorzieningen op het gebied van gezinsplanning; onvoldoende acceptatie van gezinsplanning door individuen of binnen een gemeenschap; gebrek aan kennis over gezinsplanningsmethoden en angst voor mogelijke gezondheidsproblemen door negatieve neveneffecten van het gebruik van anticonceptiemiddelen (Casteline & Sinding, 2000; Bongaarts & Bruce, 1995)

Vijf onderzoeksvragen sturen de voor dit proefschrift verrichte analyses, die elk in een apart hoofdstuk worden gepresenteerd. De data voor de analyses zijn afkomstig uit de Demografie en Gezondheidsonderzoeken (DHS) die zijn uitgevoerd tussen 2005 en 2011 met behulp van internationaal gestandaardiseerde vragenlijsten. Voor de laatste analyse zijn ook data gebruikt afkomstig van de in 2007 gehouden Service Provision Assessment.

De eerste deelvraag richt zich op het ontrafelen van de differentiatie in gewenst kindertal en verschillen in de vraag naar gezinsplanning tussen en binnen vier Oost-Afrikaanse landen: Rwanda en haar buurlanden Uganda, Tanzania en Kenya. Deze comparatieve benadering is gekozen om de positie van Rwanda in het demografische veranderingsproces ten opzichte van haar buren te bepalen en te bezien hoe het gewenst kindertal en het gebruik van anticonceptie varieert naar diverse sociaaleconomische en sociaal-culturele contexten. De resultaten laten zien dat het gewenst kindertal in Kenya de grootste differentiatie kent. Het gewenst kindertal van de rijkere en goed opgeleide bevolkingsgroepen ligt dicht bij het vervangingsniveau, ongeacht religieuze achtergrond, terwijl arme, ongeschoolde groepen, met name binnen de Moslim gemeenschap, een zeer

hoge kinderwens hebben. Rwanda laat een totaal ander beeld zien. Hier zijn de verschillen tussen de onderscheiden groepen klein. Arme ongeschoolde vrouwen wensen gemiddeld een even groot kindertal als rijkere, goed opgeleide vrouwen. In beide landen is de potentie voor geboortebeperking hoog. Meer dan de helft van de vrouwen die vijf of meer kinderen hebben zou liever het aantal beperkt willen hebben tot vier. Tanzania en Uganda nemen een positie in tussen de andere twee landen ten aanzien van gewenst kindertal en in beide landen is het potentieel voor geboortebeperking lager. De uitkomsten ondersteunen de conclusie dat hoge vruchtbaarheid in sub-Sahara Afrika meer geassocieerd is met armoede dan met religieuze normen, maar dat Rwanda hierop een uitzondering vormt. De kloof tussen gewenst en gerealiseerd kindertal en het bewustzijn dat men eigenlijk te veel kinderen heeft geldt voor alle onderscheiden groepen. Het opmerkelijke gebrek aan differentiatie ten aanzien van gewenst kindertal (relatief laag) en mate van vraag naar geboorteregeling ongeacht opleiding, godsdienst, armoedegraad, beroep en houding van de partner kan in verband worden gebracht met het probleem van extreme schaarste aan land en hoge bevolkingsdruk. Het hebben van veel kinderen wordt gezien als een last.

Vervolgens wordt geanalyseerd welke factoren de vraag naar anticonceptie stimuleren en welke het gebruik ervan in de weg staan in Rwanda. Er worden aparte analyses gemaakt voor gezinsplanning (vraag en gebruik van anticonceptie) met het doel het kindertal te beperken en voor die met het doel de opeenvolgende geboorten te spreiden. De analyse van de wens naar geboortebeperking en de vervulling van die wens is gedaan voor het jaar 2005 toen de beleidsvoornemens van de overheid met betrekking tot de reproductieve gezondheidszorg nog nauwelijks geïmplementeerd werden. De resultaten tonen aan dat 87 procent van de vrouwen van 15-49 jaar een positieve houding heeft met betrekking tot geboortebeperking, maar slechts 64 procent denkt dan hun partner het goedkeurt, 58 procent van de vrouwen die geen kinderen meer willen, gebruikt geen moderne anticonceptiva. Behalve door factoren die samenhangen met de gerealiseerde vruchtbaarheid, blijkt de wens voor geboortebeperking gerelateerd te zijn met een positieve houding er over, bekendheid ermee, en met discussie over dit thema tussen partners. Deze factoren blijken ook met een hoger gebruik van contraceptie methoden samen te hangen. Sociaaleconomische factoren zoals opleiding en beroep laten nauwelijks een relatie zien. Ten aanzien van de vraag naar methoden om de geboorten te spreiden blijkt een relatie met ervaring met zuigelingensterfte en de gezondheidsstatus van het laatst geboren kind. Tussen 2005 en 2010 groeide het percentage vrouwen dat hun kinderen met behulp van moderne anticonceptiva spreidde, met name onder lager opgeleide en agrarische vrouwen. De belemmeringen voor het gebruik van geboorte-regelingsmethoden hangen hier samen met bio-demografische factoren zoals *amenorrhea*, de lengte van het (open) vorige geboorte-interval, een negatieve houding t.a.v. geboorteregeling, lagere bekendheid ermee en religieuze beweegredenen.

De vierde deelvraag heeft tot doel de toename in gebruik van anticonceptiemiddelen tussen 2005 en 2010 te ontwarren. In hoeverre heeft deze toename te maken met veranderingen in de bevolkingssamenstelling en in hoeverre met veranderingen in houding en gedrag ten aanzien van gezinsplanning. De resultaten van de decompositie analyse duiden erop dat de toename van het gebruik van gezinsplanningsmethoden in hoofdzaak kan worden toegeschreven aan gedragsveranderingsverandering. Dit geldt met name onder vrouwen in plattelandsgebieden en onder lager opgeleiden. De bijdrage van veranderingen in de

bevolkingsstructuur was beperkt. De resultaten kunnen worden toegeschreven aan het gevolgde bevolkingsbeleid, waarbij onder meer campagne wordt gevoerd met behulp van nationale politici en lokale leiders, en de bevolking via een communaal verzekeringssysteem toegang geeft tot gezondheidszorg en voorlichting op lokaal niveau. Door de campagnes worden mannen ook meer bij de discussie over gezinsplanning betrokken wat het overleg tussen partners over het onderwerp bevordert. Uit een vorige analyse was dit punt naar voren gekomen als een belemmering voor toepassen van gezinsplanning.

Ondank de snelle algemene groei in acceptatie van gezinsplanning doen zich hierin opvallende regionale verschillen voor in Rwanda. Deze regionale verschillen kunnen het gevolg zijn van individuele en van regionale factoren (Elfstrom, 2012; Stephenson et al., 2007). De laatste deelvraag voor dit onderzoek betreft de analyse van de factoren die in verband kunnen worden gebracht met de regionale differentiatie in acceptatie van gezinsplanning in 2010 en na te gaan welke gebieden achter blijven bij dit demografisch moderniseringsproces. Het theoretische kader voor dit deel stoelt op drie concepten die zijn ontwikkeld door Coale (1973) en Lesthaege en Vanderhoeft (2001), namelijk de pre-condities 'readiness, willingness and ability' waaraan moet worden voldaan voordat tot adoptie van gezinsplanning wordt overgegaan. De uitkomsten van dit deel van het onderzoek laten zien dat de totale regionale variantie aanzienlijk is en voor meer dan de helft kan worden toegeschreven aan het gecombineerde effect van '*readiness*' (regionaal niveau van vraag naar geboorte beperking of naar –spreiding) en '*willingness*' (normen en attitude ten aanzien van gezinsplanning). Regionale variatie in '*ability*' (regionale toegang tot faciliteiten op het gebied van reproductieve gezondheidszorg) droeg niet bij aan de verklaring van verschillen. In alle uitgevoerde analysemodellen bleken de effecten van individuele factoren stabiel. Regio's met een minder armoede en een betere score voor opleidingsniveau hadden het zelfde acceptatieniveau van gezinsplanning als regio's met een meer armoede en een lager opleidingsniveau. Het gebruik van anticonceptiemiddelen was laag in gebieden met: een hoog aandeel vrouwen met een hoge gewenst kindertal, een hoog aandeel Protestante Christenen, en een hoog aandeel vrouwen dat gezinsplanning afkeurde. Sociale belemmeringen blijken belangrijker dan toegang en beschikbaarheid van voorzieningen gericht op reproductieve gezondheid. Deze laatste factoren zijn geen voldoende voorwaarden voor acceptatie van gezinsplanning.

Het onderzoek uitgevoerd in dit proefschrift draagt bij aan het inzicht dat sociaaleconomische ontwikkeling geen noodzakelijke voorwaarde is om een daling van het gewenst kindertal te bewerkstelligen. Ook armoede en gebrek aan economische mogelijkheden kan leiden tot daling van het (gewenst) kindertal. Rwanda lijkt ook een voorbeeld van '*poverty Malthusianism*'. Schaarste aan landbouwgrond verkleint waarschijnlijk de voordelen van het hebben van veel kinderen. De voorlichtingscampagnes en aanpak van de Rwandese overheid om gezinsplanning te stimuleren en de toegang tot gezondheidszorg op dit terrein, vielen in vruchtbare aarde en de kloof tussen gewenst kindertal van rijkere en arme Rwandezen is aanzienlijk verminderd. De algemene volkstelling van 2012 laat zien dat het TVC sinds 2010 verder ss gedaald van 4.6 tot 4,1 kinderen per vrouw. Ook laat dit onderzoek zien dat het conceptuele kader van readiness, willingness and ability meer aandacht verdient in onderzoek naar acceptatie van gezinsplanning in arme landen, al moet de kanttekening worden gemaakt dat door de situatie van hoge

bevolkingsdruk op landbouwgrond in Rwanda, dit land niet representatief is voor andere arme landen in Afrika. Voorts illustreren de uitkomsten dat landen niet als homogeen moeten worden gezien als demografische veranderingen worden bestudeerd. Bevolkingsgroepen en gebieden verschillen in dit opzicht, ook in relatief homogeen en klein land als Rwanda.

Niet alle elementen van de vruchtbaarheidsdaling en acceptatie van gezinsplanning zijn in deze studie aan de orde gekomen. Het verdient aanbeveling toekomstig onderzoek te richten op:

- De mate en tempo waarin het gebruik van anticonceptiemethoden zich ontwikkelen zonder ondersteuning en bemoeienis van overheid en donoren;
- Een dieptestudie naar aanvullende redenen waarom bepaalde gebieden, met name in het Westen van Rwanda, achter blijven op het gebied van acceptatie van gezinsplanning;
- Het achterhalen van de oorzaken van de weestand tegen gezinsplanning onder specifieke sociaal-culturele groepen.

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Curriculum Vitae

Dieudonné Ndaruhuye Muhoza was born in South Kivu, Democratic Republic of Congo (DRC), on May 7th 1963. He received his primary, secondary and higher education in the same country. In 1988, he obtained his Bachelor degree in Geography at the '*Institut Supérieur Pédagogique de Bukavu (DRC)'*. From 1988 to 1994, he was employed in education in DRC and Burundi.

He joined the National University of Rwanda (current University of Rwanda) in April 1995 and worked as Registrar till September 2001 when he benefited from a scholarship by the Belgian Government through the '*Commissariat Général aux Relations Internationales de la Communauté Française de Belgique'* for a Master's degree in Demography and graduated with distinction in 2003 at the '*Institut de Démographie de l'Université Catholique de Louvain* (UCL)' in Belgium. When he returned to the University of Rwanda in 2003, he was transferred to the Department of Geography as Assistant Lecturer. Thereafter he was posted to the Department of Applied Statistics which had been newly created in 2005. One year later he was promoted to Lecturer, a position that he occupies till today. In his capacity as lecturer, besides teaching duties at the University of Rwanda, he has participated in the analysis of different national socio-demographic surveys and Censuses.

In 2006, he enrolled for a PhD program at Utrecht University in The Netherlands on a sandwich mode arrangement combining thesis research and teaching responsibilities in Rwanda. His doctoral research - "Excess fertility and family planning in Rwanda" - was aimed at understanding how during a short period of less than five years, Rwanda shifted to a high contraceptive prevalence country. While doing his PhD, he participated in various national and international conferences in which he presented several papers, a number of which have been published as articles or working papers. In 2011, he was selected for a Summer School on Longitudinal and Life Course Research at University of Antwerp in Belgium and in 2012 he participated in the Demographic and Health Surveys (DHS) Data Users workshop in Kampala, Uganda.

With a rich experience in teaching and strong acquired skills in statistical methods and software, he will continue to apply these knowledge and technical skills in teaching, research and community services in Rwanda. His current research interest is to analyze the complex relationships between family planning, poverty and economic development in Sub-Sahara Africa.

He is happily married to Florence Nyirahoza, together they have four sons and one daughter.