Evaluating the impact of a family planning programme on women's outcomes in Nigeria

Oludamilola Adetomi Adeyanju

Submitted in accordance with the requirements for the degree of
Doctor of Philosophy

` The University of Leeds
Leeds Institute of Health Sciences

2018

The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

This copy has been supplied on the understanding that it is copyright material and that no quotation from the thesis may be published without proper acknowledgement.

The right of Oludamilola Adetomi Adeyanju to be identified as Author of this work has been asserted by her in accordance with the Copyright, Designs and Patents Act 1988.

ACKNOWLEDGEMENTS

Undertaking this PhD has been a life-changing experience for me and it would not have been possible to do without the support and guidance that I received from many people.

I would like to first say a very big thank you to my supervisors, Dr Sandy Tubeuf and Professor Tim Ensor for all the support and encouragement they gave me during my PhD. Without their guidance and constant feedback this PhD would not have been achievable. Their insights and associated experience have broadened my perspective and added to my knowledge.

I gratefully acknowledge the funding received towards my PhD from the Debyl Nigeria Education Fund.

I would like to acknowledge the Measurement, Learning & Evaluation (MLE) of the Nigerian Urban Reproductive Health Initiative (NURHI) for giving access to the NURHI survey datasets and the MEASURE DHS programme for access to the Nigerian Demographic and Health Survey dataset that was used in this thesis.

I would also like to say a heartfelt thank you to my Mum and Dad; Mr and Dr (Mrs) Adeyanju for always believing in me and encouraging me to follow my dreams for helping in whatever way they could during this period.

And finally to Ike, who has been by my side throughout this PhD, living every single minute of it, and without whom, I would not have had the courage to embark on this journey in the first place. This thesis is dedicated to him.

ABSTRACT

Nearly 80% of women in reproductive age (15-49), in Nigeria do not use modern contraceptives and despite the implementation of several family planning (FP) programmes, uptake and use of modern contraception in Nigeria remains constrained by a limited access and weak service delivery especially among the poorest.

In 2009, the Nigerian Urban Reproductive Health Initiative (NURHI) was introduced in 6 Nigerian cities. The programme aimed at increasing the use of modern contraceptive in the programme areas. This thesis attempts to evaluate and measure the impact of the NURHI on modern contraceptive use in Nigeria between 2009 and 2014. We use data collected before and after the programme and the Nigerian Demographic and Health Survey (NDHS). We start the analysis by briefly describing our data and then assess the impact of the NURHI programme on two outcomes of interest. We also assess the effects of the programme on three key groups of women in both outcome of interests using a reflexive comparison approach. We then proceed to assessing the changes in modern contraceptive use in programme participants and the contribution of compositional changes to those trends. We use a binary variable adaptation of the Oaxaca decomposition method (Fairlie) and evaluate the contribution of socioeconomic and other individual factors to the changes in contraceptive use over time and finally we apply the difference-in difference (DID) estimation method to evaluate the causal effects of the programme of modern contraceptive use in Nigeria.

Results show an increase in modern contraceptive use in the programme areas over time. Our reflexive analysis result also reveal that there is an impact of the programme on the outcomes of interest that we measure in certain groups of women. Our decomposition analysis also show that while wealth and education are important determining factors of modern contraceptive use pre-programme, their contribution post-programme reduces substantially. Pre-programme it is mainly women with higher education who use modern contraception because of greater autonomy, financial ability, social interaction and access to FP services however the programme appears to help close the socioeconomic gaps in modern contraceptive use over time. In particular, the NURHI reduces the strength of the link between contraceptive use, and education and wealth, and increases women's empowerment and decision-making regarding contraception. Our impact analysis also show that even after account for other family planning and education programmes in Nigeria, the NURHI programme had a positive impact on the changes that we observe in modern contraceptive use in Nigeria.

Overall, our findings suggest that the introduction of the programme is positively correlated to the changes in modern contraceptive in Nigeria and findings has certain implications for policy and programme makers in Nigeria and Sub-Saharan especially in regards to the future designing and implementation of family planning health programmes in the region.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: Introduction

Significant progress in contraceptive uptake has not been observed in Nigeria despite the many family planning and education programmes that have been implemented over the past 30 years (Tsui et al., 2010; Aransiola et al., 2014; Cleland et al., 2010; Fagbamigbe et al., 2015). In 1988, the Family Health Services Project was the very first major health programme with a family planning component in Nigeria (Dabiri, 1993). The five year project, which was jointly run by the Nigerian Federal Ministry of Health (FMOH) and the United States Agency for International Development (USAID), aimed at making family planning information and services widely available at reasonable costs in both the private and public sectors as well as to improve the nationwide contraceptive prevalence (Pathfinders International, 1993). Since this first programme, there has been a total of ten substantial family planning programmes in different regions of the country yet Nigeria's fertility rate has remained high with currently six births per woman and as high as eight in certain Northern regions (NPC and ICF, 2014; World Bank, 2017). This is much higher than neighbouring Ghana which has up to four births per woman (World Bank, 2017). According to the Nigeria Demographic and Health Survey (NDHS) report in 2014, the use of modern contraceptives in Nigeria was just under 19%. Additionally, there remain considerable variations in modern contraceptive use across not just geographical areas but also social strata. For example the rate of modern contraceptive use is much lower in Northern regions compared to the South and among the poorer compared to richer population (NPC and ICF, 2014). While the demand for family planning (FP) has remained low, unmet needs for family planning is as high as 22% among married women and 20% in women in general (Aransiola et al., 2014; Chuhan-Pole, et al., 2013; Creanga et al., 2011; United Nations, 2015).

In the last decade, over five major family planning programmes have been implemented in the country. One of the most recent programmes was the Nigerian Urban Reproductive Health Initiative (NURHI) that was launched in 2009 in six cities with the aim of increasing family planning methods among Nigeria women. The NURHI was led by the Johns Hopkins Center for Communication Programmes and implemented in collaboration with partners including the Association for Reproductive and Family Health and the Centre for

Communication Programmes in Nigeria. It was designed on the assumption that creating demand for FP will drive the supply of services. The demand generation aspect of the programme focused on demystifying family planning use, increasing the understanding of and appreciation for planning one's family, supporting a person's contraceptive use, and improving knowledge and perceptions of methods in the areas where the programme operated. While the programme has reported an increase in modern contraceptive use in the areas where the programme was done this conclusion was mainly based on comparing statistics on the programme participants (MLE, 2015). There is therefore more to investigate using the data from this relevant programme and this PhD aims to explore further the changes in contraceptive use over time and estimate the overall impact of the programme.

Rigorous programme evaluations in the areas of health interventions are important in determining which programmes are effective and which programmes are not. Such evaluations can benefit policy makers when deciding how to allocate limited available resources in health sectors, whether to upscale programmes or policies nationally and how to design and implement future interventions.

1.1 Research Questions

This thesis aims to evaluate and measure the impact of the Nigerian Urban Reproductive Health Initiative (NURHI) on modern contraceptive use in Nigeria between 2009 and 2014. It is presented as five chapters completing five specific objectives as follows.

Objective 1: To review literature in order to understand the factors that influence modern contraceptive use in Nigeria and Sub-Saharan Africa (SSA).

Objective 2: To identify family planning and education programmes in Nigeria over the 2000-2015 period and review their evidence.

Objective 3: To measure and evaluate the changes over time in women's outcome indicators before and after the programme between key groups of women.

Objective 4: To assess the changes over time in modern contraceptive use within the NURHI programme participants and understand the factors associated with the changes.

Objective 5: To identify appropriate controlled women in order to undertake a causal investigation of the NUHRI programme on modern contraceptive use.

This PhD will add to the existing literature at several levels. First, it will provide an understanding of how the programme impacted on different groups of women within the

cities where it was implemented. Second, it will identify which factors most contributed to the observed changes in contraceptive use over the five years follow-up. Finally it will adopt a quasi-experimental approach to measure the overall impact of the NURHI programme on women's contraceptive use in Nigeria.

1.2 Nigeria: Context, Demographics and Health Systems

The federal republic of Nigeria is a Sub-Saharan African country located in the western part of Africa. The Sub-Saharan African region is known to be mostly affected by poverty and as such faces the largest socioeconomic related inequalities especially in healthcare (Handley et al., 2009). Nigeria was formed when the British colonies known as the Northern and Southern protectorates were merged in 1914, and Nigeria gained independence in 1960 and became a republic in 1963. Comprising of six major regions, Nigeria has undergone a series of restructuring and consists of 36 states since 1997. Each state also consists of a local government area. There are currently 774 local government areas (LGAs) in Nigeria (Emelonye and Buergenthal, 2011). Nigeria has a three tier system of governance: the local, the state and the federal government. Each level of government is tasked with some form of health service provision to the Nigerian people. The federal government is the highest level of administration while the local government is the lowest. Nigeria also has more than 300 ethnic groups; the three main ones are the Yorubas, the Ibos and the Hausas (Adams, 2016).

Nigeria has the largest population in Africa and accounts for approximately one fifth of the Sub-Saharan African (SSA) population (Chuhan-Pole et al., 2012). The national census in 2006, which is the last population and housing census in Nigeria, estimated the population to be approximately 140 million. With an annual growth rate of 3.3% (NPC, 2010), the current population is now estimated to be about 192 million (World Bank, 2016). These figures exclude Nigerians that live abroad. There is a high rate of emigration in Nigeria due to favourable living and working conditions in developed countries (WHO, 2012; Black et al., 2004). Nigeria's population has also become urbanised over time. The Centre for Human Settlements and Urban Development (CHSUD) in 2005 estimated that by 2010, 55% of Nigeria's population will be living in urban centres and the 2006 census reports from the national census showed that approximately 46% of Nigerians lived in urban centres (NPC, 2010; UN, 2011). Compared to the rural areas, many urban centres in developing countries offer better educational facilities and more diverse employment options, which can help break

the cycle of intergenerational transmission of poverty. However, these increasing trends in urbanization have a staggering effect on health care access and utilisation, which in turn affect economies and national development (UN, 2011).

Nigeria continues to face high levels of fertility rates, though these vary by LGAs, cities, states and regions. The northern regions in general have worse health and development indicators when compared with the southern regions. In 2013, data from the Nigerian Demographic and Health Survey (NDHS) showed differences in the total fertility rate (TFR) between regions with the TFR in the northern region between seven and eight births per woman while southern regions were between four and five births. They also noted differences in TFR between rural areas having a TFR of 8 births per woman while urban centres had 6 births per woman, and between socio-economic status with the poorest segments of the population having a TFR of seven and the richest a TFR of three (NPC and ICF, 2014).

The Nigerian healthcare system is organised into primary, secondary and tertiary healthcare levels. The LGAs are responsible for primary healthcare, the state governments are responsible for providing secondary care while the federal government is responsible for policy development, regulation, overall stewardship and providing tertiary care. The LGA level in Nigeria is the least organised and the least funded level of government and therefore has not been able to properly finance and organise primary healthcare, creating a very weak base for the healthcare system (Leke et al., 2014).

Nigeria has five hospital beds per 10,000 population (WHO, 2009). The federal Ministry of Health's (FMOH) health facilities census in 2005 showed that Nigeria had a total of 23,640 public and private hospitals. A census of private health facilities conducted by USAID in six states in April 2014 revealed that approximately 32% of the private health facilities were not included in official government lists, while approximately 53% of the private health facilities included in official government lists could not be found by surveyors (Johnson et al., 2014). This suggests that lists from government agencies are incomplete and largely inaccurate. Although recent data on the number and growth rate of hospitals, diagnostic centres and laboratories are not available, there has been a visible growth in the number of private health facilities in the major cities in Nigeria. The 2008 Demographic and Health Survey showed that the private sector provides over 65% of healthcare services. Among the private sector providers, pharmacies and patent medicine vendors (PMVs) play a critical role. Pharmacies

and PMVs provided 39% of the services to children with fever in 2008, compared to public clinics 37%, private clinics 13%, and shops 7% (NPC and ICF, 2014).

Nigeria's total healthcare expenditure (THE) continues to rise and was estimated at $18.3 billion in 2014. However, households' out-of-pocket expenditure (OOP) has remained the major source, constituting about 70.3% of THE. The government expenditure on health as a percentage of GDP is below the average for Sub-Saharan Africa and less than 5% of Nigerians were covered by any form of health insurance at the end of 2013 (Lawanson, 2014). As a result of this extremely low health expenditure, Nigeria' health care services continue to greatly depend on donor funding. Although Nigeria is not regarded as a donor-dependent country, many of the major public health interventions in the country especially in maternal and child health care are largely funded and implemented by donors (Ejughemre, 2013). With a huge debt burden and depleted foreign reserves, the government faces the challenge of how to creatively source funds to provide essential public health services and sustain ongoing programmes to save the lives of women and children (Senibi et al., 2016). As such, the proper evaluation of the impact of these programmes are essential in order to ensure that important public health services are up-scaled.

1.3 Impact Evaluation

The aim of an impact evaluation is to estimate a causal relationship between a programme and its outcomes. In practice, both the direct and indirect effects can be observed. For example, a maternal care demand-side voucher programme may have a direct effect on a mother's use of maternal care services, on the other hand, the use of this maternal care services could also lead to improvements in child health; an indirect effect of the programme. To establish a causal relationship we must identify what changes would have occurred in the absence of the programme (Weiss, 1972).

Suppose a researcher attempts to identify whether there is a causal relationship between a treatment due to a health-oriented programme or policy intervention, p, and a health-associated outcome, y. Assume the treatment effect of interest is d:

$$d = y^1 - y^0 \qquad (1)$$

Here y^1 represents the health-related outcome of the treatment group and y^0 represents the health-related outcome of the control group. For evaluating programmes a common problem faced by all researchers is that if an individual is treated then the outcome of this same individual without treatment cannot be observed (Rubin, 1974; Holland, 1986). For example, let's assume that a mother receives a maternal care service which is helpful to her child's health. As the baby receives benefit from maternal care services, the health outcome of that baby without benefit from maternal care services cannot be observed. Therefore, the pure treatment effect cannot be identified directly as the direct counterfactual outcome is not observed.

The outcome of treatment that is in fact observed can be expressed in terms of the potential outcomes (Jones, 2009):

$$d = (y^0 + d(y^1 - y^0)) \qquad (2)$$

Here d is an indicator of treatment.

Since at a particular point in time, and for a particular respondent, we can observe only one potential outcome, we cannot decompose the health outcome to find out the impact of the programme on the treated, $d(y^1 - y^0)$, by only looking at the treated individuals. Therefore, in order to ascertain causal relationships between treatment and outcomes it is indispensable to define the counterfactual consequences: what the outcomes would have been without the intervention.

1.4 Randomised Experiments

Randomized assignment of a target population into a control group tend to provide effective tools in evaluating the impact of programmes or policy and usually eliminates bias due to selection via treatment. As such, using randomised trials are the norm in evaluation of new clinical therapies since a well-designed randomised trial can minimise the selection bias which may arise while estimating the average treatment effect. Randomised trials are also used rigorously to measure cost-effectiveness of medical technologies and decision analytic models in developed countries (Claxton et al., 2006). However, the use of randomised experiments for evaluation in a broader social context are rare (Jones and Rice, 2011).

Randomised trials are expensive to implement and require substantial planning and implementation. There are some other constraints of using randomised trials some of which were highlighted by Wynn et al. (2006). For example, it may not be possible to assign the groups randomly. Furthermore, collecting baseline data is costly and it may take a long period to collect post-programme data while it may not be possible to delay the programme for very long. Randomised trials also face strong ethical issues as it may require withholding care from the control group as such for many programmes and policies concerns make it difficult not to implement it for a group of people. Most importantly, randomised trials are subject to many biases. The initial randomisation may not be respected and individuals from the control group may reap the benefit of the programme. Differential attrition between the groups may also cause bias as those benefiting from the programme are more likely to remain in the group (WHO, 2013). While there are some good examples of randomised trials in a broader social context, and despite the fact that randomised studies do offer the best place to identify the treatment effect, in developing countries like Nigeria, the practice of randomised controlled trials for evaluating clinical therapies is limited and its practice for evaluating public and health-related policies are minimum (Wynn et al., 2006).

1.5 Evaluation of healthcare programmes and policies in Nigeria

In the absence of randomised trials, especially for policy and programme evaluations, many researchers propose the use of "natural experiment" or quasi-experimental designs to evaluate programmes to identify causal relationships. Meyer (1995) shows that when controls are not available it is possible to design "natural experiments" for programmes. The idea behind natural experiments is to look at the variation over time or across groups and areas. In developing countries, natural experiment-based frameworks are now used in a number of studies undertaking evaluations of health programmes. Gallant and Maticka (2004) find that a sizable number of evaluations in the area of HIV/AIDS prevention programmes in developing countries are based on quasi-experimental designs. In the area of reproductive health programmes, a study in Ethiopia found that a reproductive health programme improved all behavioural indicators of its beneficiaries. The study collected data using cross-sectional surveys at baseline and after implementing the programme. A natural experimental framework was used with comparable controls. Multivariate analysis of results found that

behavioural indicators, measured using survey answers and personal details, improved significantly due to the programme (Erulkar and Tamrat, 2014). It is evident that several health-related programmes and policies in developing countries that are not randomised could be evaluated using a "natural experiment" design as proposed and applied by many health economists. In Nigeria, evaluation of many health-related programmes could be designed like natural experiments by looking at the differences over time and across groups or areas. These natural experiments support econometrics based evaluation approaches including matching and difference-in-differences and relevant data collected and combined from household survey or broad health datasets.

There are a few health studies carried out in recent times in Nigeria, that have used the features of natural experiments to evaluate the effects of health programmes in Nigeria. For example, Brals et al. (2017) analysed the impact of the Kwara State Health Insurance (KSHI) scheme and health facility-upgrades on hospital deliveries using this approach. The central data source for this study was observational data. A baseline survey was carried out in May 2009, shortly before the introduction of the programme, and two follow-up surveys were carried out among the same households in June 2011 and 2013, respectively. Control areas were created using data based on the 2006 National Population Census (Brals et al., 2017). Another such example is a study by van der Gaag et al. (2013) in which they used two population based household surveys in Kwara Central in Kwara state, Nigeria to measure the impact of the Hygeia Community Health Care (HCHC) programme on the use of health care and certain health outcomes in the state. The study showed that HCHC not only increased utilization of health care among the insured by over 70% (as well as in the treatment community overall), but it also significantly increased utilization of quality health care (van der Gaag et al., 2013). None of these programmes were randomised, yet the programmes' impact was assessed by looking at the variation across areas and groups respectively and by using relevant econometric models.

With this in mind this PhD will add to the existing literature of natural experiments in Nigeria in the health care system especially with regard to maternal health care. This PhD starts by presenting in chapter 2, a literature review followed by chapter 3 that presents the programme we have chosen to evaluate and the datasets that are used in this thesis. Chapter 4 presents our findings from the first empirical analysis which is a before and after (reflexive comparison)

analysis of the programme. In chapter 5, we present our findings from a decomposition analysis in the changes in modern contraceptive use within the programme regions and we present a final empirical analysis in chapter 6 where a causal impact evaluation of the programme using a natural experiment approach is carried out. Chapter 7 summarizes and discusses the findings as well as the limitations and policy implications of the thesis.

CHAPTER 2: Literature Review

In this chapter, We present three different reviews of literature. Firstly, we present the methods that we use for our literature review search. Secondly, we present a review of literature that discusses the issue of family planning on the international agenda. Thirdly, we present a review of literature on family planning trends, patterns and choices in Sub-Saharan Africa and Nigeria and finally, we present a review of the major family planning and education programmes from the year 1988 when the first major family planning programme started in Nigeria. This chapter helps to understand the history, trends, patterns and choices in family planning and modern contraceptive use in Nigeria.

2.1 Methods

The literature on modern contraceptive use in Sub-Saharan Africa are is so disparate and the research questions often so unclear as such that it made it difficult for us to do a systematic review. In addition to this a meta analysis was not needed for our results as such we only do a structured literature review; the review had as a main focus to allow a robust understanding of the area of research and the identification of any similar public policies in Nigeria and the SSA. For this reason, the methods adopted in this thesis were designed to be thorough in including as many resources as possible on family planning and education programmes in Nigeria and the SSA. We also included a review on family planning trends, patterns and choices in Nigeria and SSA.

The search was done in two parts. The first search reviewed reports from the Nigerian Government Federal Ministry of Health (FMOH), the National Bureau of Statistics (NBS) and the National Planning Commission (NPC). It also included reports from non-governmental agencies including the World Bank (WB), the World Health Organization (WHO) and the United Nations Development Program (UNDP).

The second part included published studies, articles and journals on family planning trends, patterns and choices in Nigeria and in SSA. Where studies from Nigeria or the SSA region were lacking, studies external to this region in Africa were included.

Search design

A first search researched governmental and non-governmental agencies' resources to retrieve

data on health inequalities and inequalities in health care access in Nigeria. The Federal Ministry of Health (FMOH) website was searched for publications that addressed or discussed family planning and modern contraceptive use.

Other non-governmental databases like the WB, WHO was also searched to identify relevant documents and information.

The second stage of the literature search was done, using the following electronic databases: Medline, Embase, Global Health, PsycINFO, Popline and CAB abstracts. The global reach of these databases was used because it increased the likelihood to include studies on the Nigerian and SSA context. Articles were identified on family planning and modern contraceptive use, family planning trends, patterns and choices in the context of Nigeria and the SSA region. Family planning and education programmes where also identified and included in our review. Our search terms and combinations can be found in appendix A6.

2.2 Family planning on the international agenda

Since the middle of the 1960s, access to comprehensive family planning services has been widely recognised as a basic human right (UNDP, 1966). In spite of this, family planning programmes and policies have been one of the most under-resourced developmental problem (Sinding, 2009). As a result, it is estimated that about 214 million women in the developing world have an unmet need for family planning (WHO, 2017). At the 2012 London Summit, the Family Planning 2020 (FP2020) movement was initiated; it was agreed that this programme would enable 120 million more girls and women to access modern contraceptives by 2020 in the world's poorest countries (Schlachter, 2016). Achieving this would cost approximately $8 billion, and prevent 54 million unintended pregnancies, 80,000 maternal deaths, and up to one million infant deaths. Some recent United Nations (UN) predictions show that half the projected growth in population between now and 2050 will occur in Africa – a continent with the world's highest fertility rates and the lowest use of modern contraception (UN, 2015). The population of 26 African countries is predicted to at least double by 2050. Some experts worry that rampant population growth in Africa will not just aggravate the current migration crisis but could play into the hands of terror groups across the Sahel who seek recruits among large, poor families with few options (AfDB et al., 2012). The United Nations Population Fund (UNFPA), the agency charged with ending maternal deaths

and promoting family planning services, is also facing a $700 million funding gap for contraceptives over the next three years (UNFPA, 2015).

Family planning improves the health and overall well-being of women and families around the world. In 2010, a summary of the evidence showed family planning's connection to all of the eight Millennium Development Goals (Cates et al., 2010). Since then, many stakeholders have advocated for family planning to be a fore front within the next global development agenda. Many of the advocates come from the reproductive health community, but it has also come from many heads of state and key decision-makers in developing countries, global policy-makers as well as major funders of women's health around the world (Osotimehin, 2012; Habumuremyi et al., 2012; DFID, 2013). Simultaneously, the international community has shifted its focus towards a post-2015 development agenda that widens the lens from primarily micro-level social development to include macro-level economic, sustainability and governmental objectives. As the development framework becomes broader, the extensive ripple effect of family planning's benefits remains clear. Evidence made available since the published summary in 2010 continues to confirm that family planning has an impact on global goals that will remain for a while (Canning et al., 2012; O'Neill et al., 2012). It is also clear that access to family planning has a beneficial impact on several of the newly proposed global development objectives. For example, with regard to sustainable livelihoods and job growth, family planning programmes can reduce unwanted fertility in resource-poor settings. This, in turn, allows women greater opportunities to participate in paid employment and to increase their productivity and earnings (Osotimehin, 2012). Furthermore, when women are employed or have more control over household incomes, they tend to spend more than men do on food, health, clothing and education for their children and this expenditure can generate improvements in household nutrition, health and education.

There continues to remain variations in contraceptive use and the unmet needs for family planning across Sub-Saharan Africa. For example, in Southern Africa, contraceptive use is approximately 51% and comprises almost exclusively modern methods while unmet needs in this region represent 16%. In contrast only 15% of women use modern contraceptive in West Africa and 24% of them report an unmet need for family planning making it one of the highest in Africa (Sedgh et al., 2016). One of the direct consequences of relatively low use of contraception and high unmet needs is that family sizes remain large. On average a West

African woman has approximately six children in her lifetime while fertility in Southern Africa is much lower at three children per woman, partly due to the high use of modern contraception (Sedgh et al., 2016).

2.3 Family planning trends, patterns and choices in Sub-Saharan Africa (SSA)

The media has very often treated Africans especially in the SSA region as significantly lagging behind on economic and human development indicators and continuously in need of donor aid (Biesma et al., 2009). There are some suggestions that African consciousness of this is rising and efforts to establish self-sufficiency are growing. In 2001 at a meeting in Abuja, Nigeria, the African Heads of State pledged to commit 15% of their total annual government budgets to the health sector. More than a decade later, while just six african countries have met this mark, the annual government per capita spending on health has risen. From a demographic perspective, fertility rates vary considerably across Sub-Saharan Africa (United Nations, 2016). Total fertility rates, which hovered at 6.5 births per woman in the early 1960s across all regions, now range from 2.38 births per woman in southern Africa, to 3.05 in northern Africa, to 4.52 in eastern Africa and to 5.2–5.3 in western and middle Africa. Demographers have identified definitive onsets but with considerable spatial and temporal variation in pace (Garenne, 2008; Johnson et al., 2011; Bongaarts and Casterline, 2012; Westoff et al., 2013; and Lesthaeghe, 2014). Johnson et al. and Westoff et al., who analyzed fertility trends using data from the DHS, suggested that there are at least 30 fertility transitions underway but in various phases. Garenne (2008) observes that over a 30 to 40 year period about three-fifths of the transition from peak to replacement fertility levels have occurred in urban areas of SSA and about one fifth of this transition is being experienced in rural areas in 20 to 30 years. An UN review (NAS, 2016) notes variation in the speed of fertility declines in nine geographic clusters in SSA, with some being quite rapid. If the pace of the more rapid changes spreads to other parts of the subcontinent, SSA countries may defy the expectations of most demographers regarding the potential and realized speed of its fertility transitions. The UN anticipates the largest reductions in fertility between 2045–2050 to occur in Africa.

An important driver will be recent and significant declines in infant and child mortality. The under-five mortality rate has decreased between 2000–2005 and 2010–2015 by 20% or more

in 42 out of 57 countries in all of Africa (United Nations, 2016). The infant mortality rate in the SSA region has declined from 88 to 64 deaths per 1000 live births in this period, and is just one third its 1950–1955 estimated level of 183. Under-five mortality for the SSA region reduced from 142 deaths under age 5 per 1000 live births to 99, or a 30% reduction, in the ten-year period and is also one third of its 1950–55 rate of 307. The robust developments of the past decade are not only heralded for their reflection of improved wellbeing and longevity but also signal prospective changes in parental demand for future childbearing, particularly in the context of rising child rearing costs.

Among the main influences on fertility, marriage ages for females and levels of completed schooling, both of which have increased, are seen as responsible for some of the observed fertility declines (Garenne, 2014). The short-term effects of later marriage and higher schooling for females will appear in lower adolescent fertility rates, an age component of total fertility rates. With declining infant and child mortality, lower demand for fertility will likely lead to higher demand for contraception-assisted birth spacing. Fertility demand, though, is to be distinguished from contraceptive demand, as change in one does not automatically mean a change in the other. Casterline and El Zeini (2014) have noted the weak association between trends in unmet need and fertility in Sub-Saharan Africa. Bongaarts and Casterline (2012) have observed slow change in fertility preferences and ideal family size in the SSA region, behind the pace of those in Asia or Latin America in the 1970s.

Unplanned pregnancies present considerable public health challenges in women of reproductive age especially in Sub-Saharan Africa (SSA). There is an estimated 210 million pregnancies that occur worldwide, 38% are unplanned and 22% of these end in abortion (UN, 2015). In Sub-Saharan Africa more than 100 million women would like to delay their next pregnancy or even stop bearing children altogether but many still rely on traditional and less effective contraceptive methods and many do not use any contraceptive method at all (WHO, 2012). Women who do not use any contraceptives most likely face barriers including a lack of knowledge or awareness, a lack of access, religious factors, cultural factors, fear of health risks or side effects as well as opposition to use by family or partner (Nyongesa, et al., 2015; Zaidi et al., 2015; Srikanthan et al., 2008). SSA has the highest average fertility rate in the world. In 2015, the UN reported that the total fertility rate (TFR) in many African countries

was 5.0, double the levels observed in South Asia (2.8) and the Caribbean (2.2) (UN, 2015). Similarly, the average contraceptive prevalence rate (CPR) in SSA was 22% and so less than half the rates in South Asia (53%) (Weinberger et al., 2015). The population in the SSA region is continuing to grow at a much larger rate than in any other developing regions. These aggregate level trends conceal on-going fertility transition at the country levels; some countries in the SSA have observed dynamic changes in the fertility pattern (UN, 2015). Many studies have shown geographic variations in contraceptive use with countries in Southern Africa reporting the highest levels of use, followed by the countries in Eastern Africa and with a very few exceptions, Central and Western African countries reporting very low levels of family planning use and having some of the lowest levels in the world (Seiber et al., 2007; Adetunji, 2011; UN, 2014).

An indicator of advancement in family planning adoption is the change in the type of contraceptive methods used by women. Family planning methods are classified into traditional and modern methods. Modern family planning methods are categorised into three subgroups: short-term modern methods including the pill, condoms, the lactational amenorrhoea method (LAM), diaphragms, foaming tablets, jelly, and the emergency contraceptive pill and the long term modern methods which are injectables, implants and intrauterine devices (IUDs) and lastly permanent methods which are female and male sterilisation. Traditional methods consist of periodic abstinence, withdrawal, and various folk methods such as strings and herbs (WHO, 2017). The use of traditional methods tends to be more in areas where societal approval of family planning is low and use of family planning programmes is weak. Traditional methods mostly tend to have high failure rates and are therefore not considered effective (PATH and UNFPA, 2006). Patterns in the choice of contraceptive methods show that in many of the countries of the SSA regions, the use of traditional methods has declined while the use of modern methods has seen an increase. Many countries in Central and West Africa saw an increasing trend in the use of modern methods but still reported high levels of traditional methods use (Ross et al., 2015). The use of modern contraceptive does not only depend on users' preferences but also on the characteristics of the health system. Strong family planning programmes rely on effective family planning service delivery strategies, such as those that offer methods tailored to the needs of users; provide counselling as well as medical expertise for the administration of

contraceptives and follow up on users' response to the method (Denno et al., 2015). Many of the countries in the SSA region have a weak health system and are constantly faced with the challenges of improving contraceptive method choice within existing constraints (O'Donnell, 2007; Jacobs et al., 2011; Ross et al., 2012).

2.4 Trends in total fertility rates and unmet needs in the SSA

Average fertility rates in many of the SSA countries has declined over the last decade. The steepest declines were observed in Ghana, Kenya, Liberia, Namibia, and Zimbabwe. Other countries, such as Madagascar, Senegal, and Togo, also showed promising declines. However TFR increased or remained constant in some countries including Mozambique, Niger, and Nigeria (CSDH, 2008). Despite increases in contraceptive prevalence over time in countries mentioned above, fertility decline has been slow. As there tends to be a time lag between changes in contraceptive use behaviour and a corresponding decline in average fertility, it is likely that national statistics will confirm that there were greater fertility declines in countries in which CPRs have risen. Fertility decline also tends to be correlated with demographic and socioeconomic factors, such as the level of urbanization, women's education, women's labour force participation, and economic growth (UNFPA, 2017). Studies in Africa have shown that differentials in fertility trends across countries are associated with women's education, child survival and exposure to modern roles and behaviours linked with growing urbanization (Starbird et al., 2016; Ramjee et al., 2013; Alaba et al., 2017). Some studies have examined the trends in actual and desired total fertility in some SSA countries. These studies have revealed that in countries such as Uganda that have a high level of unmet needs, the gap between the actual and wanted TFR in the late 2000s widened, suggesting a growing demand for small family size and the failure of family planning programmes to meet the latent demand for services (Goujon et al., 2013; Malarcher, 2010). Countries such as Kenya and Zimbabwe that have had strong family planning programmes and have improved contraceptive prevalence showed a narrowing of the gap between desired and actual fertility (Muhoza, et al., 2014). While there continues to be differences in the fertility trends across the SSA region, some country level studies in East Africa attribute the faltering of the fertility decline to diminishing donor support for family planning and a greater emphasis on sexually transmitted diseases (Bongaarts et al., 2012). An Eastern Africa study concluded that poorer

socioeconomic variables, changes in the family planning programme environment, and reproductive behaviour models were associated with the decline in contraceptive use and increases in unmet need, the desire for larger families and teen fertility (Rutayisire, 2014).

Unmet need in family planning measures the gap between demand for family planning and the use of contraceptives. Unmet need is expressed as the percentage of sexually active women who do not want additional children but are not using any form of contraceptives (MacQuarrie, 2014). Changes in unmet needs can be influenced by several factors that relate to fertility preferences, which may be related to the effectiveness of family planning programmes. When examined in relation to contraceptive prevalence, changes in unmet need provide an estimate of the gap between demand and use of family planning. Studies have shown that unmet needs in Eastern and Southern Africa simultaneously declined when an increase in access to family planning was observed (Letamo et al., 2015; Mayhew et al., 2017). This may suggests the concurrence of the demand and supply sides of family planning. Other studies showed that in Western and Central Africa the unmet need gap had remained consistently wide. Satisfied demand for contraception is defined as the percentage of sexually active women who do not want additional children and are practicing family planning (Bradley et al., 2014; Cavallaro et al., 2017).

2.5 History of family planning programmes and policies in SSA

Many studies in SSA have tried to determine the reasons certain countries in the region went through fertility decline and others did not. One of the studies compared Kenya where the total fertility rate fell by almost 40% between 1980 and 2001 with neighbouring Uganda where fertility reduced by only 10%; it concluded that both economic development and a strong national planning programme was associated with a lower fertility in Kenya (Korotayev et al., 2015). Another study compared Zimbabwe where the TFR fell more quickly than in Zambia; the major factors of the decrease were due to a strong family planning programme in Zimbabwe supported by a high-level of political commitment and financial stability. Emerging evidence from a study in Rwanda suggested that major steps in improving family planning uptake could be made if a strong political and government support existed (UNFPA, 2012; Chevo et al., 2012; Chi et a., 2015).

Some studies have said that high rates of fertility in Sub-Saharan Africa were related to a lack of policy makers' commitment for family planning programmes (Nations U, 2010; USAID et al., 2012). In the early 1960s, many governments in the region were hesitant to establish effective family planning programmes and political support for family planning in the public sector was weak across the continent. Many of them had the traditional ideas that family planning was not as important as other public health issues like malaria (USAID, 1979). However, since the world population conference in 1984, governments in several African countries acknowledged the high fertility levels and many started to initiate family planning programmes. Some of the recommendations from the conference invited countries to consider adopting population policies within the framework of socio-economic development, which are consistent with basic human rights and national goals and values. It encouraged countries that consider that their population growth hinders the attainment of their national goals to pursue relevant demographic policies within the framework of socio-economic development (UNFPA, 1992).

Family planning programmes in SSA are not as strong or as old as those in other parts of the world, but many African countries have gained experience in family programmes in recent years. Better progress on family planning indicators in East Africa compared to West Africa has been attributed to stronger family planning efforts that ensured wider availability of modern contraceptive methods (Bloom et al., 2013). While until recently family planning programmes in the SSA region were weak in general, there has been some promising progress in programme implementation in the region. One study of a family planning programme has found that the biggest improvement among all regions of the world in the early 1990s occurred in SSA, where there was an increase in number of family planning programmes (Mauldin et al., 1991). In SSA countries like Kenya and Zimbabwe, some family planning programme management strategies have been found to be particularly effective. Strong family planning associations have been seen to initiate policy changes and facilitate programme implementation (Arkutu, 1995). In Zambia the separation of institutions responsible for policy formulation and implementation resulted in a weaker family planning programme (USAID, 2003; Lee et al., 1998). Other SSA countries have tried community-based distribution of contraceptives to extend family planning in hard-to-reach communities especially the rural areas. Countries like Ghana and Nigeria have in the last

decade implemented large community-based distribution programmes at the national level (Hoke et al., 2012). Although conclusive evidence on the effectiveness of these types of programme is not available, such programmes give good examples of bottom-up approaches that have been practiced in the region.

In summary, despite the high level of fertility in SSA, some countries have managed to make significant progress in terms of fertility decline. Continual shifts in contraceptive use and fertility behaviour indicate the beginning of fertility declines in more countries in the coming years. In spite of the hectic political situations, several success stories in family planning policy formulation and programme implementation have emerged. The lessons that can be drawn from countries that have made some progress attest to the importance of political commitments, institutional arrangements and service delivery strategies in increasing the use of family planning methods and lowering fertility. Many countries that were successful in reducing fertility adopted population policies and instituted family planning programmes quite early. Programmes in Botswana, South Africa, and Zimbabwe have been considered particularly successful. High level policy commitment and political ownership of the population programme were key ingredients for success (Lucas, 1992; Leburu et al., 2009; Mwaikambo et at., 2011).

2.6 Family planning and contraceptive trends in Nigeria

In developing countries like Nigeria, children are highly valued as they do not only represent the virility of a man, but also act as a source of income in places where agriculture is the main source of livelihood, acting as extra hands for work. In addition to this, parents and extended relatives depend on their children for maintenance as they get old and are thus hesitant to restrict births (Mokomane, 2013). In 1992, due to the rapid population growth that was seen in Nigeria, the then Nigerian president suggested that each family should have only four children. In response to this, the mass media started awareness campaigns on the disadvantages of having too many children. During this period, family planning clinics were also established in government owned hospitals, mostly in urban centres (Ogunbekun et al., 1999). This however did not achieve the desired results mostly due to the cultural and religious preferences of the various ethnic groups that make up Nigeria. Some reports in Nigeria have showed that in general, Nigerian women would want to have fewer children

than they actually have; in other words, Nigerian women are more receptive of family planning than their male counterparts mostly because they bear the burden of childbearing as well as attending to household chores and sometimes understand the probable break down in their health as a result of child-bearing (Anyanwu et al., 2013; BCN, 2012).

Between 1990 and 2015 in Nigeria, the maternal mortality ratio (MMR) declined by almost 30%, falling from 1,110 deaths per 100,000 live births to 814 deaths per 100,000 live births (WHO et al., 2016). In spite of the reported decline in maternal deaths, many women in Nigeria still die from pregnancy-related causes and more recent trends in MMR suggests that there has been a stagnation in the decline. In 2013 for example, the WHO reported that approximately 40,000 women died due to maternal causes (WHO et al., 2014). This figure accounts for 14% of the global maternal death burden, which is disproportionate when Nigeria constitutes only 3% of the world population. Data from the Nigeria Demographic and Health Surveys (NDHS) show that the percentage of currently married women with an unmet need for contraceptive increased between 1990, 2003 and 2008 while a decline in unmet needs was observed between 2008 and 2013 (NPC and ICF, 2014)

Egede et al. (2015) looked at contraceptive choices and behaviours in all the regions in Nigeria. Their study revealed that intrauterine contraceptive devices (IUCD) were the most popular choice and accounted for 77.9% of the Nigerian women users and it was followed by injectables (12.6%), oral contraceptive pills (4.1%) and progestin implants (2.3%). The less popular were condoms, spermicides and female sterilization (1.5%, 0.1% and 0.1% respectively). This may reflect the relative availability of each method and cost variations. The invasive nature of Bilateral Tubal Ligation (BTL), religious beliefs and cost consideration may contribute to making it less acceptable compared to the other methods available (Ijarotimi, et al., 2017). Most studies on contraceptives in Nigeria converge with Egede et al. (2015) and found that the majority of women use IUCDs. IUCDs are the most widely used reversible contraceptives in the world, and it has been estimated that over 130 million women of reproductive age use it for birth control. Regional differences in choices have also been observed by many studies. Progestogen-only injectables use of 12.6% is found in Ife (South-western) Nigeria which is lower than the 71.8% found in Aba (South-eastern Nigeria) but comparable to 14.2% reported from Jos (North-central Nigeria) (Buhling et al., 2014).

2.7 Trends in family planning and education programmes and policies in Nigeria

In every country, understanding the size of unmet need and the characteristics of women with unmet need can help planners strengthen programmes and inform policy. Survey data on unmet need can provide overall direction by helping to pinpoint the obstacles in society and weaknesses in services that need to be overcome. Family planning programmes clearly have a role to play in helping people get the information and services they need to make informed choices. In this section, we present the trends in family planning programmes and policies as well as the trends in education programmes in Nigeria.

2.7.1 Family Planning Policy in Nigeria

The Nigerian government initially did not perceive the rapid population growth as constituting a significant barrier to economic growth. The 1975-1980 third development plan in Nigeria revealed an insight into the official thinking of government about its population before 1980. The Government's thought about creating a policy to curb population growth because they felt that economic progress was seriously impeded by demographic factors. However, they came to a conclusion that rather than instituting a course of actions that would control the population by consciously reducing family size, the plan emphasized accelerating the growth of the economy which, in turn, would bring down the birth rate in the long run. There was, however, a plan to continue with integrating various family planning schemes into an overall health and social welfare for the country (Okpala, 1990).

In 1988, in response to the rapid rate of population growth and its adverse implications for development, the federal government of Nigeria approved the National Policy on Population for development, unity and self-reliance (Chuks, 2002). At the beginning of the national policy in 1988, the TFR was 7 births per woman, the infant mortality rate (IMR) was 87 deaths per 1000 live births and the maternal mortality rate (MMR) was one of the highest in Africa at the time. The policy highlighted the need to reduce the proportion of women who marry before the age of 18 years by 80% in the year 2000, reduce under 18 pregnancies and over 25 pregnancies by 80% in 2000, reduce TFR to 4 by the year 2000 and the growth rate from 3.3% to 2% and to extend the coverage of FP services to 80% in 2000 (UNICEF, 2011). This policy remained one of the only major family planning policies in Nigeria until emerging issues like HIV/AIDS, gender inequality and poverty, made it necessary for a review.

After the review, the Nigerian government launched the National Policy on Population for Sustainable Development in 2004 (Federal Government of Nigeria et al., 2015). The new policy recognized that population factors, social and economic development, and environmental issues are interconnected and critical to the achievement of sustainable development in Nigeria. The overall goal of the policy was to improve the quality of life and standard of living for the Nigerian population, by achieving a number of specific goals that included an improvement in the reproductive health of every Nigerian at every stage of the life cycle (Federal Government of Nigeria et al., 2015).

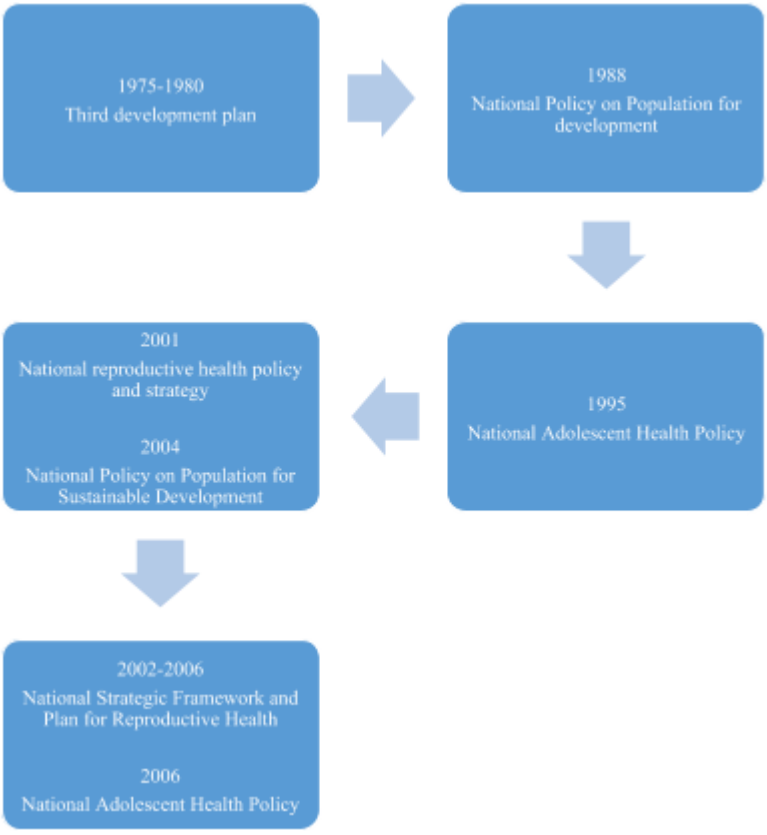
With the ongoing population growth and in recognition of the important link between reproductive health and the quality of life of its citizens, the Nigerian government launched a national reproductive health policy and strategy in 2001 (Federal Ministry of Health, 2001). Even before the creation of this policy, the Nigerian society (government, individual and nongovernmental organizations) either independently or in collaboration with international agencies and organizations exhausted a lot of resources on providing reproductive health education and reproductive health services to Nigerians (Federal Ministry of Health, 2001). However, statistics showed that the reproductive health situation in Nigeria at the time was still extremely poor. The Multiple Indicators Cluster Survey (MICS), conducted by the Federal Office of Statistics in collaboration with UNICEF at the time, showed that the maternal mortality ratio was 704 deaths per 100,000 live births, with a wide geographical disparity ranging from 166 per 100,000 live births in the southwest to 1,549 per 100,000 live births in the northeast. The figures were believed to be an underestimation of the situation because the WHO and other UN statistical sources, estimated it to be around 1,000 maternal deaths per 100,000 live births (WHO et al, 2014). An estimated 40 percent of pregnant women experience pregnancy-related health problems during or after pregnancy and childbirth (NBS, 2008). The Nigerian Bureau of Statistics (NBS) suggested that low level of access to, and utilisation of quality reproductive health played significant parts in the high maternal mortality in Nigeria. For example, the 1999 NDHS revealed that only 31% of deliveries took place within health facilities. Study of the 1999 NDHS also revealed that the level of utilisation of modern contraceptive in Nigeria was still low, although it had increased over the last decade from 3.5 to 8.6%. The level of contraception among sexually active adolescents was particularly low, and was contributing to the high level of teenage pregnancy,

unsafe abortions and maternal mortality. On the whole, the total demand for FP was also relatively low as only 29 percent of women demanded for family planning (ICF and NCP, 1999).

Reproductive health remained on the concurrent legislative list (concurrent list implies the list that bears the matters over which both the federal and state authorities can exercise legislative authority in Nigeria), with each state having the advantage to determine its activities, guided by the national reproductive health policy and guidelines and based on the availability of local resources. To facilitate the implementation of the policy, a National Strategic Framework and Plan for Reproductive Health (2002-2006) was developed with the objectives to increase the CPR, reduce gender-based violence and practices, reduce the prevalence of sexually transmitted infections (STIs), reproductive cancer and infertility as well as reduce the MMR. The National Strategic Framework and Plan for Reproductive Health called for the decentralization of services to the states, LGAs and communities. It recognized the need for the promotion of community participation and encouraged private sector support to ensure effective implementation of the strategies and activities in the plan (Federal Ministry of Health, 2006).

Another relevant family planning policy was the National Adolescent Health Policy in 1995, which was designed to create a climate for laws necessary to meet adolescent health needs and to promote and support the dissemination of reproductive knowledge and information to adolescents (Federal Ministry of Health, 1995). The policy, which was developed by the Federal Ministry of Health (FMOH) was revised in 2006, in collaboration with other ministries, government agencies and NGOs. The revised framework encompasses a broad range of issues addressing adolescents, including sexual behaviour, nutrition, drug abuse, education, career and employment, and parental responsibilities and social adjustment techniques. This strategic framework was designed to facilitate implementation of the National Adolescent Health Policy by translating the policy into actionable plans to promote adolescent sexual and reproductive health in Nigeria (Federal Ministry of Health, 2007). Figure 1 shows a summary of the major family planning policies over time in Nigeria.

Figure 1: Family Planning Policies in Nigeria from 1975-2006



2.7.2 Family Planning Programmes in Nigeria

Family planning programmes give women access to contraceptives and contraceptive information. Many developing countries like Nigeria have implemented such programmes to reduce high birth rates, lower maternal and child mortality as well as support women's right to decide when and how many children they want to have. The primary justification for voluntary family planning programmes is substantial unmet need for contraception. This unmet need results in 9.2 million unplanned pregnancies in Nigeria each year, about half of which end in abortion (Bankole et al., 2016). Family planning programmes vary widely in the coverage and quality of their services. In Nigeria, there have been approximately 11 major family planning programmes that have been implemented since the late 1980s when family planning programmes where initially introduced. Many of these programmes focused on improving service delivery through service provision, counselling and mass media campaigns.

From the 11 major programmes identified only two have been implemented nationwide and the rest in various states in Nigeria (see Table 1).

While some family planning programmes have reported increases in contraceptive use after implementation, contraceptive use in Nigeria remains relatively low (Akinlo et al., 2013). Some of the programmes have revealed that communities are not usually involved in the planning and pre-implementation phases of programmes, which could have encouraged their full participation and help to unravel the barriers to uptake of services (Asekun-Olarinmoye et al., 2013). Asekun-Olarinmoye et al. (2013) concluded that understanding the main factors influencing contraceptive use among women is the key to the development of effective family planning programmes. Some of the reports from some of the programmes reveal that there have been increases in modern contraceptive use in the areas that the programme occurs. The ACCESS/MCHIP USAID Nigeria programme reported that at baseline use of FP services was approximately 5% in 2006 across the three states and that by end-line, use of FP services had increased to 13.5% in 2012. It also reported that maternal deaths had reduced from approximately 3.7% at the baseline to 0.7% in these areas. Another programme, the Community Participation for Action in the Social Sector Project also reported increases in the use of modern contraceptive use in some of the states post programme. Post-programme figures showed that the use of modern family planning methods in the intervention states had increased from 18% and 5% to approximately 25% and up to 11% in Kano and Bauchi respectively. The Community-Based Access to Injectable Contraceptive (CBA2I) programme also reported that in the 11 months that the programme lasted for, it was able to provide injectables to 1,662 women and that uptake of the injectables increased from 20% in 2011 at baseline to 38% after the project ended in the facilities where the programme occured.

Table 1: Family Planning Programmes in Nigeria

Programme	Location	LGA	Aims	Time
The Family Health Service Project	Nationwide	All LGAs	To increase the contraceptive prevalence rate	1988-1994
The Policy Project	Nationwide	All LGAs	To strengthen family planning and reproductive health programmes in Nigeria	1995-2000
Fistula Care Plus Project Nigeria	Katsina,Kebbi,Zamfara, Kano,Sokoto,Ebonyi, Bauchi,Cross-River,Kwara,Ibadan	All LGAs in each state	To provide access to emergency obstetric care and advanced family planning services	2006-2012
The USAID-funded Targeted States High Impact Project	Bauchi, Sokoto	All LGAs in each state	To increase the use of high-impact integrated maternal, new-born, child-health and family planning and reproductive health interventions	2009-2015
The Private Sector Family Planning Service Delivery Project (Advanced Family Planning for Improved Reproductive Health in Northern Nigeria)	Sokoto, Katsina, Niger, Kaduna, Kano, Bauchi, Yobe, Abuja	All LGAs in each state	Improved quality and accessibility of FP/RH services, improved demand for and use of FP/RH services and increased access to and uptake of modern FP methods.	2000-2011
The Evidence to Action Project	Kaduna, Cross-River	All LGAs in each state	To increasing support, building evidence and facilitating the scale up of best practices that improve family planning services	2011-2016
The Extending Service Delivery (ESD) Project in Nigeria	Kano	All LGAs in the state	To increase the use of reproductive health and family planning services at the community level, especially among underserved populations, to improve health and socioeconomic development	2005-2010
The Community Participation for Action in the Social Sector Project	Lagos,Kano, Nasarrawa,Bauchi, Abuja	All LGAs in each state	To increase access to contraceptives	2005-2010
The ACCESS/MCHIP USAID Nigeria programme	Zamfara, Kano, Katsina	All LGAs in each state	To contribute to the reduction of maternal and neonatal mortality by increasing the utilisation of contraceptives	2006-2012
The Community-Based Access to Injectable Contraceptive (CBA2I) Programme	Gombe	All LGAs in the state	To increase access to contraceptives	2011-2012
Family Planning 2020	Nationwide	All LGAs	To increase women's use of FP services (target: CPR to increase from 15% to 36%) and contribute to the reduction of maternal mortality by 75% and infant mortality by 66% across Nigeria by 2018	2013-2018

2.7.3 Education Programme and Policies in Nigeria

Both within and across SSA countries, differential and changes in contraceptive use have been explained largely by socio-economic and sometimes sociocultural differences among groups. Particularly, a large body of research has emphasized the importance of women's education in contributing to the increase in the use of modern contraceptive methods both directly at the individual level through women autonomy, financial and cultural access to reproductive health services, and indirectly through social interaction (Thummalachetty et al., 2017; Emina et al., 2014). Goni et al. (2012) suggested that education is an event of human life that carries out a significant role in determining social status but that education may also contribute to increases in women's knowledge and exposure to mass media. Mass media can influence fertility attitudes and behaviour by publicizing non-traditional lifestyles, including small families and by creating a climate conducive to behavioural change. They concluded that education considerably enhances women's knowledge about their bodies and reproductive physiology (Goni et al., 2012). The gap between girl and boy in SSA has been seen to grow as they progress through their primary education: it has been reported that girls are much less likely to complete primary school (UNESCO, 2013; UNESCO, 2015). However, tackling gender equality within schools is only part of the issue. Many of these concerns and constraints have their roots in deep-seated inequalities in the wider community, which impact on girls' ability to access schooling and to stay there (UNESCO, 2015). Changing these mindsets and behaviours is one of the biggest challenges facing girls' education and also one of the most complex to address. The burden of caring and of household domestic labour falls on girls and women in traditional gendered roles (O'Reilly et al., 2012). As such many of the education policies and programmes implemented in the SSA region not only focus on improving the quality of education as well as access to education, but many focus on empowering, most especially girls. In this regard, we have identified key education programmes in Nigeria most of which have a focus on reducing the gaps between girls and boys as well as programmes with some family planning focus components. We summarize our findings in Table 2 below.

One of the first major education programmes in Nigeria was the Universal Primary Education (UPE), which was implemented by the Nigerian government in 1955 and provided free primary level education to all Nigerian children (Csapo, 1983). The programme featured

prominently up till 1966 but was scrapped, following the military take-over of government in that year as well as corruption in the government at the same time. The scheme however left an indelible imprint in education in Nigeria (Csapo, 1983).

Following this programme, there has been a total of seven major education programmes.

In 1999, following the reinstatement of the civilian regime in Nigeria, the Universal Basic Education (UBE) programme was implemented by the Obasanjo administration (UBEC, 1999). The implementation process of the programme started in 1999, but progress was hampered by the inability to execute certain aspects of the programme. However, in 2004, the programme was re-implemented and made provision for basic education comprising of Early Childhood Care and Education (ECCE) and Primary and Junior Secondary Education (UBEC, 2004). The programme is one of the longest running and most successful education programmes providing universal, free and compulsory education to all Nigerians from birth till the junior secondary education level.

The UK Department for International Development (DFID) is one of the few donors with a significant long-term commitment to improving basic education in Nigeria. DFID started work in education in Nigeria in 2003. DFID's education programme in Nigeria is targeted on interventions in some of the poorer states, with a focus on gender parity. It currently has two main education programmes: The Girls Education Programme (GEP) and the Education Sector Support Programme in Nigeria (ESSPIN). The GEP is delivered by UNICEF and aims to improve girls' access to education and learning in four northern States (Sokoto, Niger, Katsina and Bauchi). It started in 2005 and it is now in its third phase (GEP3). Phase 1 (GEP1) ran from 2005 until 2008; Phase 2 (GEP2) ran from 2008 until 2012; and Phase 3 is due to run until 2019. DFID chose to work with UNICEF because of its well-established presence and network of contacts at federal and state levels in the country. As for the ESSPIN, it is delivered by a Cambridge Education-led consortium, which is working to strengthen governance and systems of basic education in six states (Lagos, Enugu, Kwara, Kaduna, Kano and Jigawa). It started in 2008 and finished in 2014 (DFID, 2012).

In 2011, Nigeria joined the Global Partnership for Education to implement an education programme in five northern states (Jigawa, Katsina, Kano, Kaduna, and Sokoto). Each state

created an education sector plan to outline its priorities and objectives as to how the programme would work (Global Partnership for Education, 2011).

Among the other recent education programmes that have been implemented was the Cash Transfer for Girls Education that aimed to increase school attendance by girls led by UNICEF in 2014 in Sokoto State in the north-eastern part of Nigeria. This project aimed to provide girls with financial support to pay for textbooks and other school materials. A sample of 23,000 girls benefited from the cash transfer programme and another 50,000 beneficiaries were added in 2015 (CII, 2016). This programme was closely followed by the implementation of the National Action Plan on Child Labour Education Programme in the same year to address the growing concern about the high number of child labourers in Abuja. The programme was expected to run until the end of 2017, when the Government was expected to have eradicated child labour in Nigeria (FMLP, 2013). This did not happen however and child labour still remains an issue in Nigeria, the deadline to eradicate child labour has now been extended to 2025 (FMLP, 2017). Finally, the most recent programme in 2014 was the Promotion of Literacy Skills Programme implemented in Rivers state in Southern Nigeria. It aimed at promoting the use of books and encouraged reading among Nigerian girls in the region. The project that ended in 2015 had a great success with over 2500 participating students (UNESCO, 2015).

2.8 Conclusion

Although fertility transition has begun in SSA, it is still limited to a few countries; fertility decline across the region remains a distant goal. Even in countries in which contraceptive prevalence is increasing, huge differentials exist by socioeconomic status, urban-rural residence, and correlates such as female education and autonomy (UN, 2009). The design, implementation and evaluation of family planning and education programmes continue to remain important factors especially in countries where contraceptive use is very low and attitudes are ambivalent or even hostile towards family planning. Regardless of the many family planning related programmes that have been carried out in Nigeria, it is important that we not only focus on suggestions to implement new programmes but make sure that we properly evaluate previous and existing programmes. This chapter has summarized evidence will become very useful to measure how a programme has impacted some specific outcomes especially to account for concurrent programmes in the same programme areas

Table 2: Education Programmes in Nigeria

Programme	Location	LGA	Aims	Time
Universal Primary Education	Nationwide	All LGAs	To provide free primary level education to all Nigerian children	1955-1966
Universal Basic Education	Nationwide	All LGAs	To provide free, universal basic education for every Nigerian child of school going age	1999-date
The Girls Education Programme	Sokoto, Niger, Katsina, Bauchi	All LGAs in each state	To improve girls' access to education and learning	2005-2019
Education Sector Support Programme	Lagos, Enugu, Kwara, Kaduna, Kano and Jigawa	All LGAs in each state	To increase access to quality education	2008-2014
Global Partnership for Education	Jigawa,Katsina,Kano, Kaduna and Sokoto	All LGAs in each state	To provide free and compulsory basic education of good quality to all school age children To ensure equitable access to basic education through addressing both supply and demand factors.	2012-2022
Cash Transfer for Girls Education	Sokoto	All LGAs in the state	To provide girls with financial support to pay for textbooks and other school materials	2014-2015
National Action Plan on Child Labour	Abuja	All LGAs in the state	To reduce the girl child labour	2014-2017
Promotion of literacy skills	Rivers	All LGAs in the state	To promote the use of books and encouraged reading among Nigerian girl in the region	2014-2015

CHAPTER 3: Programme and Datasets

In this chapter, we present the Nigerian Urban Reproductive Health Initiative that we aim to evaluate in this thesis along with the datasets are used. We start by presenting the philosophy of the programme, its main aims and how the data were collected. We then proceed to describing what kind of data was collected. Lastly we briefly describe the Nigerian Demographic and Health Survey (NDHS), that we also called upon for the quasi-experimental evaluation later on in chapter 6.

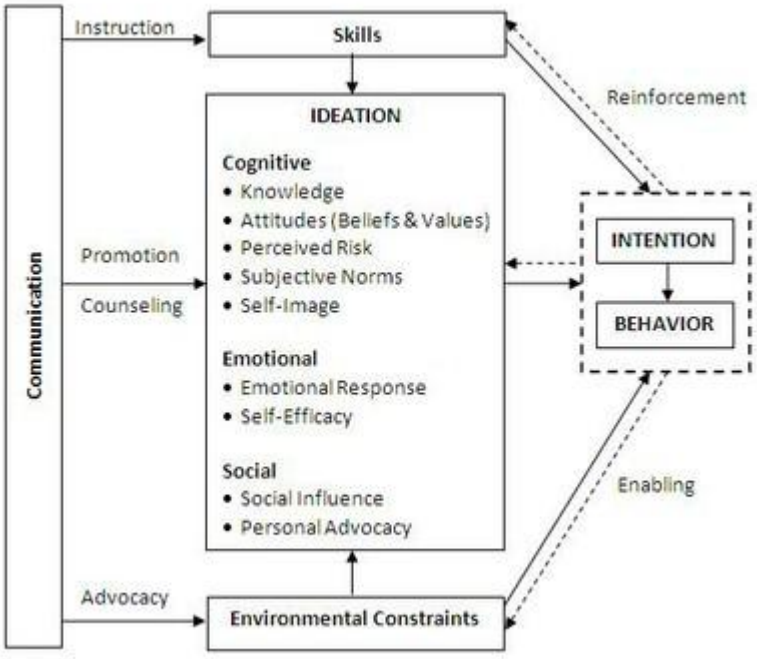
3.1 The Nigerian Urban Reproductive Health Initiative

This study is based on the Nigerian Urban Reproductive Health Initiative (NURHI), which is a family planning programme aimed at reducing maternal, infant mortality and unintended pregnancy in Nigeria by increasing access to high-quality, voluntary family planning (FP) services. The NURHI was strategically designed from a good understanding of (i) the barriers to contraceptive use in intervention cities and in Nigeria as a whole such as knowledge, attitudes, and social norms, and (ii) the existence of a causal pathway to improve the contraceptive use prevalence rate in Nigeria through changes in these factors at each level of society, from the individual up through communities, service sectors, and the policy environment (NURHI and MLE, 2011). The programme's main hypothesis was that communication is the driver of changes at all levels, from demand creation at the individual level to supportive supervision and training in interpersonal communication at the provider level and advocacy at the policy level (NURHI and MLE, 2011). In developing strategies for demand creation, service delivery interventions, and advocacy, the NURHI programme made use of a communication theory called 'ideation' (Kincaid, 2000). Ideation is the concept that people's actions are influenced strongly by their beliefs, ideas, knowledge and feelings and that changing them can change contraceptive behaviour as represented in Figure 2.

Many of the ideation factors are personal factors for example what someone knows about family planning and what they think affects them while other factors embody a social standard such as what people believe other people will think of them if they use contraceptives. The programme implementers suggested that the more positive one's

ideational factor is, the more likely that one is to take up the behaviour that is desired. The NURHI programme intervention was implemented jointly as (i) knowledge creation, (ii) service delivery to backup demand and (iii) changing the social norms.

Figure 2: NURHI based Ideation Model of Communication



Source: Health Communication Capacity Collaborative (2014)

3.1.1 Knowledge Creation

The knowledge creation strategy of NUHRI focused on de-medicalising and demystifying the practice of family planning, by fostering dialogue around family planning in the home, on the street, at work, in the clinic and in the media. This part also focused on increasing the understanding, appreciation, and social approval for planning one's family including improving knowledge and perceptions of family planning methods by reinforcing existing contraceptive use and thus reducing discontinuation. The main knowledge creation activities consisted of mass media, entertainment-education, social mobilization, and integrated branding with a memorable, colourful puzzle logo and tagline that helped tie all programme activities together under one identity[1].

[1] Pictures and logos from the NURHI programme can be found here http://new.nurhi.org/photo-gallery#.Wu2nfaQvzcs

3.1.2 Service Delivery

The service delivery aspect of the programme was based on best practices in service integration and quality improvements. The programme operated through existing health facilities in the intervention cities. In these facilities, they launched a new family planning facility that built support for health providers in their community.

They also did some renovation of the facilities generally entailing a coat of fresh paint, scrubbing, connecting a sink to the hospital's water line, and providing the contraceptive commodities and equipment dependent on provider needs. NURHI ensured that health service providers were trained. They ensured that training sessions included enough time and priority for interpersonal communication and counselling. In addition, they made sure that providers had the tools they needed to counsel their clients well to provide voluntary, free choice of methods, and they developed these materials to integrate with demand generation outside the clinic walls.

3.1.3 Social Norms

The last programme focus was trying to modify social and cultural norms in Nigeria. In Nigeria, there is the traditionally high values placed on marriage that occurs early in life with the consequence that child bearing started early in life and in most cases continued until late in the reproductive span. There is also the norm of institution of polygamy in many cultures which sometimes promotes competition for childbearing among co-wives also contribute to sustain high fertility. The use of modern contraception is also traditionally unacceptable in some cultures as it is believed to violate the natural process of procreation. And lastly, the traditional long period of breast-feeding and postpartum abstinence that is believed to guarantee adequate spacing between children. The programme encouraged prominent faith leaders to speak in the media about family planning and developed advocacy kits that were used by each city's leaders.

3.2 NURHI dataset

The NURHI collected data via a baseline survey in 2009 and a follow-up survey in 2014. The 2009 survey was initiated one year prior to the implementation of the programme activities so

that baseline conditions in the Nigerian project cities could be documented and unbiased. Data were collected from a sample of more than 16,100 women. All eligible women aged 15 to 49 in selected households were individually interviewed using a paper-and-pencil survey, as were men aged 15-59 in half of the selected households. In 2009, a total of 16,144 women were interviewed. The sample was drawn from the six study cities (Zaria, Ibadan, Benin, Kaduna, Abuja and Ilorin) and was designed to permit the calculation of specific indicators, such as contraceptive prevalence and total fertility rate, for each city. A two-stage sampling design was used in the survey selection. In the first stage, a random sample of clusters was selected for each city based on probability proportional to their population. The number of clusters selected from a city was determined based on information from the 2008 Nigeria Demographic and Health Survey (NDHS) on the number of women per household in urban areas at the state level. Cities where there were fewer women per household required more clusters, while cities with more women per household required fewer clusters. The number of clusters included in the survey ranged from a low of 74 clusters in Zaria to a high of 102 clusters in Ibadan. In the second stage, 41 households were selected in each cluster in order to create a sample of about 3,000 households in each city. All women age 15-49 years who were permanent residents of the household or visitors present on the night before the survey were then interviewed individually. Contact information were then collected to help find households and women at midterm and endline. The end-line survey that was conducted in 2014 interviewed a sample of 10,797 women from the original survey and marked the end of the programme[2]. The endline survey was designed to track and interview all the eligible women and their households who were interviewed at the baseline in the six cities. At the endline survey, a woman was defined as eligible if she had completed the baseline survey interview and was a regular member of the household and not a visitor. The eligible women were first tracked to confirm their current residence and were again interviewed. Women were still eligible to be tracked regardless of whether they had moved from the original location as long as they were still resident in any of the intervention cities. If women interviewed at the baseline had moved out of any of the intervention areas, they were excluded from the end-line survey. Of all the eligible women from the baseline survey, 10,797 women were found to still be in an intervention area, 1,451 women had moved out of

[2] A follow-up survey with a random sample of the original sample was done in 2012 and 4331 women were interviewed, we did not use this smaller sample in the study.

the intervention areas, 162 had died and 3,708 (including the visitors from the baseline survey) could not be tracked during the period of the fieldwork. The intervention city, Zaria, had the highest percentage of women that could be found at follow-up with 83% of women and the lowest with just 58% was Benin. The information collected included variables like their social background of respondents (for example age, educational attainment or current school attendance), information about sexuality, fertility and fertility preferences, knowledge and use of family planning methods (for example respondents were asked to name ways or methods by which a couple could delay or avoid pregnancy. If the respondent failed to mention a particular contraceptive method spontaneously, the interviewer probed further by describing the method and asked whether the respondent had heard of it. For each method known, respondents were asked if they had ever used the method. Respondents who reported ever use of family planning were asked whether they or their spouses/partners were using a method at the time of the survey, spousal communication and decision-making ability.

The NUHRI programme was delivered in Benin, Abuja, Kaduna, Zaria, Ibadan and Ilorin. The smallest geographical identifiers we could access for the NURHI programme were the Local Government Areas (LGA) which is the smallest level of government data in Nigeria. Figure 3 shows a map of the LGAs in Nigeria and the shaded LGAs are the NURHI areas.

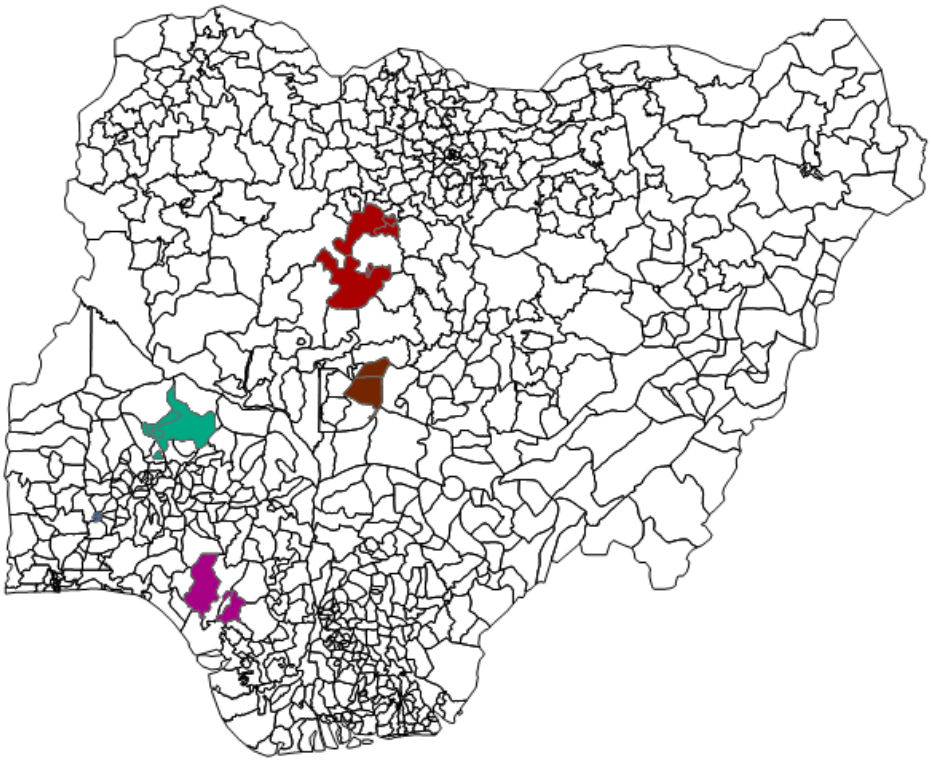
Limitations of attrition rates in NURHI sample

In our sample we observe a high level of attrition rate from our baseline sample to our endline sample as such in the section we present a baseline comparison of characteristics of women who were lost to follow-up versus those followed up as well as a discussion of the limitations of the attrition rates that we observe. There were 5347 women out of the 16144 women lost to follow up. In Table 3, we observe that there are no major differences in the baseline characteristics of women who were lost to follow-up versus women who were followed up. This may suggest that there is no particular trend in the characteristics of women in both groups suggesting that they may be completely missing at random.

Table 3: Comparison of characteristics of women lost to follow-up and followed up

Characteristics	Women Followed up (%)	Women Lost (%)	Difference
Education			
No Education	32.74	35.14	3.10
Primary	23.52	25.64	2.12
Secondary	33.20	35.98	2.78
Higher	10.54	3.24	7.3
Wealth			
Poorest	21.41	25.21	4.11
Poorer	23.21	28.14	5.04
Middle	25.12	22.28	2,84
Richer	16.87	14.22	2.65
Richest	13.39	10.15	3.24
Religion			
Non-Muslim	55.21	57.68	2.47
Muslim	44.79	42.83	1.96
Marital Status			
Never Married	25.52	20.47	5.05
Living together	43.25	48.14	4.89
Separated	19.55	19.97	0.42
Widowed	11.68	11.42	0.26
Region			
Abuja	20.14	19.83	0.31
Ibadan	20.21	22.45	2.24
Ilorin	17.22	18.21	0.99
Kaduna	11.87	13.52	1.65
Benin	19.77	15.23	4,54
Zaria	10.79	11.21	0.42

Figure 3: Map of Nigeria showing the NURHI programme LGAs



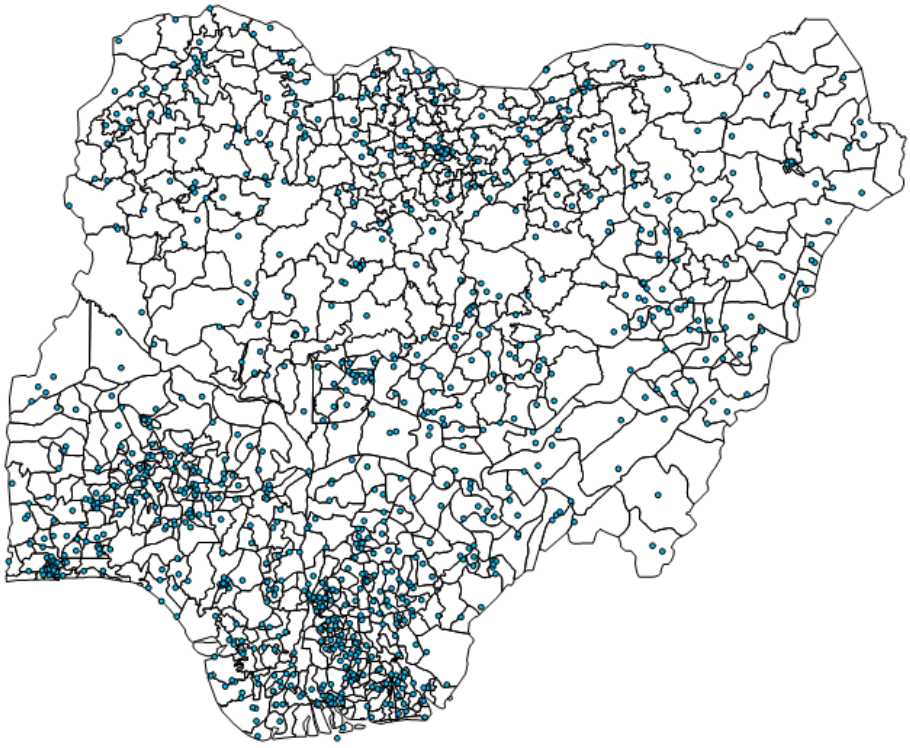
Created on: ArcGis by Caritas_Jekpa

3.2 The Nigerian Demographic and Health Survey (NDHS)

In our final empirical chapter, we use the Nigerian Demographic and Health Survey (NDHS) to create a set of suitable controls so that we can compare our findings to that observed in our programme. The NDHS surveys are nationally representative and cross-sectional data with more than 30,000 households included. The surveys were conducted by the Federal Office of Statistics. Information was gathered from respondents through face-to-face interviews, including individual socio-economic status, health service utilisation and spending on health. Although there are differences in the variables collected each year in the NDHS, the basic structure of the sampling and some core variables are the same. The two rounds of the NDHS that we use are the surveys in 2008 and 2016. These surveys have sample sizes of 33,385 and 38,948 households respectively. In addition to the main NDHS dataset, the groupings of households that participated in the survey, known as clusters, were geo-referenced. These survey cluster coordinates are collected in the field using global positioning systems (GPS)

receivers, usually during the survey sample listing process. Many of the GPS readings for these clusters are accurate to less than 15-20 meters. In our analysis we restrict our sample to the urban areas this is because the programme was done in urban areas and so compare our results in a similar situation. Figure 4 shows a map of Nigeria with the LGAs and NDHS clusters in 2008.

Figure 4: Map of Nigeria showing the LGAs and the NDHS clusters: Identified by blue points



Created on: ArcGis by Caritas_Jekpa

We used NDHS datasets in the last empirical chapter to undertake quasi-experimental evidence. As the smallest geographic data files from the NURHI programme we could get were LGAs despite several attempts to access GPS from the department responsible, we linked the two surveys (NDHS and NURHI) together at LGA level . We used data from the Nigeria MDG (Millennium Development Goals) Information System – NMIS education facility data to link local government areas (LGA) and their corresponding geographical identifiers so that we could compare the NDHS with LGAs in the NURHI dataset. The Nigeria MDG (Millennium Development Goals) Information System – NMIS education

facility data was collected by the Office of the Senior Special Assistant to the President on the Millennium Development Goals (OSSAP-MDGs) in partner with the Sustainable Engineering Lab at Columbia University. A rigorous, geo-referenced baseline facility inventory across Nigeria was created spanning from 2009 to 2014, to build Nigeria's first nation-wide inventory of education facilities. The database includes information on 98,667 education facilities in all the LGAs in Nigeria. The goal of this database was to make the data collected available to planners, government officials, and the public, to be used to make strategic decisions for planning relevant interventions. We merged the NMIS GPS to the NDHS GPS so that we obtained LGA along with the GPS. In this case the NDHS would have an LGA value if they have a value between this longitude and latitude in this LGA.

3.3 Survey Weights

In many cases, when using the survey datasets, the data must be weighted in order to get an accurate representation of population-wide characteristics. The following section describes how NDHS and NURHI weights are constructed. The definition of sampling weights are adjustment factors applied to each case in tabulations to adjust for differences in probability of selection and interview between cases in a sample, either due to design or coincidence. In our analysis we used sampling weights.

In the DHS surveys, the sample is selected with unequal probability to expand the number of cases available and as such reduce sample variability for certain areas or groups where statistics are needed. As such weights need to be applied to ensure that the sample has proper representation.

There are two main sampling weights in DHS surveys: household weights and individual weights. The household weight for a particular household is the inverse of its household selection probability multiplied by the inverse of the household response rate of its household response rate group. The individual weight of a respondent's case is the household weight multiplied by the inverse of the individual response rate of her individual response rate group. Response rate groups are groups of cases for which response rates are calculated. In DHS surveys, households and individuals are grouped into sample domains and response rates are calculated for each domain. The initial sample weights are produced by the DHS sampler

using the sample selection probabilities of each household and the response rates for households and for individuals. The initial weights are then standardized by dividing each weight by the average of the initial weights so that the sum of the standardized weights equals the sum of the cases over the entire sample.

In our NURHI sample analysis we also used the sampling weights. For the baseline sample, the probability of selection was used to compute weights, which were equal to the inverse of the probability of selection. The endline weights included appropriate adjustments for non-response, including correction for selective attrition. This attrition adjustment is corrected for bias resulting from non-random attrition between baseline and endline.

CHAPTER 4: Reflexive Analysis

In this chapter we present our first empirical analysis which is a reflexive comparison analysis. We compare the NURHI women to themselves before and after the programme implementation. We start by analysing the trends in the two outcomes of interest at both waves. We then evaluate the change in outcome indicators before and after the intervention between key groups of women. We briefly describe the different types of evaluation, our data and then assess the impact of the NURHI programme on two outcomes of interest: modern contraceptive use and the use of a family planning service.

4.1 Introduction

Fertility trends in Nigeria for several years have remained relatively high. The average total fertility rate (TFR) measured by the Nigeria Demographic and Health Survey in 2014 was reported to be 6.1 births per woman and up to 9 in Northern Nigeria (NPC and ICF, 2014). With almost 180 million dwellers, Nigeria is Africa's most populous nation and the third largest in the world. In line with the fertility trends in Nigeria, many studies have also reported that modern contraceptive use has remained low, currently around just 15% of Nigerian women (NPC and ICF, 2014). Fertility decline is a means of achieving a demographic dividend, with the potential of reducing poverty, boosting economic growth and contributing to the overall well-being of families and societies (Cleland et al. 2015; Graff and Bremner 2014; Gribble and Bremner 2012). A study in Nigeria has reported that a reduction in fertility by one child per woman would lead to a 13% increase in GDP per capita within 20 years (Ashraf et al., 2013). A recent commentary on Family Planning (FP) in the Lancet concluded that meeting the contraceptive needs of 215 million women with an unmet need for modern contraception would reduce worldwide unintended pregnancies by more than two thirds and avoid 70% of maternal deaths (Singh et al., 2010). They also suggested that, the resulting reduction in fertility and population growth would bring numerous socio-economic benefits.

In this chapter, we aim to measure and evaluate the change in outcome indicators before and after the intervention between key groups of women. We briefly describe the different types of evaluation, our data and then assess the impact of the NURHI programme on two

outcomes of interest: modern contraceptive use and the use of a family planning service. We also assess how the programme has affected three key and interesting groups of women: group 1: older versus younger women, group 2: women with and without children, group 3: women who have sons and those who don't have sons. We use a reflexive comparison evaluation approach to evaluate the effect of the programme on our outcomes of interest on its participants. The reflexive comparison addresses bias from unobservable or unmeasurable factors. In this case, programme participants are compared to themselves before exposure to the programme. Since individuals are being used as their own comparison group, there cannot be any selection on unobservables such as ability or motivation. It does not, however, solve the problem of isolating programme effects from other factors influencing outcomes. Unless adequate variables are available to account for all changes in the outcome variable from sources other than the programme, such as changes in economic conditions, changes in personal assets, or exposure to other programmes, therefore a reflexive comparison will produce a biased estimate of impact. However, the reflexive method is useful when it is impossible to establish an external comparison group. It is often used in assessing the effects of a broad policy or set of programmes in which there is full participation by the target population (for example, assessing the effect of an educational policy on school enrolment). The question of bias remains nevertheless.

In Nigeria, as in many other SSA countries, major factors associated with contraceptive use are women's age, education, and socioeconomic status. Nigerian women who are more educated and wealthier are more likely to use contraception compared with illiterate and less wealthy women (NPC and ICF, 2014). Similarly, women who use contraceptives tend to have a better quality of life, higher social status, and greater autonomy. This association has also been highlighted in a study in Nigeria, who emphasized that contraceptive use has the power to reduce fertility considerably and ultimately to improve maternal and child health (Osemwenkha, 2004). Understanding the key factors influencing contraceptive use among young women who are at a higher risk of unwanted pregnancies is one key to the development of effective family planning programmes. In the same regard, women over 35 years of age still require effective contraception if they wish to avoid pregnancy. Most women in this age group who have partners or are married have vaginal intercourse. However, this population has special attributes that influence contraceptive use and choice.

Women of older reproductive age may be experiencing perimenopausal symptoms that could be managed with contraceptives. In addition, such women may have medical conditions that make some contraceptive methods inappropriate. Women over 40 are also more likely than younger women to desire a permanent form of contraception. Finally, older women of reproductive age have lower rates of contraceptive failure than younger women because of lower fecundity (probability of achieving a live birth per menstrual cycle), less frequent sexual intercourse and higher compliance with contraceptive regimens (OlaOlorun et al., 2014). We believe that these two age groups are important groups in determining modern contraceptive use and so we compare these two groups of women and measure the changes over time and the differences across the groups. Women in Nigeria who have not had children will tend not to use contraceptive with the fear that it would either prevent them from having children in the future or even prevent those who have one already from having more children. As such, we believe that it would be interesting to investigate trends in women with comparatively to women without children. Finally, the birth of male children is still a source of pride and honour in the Nigerian culture, while that of female children is seen as failure. This may perhaps explains the reason for the large number of children born by most families in a quest to have male children (Ohagwu et al., 2014). Contrary to the desires of most families, the National Population and Census Board data show that there are more female children that are being born than male children each year in Nigeria (NPC, 2010). As such we believe this group with also be an important and interesting group to investigate regarding the contraception behaviours of women.

4.2 Methods

The reflexive analysis is a before and after evaluation analysis with the same group of participants before and after the programme was implemented. This chapter presents the first empirical analysis where we compare the women to themselves before and after the programme implementation. We start by analysing the trends in the two outcomes of interest at both waves as well as trends within the different groups of women. We test the significance of the changes over time using a t-test.

4.2.1 Model

Since the work by Ashenfelter and Card (1985), the use of difference-in-differences methods has become very widespread especially in policy or programme evaluation.The simplest set is one where the outcomes are observed for two groups for two time periods. One of the groups is usually exposed to a treatment in the second period but not in the first period. The second group is not exposed to the treatment during either period. In the case of the reflexive analysis, the three groups of women that we compare are exposed to the programme at two time points. In general, we are interested in estimating the effect of the NURHI programme D_i on modern contraceptive use y_i. The model can be written as

$$y_{it} = \alpha_i + \lambda_t + \rho D_{it} + X_{it}^{'}\beta + \epsilon_{it} \qquad (3)$$

where α_i are individual fixed effects (characteristics of individuals that do not change over time), λ_t are time fixed effects, $X_{it}^{'}$ are time-varying covariates like individuals' age, and ϵ_{it} is the error term. Individuals and time are indexed by i and t, respectively. To see how the programme has affected differently key groups of women, we want to know the difference in two groups of women exposed to the programme. Suppose we have two periods t=1, 2 and two groups $s = A, B$. Then, under the assumption that the trends in the two groups would have continued the same way as before in the absence of the programme and holding all covariates at t=1, we can estimate the effect of the programme on our two outcomes of interest in the two groups as

$$\rho = (E\{y_{ist}|s = A,\ t = 2\} - E\{y_{ist}|s = A, t = 1\}) - (E\{y_{ist}|s = B,\ t = 2\} - E\{y_{ist}|s = B, t = 1\}) \quad (4)$$

Here, we have three different groups of women as (i) A = Older Women, B = Younger Women, (ii) A = Women with children, B =Women without children, (iii) A = Women with sons, B =Women without sons.

We first predict the probability of modern contraceptive use using a probit regression analysis. Results are presented as the average marginal effects. The average marginal effects measure the expected instantaneous change in the dependent variable as a function of a change in a certain explanatory variable while keeping all the other covariates constant. The marginal effect measurement is required to interpret the effect of the regressors on the dependent variable. Let us consider the single-equation regression model

$$E(y) = F(\beta x) \quad (5)$$

where βx denotes the linear combination of parameters and variables and $F(.)$ is the cumulative distribution function that maps the values of βx to the [0; 1] interval. Following the standard interpretation of linear statistical models, marginal effects should measure the change in the expected value of y as one independent variable increases by one unit while all other variables are kept constant. Then the average marginal effect (AME) of the kth explanatory variable is

$$AME_i = \frac{1}{n}\sum_{k=1}^{n}\{F(\beta x^m + \beta_i) - F(\beta x^m)\} \quad (6)$$

here βx^m denotes the value of the linear combination of parameters and variables for the mth observation. Because our outcome is binary, we calculate the marginal effects as

$$AME_i = \frac{1}{n}\sum_{k=1}^{n}\{F(\beta x^m \mid x_i^k = 1) - F(\beta x^m \mid x_i^k = 0)\} \quad (7)$$

4.2.2 Outcomes of interest

The two outcomes of interest are modern contraceptive use and use of a family planning service. Both variables are binary and are defined as (i) modern contraceptive use if the respondent or partner currently used at least one form of modern contraceptive and (ii) use of FP services if respondent or partner have used a family planning service in the last 12 months.

4.2.3 Vector control

We control for a wide vector of individual characteristics, which have been found correlated with contraceptive use. These include socioeconomic and demographic characteristics such as marital status (never married, married, divorced and widowed), education level (no education, primary, secondary, tertiary), and religion (Muslims and non-Muslims). We also include knowledge and preferences regarding contraceptives and fertility such as the ability to decide on how household funds are spent (full decision - if respondent decides alone, partial decision - if shared with spouse, no decision - if the respondent's partner, others decision - if other people decides on household), perception that modern contraceptives affect health (taking the value 1 if women believe that contraceptives affect their health and 0 otherwise). We

additionally include in the vector of explanatory variables, a discrete wealth index as a proxy for a household's economic status (poorest, poorer, middle, richer and richest).

We start by presenting a description of our data. Table 4 shows the percent distribution of women aged 15-49 by their background characteristics in the NURHI in 2009 and 2014 respectively. In both years of the NURHI, more than half of the respondents 53% are Muslims, while the non-Muslims represent about 47% of the surveyed respondents. Many respondents (63%) were currently married or living together with a partner. A third of women had never been married at the time of the survey and about 5% were either divorced, separated or widowed. The universality of marriage in Nigeria probably reflects the social and economic security marriage is perceived to provide (National Population Commission [NPC], 1998). Education is an important determinant of an individual's attitudes and outlook on various aspects of life. Educational attainment in the NURHI survey is fairly high; 49% of women have a secondary or higher level of education. However, 28% of women have no education or a primary education. With respect to wealth, approximately 22% of women were in the richest quintile group and 18% in the poorest wealth groups. We also describe our main outcome of interest, modern contraceptive use across the different groups. We observe a change in modern contraceptive use over time in the NURHI from 19.72% to 28.17%. Some of the most interesting changes overtime can be observed in education, religion, marital status, and wealth. We observe that modern contraceptive use in women with no education can be seen to increase from baseline (11.18%) to end-term (22.97%). Modern contraceptive use in general was seen to increase across education group overtime. We observe similar results for women in the poorest, poorer and middle wealth groups all recording an increase in modern contraceptive use over-time. Modern contraceptive use in the women with no education, women in the poorest wealth group and widowed women represent the groups with the lowest modern contraceptive use over time (4.38%) in 2009 and (10.19%) in 2014. (See Table 4 columns 5 and 6). The outcome use of a FP service show a similar increasing trend over time many of the covariates. Some of the most interesting results from the outcome, use of a FP service was seen in education and wealth, we observe that at both time points these variables were seen to favour the poorer and less educated women with the trends increasing over time. We also observe that women who had never been married used very little family planning services in the last 12 months when compared to the other women

in the same group. Again as in modern contraceptive use, Muslim women used less than non-Muslim women (Table 4 column 7 and 8).

Table 4: Characteristics of survey population in NURHI in 2009 and 2014

Characteristic	Groups	Whole sample (%)		Modern Use (%)		Use of FP service (%)	
		2009	**2014**	**2009**	**2014**	**2009**	**2014**
Region	Zaria	20.51	24.48	20.54	18.60	23.52	35.17
	Kaduna	17.56	18.49	14.01	24.66	16.40	22.03
	Abuja	13.09	12.72	30.16	36.01	18.65	18.23
	Ibadan	18.12	16.04	29.39	37.95	19.15	20.29
	Ilorin	15.11	15.58	21.70	31.45	19.76	25.38
	Benin	15.60	12.40	24.24	27.38	15.40	13.69
Education	No Education	12.75	13.72	11.18	22.97	20.36	20.42
	Primary	14.67	16.08	18.67	29.91	25.52	27.30
	Secondary	48.85	40.10	18.10	29.22	17.10	25.87
	Tertiary	22.95	30.08	29.94	30.71	16.98	19.07
Religion	Muslim	52.52	57.07	13.40	24.49	15.76	15.58
	Non-Muslim	47.06	42.92	23.30	25.70	21.94	30.30
Age	Younger	56.78	52.22	17.26	21.72	20.59	20.64
	Older	43.22	47.48	24.65	31.87	15.94	15.35
Parity	0	36.93	23.32	14.08	18.50	1.84	1.64
	1-4	43.63	45.66	23.82	32.46	31.64	23.94
	5-8	16.27	25.42	23.88	32.37	24.00	24.82
	9-12	3.18	5.60	8.37	15.25	21.37	20.47
Sex	Son	17.16	12.91	23.86	31.79	33.18	35.98
	Daughter	82.84	87.09	19.76	28.03	28.28	29.35
Marital Status	Never Married	33.97	21.17	16.13	22.04	1.07	1.40
	Living Together	61.72	73.53	22.16	31.01	29.63	31.75
	Separated	1.80	1.83	18.02	18.75	6.71	9.90
	Widowed	1.60	3.46	4.38	10.19	7.57	4.41
Wealth Index	Poorest	17.95	19.56	16.75	23.15	19.62	25.80
	Poorer	19.07	19.06	19.59	28.99	20.53	28.59
	Middle	19.66	20.59	20.18	28.17	21.79	23.82
	Richer	20.86	19.64	20.54	29.49	18.07	22.98
	Richest	22.46	21.15	21.14	28.06	15.65	19.22
Total number (%)		**15733**	**10480**	**19.72**	**28.17**	**19.00**	**23.98**

4.4 Results

4.4.1 Reflexive Analysis (Trends)

We analyse the trends in the two outcomes of interest at both waves as well as trends within the different groups of women. Trends in the two outcomes showed that there were clear and statistically significant changes in both outcomes when comparing baseline with follow-up (see Table 5). The trends revealed that modern contraceptive use in the programme areas increased from 19.72% at baseline to 28.17% while the use of a family planning services increased from 19.17% to 24.81% at follow-up.

Table 5: Changes in outcomes from baseline to follow-up

Outcomes	Baseline (%)	Follow-up (%)	Change (%)
Modern Use	19.72	28.17	32.3+***
Use of FP service	19.00	23.81	29.8+***

*** p < 0.001, **p < 0.01,*p < 0.05

Table 6: Changes in contraceptive use by contraceptive methods from baseline to follow-up

	FP Method	Baseline (%)	Follow-up (%)
No Method	No Method	73.24	61.25
Modern Method	Female Sterilization	0.25	0.65
	Male Sterilization	0.01	0.02
	Implants	0.20	2.34
	Injectables	4.16	6.43
	Daily Pill	2.24	2.97
	Emergency Pill	1.21	1.35
	Male Condom	8.51	7.72
	Female Condom	0.04	0.02
	Intrauterine Contraceptive Device (IUCD)	1.94	2.52
	Breastfeeding/LAM	1.13	4.13
	Other Modern Methods	0.03	0.02
Other Method	Natural Methods	6.50	9.06
	Other Traditional Methods	0.55	1.06

Results from Table 6 show the trends in contraceptive use by method. These trends show that injectables and male condoms were the major sources of modern contraceptive use at baseline. Results from the endline surveys also show that both injectables and male condoms remained the highest sources of modern contraceptive use, however, trends in the use of injectables increased overtime while that of male condoms can be seen to decrease overtime. Overall, the table reveals the contraceptive use by any method was low at both time points.

Results from the probit regression (Table 7) show that at baseline in 2009 within the programme areas, education and wealth are highly correlated with modern contraceptive use with clear positive gradients between contraceptive use and education and between contraceptive use and wealth. In 2014, however, while education and wealth are still correlated with modern contraceptive use, the marginal effects have substantially reduced over time. More importantly, modern contraceptive use is not correlated with the richer and richest wealth groups anymore while it is still correlated with poorest wealth groups. Results for the use of family planning services showed some of the results were similar to results found in modern contraceptive use.

Table 8 shows the details of the analysis in use of family planning services. We observe that results at baseline and follow-up differ significantly. Factors that seemed to matter in the use of family planning services were programme areas, education, age, parity and empowerment index. However, in the results from the follow-up survey, only age and the perception that modern contraceptives affect health were significantly associated with the use of family planning services. We also observe that older women had a slight reduction in the use of a family planning service at follow-up from 27% to 26% at baseline. Another interesting result was the significant negative association between the use of family planning services and the perception that modern contraceptives will affect health which reduced to 4.3% reduction at follow-up.

Table 7: Margins of modern contraceptive use

Modern contraceptive use	2009		2014	
	Coef.	**SE**	**Coef.**	**SE**
Education (Ref: No Education)				
Primary	0.241***	0.053	0.201***	0.054
Secondary	0.387***	0.048	0.234***	0.051
Higher	0.599***	0.054	0.321***	0.058
Wealth (Ref: Poorest)				
Poorer	0.070***	0.042	0.102***	0.058
Middle	0.089***	0.043	0.061*	0.044
Richer	0.044*	0.045	0.075	0.046
Richest	0.186**	0.045	0.059	0.052
Religion (Ref: Non-Muslim)				
Muslim	-0.525***	0.030	-0.555***	0.035
Marital Status (Ref: Never married)				
Living together	-0.634***	0.014	-0.657***	0.099
Separated	-0.689***	0.025	-0.904***	0.042
Widowed	-0.576***	0.037	-0.919***	0.079
House Fund Decision (Ref: No Choice)				
Full choice	0.056***	0.052	0.156*	0.061
Medium choice	-0.001***	0.039	-0.098*	0.050
Others Decide	-0.537***	0.088	0.255*	0.113
Believes contraceptive affects health(Ref: No)	-0.235***	0.025	-0.422***	0.031
Region (Ref: Abuja)				
Zaria	-0.123**	0.014	-0.055	0.036
Kaduna	0.022	0.017	-0.023	0.036
Ibadan	0.127***	0.015	0.067	0.037
Ilorin	0.079***	0.016	-0.022	0.031
Benin	0.025*	0.012	-0.006	0.037

*** $p < 0.001$, **$p < 0.01$,*$p < 0.05$, SE (Standard Errors)

Table 8: Margins of use of FP service

Use of FP Service	2009		2014	
	Coef.	**SE**	**Coef.**	**SE**
Education (Ref: No Education)				
Primary	0.028***	0.016	0.006	0.031
Secondary	0.054***	0.016	0.035	0.030
Higher	0.057***	0.019	0.036	0.036
Wealth (Ref: Poorest)				
Poorer	0.006	0.016	-0.123	0.029
Middle	-0.008	0.017	-0.039	0.030
Richer	-0.003	0.017	-0.041	0.032
Richest	-0.017	0.018	-0.085**	0.037
Religion (Ref: Non-Muslim)				
Muslim	0.040	0.025	0.075	0.057
Marital Status (Ref: Never married)				
Living together	0.143***	0.016	0.116	0.083
Separated	0.007	0.016	-0.020	0.090
Widowed	0.045	0.019	-0.075	0.083
House Fund Decision (Ref: No Choice)				
Full choice	0.025	0.016	0.001	0.031
Medium choice	0.041***	0.012	0.020	0.026
Others Decide	-0.037***	0.013	0.038*	0.024
Believes contraceptive affects health(Ref: No)	-0.001	0.010	-0.043**	0.019
Region (Ref: Abuja)				
Zaria	-0.123***	0.014	-0.055	0.030
Kaduna	-0.050***	0.015	-0.107	0.031
Ibadan	-0.055***	0.015	-0.044	0.030
Ilorin	-0.076**	0.013	-0.023	0.015
Benin	-0.015***	0.012	-0.006	0.011

*** p < 0.001, **p < 0.01,*p < 0.05, SE (Standard Errors)

We also look at how trends in the two different groups of women have changed from baseline to follow-up in our outcomes of interest. Results from Table 9 show that there are significant differences within the younger and older women and from baseline to follow-up in both outcomes. Modern contraceptive use was seen to be higher in older women than their

younger counterparts at both time points. The difference was also found to be statistically significant. Trends in use of family planning services were seen to be significantly higher in younger women than in older women at both time points. Modern contraceptive use was seen to be higher in women with children than in women without children at the two-time points. As observed with older versus younger women, differences and changes over time between women with children and women without were significant. Similarly, the use of family planning services was significantly higher in women with children than in their counterparts (See Table 9). In the same regard, modern contraceptive use was seen to be higher in women with sons than in women without sons at both time points. Interestingly, although modern contraceptive use remained higher in women with children, the overall change over time was higher in women without children (42%) when compared to the change in their counterparts

Table 9: Change in sub-groups by outcomes over time

	2009(%)	2014(%)	Change(%)
Modern Use			
Younger	17.3	26.4	52.6+***
Older	24.7	40.6	64.3+***
Difference	35.2***	42.3***	20.2+
Use of FP			
Younger	20.8	30.5	46.6+***
Older	15.8	19.1	20.8+***
Difference	27.3***	45.9***	68.1+
Modern Use			
Children	23.1	38.8	67.9+***
No Children	14.1	13.6	2.9-***
Difference	48.4***	96.2***	98.7+
Use of FP			
Children	28.9	32.9	13.9+***
No Children	2.0	3.0	50+***
Difference	174.1***	166.6***	4.4-
Modern Use			
Sons	23.8	31.8	33.6+***
No Sons	19.7	28.0	42.1+***
Difference	18.9***	12.7***	32.8-
Use of FP			
Sons	33.2	35.9	8.13+***
No Sons	28.3	29.4	3.88+***
Difference	15.9***	19.9***	25.2+

*** $p < 0.001$, **$p < 0.01$,*$p < 0.05$

4.4.2 Reflexive Analysis (Empirical)

The impact of the programme was assessed using a reflexive impact analysis approach overall and within the different groups of women. Overall the reflexive analysis showed that the programme seems to have an impact on the two outcomes and in the three groups of women we studied. When focusing on modern contraceptive use by age, the programme appears to have led to an increased use from 2009 to 2014 in both age groups and the change was significantly higher in older women than their younger counterpart. Table 10 shows the

detailed results. Results from the use of a family planning service in both age groups decreasing from baseline to follow-up, suggesting that the programme did not have an impact on the outcome. Another study carried out in 2017 in the south-southern region of Nigeria by Dambo et al. also concluded that women older than 26 years of age were more likely to use any form of modern contraceptive than their younger counterparts.

Turning our attention to women who had children versus those who did not have children, we observe that the programme was seen to have an impact on modern contraceptive use in both groups of women. The impact was however higher in women with children than in those women without children. Results from the use of family planning services show that the programme did not have an impact on this outcome in the two groups of women (See Table 10). Geidam et al. (2007) and Egede et al. (2015) both concluded that the desire for children made it more likely that women with children used modern contraceptives than their counterparts.

In the third group that we study, we observe that in the first outcome, our results suggest that the programme may also have an impact on modern contraceptive use in women who had sons and women who did not have sons. We also observe that this difference was significantly higher in women who had sons than in women who did not have sons. The results from the use of FP service in this group of women also reveal similar results with the results observed in the previous groups of women above. We see that the programme does not have an impact in the groups over time (see Table 10). Our findings corroborates with a similar study done in Anambra state in Nigeria. Oyeka (1989), who tested the relationship between the number of living sons and contraceptive use among married female teachers in the Enugu urban area, concluded that contraceptive use was seen to have increased directly with number of living sons.and that women with no sons and only daughters were less likely to have ever used modern contraceptives than were women with at least one son and one daughter (Oyeka, 1989). This study illustrates how long this contraceptive behaviour has spanned over approximately 30 years in Nigeria and may also help suggest what groups of women future programmes should target.

Table 10: Reflexive Difference

	2009	2014	Difference
Modern Use			
Younger	0.254	0.321	0.067**
Older	0.362	0.444	0.082***
Reflexive difference			0.015***
Use of FP			
Younger	0.773	0.696	-0.077**
Older	0.657	0.620	-0.037**
Reflexive difference			-0.040***
Modern Use			
Children	0.288	0.389	0.101***
No Children	0.130	0.136	0.006***
Reflexive difference			0.095***
Use of FP			
Children	0.726	0.670	-0.056***
No Children	0.680	0.672	-0.008***
Reflexive difference			-0.064***
Modern Use			
Sons	0.128	0.229	0.101***
No Sons	0.112	0.129	0.017***
Reflexive difference			0.084***
Use of FP			
Sons	0.426	0.328	-0.098***
No Sons	0.123	0.119	-0.004**
Reflexive difference			-0.094**

*** $p < 0.001$, **$p < 0.01$,*$p < 0.05$

4.5 Discussion

Chapter 4 provides us with a general description of the Nigerian Urban Reproductive Health Initiative (NURHI). We also assess the effects of exposure to the NURHI on a set of family planning outcomes, including current use of modern contraception and the use of a family planning service. We consider a robust set of panel data with collection occurring pre- and post-programme and involving low levels of attrition from the sample. The advantage of

these data is that they allow for the use of estimation strategies that are not generally permitted by pooled cross-sectional data. By using panel data, we are able to examine changes across time among a set of individuals who have been exposed to the NURHI programme. This allows for reflexive comparison estimations that can address changes across time on family planning outcomes. Our results, in this case, provide some evidence that the NURHI programme succeeded during the short time period of the programme of this study to achieve changes in one of the family planning outcomes, especially modern contraceptive use, in the three different groups of women that we study. Findings of this study suggest that at end line more women were currently using contraceptives, which is comparatively higher than the results we see from the Nigeria Demographic and Health Survey (NDHS) contraceptive prevalence rate of 11.1% reported for the year 2013 (NCF and ICF, 2014).

Results from analysing the trends in the three groups of women for our outcomes of interests also suggest that the NURHI programme may have some impact on the outcomes that show an increase over time. Solanke (2017), who analysed data from the NDHS found a positive association between being in the older age group, over 35 years old, and modern contraceptive use in Nigeria (Solanke, 2017). Our reflexive analysis may suggest that the programme had an impact on modern contraceptive use among the programme participants but had no impact on the changes in the use of a family planning service.

Limitations of study

Because the study was a before and after evaluation, it is impossible to conclude from this preliminary analysis that the programme had a positive and significant impact on modern contraceptive use in Nigeria as a whole. The main disadvantage of before and after designs is the lack of a comparison or control group. This limits the value of information obtained on modern contraceptive use. Without a control group, it is difficult to establish the cause and effect relationship between the exposure to the NURHI programme and modern contraceptive use.

With this in mind, it would be interesting to understand the different factors that contribute to the changes in modern contraceptive use among the programme participants to understand if the programme design and implementation were able to cause changes in the different factors as well. Secondly, we do not have any control groups to compare the women in the NURHI

programme areas to other areas of Nigeria where the programme did not happen. Lastly, we would also need to totally ascertain if the changes in modern contraceptive use were as a result of the programme or if there were other factors or other programmes happening in the same areas as the NURHI programme just before or during the same time.

CHAPTER 5: Decomposition Analysis

In this chapter, we measure and decompose the observed changes in modern contraceptive use in the NURHI programme. We use a version of the Blinder-Oaxaca decomposition technique to identify and quantify the separate contributions of various individual characteristics. We start by presenting the decomposition method, we then present and discuss of our findings.

5.1 Introduction

There are wide variations in contraceptive use between regions of the world and at sub-national levels (Alkema et al., 2013; Dynes et al., 2012). Studies on reasons for the observed variations have tended to concentrate on individual and household factors. The findings show that a number of demographic, biological, socio-economic and behavioural variables are associated with contraceptive use. Factors influencing the use of contraceptives include age, parity, marital status and marriage type. Demographic factors may be mitigated by biological and behavioural factors, such as fecundity, sexual activity and desire for children. African societies are pronatalist and believe that children are a gift from God and are social and economic investments (Caldwell and Caldwell 2000). Couples and women who desire more children are less likely to use contraceptives (Mahmood and Ringheim, 1999). Studies have found an inverse relationship between the number of living children and use of modern contraceptives (Stephenson et al., 2007; Yihunie et al., 2013). Evidence from a number of countries has also pointed towards the partner's disapproval for contraceptive use and his desire for more children as key factors for the non-use of contraception (Bongaarts and Bruce, 1995).

A strong relationship has also been found between women's education, especially completed primary education and entry into secondary schooling, and fertility reduction. Several studies have reported that women's education has a strong positive impact on contraceptive use. A study reported that Nigerian women with tertiary level education are one-and-a-half times more likely to have ever used contraception than women with secondary education (Asekun-Olarinmoye et al., 2013). Independently of socioeconomic factors, knowledge of contraceptives is a determinant of contraceptive use. Exposure to mass media has strong effects on attitudes towards family planning through ideation, which has been found to

contribute to observed fertility decline. Evidence from a number of studies reveals that exposure to mass media messages promoting family planning may affect contraceptive behaviour (Jato et al., 1999). In Nigeria, the use of modern contraceptives, the intention to use them and the desire for fewer children were found to be associated with exposure to media messages about family planning (Bankole et al., 1996).

There is a need for health researchers to focus on examining how individual-level variables interact with group-level variables to influence health and disease (Diez-Roux, 1998). This is because individuals live in communities, which influence their health behaviour, as there are usually intersections between personal beliefs and attitudes, and community norms. With regard to contraceptive use, women must navigate community norms to fulfil their ideals in terms of fertility and contraceptive decision-making (Colleran et al., 2015). The community influences an individual's use of contraceptives through multiple pathways: socioeconomic characteristics of the community, presence of health facilities and infrastructure, and prevailing perception, attitudes and behaviour. Consequently, within the reproductive health field attention is now shifting to examining the role of contextual factors in explaining the observed variations in contraceptive use, with increasing attention being given to the role of the community in shaping reproductive health behaviour of individuals, including contraceptive behaviour (Dynes et al., 2012). In recent times, a number of studies have attempted to investigate the role of contextual factors on contraceptive use in African countries (Dynes et al., 2012; Wang et al., 2013). Factors identified include presence and quality of reproductive health services, female autonomy, and availability of physical care infrastructure.

In this chapter, we assess the changes in modern contraceptive use in programme participants and the contribution of compositional changes to those trends. We use a binary variable adaptation of the Blinder-Oaxaca decomposition method and evaluate the contribution of socio-economic and other individual factors to the changes in contraceptive use over time. From here on we focus on analysing the use of modern contraceptive because from our initial analysis, we observe that this outcome shows the highest level of change overtime.

5.2 Method

Let us assume that women's decision to use at least one modern contraceptive is measured by the latent variable Y_i^*, which is assumed to be a function of k individual characteristics X and unobserved characteristics represented by ε, which is assumed to be probabilistically distributed.

The estimated model is defined as follows:

$$\text{where } \Pr(Y_i) = \alpha + X\beta + \varepsilon \qquad (8)$$

$$\text{if } Y_i >= 0,\ Y = 1$$

$$\text{if } Y_i < 0, Y = 0$$

This study aims to measure and decompose the observed changes in modern contraceptive use in the NURHI programme between 2009 and 2014. We use a version of the Blinder-Oaxaca decomposition technique (Blinder, 1973; Oaxaca, 1973) to identify and quantify the separate contributions of various individual characteristics, such as education, marital status, and geographical location, to the observed gaps in modern contraceptive use over time. This Blinder-Oaxaca decomposition is easy to apply when the outcome of interest can be studied using an ordinary least square regression as coefficient estimates from linear regressions for the outcome of interest and sample means of the independent variables can be used directly. However, we consider here a binary outcome and the coefficients are estimated from a Probit model, hence they cannot be used directly in the standard Blinder-Oaxaca decomposition. Hence, we use an extended version of the Blinder-Oaxaca decomposition by Fairlie (2005) appropriate for nonlinear models equation.

5.2.1 Model

The method consists in decomposing the changes in modern contraceptive use in the NURHI in 2009 and 2014. For a linear regression, the standard Blinder-Oaxaca decomposition of the 2009/2014 difference in the average value of the dependent variable, Y, can be expressed as:

$$Y^{2014} - Y^{2009} = (X^{2014} - X^{2009})\widehat{\beta}^{2014} + X^{2009}(\widehat{\beta}^{2014} - \widehat{\beta}^{2014}) \qquad (9)$$

where X^J is a row vector of average values of the independent variables and $\widehat{\beta}^J$ is a vector of coefficient estimates for year. Following Fairlie (2005), the decomposition for a nonlinear equation, such as $Y = F(X\widehat{\beta})$, can be written as:

$$Y_i^{2014} - Y_i^{2009} = \left(\sum_{i=1}^{N^{2009}} \frac{F(\beta_k^{2009} X_{ik}^{2009})}{N^{2009}} - \sum_{i=1}^{N^{2014}} \frac{F(\beta_k^{2009} X_{ik}^{2014})}{N^{2014}}\right) + \left(\sum_{i=1}^{N^{2014}} \frac{F(\beta_k^{2009} X_{ik}^{2014})}{N^{2014}} - \sum_{i=1}^{N^{2014}} \frac{F(\beta_k^{2014} X_{ik}^{2014})}{N^{2014}}\right) \quad (10)$$

where N is the sample size for the respective years 2009 and 2014.

To undertake the decomposition, we define Y_i as the average probability of modern contraceptive use and F as the cumulative distribution function from the standard normal distribution. The decomposition is based on the difference between the average values of the two predicted probabilities of using contraceptive in each year. The contribution of each variable to the change in modern contraceptive use is equal to the change in the average predicted probability of using modern contraceptive use in 2009 with the one in 2014 while holding the distributions of the other variables constant. A property of the Fairlie decomposition technique is that when the contributions of each individual variable are summed up, it equals the explained share of the change in modern contraceptive use.

5.2.2 Variables

The outcome variable of interest is modern contraceptive use. In both surveys women report whether they are currently using one or several modern contraceptives among a list of contraceptives. We construct a binary variable for modern contraceptive use taking the value 1 if women report currently using at least one modern contraceptive and 0 otherwise.

We then consider a wide vector of individual characteristics, which have been found correlated with contraceptive use. These include socioeconomic and demographic characteristics such as age, marital status (never married, married, divorced and widowed), education level (no education, primary, secondary, tertiary), and religion (Muslims and non-Muslims). We also include knowledge and preferences regarding contraceptives and fertility such as parity – number of children (0, 1-4, 5-8, 9-12, 13-19), ability to decide on the how household funds are spent (full decision (if respondent decides alone), partial decision (if

shared with spouse), no decision (if the respondent's partner), others decision (if other people decides on household)), perception that modern contraceptives affect health (taking the value 1 if women believe that contraceptives affect their health and 0 otherwise), and had a child ever died (taking the value 1 if women ever had a child who died and 0 otherwise). We additionally include in the vector of explanatory variables, a discrete wealth index as a proxy for a household's economic status (poorest, poorer, middle, richer and richest). This index was constructed using a series of socioeconomic variables including housing quality, household amenities, consumer durables, size of land holding using principal component analysis (PCA) techniques (Howe et al., 2012; Booysen et al., 2008).

5.3 Results

5.3.1 Marginal effects

We first present the results of the Probit estimation as marginal effects (see Table 11). In 2009, we observe that education and wealth were highly correlated with modern contraceptive use with clear positive gradients between contraceptive use and education and between contraceptive use and wealth. In 2014, however, while education and wealth are still correlated with modern contraceptive use, the marginal effects have substantially reduced over time. More importantly, modern contraceptive use is not correlated with the richer and richest wealth groups anymore while it is still correlated with poorest wealth groups. This suggests that the strength of the relationship between wealth and contraceptive use has changed and reduced with apparently an increased access to contraceptive for women with lower socioeconomic status.

Regarding parity, while the number of children was found to be increasingly correlated with modern contraceptive use in 2009, the marginal effects of the number of children on contraceptive use have reduced over time and the use of contraceptives in women with children appear more similar regardless of the number of children. Muslims are less likely to use modern contraceptives than non-Muslims before and after the programme with no changes in the marginal effects across time. Regarding the decision-making index, women with full decision power were more likely to use modern contraceptives in 2009, and the marginal effect substantially increased overtime. Interestingly in 2009, women who had others decide on their household funds were less likely to have used modern contraceptives, while the results in 2014 revealed that it was no longer negatively correlated with modern

contraceptive use. Lastly, the fact that women had either had a child who died or believed that modern contraceptive use affected health showed a negative correlation with modern contraceptive use in both years and the marginal effects were also seen to increase from 2009 to 2014.

Table 11: Marginal effects table NURHI in 2009 and 2014

NURHI	2009		2014	
Education (Ref: No Education)	**ME.**	**SE**	**ME.**	**SE**
Primary	0.309***	0.073	0.259*	0.109
Secondary	0.329***	0.070	0.268*	0.107
Higher	0.421***	0.080	0.245**	0.125
Wealth (Ref: Poorest)				
Poorer	0.121**	0.074	0.057*	0.109
Middle	0.193**	0.074	0.191**	0.104
Richer	0.197**	0.073	0.190**	0.102
Richest	0.292***	0.077	0.215***	0.106
Parity (Ref: No children)				
1-4	0.714***	0.109	0.664***	0.104
5-8	0.912***	0.102	0.847***	0.107
9-12	0.632***	0.107	0.538***	0.109
Religion (Ref: Non-Muslim)				
Muslim	-0.242***	0.102	-0.135***	0.103
Marital Status (Ref: Never married)				
Living together	-0.439***	0.103	-0.458***	0.131
Separated	-0.537***	0.107	-0.412***	0.131
Widowed	-0.476***	0.112	-0.624*	0.132
House Fund Decision (Ref: No Choice)				
Full choice	0.261***	0.071	0.038	0.112
Medium choice	0.214***	0.054	0.135	0.091
Others Decide	-0.561***	0.108	0.211*	0.113
Child died	-0.115	0.033	-0.124***	0.035
Believes contraceptive affects health	-0.289***	0.025	-0.401***	0.031

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, also controlled for age, age^2 and intervention cities

5.3.3 Decomposition Analysis

The decomposition analysis results presented in Table 12 suggest that education counted for 38% in the changes and so, contributed the most to the change in modern use over-time with mainly tertiary education (27%) and primary education (12%) leading the changes. Wealth was the second largest contributor to the change in modern contraceptive use (28%) with the richer and richest wealth groups contributing together to 24% of the change. Parity and decision-making factors were also major factors respectively contributing for 19% and 12% to the change in modern contraceptive use. Comparing some of the major changes in the decomposition analysis of NUHRI data with the Nigerian Demographic and Health Survey (NDHS) surveys in 2008 and 2013 (see Table 12), we observe that wealth also makes the largest contribution to the changes in modern contraceptive use in the DHS date. Most of the contribution to the changes came from wealth, closely followed by education. Results reveal that having a secondary or tertiary education contributed the most to this change over-time when compared to the other groups. Parity and region both positively contributed to the changes in modern contraceptive use in urban Nigeria and they represented the most important drivers for the change in modern contraceptive use over time.

Table 12: Decomposition results for NURHI and NDHS samples

	NURHI			NDHS	
	Sample size	**%**		**Sample size**	**%**
%N (2009)	15733		**N (2008)**	10489	
N (2014)	10480		**N (2013)**	15545	
Pr (Modern=1) in 2009		19.70	**Pr (Modern=1) in 2008**		9.41
Pr (Modern=1) in 2014		28.20	**Pr (Modern=1) in 2013**		16.82
DECOMPOSITION	**Estimated Coefficient**	**Contribution%**		**Estimated Coefficient**	**Contribution%**
Overall difference	0.085	8.51	**Overall difference**	0.074	7.40
Explained difference	0.058	68.22	**Explained difference**	0.065	87.81
Unexplained difference	0.027	31.84	**Unexplained difference**	0.009	12.21
Decomposed contributions					
Education	**-0.022**	**38.00**	**Education**	**0.022**	**35.00**
Primary	0.007***	12.11	Primary	-0.018***	-27.70
Secondary	-0.001***	-1.72	Secondary	0.015***	24.70
Tertiary	0.016***	27.63	Tertiary	0.025***	38.50
Wealth	**0.016**	**27.60**	**Wealth**	**0.026**	**40.00**
Poorer	0.000**	0.00	Poorer	-0.026	-40.00
Middle	0.002**	3.41	Middle	-0.031***	-47.71
Richer	0.007**	12.12	Richer	-0.006***	-9.20
Richest	0.007**	12.12	Richest	0.089***	137.00
Religion	0.001	0.00	**Religion**	0.001	0.00
Muslim	0.001**	1.70	Muslim	0.001***	1.51
Marital Status	**-0.005**	**-8.60**	**Marital Status**	**-0.015**	**-23.10**
Married	-0.003***	-5.21	Married	-0.019***	-29.20
Separated	-0.001***	-1.70	Separated	0.001***	1.51
Widowed	-0.001***	-1.70	Widowed	0.003***	4.60
Decision Factors	0.011***	18.91	**Decision Factors**	0.004***	6.20
Perception	0.000***	0.00	**Perception**	0.000***	0.00
Loss	0.011***	18.91	**Loss**	0.001***	1.51
Parity	0.007***	12.10	**Parity**	0.016***	24.60
Age	-0.004***	-12.11	**Age**	-0.001	-1.50
Region	**0.002**	**3.40**	**Region**	0.01	15.30
Zaria	0.001***	1.70	North-East	0.003***	4.61
Kaduna	-0.001	-1.70	North-West	0.002***	3.10
Ilorin	-0.001**	-1.70	South-East	0.001***	1.50
Ibadan	0.001**	-1.70	South-West	0.001	1.50
Benin	0.001***	1.70	South-South	0.003**	4.60

*** p < 0.001, **p < 0.01,*p < 0.05

5.4 Discussion

The use of modern contraceptive was associated with several factors pre- and post-programme, especially wealth and education. These estimates are consistent with some recent Nigerian studies. Austin, (2015) and OlaOlorun et al. (2014) concluded that wealth and education were important determinants in the use of modern contraceptives. Education and wealth have been widely reported to be associated with both women's household decision-making and their use of modern contraceptives (Acharya et al., 2010; Senarath et al., 2009; Stephenson et al., 2007). Acharya et al. (2010) suggested that women who were of high social standing also reported greater involvement in household decision-making and were able to control their fertility through the use of modern contraception.

In our study, the decision power factors revealed that women with full or partial decision power were more likely to use modern contraceptives than women who reported no decision power in household decisions and the relationship between modern contraceptive use and decision making factors increased over-time. We also observed that women who had others deciding on their households for example mother in-laws or community leaders were even less likely to use contraceptives than women whose spouse decided in the household. Ankomah et al. (2013) concluded that the critical role mothers-in-law play in contraceptive decision-making in many traditional African societies was legendary. They reported that the participants in their study, in particular, women from southern Nigeria, perceived their mothers-in-law as being at best non supportive and at worst overtly anti-family planning. On the other hand, mother-in-laws in the study described the wives as controlling their sons and encouraged their sons against the use of contraceptives because in their view, it would offer 'licence for women to be loose'. One Nigerian study by Isiugo-Abanihe (1994), also suggested that mother and sister-in-law play a big role on decision in their brothers' household. In the study, Isiugo-Abanihe found out that if the in-laws in some families perceived that children were in short supply, they may put pressure on the couple by not supporting contraceptive use and constantly reminding them that it is "time to give us what we lack".

With regards to being Muslim and unmarried, we observe that this was negatively correlated with modern contraceptive use at both time points. We however notice that the negative correlation decreased over time. This result may suggest that the programme may have

changed affected the contraceptive behaviours of Muslim and married women. In this case, we believe that involvement of prominent religious leaders may have affective this in a positive way. The NURHI reported that a prominent Islamic Cleric, the Chief Imam of Kaduna was actively involved in the campaign for birth spacing in Kaduna (MLE, 2015).

The Fairlie decomposition analysis helped us separate clearly the components explaining the difference in modern contraceptive prevalence rate between 2009 and 2014. Findings from the decomposition analysis show that most of the observed increase in modern contraceptive use among the Nigerian women in the NURHI programme was due to a change in the correlation between education and contraceptive use. This corroborates women's education as a key determinant of modern contraceptive use as evidenced elsewhere (Bbaale and Mpuga, 2011). There is a relationship between modern contraceptive use and education at the baseline of the programme but by the end of the programme, the programme can be seen to reduce barriers to access to contraceptive use due to a lack of education by lowering the relationship between contraceptive use and education. Breaking down the contribution of education, it shows that most of the contribution to the increase in contraceptive use over time was led by a change in the association between tertiary education and modern contraceptive use.

An increasing proportion of non-Muslims who also use contraception more than Muslims had a positive effect on the trends. As recognized in previous studies (UNFPA, 2011), the association between religion and health care has become more important over time. At baseline, contraceptive use was more or less similar in the three major religions (5% to 6%). Another study in Nigeria showed that over the 10-year period studied, Orthodox Christian and Protestants showed a 36% and 38% increase in contraceptive use, respectively, compared with 17% among Muslims (Worku et al., 2015). Although there is no supporting evidence on the reasons for the difference among religions, religious belief is one of the psychosocial barriers when women think about using a method for fertility regulation.

Family planning programmes may need to understand the major reasons for slow progress in adopting family planning, in order to identify factors to tackle. Our findings imply that appropriate strategies may be needed to improve service access and benefits of family planning programmes, especially in Muslim-dominated regions of the country. Changes in women's experience of a child death were also essential to increasing contraceptive use over time. When children survive, women engage less in replacing them and may therefore be

more likely to use contraception, suggesting that survival of children appear to motivate women to practice contraception. This supports the assumption that a replacement effect exists in the relationship between child survival and fertility. Programmes need to be responsive to the increasing demand for effective contraception arising from the decline in child mortality in Nigeria.

The main aims and objectives of the NURHI programme between 2009 and 2014 were to increase modern contraceptive use in urban Nigeria by demand creation, service delivery and advocacy. Results from our study provide some evidence suggesting that the programme was able to address its main aim regarding contraceptive use take-up. Secondly looking at the decomposition results from the programme we found that the programme affected the changes in modern contraceptive use by impacting on education, wealth and decision power factors. The NURHI strategy of demand creation, may suggests the reason that the education level of the woman did not seem as important in modern contraceptive. With regards to the final strategy about service delivery used by the programme, making services more accessible as well as the improvement and availability, may explain again why wealth did not seem to matter as much at the end of the programme.

In our study, decision-making factors are key factors and as women are becoming empowered with knowledge and social acceptability of contraceptives as a result of the programme, education and wealth have become less important as determining factors. It appears that what matters is whether women have the power to make decisions in their homes, and typically their use of modern contraceptive is strongly associated with their decision power in the households and their involvement in decisions related to children. Despite our positive findings in regard to the NURHI programme, we acknowledge the fact that this decomposition study focuses on the sample of women within the NUHRI programme and a causal evaluation of the impact of the programme on contraceptive use still remains to be undertaken. In chapter 6, we consider a quasi-experimental context bringing together the NUHRI dataset and the DHS dataset to evaluate the causal impact of the NURHI programme.

CHAPTER 6 : Impact Evaluation

In this chapter, we use these methods for evaluating the impact of the Nigerian Urban Reproductive Health Initiative (NURHI) programme: propensity score matching estimators with a difference-in-differences estimator (DiD). This method assumes that, once measurable characteristics of individuals are controlled for, the process of determining exposure to the programme is independent of the outcome. We focus on the effects of the programme on modern contraceptive use primarily because of the information we have in the datasets, particularly the Nigerian Demographic and Health Surveys (NDHS), which has data on contraceptive use allowing us to compare it with our programme dataset. For our analysis, we use data from two surveys, the 2009 and 2014 NURHI programme survey dataset and the 2008 and 2013 NDHS for our control areas. We then present our findings as well as a discussion of our results.

6.1 Introduction

The SSA region's growth rate is 2.6% per annum and is accompanied by a decline in economic growth. This is perceived not to be a good prospect for sustainable development in the region (USAID, 2004). An encouraging trend however has been the strengthening of political commitment to population-related policies and family planning programmes by many of the governments (UNFPA, 2007, USAID, 2013). This has the potential to catalyse fertility transition and allow the balancing and integration of population issues with other development-related ones. The revised National Policy on Population for sustainable Development in Nigeria in 2004 takes into account the 1994 International Conference on Population and Development (ICPD) Programme of Action (UNFPA, 2007). The aim of the policy is the improvement of the quality of life and the standards of living of the people of Nigeria. Some specific goals include progress towards a complete demographic transition to reasonable birth rates and low death rates, to expand access and coverage and improve the quality of reproductive and sexual health care services to all Nigerians at every stage of the life cycle and to use effective advocacy to promote and accelerate attitudinal change towards population and reproductive health issues (Federal Government of Nigeria, 2015).

National policies on reproductive health, HIV/AIDS, women, and youth exist in Nigeria and programmes (such as the National Economic Empowerment and Development Strategy (NEEDS) to eradicate poverty) are being developed to operationalise the policies at all levels. Development partners are also supporting the government in building technical capacity for the operationalisation of the various policies. For example, the United Nations Population Fund (UNFPA) is engaged in advocacy and policy dialogue to mobilize support for the population programme, including the improvement of reproductive health services. The body also supports the implementation of existing reproductive health and rights policies (UNFPA, 2007). There have also been several international bodies that have initiated a number of family planning programmes to support the Nigerian government with the policies that have been introduced.

Several African countries continue to have high fertility rates and most of the predicted increase in the world's population until 2100 comes from these high-fertility countries (United Nations, 2011). High fertility continues to have serious implications for maternal and child health in addition to economic development more broadly. Because of these concerns, policy discussions often focus on the role of family planning programmes in helping individuals manage their fertility. Standard economic models of fertility decisions suggest, however, that many people in developing countries have little incentive to reduce the number of children (Prichett et al., 1994). Women are mostly underpaid, and children are potentially productive on the family farm or can serve as old age security.

There is a lack of empirical evidence that family planning programmes are effective. As a result, rather than focusing on the supply of family planning, economists emphasise factors that influence fertility and modern contraceptive demand such as household poverty and girls' schooling (Gupta et al., 2011). The lack of convincing empirical evidence that family planning programmes reduce fertility or increase modern contraceptive use may be attributed to the challenge of measuring their impact. Firstly, studies of family planning programmes have often covered periods of rapid economic development, multiple family planning programmes and fertility decline, making it difficult to isolate the effects of a family planning programme. Secondly, existing studies have largely ignored heterogeneous impacts, especially with regard to how family planning affects women with different education levels. A study from the United States shows that better-educated women are not more efficient

users of modern contraceptives than less-educated women but they are more efficient at using "ineffective" contraceptive methods such as withdrawal or rhythm (Rosenzweig and Schultz, 1989). The effect of family planning is therefore likely to substitute for education in reducing fertility at lower education levels. Thirdly, rigorous study is hampered by the challenge of non-random programme placement (Rosenzweig and Wolpin, 1986; Pitt et al., 1993). On one hand, if the government or programme implementers places or implements programmes in areas that are more receptive to reducing fertility, simply comparing fertility in areas with and without family planning may overestimate the impact of expanding the programme. On another hand, if the government or programme implementers place programmes in high fertility areas and information on prior fertility is not available, comparing fertility across areas may underestimate the effectiveness of the programme. Without information on the placement process it is difficult to assess the direction of the potential bias, although the prior literature suggests that the effect of family planning programmes is likely to be underestimated (Rosenzweig and Wolpin, 1986; Pitt et al., 1993). Technically, randomising the allocation of programmes and comparing the outcomes of interest between treatment and control areas could overcome the non-random programme placement problem.

Evaluating the true impact of a health programme remains crucial in several aspects. A properly designed impact evaluation can answer the question of whether the programme is working or not, and also assists in decisions about upscaling. A well-designed impact evaluation can also answer questions about programme design: which parts of the programme works and which parts don't, and thus can provide policy-relevant information for both the redesign and the design of future programmes. In our case we measure how much the changes that we observe in modern contraceptive use is a result of the NURHI programme. In chapter 3, we mentioned that we had some challenges in obtaining GPS data to locate participants to the NURHI programme but we could identify their local government areas and the Nigeria MDG (Millennium Development Goals) Information System – NMIS education facility data allowed us to get their corresponding GPS. In that way, we were able to link the NDHS participants with the NURHI participants using LGAs. We then consider develop an original approach using non-experimental cross-sectional survey data under common conditions to gauge the impact of health programmes.

6.2 Methods

Evaluating the impact of a health programme usually aims to answer the following question; how would the health of exposed individuals have evolved in the absence of the programme or policy? Or, how would those who were not exposed to the programme or policy have fared in the presence of it? Difficulties in answering this question arise, as at any given point in time individuals are observed in only one situation, either exposed or not exposed to the programme. As many aspects may have varied from the time individuals were exposed to the intervention, it is usual to measure the programme's average impact on a group of individuals by comparing the evolution of some indicators in this group with the evolution of the same indicators in a similar group of individuals not covered by the programme. However, individuals exposed to a programme are usually different in a set of characteristics such as initial health status from those individuals who are not covered by the intervention. This makes it difficult to isolate the differences between both groups that are due to already existing differences before treatment this is known as selection bias; from those which are due solely to the programme's impact. The main problem faced when undertaking an evaluation relies on creating a suitable comparison group.

Family planning programmes designed to promote a change in behaviour, use its programme to demonstrate norms and ideals regarding behaviours, and to promote beneficial social change. Increasingly, programme officers and countries are called upon to demonstrate the effectiveness of health programmes in achieving some objective, for example, reduced smoking, increased use of family planning methods, or improved HIV/AIDS preventive behaviours. Evaluations of health programmes use a variety of methods and research designs to measure effectiveness: regression-discontinuity designs, interrupted time-series analysis, pre- and post- evaluation designs with statistical controls for exposure, post-only cross-sectional surveys, longitudinal surveys, or in some cases, randomized controlled group designs (Grilli et al., 2002; Sowden et al., 2003; Vidanapathirana et al., 2005; Guilkey et al., 2006). Although the chosen methods in any evaluation are often dictated by the research, budgets or the characteristics of the programme or policy, it generally relies on comparisons of outcomes between those who had the treatment and those who did not. Such comparisons may be straightforward if randomized controlled trials (RCT) are used that is, when selection of who is exposed to the programme is random and the selection process is uncorrelated with

outcomes of interest. The average outcome for those who have been exposed is simply compared with the average outcome for those who have not been exposed. Because exposed and unexposed individuals are expected to be statistically equivalent in all relevant characteristics with any other differences assumed to reflect chance, differences in average outcomes can be more convincingly attributed to the effects of the programme. However, RCTs are frequently infeasible because of the nature of many programmes (Bertrand et al., 2004; Kincaid and Do, 2006).

Researchers are sometimes faced with a natural experience or quasi-experiment situation that mimics an RCT design. Even local media campaigns are rarely truly random, however, and the processes underlying decisions to implement such campaigns are seldom known, meaning that simple comparisons of average outcomes may be contaminated by other confounding factors (Pitt et al., 1993; Gertler and Molyneaux, 1994; Angeles et al., 1998). A common method for evaluating the effects of a health programme is to estimate a single-equation multiple regression with a health outcome regressed on a measure of exposure to a health programme and a set of control variables that account for all relevant observable differences in those exposed and those unexposed to the programme. The measure of programme impact, controlling for other observable characteristics of individuals and assuming a causal interpretation, is given by the regression coefficients for the exposure variable. This effect is often measured in terms of the odds of experiencing the outcome relative to not experiencing the outcome (Kincaid et al., 1996; Van Rossem and Meekers, 2000). Evaluations of family planning and other health programmes have employed alternatives to multiple regression analysis, namely matching methods, which compare outcomes for exposed and unexposed individuals with similar observed characteristics (Babalola and Vonrasek, 2005; Kincaid et al., 2006). These estimators have the strengths that estimation is non-parametric in nature and that it does not require specifying the functional form for the relationship between exposure and the outcome of interest (Imbens, 2004; Moffitt, 1991). Matching methods, however, are not without limitations, most notably matching treatment and control individuals become increasingly difficult as the number of covariates on which matching is intended increases. Propensity score matching helps to overcome this limitation by allowing matching to be based on a score function of observable characteristics (Conniffe et al., 2000; Yanovitzky et al., 2005). In both single-equation multiple regression analysis and matching methods, however, the assumption is either that the process of determining exposure to the programme

is random and independent of health outcomes or, if not, that health outcomes can be conditioned solely on exposure to the programme and observed characteristics of individuals. In other words, conditional upon certain background characteristics of respondents, exposure to the programme is considered to be exogenous to decisions about family planning method. These are strong assumptions under many circumstances, particularly when measures of exposure are determined by individuals, which may reflect underlying unmeasurable factors that also influence health outcomes. For example, individuals who are more motivated to control their fertility, an effect that may not be measured by researchers, may be more likely to make the effort to obtain access to available family planning services. In this case, exposure to the programme is considered to be endogenous; the unobservable level of motivation affects contraceptive use, biasing estimates of the effect of exposure to the programme on contraceptive use in both matching and single-equation econometric estimations (Bertrand et al., 2004; Imbens 2004; Guilkey et al., 2006).

6.2.1 Propensity score matching

Matching methods for use with non-experimental data have grown in popularity in recent years. The principle behind matching estimators is that potential biases introduced by non-random or self-selection into treatment can be largely removed by comparing individuals in the treatment and control groups, who have identical or nearly identical observed characteristics. For such individuals in treatment and control groups, differences in outcomes can be attributed to the treatment (Zhao 2004; Ho et al., 2007). The key to using matching estimators is having enough data on exposed and unexposed individuals so that the missing counterfactual information for exposed individuals can be obtained from a sample of unexposed individuals with similar observed characteristics (Ho et al., 2007).

Matching methods copy the feature of a randomized experimental trial by matching individuals within the treatment and control groups using a vector of observable characteristics (Heckman et al. 1995). However, unlike experimental data, observational data with matching techniques may not produce groups where every individual is matched. In practice, matching individuals on specific characteristics may reduce the quantity of matching possibilities, which decreases with the number of characteristics on which to match

increasing. Rosenbaum and Rubin (1983) addressed this issue via the use of a single index called a propensity score rather than using specific characteristics. They demonstrated that matching individuals using a propensity score increased the probability of identifying matches.

The propensity score is estimated as a function of a set of predetermined characteristics observed at baseline of respondents, hypothesized to be independent of the ultimate outcomes (Becker et al., 2002). Propensity score matching estimators alleviate some of the difficulties faced with covariate matching methods by allowing matching to be based on the likelihood of exposure given observed covariates rather than on the covariates themselves. In the context of evaluating a family planning programme, propensity scores method involves calculating the probability of participating in the programme, $P(X_i)$ for a given woman i ($i = 1….N$) conditional upon her observed characteristics, X_i , namely:

$$P(X_i) = \mathrm{P}(D_i = 1|X_i) \qquad (11)$$

where D_i is a binary variable indicating whether a person was exposed to the NURHI programme and $P(X_i)$ is the propensity score. Assuming conditional mean independence of treatment and outcomes, an unbiased estimate of the average treatment effect is the expected difference in the outcomes between treated and untreated individuals with identical propensity scores (D'Agostino, 1998), given by:

$$\mathrm{E}\{Y_{1i}|D_i = 1, P(X_i)\} - E\{Y_{0i}|D_i = 0, P(X_i)\} = E\{Y_{1i} - Y_{0i} \mid P(X_i)\} \qquad (12)$$

The matching method that we use here is based on stratification of propensity scores into groups of exposed and unexposed individuals. Estimation of the average treatment effect based on stratification involves calculating the propensity score using a standard Probit model (Becker and Ichino, 2002; Kincaid and Do, 2006). Variables to be included in this first stage are chosen based on *a priori* theory-driven hypotheses of whether the variables determine exposure to the programme, but not vice versa (Yanovitzky et al., 2005).

We include variables on age, education, wealth, religion, marital status, decision index, owning a radio, owning a television, having sons, parity, used health facilities in the last 12 months, LGA, and purchasing power per LGA. The propensity score is estimated using a

Probit model. We obtain groups with different numbers of treatment and control units, making sure that within groups, the propensity scores between treated and controls are equal, and that the average for each explanatory variable are also equal. Now, the relevant question becomes how to decide which individuals are close matches. In general, the quality of the estimates can be improved if each matching estimator is calculated where the average propensity score overlaps for the treated and controls this is the common support condition.

Method of matching

The matching method aims to re-create the conditions of an experiment for non-experimental data and construct the counterfactual for the treated outcomes had they not been treated using the non-treated sample. It consists in pairing up each treated individual with one or several individuals in the non-treated group (control) under the matching assumption so that the only remaining difference between the outcomes of the two groups is the effect of the treatment. Matching techniques require identifying characteristics observed prior to the treatment that could be used to match each treated individual with an untreated individual having identical pre-treatment characteristics. The main challenge in the matching method is to identify the appropriate matching variables and construct a consistent estimate of the treatment effect. The matching variables must affect both the outcome and the treatment, hence the vector of matching variables will differ with each time-point being analysed. Among the previous vector of variables x, we will distinguish a subset of variables M, which will affect both the outcome Y_i^0 and being a NURHI programme participant P_i. Conditionally on M the assumption made is that the counterfactual outcome Y_i^0 in the treated group is the same as the observed outcome Y_i^0 in the untreated group. Rosenbaum and Rubin (1983) suggest the use of a balancing score $b(M)$, which is a function of the relevant observed variables M such that the conditional distribution of M given $b(M)$ is independent of the assignment to the treatment. The match does not need to be carried out on every pre-treatment characteristic, particularly when the vector M is large. The matching method allows us to match women who were in the NURHI programme to women were non in the NURHI programme using a number of characteristics to construct a propensity score and assume that this matched

comparison group constitutes the counterfactual outcome required. We describe this in detail below.

6.2.2 Propensity score matching with difference-in-difference (PSM-DID)

The difference-in-difference (DID) estimator can be combined with matching to obtain a more accurate estimate of the impact (Heckman et al., 1997; Smith and Todd, 2005). The PSM-DID method attempts to improve on the standard DID estimator by comparing modern contraceptive use trends over time between the treatment and control groups that are more alike. This method is particularly effective if all or most women are matched and if matched women are more likely to follow a common trend in modern contraceptive use. We match women based on their probability of selection into the programme using the propensity score, which we estimate using the same covariates used in the DID estimation. The difference-in-difference or double difference estimator is defined as the difference in average outcome in the treatment group before and after treatment minus the difference in average outcome in the control group before and after treatment. It is literally a "difference of differences".

Our main parameter of interest is the average treatment effect (ATET), which is the average impact of the NURHI programme for those who were subject to this programme. The DID method isolates the ATET by removing the unobservable individual characteristics and the secular time trend. The ATET in the DID estimator can be written as

$$\begin{aligned} \alpha^{ATT} &= E\{\delta|D=1) \\ &= \{E(y_{it}|D_i=1, t=t_1) - E(y_{it}|D_i=1, t=t_0)\} \\ &- \{E(y_{it}|D_i=0, t=t_1) - E(y_{it}|D_i=0, t=t_0)\} \end{aligned} \quad (13)$$

where, y is the outcome of interest, D_i is the treatment status, $D_i = 1$ if the individual is in the treatment group and 0 if otherwise and t_0 denotes before the programme and t_1 after the programme. We also use the propensity score matching with the difference in difference method (PSM-DID) to estimate the ATET. The idea here is to create a counterfactual group who similar to the treatment group as measured by the propensity score. This method is now being used in policy and programme evaluation research as studies have suggested that the

assumption of parallel time trend in the standard DID method is more likely to apply if both groups are comparable in their characteristics (Heckman et al., 1997; Wagstaff and Yu, 2007). The estimation equation is

$$Y_{it} = B_0 + B_1 D_i + B_2 + B_3 * T + \varepsilon_{it} \quad (14)$$

where, Y_{it} is our outcome of interest, B_1 is the coefficient for the programme dummy which shows the time effect when the programme was implemented (*0* for time before and *1* for time after); B_2 represents the treatment group if subject to the programme and equals 1 and 0 otherwise; B_3 is the interaction between the programme and individuals in the treatment groups and thus represent the programme effect.. It should be noted that the DID model requires the assumption of a parallel time trend that indicates the secular time trend is the same for both the treatment and control groups (Gertler et al., 2011).

The conditional mean independence condition states that patients in the control or treatment group is ignorable with respect to the outcome variables if all factors that influences the allocation of the groups as well as the outcome measure are included in X. X denotes a vector of pre-programme characteristics for individuals in the sample. Therefore, if the conditional mean independence condition holds,

$$E(Y^0_{i,t1} - Y^0_{i,t0} \mid X, D_i = 1) = E(Y^0_{i,t1} - Y^0_{i,t0} \mid X, D_i = 0) \quad (15)$$

Rosenbaum and Rubin (1983) suggested that if X is large in dimension, it can be summarised using the propensity score method given as equation (11). Here, the conditional probability of individuals in the treatment group $D_i = 1$ is estimated by using a Probit model. The second assumption is the presence of common support. This assumption states that for each value of X_{it}, there is a positive probability of being both treated and untreated that is $0< Pr(d_i = 1|X_{it})<1$. This assumption prevents X_{it} from being a perfect predictor of treatment assignment.

Average treatment effect on the treated vs the Average Treatment Effect

In our results section we present two sets of results; the average treatment effect on the treated (ATET) and the average treatment effects (ATE).

The ATET and the ATE are commonly defined across the different groups of individuals. In addition, ATET and ATE are often different because they might measure outcomes (Y) that are not affected from the treatment D in the same manner. First, some additional notation:

- Y^0 : population-level random variable for outcome Y in the control state.
- Y^1 : population-level random variable for outcome Y in the treatment state.
- δ : individual-level causal effect of the treatment.
- π : proportion of population that takes treatment.

Given the above, the ATET is defined as: $E\{\delta|D=1)$ i.e. what is the expected causal effect of the treatment for individuals in the treatment group. This can be decomposed more meaningfully as equation (11). Similarly, the ATE is defined as: $E(\delta)$ i.e. what is the expected causal effect of the treatment across all individuals in the population. Again we can decompose this more meaningfully as

$$E\{\delta\} = \{\pi E[Y^1|D=1] + (1-\pi)E[Y^1|D=0]\}$$
$$- \{\pi E[Y^0|D=1] + (1-\pi)E[Y^0 D=0]\} \quad (16)$$

As you see the ATT and the more general ATE are referring by definition to different portions of the population of interest. More importantly, in the ideal scenario of a randomised control trial (RCT) ATE equals ATT because we assume that:

$E[Y^0|D=1] = E[Y^0|D=0]$ and

$E[Y^1|D=1] = E[Y^1|D=0]$

that is we have believe respectively that the baseline of the treatment group equals the baseline of the control group (women in the treatment group would do as bad as the control group if they were not treated) and the treatment effect on the treated group equals the treatment effect on the control group (women in the control group would do as good as the treatment group if they were treated). These are very strong assumptions which are commonly violated in especially observational studies and therefore the ATT and the ATE are not expected to be equal.

Especially in the cases where the individuals self-select to enter the treatment group or not for example an e-shop providing cash bonus where a customer can redeem a bonus coupon for X amount given she shops items worth at least Y amount the baselines as well as the treatment

effects can be different like repeat buyers are more likely to redeem such a bonus, low-value customers might find the threshold Y unrealistically high or high-value customers might be indifferent to the bonus amount X. In scenarios like this even talking about ATE is probably ill-defined. It is unrealistic to expect that all the customers of an e-shop will ever shop items worth Y. ATET being unequal to ATE is not unexpected. If ATET is smaller or greater than ATE is application specific. The inequality of the two suggests that the treatment assignment mechanism was potentially not random. And so as such we feel it would be important to measure both to potentially confirm any limitations of our data.

A naïve estimator of the impact of the NURHI programme on modern contraceptive use was also measure and it would consist in estimating the difference as :

$$\tau^{naive} = \frac{1}{n_1}\Sigma_1^{n_1} Y_i^1 - \frac{1}{n_0}\Sigma_1^{n_0} Y_i^0 \qquad (17)$$

where the total number of individuals in the treatment and control groups are respectively n_1 and n_0 . The difference parameter τ^{naive} is potentially a biased estimator of the ATE. Intuitively, women in the NURHI programme might be different from non-programme women in the first place; they may have different outcomes. The key issue is then that if programme participation is not randomly distributed then the two populations are likely to be self-selected and systematically differ from each other so that Y_i^0 for the non-programme participants do not correctly estimate Y_i^0 for the programme participants. A solution to the selection bias would be to produce experimental data and randomly assign individuals to the treatment. In our context, an experiment that would assign randomly the treatment cannot be reasonably considered. We need to use observational data and use a quasi-experimental approach, such matching estimators, which relies on stronger identifying assumptions. We therefore use the propensity score matching to deal with this selection issue.

6.2.3 Results sensitivity and matching quality

Using the propensity score matching, alone or in combination with other methods, is constantly evolving. The matching between pairs of individuals can be done using several methods; women can be matched to one unexposed matched individual (one-to-one matching) or to several unexposed matched individuals using specifications including nearest neighbour, kernel, or radius matching. The matching specification can influence the results and there is no consensus on the best matching specification in existing literature (Rosenbaum and Rubin, 1985). After matching, we perform balancing tests to check that the matching sufficiently eliminates any significant association between treatment status and covariates. We look at the differences between treated and untreated individuals on each covariate using t-tests (Rosenbaum and Rubin, 1985). After matching the covariates should be balanced between groups and therefore no significant differences should remain (Caliendo and Kopeinig, 2005). We use three weighting estimators to perform the propensity score matching and to construct the counterfactual mentioned. These weighting estimators include nearest-neighbour, radius and kernel matching. Following Caliendo and Kopeinig (2005)'s suggestion, we use the 5 nearest-neighbour with replacements, it increases the quality of the matching and thus reduces the bias of our estimation. The radius matching defines the tolerated radius around the propensity score for the treated individuals. We use a radius size 0.1 commonly used in other empirical studies (Caliendo and Kopeinig, 2005). It should be noted that the choice of a radius is subjective. Although using a smaller radius will yield better matching quality, it might come with fewer observations hence, it is difficult to know what choice of radius level is reasonable. In our kernel analysis we a bandwidth of 0.05. We also use bootstrapping with 1000 replications to calculate standard errors.

6.3 Results

We present our trends in modern contraceptive use in some of the characteristics of women that we use in our matching. Considering local government areas, we understand that we may have treatment areas in some of the NDHS areas so we present these trends in three groups; NURHI (Women in NURHI LGAs), NDHS Exposed (Women in the NDHS dataset in the

same LGAs as the NURHI LGAs) and the NDHS Untreated (Women in other LGAs different from NURHI LGAs). These comparison exercise allows us to decide whether to include the NDHS Exposed as part of our treated sample. Our results show similar trends in the sample of NURHI and the NDHS Exposed (see Table 13).

Table 13: Trends in contraceptive use by treated and untreated

	Contraceptive Use	**NURHI Treated**		**NDHS Exposed**		**NDHS Untreated**	
		Before	After	Before	After	Before	After
Wealth	Poorest	14.97	24.38	5.86	5.95	2.39	3.05
	Poorer	16.99	26.57	5.58	7.11	4.34	5.17
	Middle	18.69	25.90	8.97	12.41	8.07	10.22
	Richer	18.42	27.87	13.75	18.85	13.79	15.17
	Richest	18.33	26.82	20.87	25.58	19.10	21.13
Education	No Education	10.56	20.56	5.00	6.00	2.34	2.60
	Primary	15.69	27.47	10.36	15.81	9.69	11.41
	Secondary	15.62	26.89	15.36	20.12	13.21	15.45
	Tertiary	28.61	29.88	27.19	30.33	24.62	25.58
Religion	Non-Muslim	25.52	32.37	15.52	22.33	13.47	16.78
	Muslim	10.55	22.08	9.59	12.25	3.58	3.69
Marital Status	Never Married	15.16	22.58	17.82	20.14	11.67	15.28
	Living Together	19.45	28.48	20.52	23.47	18.80	18.74
	Separated	13.27	17.11	13.22	18.05	16.38	17.32
	Widowed	4.21	9.58	5.21	5.45	5.10	7.25

The results of the Probit model used to derive the propensity score of being treated in the NURHI areas are presented in Table A5 in the appendix. We do not discuss further this model in this instance it is used purely used as a statistical tool to construct the propensity score that is required for matching the two groups of women. We note however that the pseudo R^2 of this Probit model is 0.152 and the coefficients indicate that a handful of the covariates are important predictors of treatment status. The purpose of matching is to balance the covariates such that the bias on observables is reduced as much as possible. The quality of the matching of the covariates can be assessed through various balancing tests. We applied the following types of propensity matching. All balance-checking criteria are presented in Table 14 below. All the three methods that we use reduce the bias between the two groups of women, some more than the others. The kernel specification reduces the average bias the most with an average bias of around 1.1% after matching, the nearest neighbour results were

approximately 1.5% after matching and the radius reduces the average bias at 3.5%. It should be noted that some bias always remains regardless of what matching method one uses.

Table 14: Balancing of the covariate by types of matching estimators

	Before Matching	Radius (0.1)		Kernel		Nearest Neighbour (5)	
	%Bias	%Bias	%Reduce	%Bias	%Reduce	%Bias	%Reduce
Education							
Primary	12.3***	3.5	20.2	3.5	20.2	3.8	22.9
Secondary	5.5***	4.7	18.7	4.6	18.7	4.6	19.2
Higher	12.7***	9.2	37.4	9.2	37.4	9.4	36.1
Wealth							
Poorer	2.1***	1.2	25.6	1.3	23.6	0.7	29.1
Middle	0.8***	0.5	52.9	0.5	52.9	0.5	52.9
Richer	3.4***	1.7	103.6	1.2	109.6	1.6	105.0
Richest	4.8***	4.3	11.7	4.4	10.6	4.2	12.6
Parity							
1-4	11.5***	2.5	89.4	2.6	10.3	3.1	73.0
5-8	12.2***	3.5	75.1	3.6	72.4	4.7	61.6
9-12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Religion							
Muslim	5.4***	3.5	51.2	3.5	51.2	3.7	48.6
Marital Status							
Living together	2.3***	1.3	38.6	1.3	38.6	1.3	38.6
Separated	12.3***	5.7	107.9	5.6	108.3	5.6	109.3
Widowed	15.5***	11.7	31.5	11.2	30.2	12.2	29.6
Decision index							
Full choice	21.0***	2.0	97.8	4.5	75.6	1.9	98.1
Medium choice	31.8***	16.5	44.2	16.2	46.1	17.8	43.9
Others decide	32.2***	10.1	69.0	12.1	56.4	10.0	69.0
Has Sons	10.4***	0.9	87.1	0.9	87.1	-0.9	91.5
Age	31.6***	0	99.9	0	99.9	0	99.9
Age squared	32.6***	1.1	97.2	1.3	95.7	1.2	96.3
Health facility	6.5***	4.7	27.8	4.6	28.8	4.6	28.8
Owning TV	3.4*	0.0	92.2	0.0	92.3	-0.2	95.1
PP per LGA	6.9**	4.7	46.2	5.6	42.1	4.7	46.2

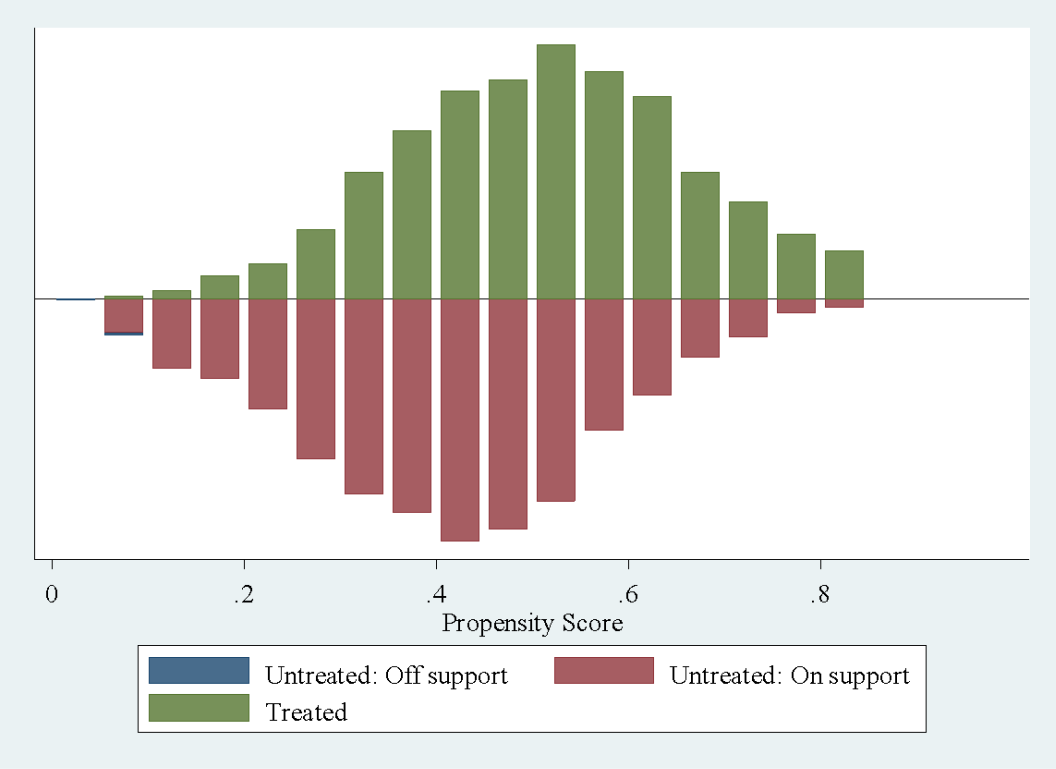
*** $p < 0.001$, **$p < 0.01$,*$p < 0.05$

The percentage of observations lost to the common support restrictions is small (8.9%); this is indicating that none of the matching methods appear to pose a problem in this regard. Figure 5 shows the propensity scores after matching for the women in both groups. From this, we observe that the region of common support is substantial. The common support and balancing test results suggest that the bias associated with differences in the observables

between the treated and untreated groups can be almost disregarded without the need to discard many of the observations from the sample because of a lack of common support.

Figure 5: Propensity scores of treated and untreated individuals

The region of common support for the radius match specification is (0.112, 0.830)



We present two sets of results; (1) the average treatment effects on the treated (ATET) and (2) the average treatment effects (ATE). Our findings from the PSM-DID are presented in Table 15. The ATET results suggest that the NURHI programme was associated with the increase in modern contraceptive use in the group of women that were exposed to the programme. The inclusion of controls shows a significant reduction in the magnitude (0.095**) of the ATET estimates when compared to the naive estimation (0.119***). We present our results in three scenarii, firstly we measure the ATET of the programme in the whole sample. Secondly, we take into account LGAs where there were other family planning programmes implemented before or at the same time as the NURHI programme and lastly, we additionally account for any education programmes implemented before or at the same time as NURHI. These two specifications lead us to exclude some LGAs as treated and controlled areas. We observe that in all our three scenarios the programme was associated with a significant increase in modern

contraceptive use (0.082**, 0.072**, 0.074**). We also observe that even after accounting for areas with concomitant family and education programmes, the NURHI programme still appears to have increased the use of modern contraceptives. The radius specification produced the highest estimates with modern contraceptive use increasing by approximately 8% without accounting for any family planning or education programmes, 11% after other family planning programmes were accounted for and 12% considering other FP and education programme. We find a similar trend in the other specifications, the kernel specification records an increase in modern contraceptive use by 7% without accounting for any family planning or education programmes, 10% after accounting for areas with other FP programmes and 11% after accounting for FP and education programmes. The nearest neighbour specifications show similar results and so may suggest that programme may have actually increased the use of modern contraceptives among the treated group of women.

We went a step further to estimate the average treatment effects (ATE) on both groups of women. Overall, although we find that the ATE estimate to be slightly lower than the ATET estimates, we find similar naïve estimator (0.107***) and control estimator (0.085**) with a reduction in the magnitude and significance of the ATE in the controlled estimation compared to the naive estimation. Similar to our results from the ATET estimation, the ATE radius estimates produced the highest specification with approximately an 11% increase in modern contraceptive use associated the NURHI programme over the five years of the programme. The results suggest that the NURHI programme had a causal positive and significant impact on the changes in modern contraceptive use in Nigerian women who participated in the programme.

Table 15: PSM-DID Estimations

	NUHRI Areas		NURHI except areas with other FP programmes		NURHI except areas with other FP and Education programmes	
	ATE	ATET	ATE	ATET	ATE	ATET
Naive	0.107***	0.119***	0.217**	0.219***	0.214***	0.247***
95% CI	(0.085;0.117)	(0.112;0.124)	(0.204;0.222)	(0.214;0.294)	(0.205;0.219)	(0.224;0.267)
Control	0.085**	0.095**	0.111**	0.119**	0.122**	0.118**
95% CI	(0.075;0.102)	(0.067;0.099)	(0.104;0.119)	(0.112;0.125)	(0.114;0.127)	(0.110;0.125)
Radius	0.049**	0.082**	0.097**	0.114**	0.110**	0.115**
95% CI	(0.039;0.050)	(0.069;0.098)	(0.084;0.106)	(0.099;0.118)	(0.107;0.118)	(0.110;0.121)
Kernel	0.045**	0.072**	0.082**	0.106**	0.105*	0.118**
95% CI	(0.023;0.059)	(0.054;0.075)	(0.068;0.091)	(0.098;0.109)	(0.092;0.111)	(0.111;0.125)
NNeighbour	0.048**	0.074**	0.089**	0.110**	0.105**	0.113**
95% CI	(0.036;0.056)	(0.066;0.091)	(0.074;0.091)	(0.093;0.117)	(0.101;0.107)	(0.102;0.115)

***p < 0.001, **p < 0.01,*p < 0.05

Control vector includes age, education, wealth, religion, marital status, decision index, owning a radio, owning a television, having sons, parity, used health facilities in the last 12 months, LGA, purchasing power per LGA

DID Robustness check using NDHS only

Table 16 :Trends in contraceptive use by treated and untreated NDHS only

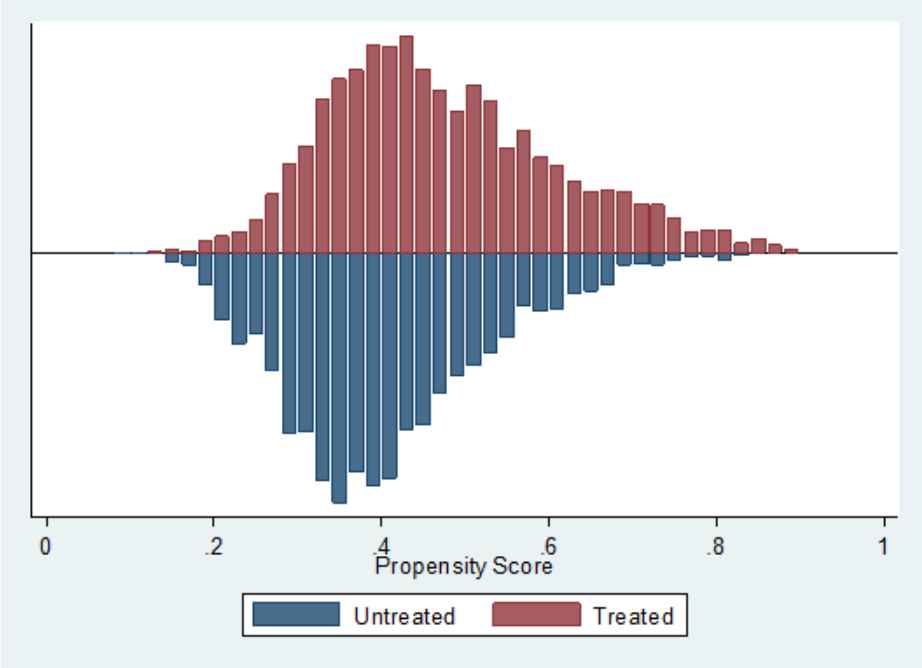
	Contraceptive Use	NDHS Treated		NDHS Untreated	
		Before	After	Before	After
Wealth	Poorest	5.86	5.95	2.39	3.05
	Poorer	5.58	7.11	4.34	5.17
	Middle	8.97	12.41	8.07	10.22
	Richer	13.75	18.85	13.79	15.17
	Richest	20.87	25.58	19.10	21.13
Education	No Education	5.00	6.00	2.34	2.60
	Primary	10.36	15.81	9.69	11.41
	Secondary	15.36	20.12	13.21	15.45
	Tertiary	27.19	30.33	24.62	25.58
Religion	Non-Muslim	15.52	22.33	13.47	16.78
	Muslim	9.59	12.25	3.58	3.69
Marital Status	Never Married	17.82	20.14	11.67	15.28
	Living Together	20.52	23.47	18.80	18.74
	Separated	13.22	18.05	16.38	17.32
	Widowed	5.21	5.45	5.10	7.25

Table 17 : Balancing of covariates by types of matching estimators NDHS only

	Before Matching	Radius (0.1)		Kernel		Nearest Neighbour (5)	
	%Bias	%Bias	%Reduce	%Bias	%Reduce	%Bias	%Reduce
Education							
Primary	14.0***	4.0	20.1	4.0	20.1	4.4	23.1
Secondary	5.7***	4.9	19.3	4.1	14.1	4.2	15.0
Higher	14.9***	11.4	33.4	10.2	32.4	10.4	31.1
Wealth							
Poorer	2.0***	1.1	26.6	1.1	26.6	1.2	26.1
Middle	0.8***	0.6	47.9	0.5	52.9	0.5	52.9
Richer	3.4***	1.7	100.6	1.2	107.6	1.6	106.1
Richest	4.8***	4.3	11.7	4.4	10.6	4.2	12.6
Parity							
1-4	11.5***	2.5	89.4	2.6	10.3	3.1	73.0
5-8	12.2***	3.5	75.1	3.6	72.4	4.7	61.6
9-12	2.0	1.0	50.0	1.9	47.9	1.6	41.5
Religion							
Muslim	5.4***	3.5	51.2	3.5	51.2	3.7	48.6
Marital Status							
Living together	2.3***	1.3	38.6	1.3	38.6	1.3	38.6
Separated	12.3***	5.7	107.9	5.6	108.3	5.6	109.3
Widowed	15.5***	11.7	31.5	11.2	30.2	12.2	29.6
Decision index							
Full choice	21.0***	2.0	97.8	4.5	75.6	1.7	94.1
Medium choice	31.8***	16.5	44.2	16.2	46.1	17.8	43.9
Others decide	32.2***	10.1	69.0	12.1	56.4	10.0	69.0
Has Sons	10.4***	0.9	87.1	0.9	87.1	-0.9	91.5
Age	31.6***	0.1	99.9	0.2	99.9	0.2	99.9
Age squared	32.6***	1.1	97.2	1.3	95.7	1.2	96.3
Health facility	6.5***	4.7	27.8	4.6	28.8	4.6	28.8
Owning TV	3.4*	0.0	92.2	0.0	92.3	-0.2	95.1
PP per LGA	6.9**	4.7	46.2	5.6	42.1	4.7	46.2

*** $p < 0.001$, **$p < 0.01$,*$p < 0.05$.

Figure 6: Propensity scores of treated and untreated individuals NDHS Only (Kernel)



Results in table 18 show the DID estimates when we use data from the NDHS only. it shows that even after account for other concurrent family planning and education programmes, the programme can still be seen to have a positive impact on modern contraceptive use. However, when we compare the results we observe in Table 18 to our earlier DID results in Table 15, we observe that the magnitude of the impact was reduced. This may suggest that the previous data combination that we had was better at capturing impact of the family planning programme than just using the NDHS cross sectional data only. Nevertheless, regardless of the dataset that we use, we were still able to observe a positive impact of the NURHI programme on modern contraceptive use in Nigeria.

Table 18: PSM-DID Estimations using NDHS only

	Treated Areas		Treated except areas with other FP programmes		Treated except areas with other FP and Education programmes	
	ATE	**ATET**	**ATE**	**ATET**	**ATE**	**ATET**
Naive	0.102**	0.107**	0.156***	0.164***	0.156***	0.157***
95% CI	(0.101;0.109)	(0.104;0.110)	(0.149;0.162)	(0.154;0.179)	(0.145;0.179)	(0.148;0.197)
Control	0.066**	0.070***	0.103**	0.109**	0.110***	0.112***
95% CI	(0.065;0.098)	(0.069;0.079)	(0.101;0.119)	(0.107;0.110)	(0.111;0.117)	(0.115;0.115)
Radius	0.037**	0.069**	0.077***	0.103**	0.109**	0.110***
95% CI	(0.035;0.090)	(0.066;0.078)	(0.074;0.086)	(0.101;0.108)	(0.105;0.110)	(0.109;0.115)
Kernel	0.034**	0.061***	0.072***	0.101***	0.105**	0.107**
95% CI	(0.027;0.049)	(0.057;0.065)	(0.068;0.079)	(0.099;0.106)	(0.101;0.108)	(0.105;0.110)
NNeighbour	0.022**	0.054***	0.069***	0.091***	0.097***	0.099***
95% CI	(0.019;0.036)	(0.045;0.61)	(0.064;0.081)	(0.090;0.102)	(0.094;0.103)	(0.097;0.104)

***p < 0.001, **p < 0.01,*p < 0.05

Control vector includes age, education, wealth, religion, marital status, decision index, owning a radio, owning a television, having sons, parity, used health facilities in the last 12 months, LGA, purchasing power per LGA.

6.4 Discussion

Understanding the impact of a programme on targeted outcomes is essential for the evaluation and potentially the wider implementation of a programme or policy. This chapter sought to evaluate the causal effect of the NURHI programme on modern contraceptive use in Nigeria. We additionally took into account other family planning and education programmes that were concomitant to the programme over the same period of time and in geographical areas so that we measured as well as possible the full impact of the NURHI on contraceptive use in the participants. Using the NURHI programme dataset (2009 and 2014) and the NDHS dataset (2008 and 2013), we carefully analysed the impact of the programme by combining the strength of two approaches towards causal inference: difference-in-differences and propensity score matching. We used data on women exposed to the NURHI programme before and after the programme was implemented and we matched them with unexposed women with similar pre-programme characteristics surveyed in the NDHS data. Before matching, there were significant differences between the two groups of women. We tested the quality of our propensity score matching and assessed after matching that there were no significant differences between the two groups of women. We also showed a significant reduction in the standardized bias overall in all the covariates we used for the matching. This indicates that there were no particular biases in participants' selection within the groups we used for the evaluation, and hence the changes in contraceptive use that we estimated may suggest that they are only due to participation to the NURHI programme. The results show that being exposed to the NURHI programme is significantly and positively associated with changes in modern contraceptive use, after controlling for all pre-intervention household, socio-economic and demographic characteristics. We observed that even after accounting for other family planning and education programmes, although reduced in magnitude and significance, the programme was still positively and significantly associated with changes in modern contraceptive use. The increase in modern contraceptive use may then be attributed to the introduction of the programme in the areas.

A few studies in Nigeria that measured the changes in modern contraceptive use in some of the programme areas also suggest that there were higher than average modern contraceptive use in the areas. For example a study in Benin, Edo state that measured the uptake and use of

modern contraceptive found out that on average Edo state recorded an higher than the Nigerian average (Alenoghena et al., 2015). Another study in Ibadan, Oyo state, suggested that women in Ibadan had a higher than average use in modern contraceptives (Uzochukwu et al., 2016). These studies concluded that programmes that empower women especially through education would not only give them the opportunities to have access to and use of modern contraceptive use but would also empower them with regards to other health care decisions and major household family decision. Although these studies did not perform a causal analysis nor evaluated any particular programme, it is encouraging to find that other smaller studies in some of the programme areas found a positive increase in the use of family planning services.

Our results suggest that the strategy used by the NURHI programme may have tackled some of the major barriers in modern contraceptive use in Nigerian women. Apart from the very few studies in Benin, Edo state and Ibadan, Oyo state, both in the south of Nigeria, our study goes further to measure the impact of the programme on modern contraception use in other areas. In particular, we measure the impact of the programme on modern contraceptive use in four northern cities, Abuja, Ilorin, Zaria and Kaduna. This is important as it helped us not only understand the trends in modern contraceptive use in Northern Nigeria but also how the programme has affected the changes in modern contraceptive use in Northern Nigeria which as mentioned in chapter 2 has poorer outcome indicators than their counterparts in the Southern regions.

Limitations of pooling two different household datasets

Combining two or more datasets can make it possible to address additional research questions. The benefits of pooling individual and household data include enhanced statistical power, the ability to compare outcomes and validate models across different settings, as well as the opportunities to develop new measures. Under certain circumstances, pooling datasets may lead to different estimates with potentially different interpretations than if both datasets were analysed separately. The pooled approach should be used only if it can be assumed that the characteristics as well as the domains of interest are similar from one dataset to the next. There are many things to consider before pooling to compute pooled estimates. The considerations form, in some sense, an iterative process. We need to think about why integration is desired, to check that it makes sense, integrate the data and compute estimates

or perform analyses, check the results and consider whether it still made sense to integrate datasets. What to do first in a pooling datasets might begin with questions like “are the samples the same/similar?” and “are the questionnaires the same/similar so that my variables mean the same thing?” Other questions maybe “we would like to estimate the population mean for this given variable; to what population will the estimate refer?” Inspite of the benefits of pooling datasets, there are a few limitations associated with pooling household datasets.

Firstly, Moving from separate datasets to a single dataset and designing the joint analyses is a time-consuming process and extensive consideration is necessary to accomplish a combined dataset of good quality with comparable variables.

Secondly, not all variables are comparable. Some outcomes and variables of interests have no comparable measure and as such we have had to construct new variables that represent comparable concepts for example our decision index variable but mostly we have had to restrict our analyses to common elements in both surveys.

Lastly, combining different studies increases the overall variability. The heterogeneity among the studies can be such that it may actually reduce overall statistical power. In addition, conflicting results may make the overall result inconclusive, despite the analytic methodology, with wider confidence intervals due to the increased heterogeneity.

Limitations of the empirical approach (DiD with PSM)

A major limitation of using PSM- DiD method is that propensity scores cannot adjust for the ‘hidden bias’ from unobserved covariates (Rosenbaum and Rubin 1983) because propensity scores can only be obtained from the observed covariates. Therefore, the accuracy and precision of estimates from a probit model used for either adjusting estimates of the effects or predicting outcomes could be seriously affected by missing predictors or confounders.

Secondly, the limitations of DiD relate to the need to find similar study groups, as ideally, the only difference should be exposure to the intervention of interest. For instance, according to the common shocks assumption, any event that occurs during or following the intervention, should equally affect each group. Therefore, a limitation of this method is in finding treatment and control groups which meet these assumptions. Also, while this approach

accounts for unobservable variables that are fixed over time, the biggest issue is that it does not account for unobservable variables that are not fixed over time.

CHAPTER 7: Discussion

In this thesis, we have analysed the impact of the NURHI programme in Nigeria on women's outcomes, especially contraceptive use. This chapter synthesises and discusses findings from the theis with a focus on the three empirical analyses in chapters 4, 5 and 6, that were carried out to measure the impact of the programme on women's outcomes. We start this chapter with a summary of the thesis' findings, we then discuss the limitations of our study, and then offer some recommendations for future research and lastly policy implications of this research.

7.1 Summary of the thesis

As we mentioned in chapter 1, the main aim of this thesis was to evaluate the NURHI programme, which is a family planning programme that was implemented in 6 Nigerian cities aiming at increasing modern contraceptive method uptake. The programme was carried out in different regions of Nigeria from Benin in the South-South region of Nigeria to Ibadan in the South- Western region of the country. It was also implemented in the Abuja and Ilorin in the North- Central region to Kaduna and Zaria in the North-Western region of the country. We have used a series of empirical approaches to measure the impact of the NURHI programme on modern contraceptive use firstly within the programme areas on its own and then in Nigeria as a whole. We did this by undertaking a quasi-experimental approach using geographical identifiers linked to a national cross-sectional dataset, the NDHS, that was available over a similar time period as the programme that we analyse.

In chapter 1, we presented our main aims for undertaking this thesis as well as the main objectives of our work. We then went ahead to present a brief summary on Nigeria, its demographics, the health system and the context of our work. We finally present a brief summary on policy evaluation and why it was important in the context of our work. This chapter helped us understand the context of this research work and why we feel it was of relevance.

Chapter 2 presented three reviews of literature. We summarised the trends in fertility and modern contraceptive use in SSA and more specifically Nigeria. In this chapter we also presented a brief history of family planning programmes in SSA and a summary of family planning and education programmes in Nigeria. From this chapter we found that Nigeria has one of the worse fertility indicators in the SSA. We showed that fertility rates in the region had remained high but that despite the high level of fertility in SSA, some countries in the region had managed to make significant progress in terms of fertility decline. However, Nigeria remained one of the countries in the SSA region with one of the highest rates at 6 births per woman and that modern contraceptive use was generally low. We also find out that since the very first major family planning programme was implemented in Nigeria, in 1988 and since then there had been a total of 11 major family planning programme in the country, nine of which had taken place just before or during the same time period as the the NURHI programme. Similarly, we found that since the very first education programme in Nigeria in 1955, there had been a total of eight programmes six of which happened around the time that the NURHI programme did.

In chapter 3, we presented a summary of the NURHI programme as well as the datasets that we used in this study. This helped us understand how the programme was designed and implemented as well as how the data were collected. We also presented the second dataset that we used in the later stages of the empirical analysis, the NDHS. We were able to link the NURHI, a panel dataset to the NDHS, a cross-sectional dataset, using a third dataset which contained both geographical identifiers so that we had a single level of geography which we later used in our impact analysis. This chapter in particular contributed methodologically to the study because it showed how datasets could be linked in the future especially in situations where geographic data files are unavailable for one or more of the datasets and natural experiments are potentially observables.

Chapter 4 was the first empirical chapter, it examined the impact of the programme on the participating women on two outcomes: modern contraceptive use and the use of family planning services. We used a reflexive comparison method, which is a very common method in the evaluation of health programmes and we found an increase in modern contraceptive use over time in the programme participants between baseline and endline however the

programme did not have an impact on the use of a family planning service over time. We investigated further the changes considering three specific groups of women based on age, motherhood, having sons. We observed an increase in modern contraceptive use in all of the three groups of women. We found that modern contraceptive use was higher in older women at both time points when compared to younger women but that contraceptive use increased over time in both older and younger women and the gap between the two groups appeared to reduce over time. Previous studies that used the NDHS had already showed that older women were more likely to use modern contraceptive while younger age women in Nigeria, especially those just beginning to bear children in marriage are less likely to use contraceptives (Unumeri et al., 2015). There is a myth in Nigeria that the use of modern contraceptives especially very early on in life would end up with health problems or permanent infertility, hence younger women may in general be less likely to use modern contraceptives (Moronkola et al., 2006: Olugbenga-Bello et al., 2011).

Despite these findings it was still encouraging that both groups of women showed an increase in modern contraceptive use over time. This may be accounted to one of the NURHI programmes specific objective of knowledge creation. As we discussed in chapter 3 the knowledge creation strategy of NUHRI focused on de-medicalising and demystifying the practice of family planning, by fostering dialogue around family planning. Reflexive evaluation of the NURHI also showed some similar results. They reported that at endline women between the ages of 40 and 44 were 12.4 times more likely to have used modern contraceptives than their younger counterparts. However, they also report that after the programme, regardless of the age group they were all more likely to have been using modern contraceptive when compared to baseline results (MLE, 2017).

The second group of women that we studied were women with children and women without. While modern contraceptive use increased over time in women with children, it reduced overtime in women without children. Again one of the major suggestions about the observed differences between modern use in both groups was the cultural myths and misconceptions that are associated with modern contraceptive use in Nigeria (Moronkola et al., 2006: Olugbenga-Bello et al., 2011). There are also myths about reduced sexual enjoyment and possible spiritual repercussions in women that you modern contraceptives and hence may

also explain the differences between the groups (Sanusi et al., 2015). Regardless of this we observe that after the programme occurred both groups of women showed an increase in modern contraceptive use over time. We believe that the strategy of the NURHI of modifying social and cultural norms especially with the involvement of traditional and religious leaders was key in the results that we observed.

The final groups of women we compared were women who had sons and women who had children but no sons. We observed an increase over time in the two groups of women, however it was interesting to observe that modern contraceptive use in women who had no sons showed a higher increase in modern contraceptive use at the end of the programme than women with sons. Although when we looked at the difference between the two groups at both time points, we observed that women with sons were still more likely to use modern contraceptives. There are several studies conducted in Nigeria where male preference has been widely reported. The reasons given for this gender preference are various and include cultural, kinship, economic and institutional factors that typically differ across different societies (Das Gupta et al., 2003; Almond, Edlund, and Milligan, 2009). In the Nigerian context, anthropological and demographic evidence emphasizes the dominant role of males in patrilineal societies in which descent and inheritance are transmitted through the male line (Goody, 1973, 1976; Isiugo-Abanihe, 1994). Furthermore, male children strengthen the relationship between the wife and her husband's kin by guaranteeing the continuation of his lineage and secure the mother's access to residence and inheritance upon the husband's death. In summary, we find that modern contraceptive use can be seen to have increased in the programme participants over time regardless of the group that we studied. This may suggest that the introduction of the programme had a role to play in the increase in modern contraceptive use of time in the programme participants. The programme strategy of the NURHI of both knowledge creation and the modifying social and cultural norms through the programme implementation we believe was key in the outcomes that we observe.

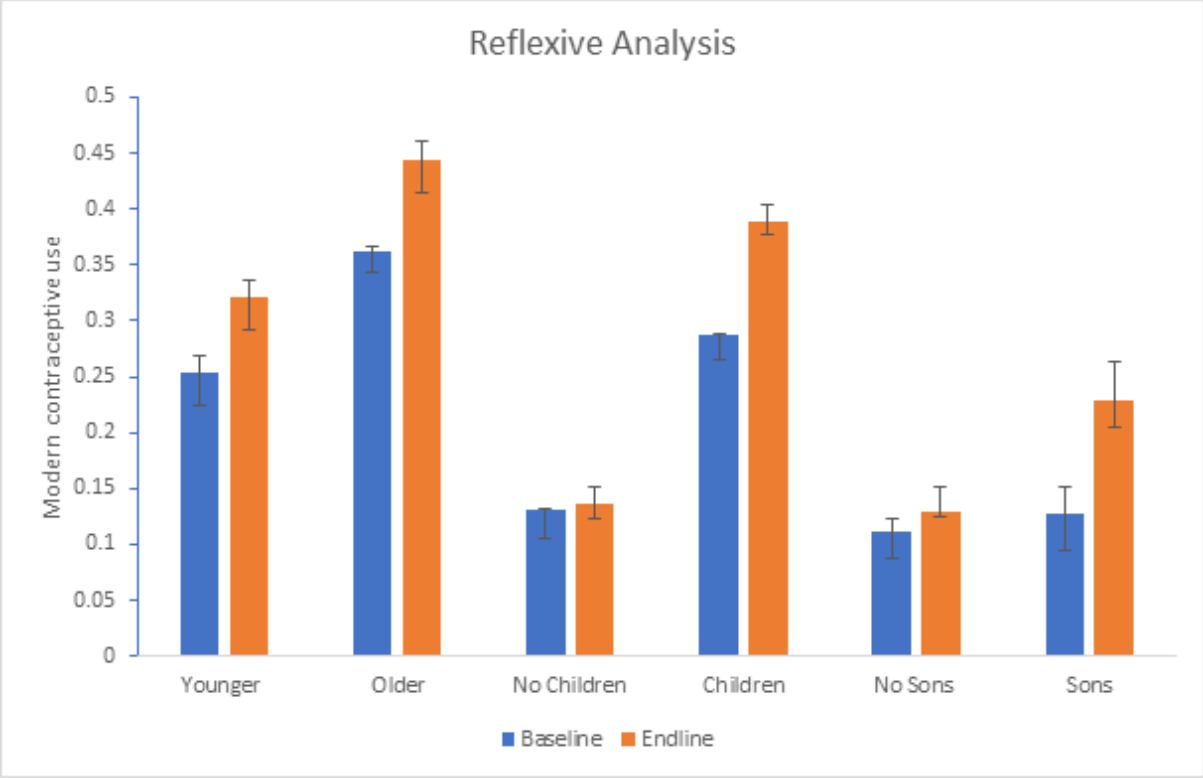
In the second outcome that we study, which is the use of family planning service, we also observed similar differences in the groups of women with the main difference being the fact that the programme did not seem to increase the use of the service over time in all of our

groups. This may be a positive outcome for the programme and may suggest that the reach of the programme was beyond the use of facilities. Although this may all look positive, this trend may also suggest a reduction in the use of health care services in Nigeria. A few studies in Nigeria have recorded that the use of maternal health care services has actually reduced over time with one of the major factor to this being wealth (Obiyan and Kumar, 2015). It may be worthwhile for the government of Nigeria to give more focus on the provision of health care services in general especially among those with the highest need.

Chapter 5 used the Fairlie decomposition analysis (Fairlie, 2005) to identify the components of the changes in modern contraceptive use over time in the programme participants. Our most interesting finding from the decomposition analysis was that most of the observed increase in modern contraceptive use among Nigerian women in the NURHI programme was due to a change in the correlation between education and contraceptive use. Women's education is as a key determinant of modern contraceptive use as evidence in several studies (Bbaale and Mpuga, 2011). Our analysis corroborated this evidence at the baseline of the programme but showed that the programme enabled a decline in the impact of education on contraceptive use. The knowledge creation as well as service delivery component of the programme is likely to have helped remove the barriers to contraceptive use of less educated women. Less educated women are more likely to be poorer and less likely to be able to afford the use of modern contraceptives and so the supply side remains an important factor which the programme has been seen to address. Another interesting find from our decomposition analysis was that the increase in modern contraceptive use appeared to be due to a change in the correlation between decision-making abilities and modern contraceptive use. This may suggest that decision-making factors are key factors to contraceptive use and that the programme helped women to become empowered with knowledge and social acceptability of contraceptives. From our results it appears that what matters is whether women have the power to make decisions in their homes, and typically their use of modern contraceptive is strongly associated with their decision power within their household and their involvement in decisions related to children.

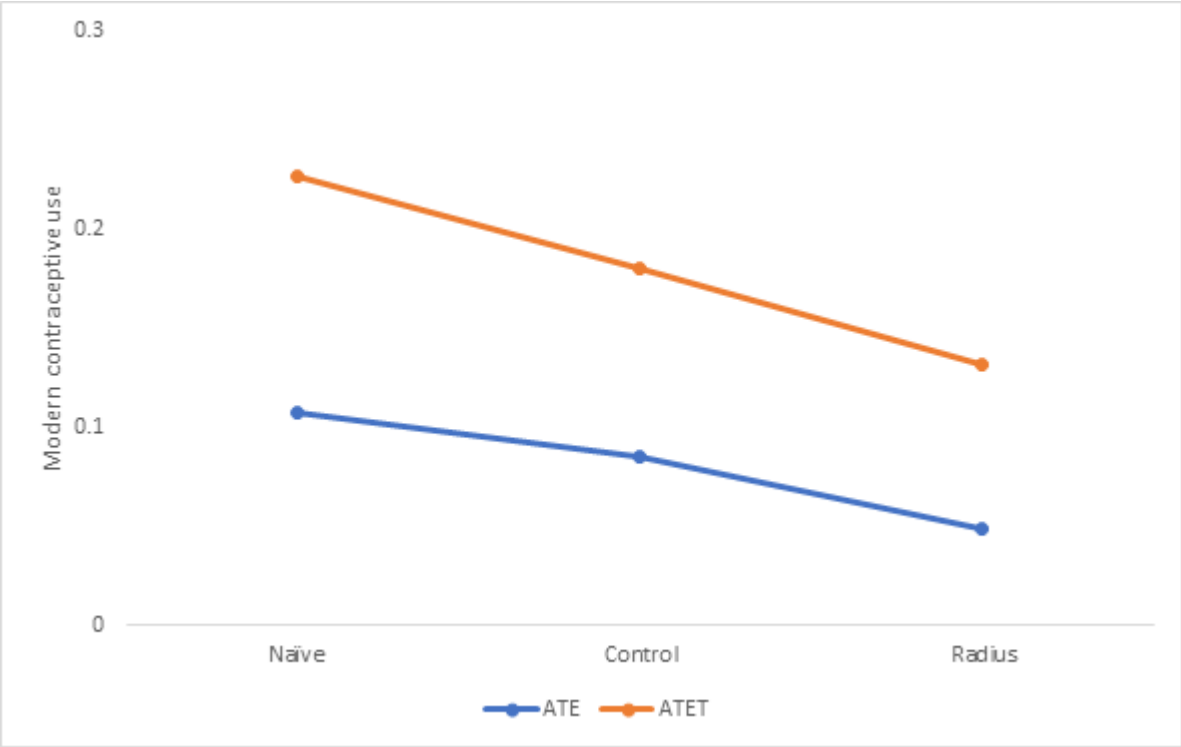
Chapter 6 offered an original use of geographical identifiers to identify suitable control women for the NUHRI participants. We combined the strength of two policy evaluation approaches towards causal inference: difference-in-differences and propensity score matching to measure the impact of the NUHRI programme as the average treatment effect on the treated and the average treatment effect on the treated and untreated population. Our main results, the estimated ATET showed that the programme was able to positively impact the changes in modern contraceptive use on the treated population. The ATE showed that the NURHI programme even after accounting for other family planning and education programmes ongoing in Nigeria, still had a positive impact on the changes in modern contraceptive use. Even after controlling for all pre- intervention household, socio-economic and demographic characteristics the programme was seen to have an impact on the use of modern contraceptives. In this chapter, we also observed that even after accounting for other family planning and education programmes, and although reduced in magnitude and significance, the programme was still positively and significantly associated with changes in modern contraceptive use. In addition to our study, it is interesting to know that a few other studies suggested that the use of modern contraceptive use has increased in two of the programme cities. Although, none of the studies had performed a causal analysis to check this, it makes our findings even more interesting and valuable (Alenoghena et al., 2015; Uzochukwu et al., 2016). Because of our findings the increase in modern contraceptive use may then be attributed to the introduction of the different components of the programme in the NURHI areas. We present a summary of our reflexive comparison analysis in the figure 7 and a summary of impact evaluation in figure 8.

Figure 7: NURHI Reflexive comparison estimating modern contraceptive use



In summary, we clearly see that in all the groups of women that we studied, there was an increase in the use of modern contraceptives over time. From this graph, we are able to suggest the groups of women that future programmes should focus on, in this case, women who had no children yet and women who had no sons.

Figure 8: Impact analysis graph



From figure 8, we clearly see that the NURHI programme had an impact on the use of modern contraceptives in Nigeria overtime and although the magnitude can be seen to decrease over time after controlling for and accounting for other areas where FP and education programme occurred, the NURHI still had an impact on modern contraceptive use.

The main aim of our study was to evaluate whether or the Nigerian Urban Reproductive initiative (NURHI) had made an impact on the use of modern contraceptive use in Nigeria. Our results revealed that the programme has not only had an impact on the uptake of modern contraceptive use but has also been able to reduce the impact of certain culture perceptions and practices such the level of involvement in household decisions and empowerment of women. This evaluation also illustrates that providing a targeted and supportive family planning programme in Nigeria can be effective in improving maternal health outcomes. A combination of family planning, traditional leaders involvement along with supportive supervision resulted in a positive impact on modern contraceptive use as a whole. However, it should be noted that these positive findings are mainly based on the programme being

introduced in easy to reach population and areas. The programme targeted cities including Abuja, Benin City, Ibadan, Ilorin, Kaduna, and Zaria, all of which are capital cities and are very different from areas of Nigeria with the highest needs for the programme such as conflict affected zones or rural Nigeria. This trend is also evident in our review of the family planning and education programmes in Chapter 2. We observed that many of the family and education programmes occured in easy to reach areas and states in Nigeria. For instance, Borno state is one the most conflict affected areas in Nigeria, there more than 1.2 million internally displaced people (IDPs) are living in the capital city. From our research, we observe that there were no family planning or education programme during the same time period as the NURHI programme. This is the case also for Benue state, Plateau state and Taraba state, where years of conflicts with the "fulani herdsmen" for land have torn the states and led to the death of almost 2,000 people. Apart from death and displacements of persons, these regions tend to be isolated from the rest of the country in most aspects including health and education. Health personnel have moved away for their safety and are less likely to return, this creates problems for local women to access family planning or health care services. Our evaluation was based on identifying suitable control individuals and it is therefore likely that our results mask and probably overestimate the true impact of the programme over Nigeria as a whole, especially if those areas with the highest health needs are continually excluded.

In addition to the overestimation of the true impact of the programme on modern contraceptive use, there remains the moral issue of equity and equality especially in conflict areas. Displacement of persons in conflict situations remains a significant factor driving inequities in both health status as well as access to health services and programmes. Key health and social determinants of Health (SDH) indicators are usually worsened during conflict (Guha-Sapir and Van Panhuis, 2002; World Bank, 2007). If future programmes are still being introduced in easy to reach areas then there is a possibility that those with the highest needs are being constantly excluded raising the issue of equity in health care. Addressing health inequities requires a more fair and just distribution of the social, economic, environmental, and policy opportunities that yield good health outcomes. Addressing health inequities requires targeting resources to those communities that have the poorest health outcomes.

7.2 Limitations of the work

This study has methodological limitations related to the data and to the empirical analysis choices and underlying assumptions that were made.

7.2.1 Methodological limitations

Regarding data, the programme was not a randomised controlled trial and so the NURHI dataset only included individuals exposed to the programme and as such we have had to use a natural experiment approach to identify suitable controls. We used an external cross-sectional and national dataset to identify potential controls. However, it is important to underline that NDHS is cross-sectional and does not provide longitudinal data following the same women over the two time-points. We matched individuals using a propensity score matching method that estimated the probability to be treated according to a selected sample of extraneous factors that were found to be correlated with the selection into the programme. There is a possibility that the participants have self-selected themselves into the programme but we cannot observe or measure this, however this is likely to be correlated with the outcome of interest. Women who were keen to enter in the programme were probably more engaged in the use of healthcare services and potential of contraceptives too.

Another limitation of our data is related to the issues that we had with obtaining the cluster specific geographic data files from the NURHI programme. Ideally we would have used GPS data to locate precisely participants and be able to ensure that one woman was not both involved in NURHI and in NDHS. However, we had to rely on the LGAs to identify suitable control areas. The sizes of LGAs vary widely in Nigeria and so it would have been ideal if we were able to use specific and smaller clusters of areas to help us identify precise e control clusters.

Lastly, we were not able to assess longer term effects of the family planning programme such as its effects on fertility rates as this takes several years to measure; continued studies are needed to measure the long term effects of this programme.

7.2.2 Conceptual and estimation limitations

Our empirical analysis also has a few limitations,

When selecting the vector controls for our propensity score matching and impact analysis, we were unable to obtain a few multilevel characteristics we felt were important in our propensity score matching. For example, variables such as the number of health facilities and number of doctors and nurses per LGAs. Including these types of variables would improve the specification of our model

Secondly, the bulk of our research only consider the outcome, modern contraceptive use. There are other outcomes of interest that can be considered in addition. For example, birth spacing is another interesting outcome and it would be worth to see whether the programme has helped with this outcome as well. Long-term results would actually probably value a two-step study where first the use of contraceptives and then the underlying effect on birth spacing are sequentially investigated.

7.3 Implications for policy and future research

Family planning has been one of the most successful development interventions of the past 50 years, but priorities change as programmes evolve to match the needs of the population. In many SSA countries like Nigeria where modern contraceptive use is very low and attitudes in the communities are sometimes ambivalent or even hostile to the use of family planning strategies, strong political and policy commitment are essential for rapid gains in contraceptive prevalence and in other health care outcomes as well. Efforts to gain the endorsement of religious and local leaders may also be key in determining positive health care attitudes in the community. The NURHI programme was successfully able to engage 48 religious leaders in the communities which we can say in turn led to the success of the programme (MLE, 2017). The NURHI programme has used the strategies of knowledge creation, addressing social norms and improving the service delivery in the cities that the programme happened and from the findings of this thesis, the evidence of its effectiveness is positive. In spite of this success, we believe that the Nigerian government need to invest in the health care system in general. Family planning delivery systems need to be designed as an integral part of the overall health system. The fragility and uneven coverage of health services

in many parts of Nigeria represent considerable constraints. Historically family planning programmes in Nigeria are operated mainly by NGOs.

The rate of population growth in Nigeria is among the highest in the world. This is related to a number of factors, which include age at first marriage, use of contraceptives and negative attitude toward family planning methods. Consequently, there is the need to achieve a goal of improving the standard of living and quality of life of the people by reducing the rate of population growth in the society through encouraging fertility control through family planning programmes. As such it remains crucial to continue to evaluate the impact or effects of health programmes on health outcomes in Nigeria. Findings from this thesis have shown that the introduction of the Nigerian Urban Reproductive Health Initiative (NURHI) family planning programme in certain areas in Nigeria had an impact on the uptake of modern contraceptive use that we observe at the end of the programme. It is also interesting to know that the programme not only has an impact on the changes we observe in modern contraceptive use but also was able to change in certain factors such as wealth and education by reducing the correlation of wealth and education with modern contraceptive use. Findings from this thesis can help future research in three major ways.

Firstly, findings can help in thinking about the future design of family planning programmes in Nigeria and possibly other Sub-Saharan African countries. The NURHI programme design did not only focus on improving service delivery which is the norm in many programmes but was also valued the creation of knowledge by involving and engaging the community leaders in the programme activities.

Secondly, we have developed a very original way to bring together two datasets using geographical identifiers to undertake an evaluation analysis. There is a potential for the transferability of the methodology to other policy or programme evaluations. This methodological approach could also benefit other researchers when faced with the challenge of evaluating a programme that is geographically based and where controlled individuals or are not directly available but there are external sources of data that can be linked geographically with the programme data and allow a natural experiment alike evaluation.

Thirdly, based on our findings, and if the geographic data files can be obtained it would be interesting to measure impact of the programme on modern contraceptive use and other outcomes using a smaller geographical identifiers than the local government areas used in this thesis. Given time and resources, it would also be interesting to be able to measure the impact of the NURHI family planning programme on other related outcomes such as birth spacing and fertility. We also believe that the Nigerian government should play a more active role especially in the collection health care data collection at the LGA level. Data on the number of health professionals or health facilities per LGA should be made available so that more precise specifications can be measured. This is important in the improvement of the healthcare system as as research place a key role in that.

Finally, given the success observed by the NURHI programme with regards to ideation and how the programme was designed, the upscaling to other areas in Nigeria and integration of the programme into the primary health care system in Nigeria is important in affecting changes in maternal and child health outcomes in the country especially among those with the highest need. In particular to our findings in Nigeria, future programmes should focus on targeting two major groups; women without children most especially women without male children. We believe that focusing on these groups would further improve the modern contraceptive prevalence rates in Nigeria.

References

1. Acharya, D., Bell, J., Simkhada, P., van Teijlingen, E. and Regmi, P. (2010). "Research Women's autonomy in household decision-making: a demographic study in Nepal". *Reproductive Health*. 7(15): pp. 1-12.
2. Adams, P. (2016). Sub-national government in Nigeria. *Africa Research Institute*. Report number: 1602.
3. Adetunji, J. (2011). Rising popularity of injectable contraceptives in sub-Saharan Africa. *African Population Studies*. 25(2): pp. 587-604.
4. African Development Bank (AfDB), Organisation for Economic Co-operation and Development, United Nations Development Programme, United Nations Economic Commission for Africa. (2012). African Economic Outlook 2012: Promoting Youth Employment. African Development Bank. Available at: file:///C:/Users/Lenovo/Downloads/AEO2012_EN.pdf. Accessed on 12/10/2016.
5. Ai, C., Norton, E. (2003). Interaction terms in logit and probit models. *Economics Letters*. 80(1): pp.123-129.
6. Akinlo, A., Bisiriyu, A., Esimai, O. (2013). Influence of Use of Maternal Health Care on Postpartum Contraception in Nigeria. *United States Agency for International Development*. Available at : https://dhsprogram.com/pubs/pdf/WP92/WP92.pdf. Accessed on 01/05/2014.
7. Alaba, O., Olubusoye, O., Olaomi, J. (2017). Spatial patterns and determinants of fertility levels among women of childbearing age in Nigeria. *South African Family Practice*. 59(4): pp. 143–147.
8. Alenoghena, I., Isah, E., Isara, A. (2015). Maternal health services uptake and its determinants in public primary health care facilities in Edo state, Nigeria. *Nigerian Postgraduate Medical Journal*. 22(1): pp. 25-31.
9. Alkema, L. et al. (2013). National, regional, and global rates and trends in contraceptive prevalence and unmet need for family planning between 1990 and 2015: a systematic and comprehensive analysis. *The Lancet*, 381 (9878), pp. 1642-1652.

10. Angeles, G., Guilkey, D., Mroz, T. (1998). Purposive program placement and the estimation of family planning program effects in Tanzania. *Journal of the American Statistical Association*. 93(443): pp.884-899.

11. Ankomah, A., Anyanti, J., Adebayo, S and Giwa A. (2013). "Barriers to Contraceptive Use among Married Young Adults in Nigeria: A Qualitative Study". *International Journal of Tropical Disease & Health*. 3(3): pp. 267-282.

12. Ankomah, A., Anyanti, J., Adebayo, S and Giwa A. (2013). "Barriers to Contraceptive Use among Married Young Adults in Nigeria: A Qualitative Study". *International Journal of Tropical Disease & Health*. 3(3): pp. 267-282.

13. Anyanwu, J., Ezegbe, B., Eskay, M. (2013). Family Planning in Nigeria: a Myth or Reality? Implications for Education. *Journal of Education and Practice*. 4(15): pp. 108-113.

14. Aransiola, J., Akinyemi, A., Fatusi, A. (2014).Women's perceptions and reflections of male partners and couple dynamics in family planning adoption in selected urban slums in Nigeria: a qualitative exploration. *BioMed Central Public Health.* 14(1): pp. 1-14.

15. Arkutu, A. (1995). Family planning in Sub-Saharan Africa: present status and future strategies. *International Journal of Gynecology & Obstetrics*. 50(2): pp. 27-34.

16. Asekun-Olarinmoye, E., Adebimpe, W., Bamidele, J., Odu, O., Asekun-Olarinmoye, I., Ojofeitimi, E. (2013). Barriers to use of modern contraceptives among women in an inner-city area of Osogbo metropolis, Osun State, Nigeria. International Journal of Women's Health. 5(1): pp. 647-655.

17. Ashenfelter, O and Card, D. (1985). Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs. *The Review of Economics and Statistics*. 67(4): pp. 648-660.

18. Ashraf, Q., Weil, D., Wilde, J. (2013). 'The Effect of Fertility Reduction on Economic Growth', *Population and Development Review,* 39(1): pp. 97-130.

19. Austin, A. (2015). Unmet contraceptive need among married Nigerian women: an examination of trends and drivers. *Contraception*. 91(1): pp. 31-38.

20. Babalola, S., Vonrasek, C.. (2005). Communication, ideation and contraceptive use in Burkina Faso: An application of the propensity score matching method. *Journal of Family Planning and Reproductive Health Care*. 31(3): pp. 207-212.

21. Bankole, A., Adewole, I., Hussain, R., Awolude, O., Singh, S., Akinyemi, J. (2016). The Incidence of Abortion in Nigeria. *International Perspectives on Sexual and Reproductive Health*. 41(4): pp. 170-181.

22. Bankole, A., Rodriguez, G., and Westoff, C. (1996). "Mass media messages and reproductive behaviour in Nigeria." Journal of Biosocial Science. 28 (2): pp.227-239.

23. Baron, R. and Kenny, D. (1986). "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations". *Journal of Personality and Social Psychology*. 51(6): pp. 1173-1182.

24. Bbaale, E. and Mpuga, P. (2011). "Female Education, Contraceptive Use, and Fertility: Evidence from Uganda". *Consilience: The Journal of Sustainable Development*. 6 (1): pp. 20-47.

25. Becker, S., Ichino, A. (2002). Estimation of average treatment effects based on propensity scores. *The Stata Journal*. 2(4): pp. 358-377.

26. Bertrand, J., Kincaid, D., Babalola, S. (2004). Measuring the Effects of Full Coverage HIV/AIDS Communication Programs. Baltimore: *Johns Hopkins University Center for Communication Programs, Bloomberg School of Public Health*.

27. Bertrand, J., Kincaid, D., Babalola, S. (2004). Measuring the Effects of Full Coverage HIV/AIDS Communication Programs. Baltimore: *Johns Hopkins University Center for Communication Programs, Bloomberg School of Public Health*.

28. Biesma, R., Brugha, R., Harmer, A., Waslh, A., Spicer, N., and Walt, G. (2009). The effects of global health initiatives on country health systems: A review of the evidence from HIV/AIDS control. *Health Policy and Planning*. 24 (1) : 239-252.

29. Black, R., Ammassari, S., Mouillesseaux, S., Rajkitia, R. (2004) Migration and Pro-Poor Policy in West Africa. Development Research Centre. Report number: 1.

30. Blinder, A. (1973). "Wage discimination: Reduced form and structural estimates". *Journal of Human Resources*. 8 (1): pp. 436–455.

31. Bloom, D., Humair, S., Rosenberg, L., Sevilla, J., Trussell, J. (2013). A demographic dividend for Sub-Saharan Africa: Source, magnitude, and realization. Available at : https://cdn1.sph.harvard.edu/wp-content/uploads/sites/1288/2014/01/PGDA_WP_110.pdf. Accessed on 09/01/2016.

32. Bongaarts, J., and Bruce, J. (1995). "The causes of unmet need for contraception and the social content of services." *Studies in Family Planning.* 26 (2): pp.57-75.

33. Bongaarts, J., Casterline, J. (2012). Fertility transition: Is sub-Saharan Africa different? *Population and Development Review*. 38(1): pp.153 -168.

34. Bongaarts, J., Cleland, J., Townsend, J. Bertrand, J., Gupta, M. (2012). Family Planning Programs for the 21st Century Rationale and Design. *Population Council*. New York. Available at : https://www.popcouncil.org/uploads/pdfs/2012_FPfor21stCentury.pdf. Accessed on 06/06/2016.

35. Booysen, F., van der Berg, S., Burger, R., von Maltitz, M. and du Rand, G. (2008). "Using an asset index to assess trends in poverty in seven Sub-Saharan African countries". *World Development*. 36(6): pp. 1113-1130.

36. Bradley, S., Casterline, J. (2014). Understanding Unmet Need: History, Theory, and Measurement. *Studies in Family Planning*. 45(2): pp. 123-150.

37. Brals, D., Aderibigbe, S., Wit, F., van Ophem, J., van der List, M., Osagbemi, G., van Hensbroek, M., Schultsz, C. (2017). The effect of health insurance and health facility-upgrades on hospital deliveries in rural Nigeria: a controlled interrupted time-series study. *Health Policy and Planning*. 32 (1): pp. 990-1001.

38. British Council Nigeria (BCN). (2012). Gender in Nigeria report 2012: Improving the lives of girls and women in Nigeria. *British Council Nigeria*. Available at :

https://www.britishcouncil.org/sites/default/files/british-council-gender-nigeria2012.pdf. Accessed on 16/05/2016.

39. Buhling, K., Zite, N., Lotke, P., Black, K. (2014). Worldwide use of intrauterine contraception: a review. *Contraception*. 89(1): pp. 162-173.

40. Caldwell, J., and Caldwell, P. (2000). The limitation of family size in Ibadan, Nigeria: An explanation of comparative rarity derived from in-depth interviews: Population and development issues: Ideas and debates. Ibadan: Ibadan Book Builders.

41. Caliendo, M., Kopeinig, S. (2005). Some Practical Guidance for the Implementation of Propensity Score Matching. Available at: http://ftp.iza.org/dp1588.pdf. Accessed on 12/08/2017.

42. Canning, D. and Schultz, T. (2012). The economic consequences of reproductive health and family planning. *Lancet*. 380 (9837): pp. 165-171.

43. Capra International Inc (CII). (2016). Evaluability assessment report of UNICEF Nigeria girls education project phase 3 cash transfer programme in Niger and Sokoto states. Available at: https://www.unicef.org/nigeria/NG_resources_gep3ctpea.pdf. Accessed on 12/12/2016.

44. Casterline, J., and El-Zein,i L. (2014). Unmet need and fertility decline: A comparative perspective on prospects in Sub-Saharan Africa. *Studies in Family Planning*. 45 (2): pp.227-245.

45. Cates, W., Abdool-Karim, Q., El-Sadr, W., Haffner, D., Kalema-Zikusoka, G., Rogo, K., et al. (2010). Global development. Family planning and the Millennium Development Goals. *Science*. 329(5999): pp.1603.

46. Cavallaro, F., Benova, L., Macleod, D., Faye, A., Lync, C. (2017). Examining trends in family planning among harder-to-reach women in Senegal 1992–2014. *Scientific Reports*. 410(6). pp. 1-11.

47. Chevo, T., Bhatasara, S. (2012). HIV and AIDS Programmes in Zimbabwe: Implications for the Health System. *ISRN Immunology*. 609(128): pp. 1-11.

48. Chi, P., Bulage, P., Urda, H., Sundby, J. (2015). A qualitative study exploring the determinants of maternal health service uptake in post-conflict Burundi and Northern Uganda. *BMC Pregnancy and Childbirth*. 15(18): 1-14.

49. Chuhan-Pole, P., Angwafo, M., Buitano, M., Dennis, A., Ye, X. (2012). Africa's Pulse: An Analysis of Issues Shaping Africa's Economic Future. *The World Bank*. Report number: 4. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/20240/679960NEWS0no500pulse0february02012.pdf?sequence=1&isAllowed=y. Accessed on 20/09/2016.

50. Chuhan-Pole, P., Christiaensen, L., Dennis, A., Kambou, G., Angwafo, M., Buitano, M. et al. (2013). An analysis of issues shaping Africa's economic future. *The World Bank*. Available at: http://www.worldbank.org/content/dam/Worldbank/document/Africa/Report/Africas-Pulse-brochure_Vol8.pdf. Accessed on 15/08/2016.

51. Chuks, J. (2002). Revisiting Aspects of Nigeria's Population Policy. *African Population Studies*. 17(2): pp. 23-36.

52. Claxton, K., Fenwick, E., Sculpher, M. (2006). Decision making with uncertainty: The value of information. In Jones, A.M. (ed) *Elgar Companion to Health Economics* Cheltenham: Edward Elgar.

53. Cleland, J., Bernstein, S., Ezeh, A., Faundes, A., Glasier, A., Innis, J. (2006). Family Planning: The Unfinished Agenda. *The Lancet*. 368 (9549): pp. 1810-1827.

54. Cleland, J., Ndugwa, R., Zulu E. (2010). Family planning in sub-Saharan Africa: progress or stagnation? *Bulletin of the World Health Organization*. Available at: http://www.who.int/bulletin/volumes/89/2/10-077925/en/. Accessed on 15/06/2015.

55. Cleland, J., Shah, I, Benova, L. (2015). A Fresh Look at the Level of Unmet Need for Family Planning in the Postpartum Period, Its Causes and Program Implications. *International Perspectives on Sexual and Reproductive Health*. 41 (3), pp. 155 – 162.

56. Colleran, H., Jasienska, G., Nenko, I., Galbarczyk, A., Mace, R. (2015) "Fertility decline and the changing dynamics of wealth, status and inequality". *Proceedings of the Royal Society*. 282(1): pp. 1-9.

57. Commission on social determinants of health (CSDH). (2008). Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva, *World Health Organization*. Available at : http://apps.who.int/iris/bitstream/10665/43943/1/9789241563703_eng.pdf. Accessed on 15/02/2016.

58. Conniffe, D., Gash, V., O'Connell, P. (2000). Evaluating state programmes: 'Natural experiments' and propensity scores. *The Economic and Social Review*. 31(4): pp. 283-308.

59. Creanga, A., Gillespie, D., Karklins, S., Tsui, A. (2011). Low use of contraception among poor women in Africa: an equity issue. *Bulletin of the World Health Organization*. 89(4): pp. 241-316.

60. Csapo, M. (1983). Universal Primary Education in Nigeria: Its Problems and Implications. *African Studies Review*. 26(1): pp. 91-106.

61. D'Agostino, B. (1998). Tutorial in biostatistics: Propensity score methods for bias reduction in the comparison of a treatment to a non-randomized control group. *Statistics in Medicine*. 17(19): pp. 2265-2281.

62. Dambo, N., Jeremiah, I., Wallymahmed, A. (2017). Determinants of contraceptive use by women in the central senatorial zone of Bayelsa State, Nigeria: A cross-sectional survey. *Nigerian Medical Journal*. 58(1): pp.26–31.

63. Denno, D., Hoopes, A., Chandra-Mouli, V. (2015). Effective Strategies to Provide Adolescent Sexual and Reproductive Health Services and to Increase Demand and Community Support. *Journal of Adolescent Health*. 56(1): pp. 22-41.

64. Department for International Development (DFID). (2012). DFID's education programme in Nigeria: the community perspective. *DFID*. Available at: https://icai.independent.gov.uk/wp-content/uploads/ICAI-Nigeria-TORs-FINAL.pdf. Accessed on 21/06/2016.

65. Department for International Development (DFID). (2013). London summit on family planning. Summaries of commitments. . Available at: http://www.familyplanning2020.org/images/content/documents/London_Summit_Commitments_12-2-2013.pdf. Accessed on 11/08/2018.

66. Diez-Roux, A. (1998). "Bringing context back into epidemiology: Variables and fallacies in multilevel analysis." *American Journal of Public Health* 88 (2):pp. 216-222.

67. Dynes, M., Stephenson, R., Rubardt, M., and Bartel. D. (2012). "The influence of perceptions of community norms on current contraceptive use among men and women in Kenya." *Health and Place*. 18 (4): pp.766-773.

68. Egede, J., Onoh, R., Ugochukwu, O., Umeora, J., Iyoke, C., Benedict, I., Dimejesi. O., Lawani, L. (2015). Contraceptive prevalence and preference in a cohort of south–east Nigerian women. *Patient Preference and Adherence*. 9(1): pp. 707-714.

69. Ejughemre, U. (2013). Donor Support and the Impacts on Health System Strengthening in Sub-Saharan Africa: Assessing the Evidence through a Review of the Literature. *American Journal of Public Health Research*. 1 (7): pp. 146-151.

70. Emelonye, U. and Buergenthal, R. (2011). Nigeria: Peace Building through Integration and Citizenship. *International Development Law Organization*. Available at : http://idlo.int/sites/default/files/Nigeria%20-%20Peace%20Building%20Through%20Integration%20and%20Citizenship.pdf. Accessed on 15/06/2017.

71. Emina, J., Chirwa, T., Kandala,N. (2014). Trend in the use of modern contraception in sub-Saharan Africa: does women's education matter? *Contraception*. 90(2): pp. 1-9.

72. Erulkar, A and Tamrat, T. (2014). Evaluation of a Reproductive Health Program to Support Married Adolescent Girls in Rural Ethiopia. *African Journal of Reproductive Health*. 18 (2): pp. 68-76.

73. Fagbamigbe, A., Adebowale, A., Morhason-Bello, I. (2015). Survival analysis of time to uptake of modern contraceptives among sexually active women of reproductive age in Nigeria. *BMJ Open*. 5(1): pp. 1-11

74. Fairlie R. (2005). "An extension of the Blinder-Oaxaca decomposition technique to logit and probit model". *Journal of Economic and Social Measurement*. 30(2005): pp.305-316.

75. Federal Government of Nigeria, National Population Commission, U.S. Agency for International Development (USAID). (2015). Nigeria's 2004 National Policy on Population for Sustainable Development. Available at : https://www.healthpolicyproject.com/pubs/821_FINALNPPReport.pdf. Accessed on 27/08/2016.

76. Federal Government of Nigeria, National Population Commission, U.S. Agency for International Development (USAID). (2015). Nigeria's 2004 National Policy on Population for Sustainable Development. Available at : https://www.healthpolicyproject.com/pubs/821_FINALNPPReport.pdf. Accessed on 27/08/2016.

77. Federal Ministry of Health, Nigeria. (1995). National Adolescent Health Policy *Federal Ministry of Health*. Available at: http://www.youth-policy.com/policies/Nigeria%20National%20Adolescent%20Health%20Policy.pdf. Accessed on 05/02/2015.

78. Federal Ministry of Health, Nigeria. (2001). National Reproductive Health Policy and Strategy to Achieve Quality Reproductive and Sexual Health for all Nigerians. *Federal Ministry of Health*. Available at : http://www.youth-policy.com/Policies/Nigeria%20National%20Reproductive%20Health%20Policy%20and%20Strategy.pdf . Accessed on 01/07/2015.

79. Federal Ministry of Health, Nigeria. (2006). Nigeria National Reproductive Health Strategic Framework and Plan, 2002–2006. Available at: http://www.policyproject.com/pubs/countryreports/nig_rhstrat.pdf. Accessed on 12/03/2017.

80. Federal Ministry of Health, Nigeria. (2007). National Strategic Framework on the Health & Development of Adolescents & Young People in Nigeria. *Federal Ministry of Health*. Available at:

file:///C:/Users/Lenovo/Downloads/adolescents-health-policy-2007-2011%20(2).pdf. Accessed on 05/02/2015.

81. Federal Ministry of Health. (2008). National aids and reproductive health survey, 2007. Abuja:*Federal Ministry of Health.* Available at : http://www.nepwhan.net/assets/NigeriaNARHSPlus2007.pdf. Accessed on 03/03/2017.

82. Federal Ministry of Labour and Productivity (FMLP). (2013). National Action Plan for the Elimination of Child Labour. Available at: http://www.ilo.org/wcmsp5/groups/public/---africa/---ro-addis_ababa/---ilo-abuja/documents/publication/wcms_303410.pdf. Accessed on 27/03/2016.

83. Federal Republic of Nigeria. (1988). *National policy on population for development, unity, progress and self-reliance*. Lagos-Nigeria: National Population Commission.

84. Federal Republic of Nigeria. (2014). National HIV/AIDS and reproductive health survey 2012. Edited by Department of Reproductive Health. Abuja-Nigeria: *Federal Ministry of Health*. Available at : http://naca.gov.ng/wordpress/wp-content/uploads/2016/11/NARHS-Plus-2012-Final-18112013.pdf. Accessed on 27/02/2017.

85. Gallant, M and Maticka-Tyndale, E. (2004). School-based HIV prevention programmes for African Youth. *Social Science & Medicine*. 58 (7): pp. 1337-1351.

86. Garenne ,M. (2008). DHS Comparative Report No 18. Calverton, MD: Macro International Inc. Fertility changes in Sub-Saharan Africa. *DHS*. Available at : https://dhsprogram.com/pubs/pdf/cr18/cr18.pdf. Accessed on 12/18/2018.

87. Geidam, A., Audu, B., Kullima, A., Kawuwa, M. (2007). Contraceptive Practices and Determinants of Current Contraceptive use in Borno State, Nigeria. *Borno Medical Journal*. 4(2): pp.12-18.

88. Gertler, P., Molyneaux, J. (1994). How economic development and family planning programs combined to reduce Indonesian fertility. *Demography* 31(1): pp. 33-63.

89. Gertler, P., Martinez, S., Premand, P., Rawlings, L., Vermeersch, C. (2011). Impact evaluation inpractice. *Washington DC: The World Bank*. Available at : https://siteresources.worldbank.org/EXTHDOFFICE/Resources/5485726-1295455628620/Impact_Evaluation_in_Practice.pdf. Accessed on 12/12/2017.

90. Global Partnership for Education. (2011). Education Sector Plan 2011-2020. Available at: http://www.globalpartnership.org/content/education-sector-plan-2011-2020-nigeria-sokoto. Accessed on 12/10/2016.

91. Goni, A. and Rahman M. (2012). The impact of education and media on contraceptive use in Bangladesh: A multivariate analysis. *International Journal of Nursing Practice*. 18(6): pp. 565–573.

92. Goujon, A., Fuchs, R. (2013). The Future Fertility of High Fertility Countries: A Model Incorporating Expert Arguments. *International Institute for Applied Systems Analysis*. Laxenburg, Austria. Available at: http://pure.iiasa.ac.at/10747/1/IR-13-013.pdf. Accessed on 02/01/2017.

93. Graff, M. and Bremner, J. (2014) *A Practical Guide to Population and Development*, Washington: USAID. Availble at:http://www.prb.org/pdf14/guide-population-development.pdf. Accessed on 15/04/2017.

94. Graff, M., Bremner, J. (2014) *A Practical Guide to Population and Development*, Washington: USAID. Availble at : http://www.prb.org/pdf14/guide-population-development.pdf. Accessed on 15/04/2017.

95. Gribble, J., Bremner, J. (2012) *Achieving a Demographic Dividend*, Washington: Population Reference Bureau. Available at: http://www.prb.org/pdf12/achieving-demographic-dividend.pdf. Accessed on 15/05/2017.

96. Grilli, R., Ramsey, C., Minozzi, S. (2002). Mass media interventions: Effects on health services utilisation. *The Cochrane Database of Systematic Reviews*, 389(1): pp. 1-10.

97. Guilkey, D., Hutchinson, P., Lance, P. (2006). Cost-effectiveness analysis for health communication programs. *Journal of Health Communication*. 11 (2): pp.47 –67.

98. Gupta, D., Bongaarts, J., Cleland, J. (2011). Population, Poverty, and Sustainable Development A Review of the Evidence. *World Bank*. Available at: http://documents.worldbank.org/curated/en/239381468170352053/pdf/WPS5719.pdf. Accessed on 12/06/2017.

99. Habumuremyi, P., and Zenawi. M. (2012). Making family planning a national development priority. Lancet. 380 (9837): pp. 78-80.

100. Handley, G., Higgins, K., Sharma, B., Bird, K., Cammack, D. Poverty and Poverty Reduction in Sub-Saharan Africa: An Overview of Key Issues. *Overseas Development Institute*. Report number:1.

101. Heckman, J., Ichimura, H., Todd, P. (1997). Matching As An Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme. *Review of Economic Studies*. 64(4): pp. 605 – 654.

102. Heckman, J., Smith, J. (1995). Assessing the case for social experiments. *The Journal of Economic Perspectives*. 9(2): pp. 85-110.

103. Ho, D., Imai, K., King, G. Stuart. (2007). Matching as Nonparametric Pre-processing for Reducing Model Dependence in Parametric Causal Inference. *Political Analysis*. 15 (1): pp. 199-236.

104. Hoke, T., Brunie, A., Kruege, K., Dreisbach, C., Akol, A., Rabenja, N., Olawo, A., Stanback, J. (2012). Community-Based Distribution of Injectable Contraceptives: Introduction Strategies in Four Sub-Saharan African Countries. *International Perspectives on Sexual and Reproductive Health*. 38 (4): pp. 214-219.

105. Holland, P. (1986). Statistics and causal inference. *Journal of the American Statistical Association,* 81 (1): pp. 945-960.

106. Holland, P. (1986). Statistics and causal inference. *Journal of the American Statistical Association*. 81(396): pp. 945-960.

107. Howe,L., Galobardes, B., Matijasevich, A., Gordon, D., Johnston, D., Onwujekwe, O., Patel, R., Webb, E., Lawlor, D. and Hargreaves, J. (2012). "Measuring socio-economic position for epidemiological studies in low- and middle-income countries: a methods of measurement in epidemiology paper". *International Journal of Epidemiology*; 41 (3): pp. 871-886.

108. Ijarotimi, A., Bakare, B., Badejoko, O., Fehintola, A., Loto, O., Orji, E., Adegoke, A. (2017). Contraceptive uptake among women attending family planning clinic in a Nigerian tertiary health facility: a 6 year review. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 4(3): pp. 721-724.

109. Imbens, G. (2004). Nonparametric estimation of average treatment effects under exogeneity: A review. *The Review of Economics and Statistics*. 86(1): pp. 4-29.

110. Imbens, G., Angrist, J. (1994). Identification and estimation of local average treatment effects. *Econometrica*. 61(2): pp. 467-476.

111. Isiugo-Abanihe, U.C. (1994). "Reproductive Motivation and Family-Size Preferences among Nigerian Men". *Population Council*. 25(3): pp. 149-161.

112. Jacobs, B., Ir, P., Bigdeli, M., Annear, P., Damme, W. (2011). Addressing access barriers to health services: an analytical framework for selecting appropriate interventions in low-income Asian countries. *Health Policy and Planning*. 1(1): pp. 1-13.

113. Jato, N., Simbakalia,C., Tarasevich, J., Awasum, N., Kihinga, N., and Ngirwamugu, E. (1999). "The impact of multi-media family planning promotion on the contraceptive behaviour of women in Tanzania." *International Family Planning Perspectives.* 25 (2): pp.60- 67.

114. Johnson, K., Abderrahim, N., Rutstein, S. (2011). DHS Analytical Studies. 23. Calverton, MD: Macro International Inc. Changes in the direct and indirect determinants of fertility in Sub-Saharan Africa. *DHS*. Available at: https://dhsprogram.com/pubs/pdf/AS23/AS23.pdf. Accessed on 19/09/2018.

115. Johnson, D., Woodman, B., Baruwa, S., Toriola, M., Chatterji, M., Kinnan, C., Jackson, J., Carmona, A. (2014). A Census of Private Health Facilities in Six States of Nigeria. Bethesda, MD: Strengthening Health Outcomes through the Private Sector Project. *USAID*. Available at: https://www.shopsplusproject.org/sites/default/files/resources/SHOPS%20Nigeria%20Private%20Sector%20Health%20Census_6.15.2014%20FINAL.pdf. Accessed: 30/04/2018

116. Jones, A. (2009). Panel data methods and applications to health economics. In Palgrave Handbook of Econometrics. Volume 2, Mills, T.C. and Patterson, K. (eds.), London Palgrave MacMillan, pp. 557-631.

117. Jones, A., Rice, N. (2011). Econometric evaluation of health policies. Oxford Handbook of Health Economics, Glied, S. and Smith, P.C. (eds.), Oxford, Oxford University Press, pp. 890-923.

118. Kincaid, D. Do, D., Do, M. (2006). Multivariate causal attribution and cost-effectiveness of a national mass media campaign in the Philippines. *Journal of Health Communication*. 11(2): pp. 1-10.

119. Kincaid, D., Merritt, A., Sandra de Castro Buffington, L., Marcos Paulo P. de Castro, and Bernadette Martin de Castro. (1996). Impact of a mass media vasectomy promotion campaign in Brazil. *International Family Planning Perspectives*. 22(4):pp. 169-175.

120. Korotayev, A., Zinkina, J. (2015). East Africa in the Malthusian trap? A statistical analysis of financial, economic, and demographic indicators. *ARXIV.ORG.* Available at : https://arxiv.org/ftp/arxiv/papers/1503/1503.08441.pdf. Accessed on 22/09/2016.

121. Lawanson, A. (2014). Health Care Financing in Nigeria: National Health Accounts Perspective. *Asian Journal of Humanities and Social Studies*. 2(2): pp. 237-252.

122. Leburu, V., El-Halabi, S., Mokganya, L., Mills, S. (2009). The Contribution of the Botswana Family Planning Program to the Largest Fertility Decline in Sub-Saharan Africa. *Department of public health, Ministry of health (Botswana)*. Available at : http://fpconference.org/2009/media/DIR_169701/15f1ae857ca97193ffff8363ffffd524.pdf. Accessed on 23/04/2016.

123. Lee, K., Lush, L., Walt, G., Cleland, J. (1998). Family Planning Policies and Programmes in Eight Low-Income Countries: A Comparative Policy Analysis. *Social Science & Medicine*. 47 (7): pp. 949-959.

124. Leke, A., Fiorini, R., Dobbs, R., Thompson, F., Suleiman, A., Wright, D. (2014). Nigeria's renewal: Delivering inclusive growth in Africa's largest economy. *McKinsey Global Institute*. Available at: https://www.canback.com/files/2014_MGI_Nigerias_renewal_Executive_summary.pdf. Accessed on 01/02/2017.

125. Lesthaeghe, R. (2014). The fertility transition in Sub-Saharan Africa into the 21st century. *Population Studies Center Research Reports. University of Michigan; Ann Arbor, Michigan* pp. 814–823.

126. Letamo, G., Navaneetham, K. (2015). Levels, trends and reasons for unmet need for family planning among married women in Botswana: a cross-sectional study. *BMJ Open*. 66(03): pp. 1-11.

127. Lucas, D. (1992). Fertility and Family Planning in Southern and Central Africa. *Studies in Family Planning*. 23 (3): pp. 145-158.

128. MacQuarrie, Kerry. (2014). Unmet Need for Family Planning among Young Women: Levels and Trends. DHS Comparative Reports No. 34. Rockville, Maryland, USA: ICF International. Available at: https://www.dhsprogram.com/pubs/pdf/CR34/CR34.pdf. Accessed on 13/12/2014.

129. Mahmood, N., and Ringheim, K. (1999). "Knowledge, approval and communication about family planning as correlates of desired fertility among spouses in Pakistan." *International Family Planning Perspectives* 23 (1):pp. 122-129.

130. Malarcher, S. (2010). A view of sexual and reproductive health through the equity lens. *World Health Organization, Geneva, Switzerland*. Available at: http://www.ncdsv.org/images/WHO_SocialDeterminantsSexualHealth_2010.pdf. Accessed on 12/01/2014.

131. Mauldin, W., Ross, J. (1991). Family Planning Programs: Efforts and Results, 1982–89. *Studies in Family Planning*. 22 (6): pp. 350-367.

132. Mayhew, S., Colombini, M., Kimani, J., Tomlin, K., Warren, C., Mutemwa, R. (2017). Fertility intentions and contraceptive practices among clinic-users living with HIV in Kenya: a mixed methods study. *BMC Public Health*. 17(626): pp. 1-15.

133. Meyer, B. (1995). Natural and quasi-experiments in economics. *Journal of Business and Economic Statistics*.12(1): pp. 151-161.

134. Measurement, Learning and Evaluation (MLE) for the Urban Reproductive Health Initiative. (2015). Nigeria 2014 Endline Survey. *NURHI*. Available at : http://www.nurhitoolkit.org/sites/default/files/tracked_files/NURHI_Endline_Report.pdf. Accessed on 03/02/2015.

135. Moffitt, R. (1991). Program evaluation with nonexperimental data. *Evaluation Review*. 15(3): pp. 291-314.

136. Mokomane, Z. (2013). Anti-Poverty Family-Focused Policies in Developing Countries. *United Nations*. Available at: http://www.un.org/esa/socdev/family/docs/WorkFamilyBalanceandIntergenerationalSolidarity.pdf. Accessed on 06/02/2017.

137. Monjok, E., Smesny, A., Ekabua, J., Essien, E. (2010). Contraceptive practices in Nigeria: Literature review and recommendation for future policy decisions. *Open Access Journal of Contraception*. 1(1). pp. 9-11.

138. Muhoza, D., Broekhuis, A., Hooimeijer, P. (2014). Variations in Desired Family Size and Excess Fertility in East Africa. *International Journal of Population Research*. 486(79): 1-11.

139. Mwaikambo, L., Speizer, I., Schurmann, A., Morgan, G., Fikree, F. (2011). What works in family planning interventions: A systematic review of the evidence. *Studies in Family Planning*. 42(2): 67-82.

140. National Academy of Sciences (NAS). The Determinants of Recent Trends in Fertility in Sub-Saharan Africa: A Workshop Summary. Washington, DC: *National Academies Press*.

141. National Bureau of Statistics (NBS). (2008). Nigeria Multiple Indicator Cluster Survey 2007 Final Report Abuja Nigeria. *National Bureau of Statistics*. Available at: file:///C:/Users/umoaa/Downloads/MICS3%20Final%20Draft%20Report.pdf. Accessed on 20/01/2015.

142. National Population Commission (NPC) and ICF International. (1999). Nigeria Demographic and Health Survey 2013. *USAID*. Available at : https://www.dhsprogram.com/pubs/pdf/FR115/FR115.pdf. Accessed on 01/02/2015.

143. National Population Commission (NPC) and ICF International. (2014). Nigeria Demographic and Health Survey 2013. *USAID*. Available at : https://dhsprogram.com/pubs/pdf/FR293/FR293.pdf. Accessed on 01/02/2015

144. Nations U: Department of E, Social A. (2010). The millennium development goals report. 2010. In New York: United Nations, *Department of Economic and Social Affairs*.

145. Nigerian Population Commision (NPC). (2010). 2006 Population and Housing Census. *National Population Commission*. Available at: http://population.gov.ng/core-activities/surveys/dataset/2006-phc-priority-tables/. Accessed on 10/04/2014.

146. Nyongesa, P., Odunga, J. (2015). Contraceptive Use in Sub-Saharan Africa: The Sociocultural Context. *International Journal of Public Health Research*. 3(6): pp. 336-339.

147. O'Donnell, o. (2007). Access to health care in developing countries: breaking down demand side barriers. *Cad. Saúde Pública*. 23(12): pp. 2820-2834.

148. O'Reilly, H., Grout-Smith, J., Tanner, S. (2012). State of girls' education in Africa: Achievements since 2000, challenges and prospects for the future. *Plan UK*. Available at : http://efc.idnet.net/publications/State%20of%20Girls%27%20Education%20in%20West%20Africa_ENG.pdf. Accessed on 04/02/2018.

149. Oaxaca, R., (1973). "Male-Female Wage Differentials in Urban Labor Markets". *International Economic Review*. 14(1): pp. 693–709. *PLoS ONE*. 9(6): pp. 1-7.

150. Ogunbekun, I., Ogunbekun, A., Orobaton, N. (1999). Private health care in Nigeria: walking the tightrope. *Health Policy and Planning*. 14(2): pp. 174-181.

151. Ohagwu, C., Eze, C., Eze, J., Odo, M., Abu, P., Ohagwu, C.I. (2014). Perception of Male Gender Preference Among Pregnant Igbo Women. *Annals of Medical and Health Sciences Research*. 4(2): pp. 173–178.

152. Okpala, A. (1990). Nigerian population growth and its implications for economic development. *Scandinavian Journal of Development Alternatives*. 9(4): pp. 63-77.

153. OlaOlorun, F and Hindin, M. (2014). Having a Say Matters: Influence of Decision-Making Power on Contraceptive Use among Nigerian Women Ages 35–49 Years. *PLoS ONE*. 9(6): pp. 1-7.

154. OlaOlorun, F. and Hindin, M. (2014). "Having a Say Matters: Influence of Decision-Making Power on Contraceptive Use among Nigerian Women Ages 35–49 Years". *PLoS One*. 9(6): pp. 1-7.

156. O'Neill, B., Liddle, B., Jiang, L., Smith, K., Pachauri, S., Dalton, M., et al. (2012). Demographic change and carbon dioxide emissions. *Lancet*. 380 (9837): pp. 157-164.

157. Osemwenkha, S. (2004). Gender Issues in Contraceptive Use among Educated Women in Edo State, Nigeria. *African Health Sciences*. 4(1): pp. 40–49.

158. Osotimehin, B. (2012). Family planning save lives, yet investments falter. *Lancet*. 380(9837): pp. 82-83.

159. Oye-Adeniran, B et al. Community-Based Survey of Unwanted Pregnancy in Southwestern Nigeria. (2006). *African Journal of Reproductive Health.* 8 (3), pp. 103-115.

160. Oyeka, I. (1989). Influence of the number of living sons on contraceptive use among female teachers in Nigeria. *Studies in Family Planning*. 20(3): pp. 170-174.

161. PATH and United Nations Population Fund (UNFPA). (2006). Meeting the Need: Strengthening Family Planning Programs. Seattle: *PATH/UNFPA*. Available at: https://www.unfpa.org/sites/default/files/resource-pdf/family_planning06.pdf. Accessed on 15/01/2015.

162. Pathfinders International. (1993). Nigeria Family Health Services. *Pathfinders International*. pp. 1-5. Available at: http://pdf.usaid.gov/pdf_docs/PDABH196.pdf. Accessed on 05/05/2015.

163. Pitt, M., Rosenzweig, M., Gibbons, D. (1993). The determinants and consequences of the placement of government programs in Indonesia. *The World Bank Economic Review*. 7(3): pp. 319-348.

164. Pitt, M., Rosenzweig, M., Gibbons, D. (1993). The Determinants and Consequences of the Placement of Government Programs in Indonesia. *World Bank Economic Review*. 7(3): pp. 319- 348.

165. Pritchett, L. (1994). The Impact of Population Policies: Reply. *Population and Development Review*. 20(3): pp. 621-630.

166. Ramjee, G., Daniels, B. (2013). Women and HIV in Sub-Saharan Africa. *AIDS Research and Therapy*. 10(30) : 1-9.

167. Rosenbaum, P., Rubin, D. (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika*. 70(1): pp. 41-55.

168. Rosenzweig, M., Wolpin, K. (1986). Evaluating the Effects of Optimally Distributed Public Programs: Child Health and Family Planning Interventions. *American Economic Review*. 76(3): pp. 470 – 482.

169. Ross, J., Hardee, K. (2012). Access to contraceptive methods and prevalence of use. *Journal of Biosocial Science*. 45 (1): pp. 761-778.

170. Ross, J., Keesbury, J., Hardee, K. (2015). Trends in the Contraceptive Method Mix in Low- and Middle-Income Countries: Analysis Using a New "Average Deviation" Measure. *Global Health: Science and Practice*. 3(1): pp. 34-55.

171. Rubin, D. (1974). Estimating causal effects of treatments in randomized and nonrandomized studies. *Journal of Educational Psychology,* 66 (1): pp.688-701.

172. Rutayisire, P., Hooimeijer, P., Broekhuis, A. (2014). Changes in Fertility Decline in Rwanda: A Decomposition Analysis. *International Journal of Population Research*. 486(210): pp. 1-10.

173. Schlachter, B. (2016). FP2020 Momentum at the midpoint. *Family Planning 2020*. Available at : http://progress.familyplanning2020.org/uploads/08/01/FP2020_DIGITAL_Single_LoRes.pdf. Accessed on 15/03/2016.

174. Sedgh, G., Ashford, L., Hussain, R. (2016). Unmet Need for Contraception in Developing Countries: Examining Women's Reasons for Not Using a Method. *Guttmacher Institute*. Available at : https://www.guttmacher.org/sites/default/files/report_pdf/unmet-need-for-contraception-in-developing-countries-report.pdf. Accessed on 12/12/2016.

175. Seiber, E., Bertrand, J., Sullivan, T. (2007). Changes in contraceptive method mix in developing countries. *International Family Planning Perspectives*. 33(3): pp. 117-123.

176. Senarath, U. and Gunawardena N. (2009). "Women's Autonomy in Decision Making for Health Care in South Asia". *Asia-Pacific Journal of Public Health*. 21(2): pp. 137-143.

177. Senibi, V., Oduntan, E., Uzoma, O., Senibi, E., Oluwaseun, A. (2016). Public Debt and External Reserve: The Nigerian Experience (1981–2013). *Economics Research International*. 10(1155): pp. 1-7.

178. Sinding, S. (2009). Population, poverty and economic development. Philosophical *Transactions of the Royal Society B*. 364 (1): pp. 3023-3030.

179. Singh, S., Sedgh, G., Hussain, R. (2010) 'Unintended pregnancy:worldwide, levels, trends and outcomes', *Studies on Family Planning,* 41(370), pp. 1338-1345.

180. Smith, A., Todd, E., (2005). Does matching overcome LaLonde's critique of nonexperimental estimators?. *Journal of Econometrics*. 125 (1): pp. 305-353.

181. Solanke. B. (2017). "Factors influencing contraceptive use and non-use among women of advanced reproductive age in Nigeria". *Journal of Health, Population and Nutrition*. 36 (1): pp. 1-14.

182. Sowden, A., Arblaster, L., Stead, L. (2003). Community interventions for preventing smoking in young people. *The Cochrane Database of Systematic Reviews*. 2000(2): pp. 12.

183. Srikanthan, A., Reid, R. (2008). Religious and Cultural Influences on Contraception. *Journal of Obstetrics and Gynaecology Canada*. 30 (2): pp. 129-137.

184. Starbird, E., Norton, M., Marcus, R. (2016). Investing in Family Planning: Key to Achieving the Sustainable Development Goals. *Global Health: Science and Practice*. 4(2): pp. 191-210.

185. Stephenson, R., Baschieri, A., Clement, S., Hennink, M., and Madise. N. (2007). "Contextual influences on modern contraceptive use in Sub-saharan Africa." *American Journal of Public Health* 97 (7): pp. 1233-1240.

186. The United Nations Educational, Scientific and Cultural Organization (UNESCO). (2015). UNIVA Functional Literacy Programme (UFLP). Available at: http://litbase.uil.unesco.org/?menu=9&programme=17. Accessed on 14/02/2016.

187. Thummalachetty, N., Mathur, S., Mullinax, M., DeCosta, K., Nakyanjo, N., Lutalo, T., Brahmbhatt, H., Santelli, J. (2017). Contraceptive knowledge, perceptions, and concerns among men in Uganda. *BMC Public Health*. 17(792): pp. 1-8.

188. Tsui, A., McDonald-Mosley, R., Burke, E. (2010). Family Planning and the Burden of Unintended Pregnancies. *Epidemiologic Reviews.* 32(1): pp. 152-174.

189. United Nations (UN), Department of Economic and Social Affairs, Population Division (2015). Trends in Contraceptive Use Worldwide 2015. *United Nations*. Available at : http://www.un.org/en/development/desa/population/publications/pdf/family/trendsContraceptiveUse2015Report.pdf. Accessed on 01/07/2017.

190. United Nations (UN), Department of Economic and Social Affairs, Population Division. World contraceptive use 2014. (2014). Available from: http://www.un.org/en/development/desa/population/publications/dataset/contraception/wcu2014.shtml. Accessed on 05/12/2016.

191. United Nations (UN). (2009). Completing the Fertility Transition. *United Nations Population Division*. Available at: http://www.un.org/esa/population/publications/completingfertility/bulletin-english.pdf. Accessed on 26/07/2016.

192. United Nations (UN). (2011). Population Distribution, Urbanization, Internal Migration and Development: An International Perspective. *United Nations Department of Economic and Social Affairs and Population Division*. Report number: 1

193. United Nations (UN). (2015). World Population Prospects The 2015 Revision. *United Nations*. Available at: https://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf. Accessed on 01/03/2017.

194. United Nations. Department of Economic and Social Affairs. Population Division. (2016). Revision of World Population Prospects. *UN*. Available at :http://esa.un.org/unpd/wpp/. Accessed on 11/09/2018.

195. United Nations Development Programme (UNDP) (1966). Reproductive Rights. Available at: http://www.un.org/en/development/desa/population/theme/rights/ . Access on 15/05/2017.

196. United Nations Educational, Scientific and Cultural Organisation (UNESCO). (2013). Girls' education – the facts. UNESCO. Available at: https://en.unesco.org/gem-report/sites/gem-report/files/girls-factsheet-en.pdf. Accessed on 01/02/2016.

197. United Nations Educational, Scientific and Cultural Organisation (UNESCO). (2015). Gender and EFA 2000-2015: achievements and challenges. UNESCO. Available at: http://unesdoc.unesco.org/images/0023/002348/234809E.pdf. Accessed on 01/02/2016.

198. United Nations International Children's Emergency Fund (UNICEF). Situation Analysis of Children and Women in Nigeria. (2011). *UNICEF*. Available at: https://www.unicef.org/nigeria/SITAN_UNICEF_Nigeria_2011_FINAL_2012_Sept.pdf. Accessed on 12/03/2017.

199. United Nations Population Fund (UNFPA) (2015). UNFPA Supplies 2015. *United Nations Population Fund*. Available at : https://www.rhsupplies.org/uploads/tx_rhscpublications/UNFPA_Supplies_Annual_Report_2015__FINAL.pdf. Accessed on 05/06/2017.

200. United Nations Population Fund (UNFPA). (1992). Pop. Growth and Eco. Devel: The Policy Response of Governments. UNFPA. Available at : http://www.un.org/popin/unfpa/pubs/econmeet/sect6.html. Accessed on 15/06/2015.

201. United Nations Population Fund (UNFPA). (2007). Population, Health and Socio-economic Indicators/Policy Developments. Overview: Nigeria. Available at: www.unfpa.org/profile/nigeria.cfm?Section=1. Accessed on 13/01/2017.

202. United Nations Population Fund (UNFPA). (2011). "Socio-Cultural Influences on the reproductive health of migrant women". Available at : https://www.unfpa.org/sites/default/files/pub-pdf/Migrant_Vietnam_.pdf. Accessed on 01/06/2017.

203. United Nations Population Fund (UNFPA). (2012). Population Dynamics in the Least Developed Countries: Challenges and Opportunities for Development and Poverty Reduction. *United Nations Population Fund*. Available at:

https://www.unfpa.org/sites/default/files/pub-pdf/CP51265.pdf. Accessed on 01/02/2016.

204. United Nations Population Fund (UNFPA). (2017). Regional Interventions Action Plan. *United Nations Population Fund*. Available at: file:///C:/Users/Lenovo/Downloads/ESARO_merged.pdf. Accessed on 06/09/2017.

205. United Nations. (Department of Economic and Social Affairs, Population Division). (2015). *Trends in Contraceptive Use Worldwide 2015*. Available at: http://www.un.org/en/development/desa/population/publications/pdf/family/trendsContraceptiveUse2015Report.pdf. Accessed on 05/01/2017.

206 United States Agency for International Development (USAID). (1979). Family Planning Program Effectiveness: Report of a Workshop. USAID. Available at: http://pdf.usaid.gov/pdf_docs/PNAAN196.pdf. Accessed on 12/12/2015.

207. United States Agency for International Development (USAID). (2003). Annual Report for FY 2003. Available at: https://www.msh.org/sites/msh.org/files/ACR_ZW_Annual_Report_10-03-1.pdf. Access on 13/07/2016.

208. United States Agency for International Development (USAID). (2004). Sub-Saharan Africa: U.S National Interests. Available at : www.usaid.gov.policy/budget/cbj2004/SubSaharan_africa/. Accessed on 12/12/2016.

209. United States Agency for International Development (USAID)., Africa Bureau., Population and Reproductive Health., Ethiopia Federal Ministry of Health., Malawi Ministry of Health., Rwanda Ministry of Health. (2012). Three Successful Sub-Saharan Africa Family Planning Programs: Lessons for Meeting the MDGs. Available at: http://pdf.usaid.gov/pdf_docs/PA00HQSV.pdf. Accessed on 15/05/2017.

210. Universal Basic Education Commission (UBEC). (1999). Universal Basic Education (UBE). *UBEC*. Available at : https://ubeconline.com/. Accessed on 15/07/2015.

211. Universal Basic Education Commission (UBEC). (2004). Universal Basic Education (UBE). *UBEC*. Available at : https://ubeconline.com/. Accessed on 15/07/2015.

212. Uzochukwu, C., Fawole, O., Adebowale, A. (2016). Women Empowerment And Modern Contraceptive Use Among Married Women In Ibadan, Oyo State. *African Population Studies*. 30(2): pp. 1-7.

213. van der Gaag, J., Gustafsson-Wright, E., Tanović, Z., Kramer, B., Janssens, W., Duynhouwer, A., et al. (2013). A Short-term impact evaluation of the health insurance fund program in central Kwara state, Nigeria. *Amsterdam Institute for International Development*. Available at : https://www.pharmaccess.org/wp-content/uploads/2016/08/A-Short-term-Impact-Evaluation-of-the-Health-Insurance-Fund-Program-in-Central-Kwara-State-Nigeria.compressed.pdf. Accessed on 16/02/2017.

214. Van Rossem, R., Meekers, D. (2000). An evaluation of the effectiveness of targeted social marketing to promote adolescent and young adult reproductive health in Cameroon. *AIDS Education and Prevention*. 12(5): pp. 383-404.

215. Vidanapathirana, J., Abramson, M., Forbes, A., Fairley, C. (2005). Mass media interventions for promoting HIV testing. *The Cochrane Database of Systematic Reviews.* 20(3): pp. 1-10.

216. Wagstaff, A., Yu, S. (2007). Do health sector reforms have their intended impacts? The World Bank's Health VIII project in Gansu province, China. *Journal of Health Economics*. 26(3): pp. 505 – 535.

217. Wang, W., Alva, S.,Winter, R. and Bugert, C. 2013. Contextual influences of modern contraceptive use among rural women in Rwanda and Nepal. DHS Analytic studies no. 14. Washington DC USA: USAID.

218. Weiss, C. (1972). Evaluation Research: methods for assessing program effectiveness. *Englewood*. Cliffs.

219. Westoff, C., Bietsch, K., and Koffman, D. (2013). Indicators of trends in fertility in Sub-Saharan Africa . *DHS Analytical Studies No 34. Calverton, MD: Macro International Inc*. Available at : https://www.dhsprogram.com/pubs/pdf/AS34/AS34.pdf. Accessed on 05/10/2018.

220. WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division (2014). Trends in Maternal Mortality: 1990 to 2013.*World Health Organization*. Available at: http://apps.who.int/iris/bitstream/10665/112682/2/9789241507226_eng.pdf. Accessed on 29/02/2016.

221. WHO, UNICEF, UNFPA, World Bank Group, and United Nations Population Division. (2016). Maternal mortality in 1990-2015: Nigeria. *World Health Organization*. Available at : http://www.who.int/gho/maternal_health/countries/nga.pdf. Accessed on 12/12/2016.

222. Worku A., Tessema G., Zeleke A. (2015). "Trends of Modern Contraceptive Use among Young Married Women Based on the 2000, 2005, and 2011 Ethiopian Demographic and Health Surveys: A Multivariate Decomposition Analysis". *PLoS ONE* 10(1): pp. 1-14.

223. World Bank. (2016). World Bank Group Country Survey 2016. *World Bank*. Available at: http://microdata.worldbank.org/index.php/catalog/2714. Accessed on 01/11/2016.

224. World Bank. (2017). World Development Indicators: Reproductive health. Available at: http://wdi.worldbank.org/table/2.17. Accessed on 10/04/2015.

225. World Health Organisation (WHO). (2012). Family Planning Summit – London, July 2012. Available at: http://www.who.int/pmnch/about/steering_committee/b12-12-item5_fp_summit.pdf. Accessed on 10/06/2015.

226. World Health Organisation (WHO). (2013). Ethical issues in Patient Safety Research Interpreting existing guidance. *World Health Organisation*. Available at: http://apps.who.int/iris/bitstream/10665/85371/1/9789241505475_eng.pdf. Accessed on 06/06/2016.

227. World Health Organisation (WHO). (2017). Family planning/Contraception. *World Health Organisation*. Available at: http://www.who.int/mediacentre/factsheets/fs351/en/. Accessed on 12/04/2017.

228. World Health Organisation. (WHO). (2009). Global tuberculosis control - epidemiology, strategy and financing. *WHO Report 2009*. Available at: www.who.int/tb/publications/global_ report/2009/en/index.html. Accessed on 20/01/16.

229. World Health Organization (WHO). (2012). WHO, Safe Abortion: Technical and Policy Guidance for Health Systems. *World Health Organization*. Available at: http://apps.who.int/iris/bitstream/10665/70914/1/ 9789241548434 eng.pdf. Accessed on 10/02/2015.

230. Wynn, B.O., Dutta, A., Nelson, M. (2006). Challenges in programme evaluation of health interventions in developing countries. Santa Monica, CA: *Rand Corporation*.

231. Yanovitzky, I., Zanutto, E., Hornik, R. (2005). Estimating causal effects of public health education campaigns using propensity score methodology. *Evaluation and Program Planning.* 28(2): pp. 209-220.

232. Yihunie, L., Reda, A., Tamene, H., Benedict, S., and Deribe, K. (2013). "Geographical variation and factors influencing modern contraceptive among married women in Ethiopia: Evidence from a national population based survey." *Reproducitve Health*. 10 (1): pp. 52.

233. Zaidi, B., Hussain, S. (2015). Reasons for Low Modern Contraceptive Use – Insights from Pakistan and neighboring countries. *Population Council*. Avalable at: https://www.popcouncil.org/uploads/pdfs/2015RH_LitReview-RAF.pdf. Accessed on 01/08/2017.

234. Zhao, Z. (2004). Using matching to estimate treatment effects: Data requirements, matching metrics, and Monte Carlo evidence. *The Review of Economics and Statistics* 86(1): pp. 91–107.

Appendix

Table A1: Margins by sub-groups in modern contraceptive use

	Older		Younger		Child		No	
Modern Use	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**
	Coef.	**Coef**	**Coef.**	**Coef**	**Coef**	**Coef**	**Coef**	**Coef**
Education (Ref: No)								
Primary	0.306***	0.295***	0.165**	0.117	0.237**	0.287**	-0.717	0.399
Secondary	0.321***	0.327***	0.225***	0.086	0.312**	0.361**	0.197	0.433
Higher	0.356***	0.214***	0.708***	0.284***	0.399**	0.299**	0.910**	0.479
Wealth (Ref: Poorest)								
Poorer	0.127*	0.017	0.040*	-0.016	0.128**	0.017	-0.063	-0.158
Middle	0.107	-0.00	0.009**	-0.056	0.158**	-0.001	-0.084	-0.132
Richer	0.189**	0.072	-0.053	-0.068	0.211**	0.048	-0.348*	-0197
Richest	0.179***	0.111	0.232***	-0.195**	0.169**	0.052	-0.153*	-0.353
Religion (Ref: Non-Muslim)								
Muslim	-0.248***	-0.060	-0.275**	-0.313***	-0.252*	-0.075*	-0.465*	-0.612
Age	-	-	-	-	0.116**	0.120**	0.026	0.021
Age^2	-	-	-	-	-0.002*	-0.001*	0.001	0.001
Marital Status (Ref: Never married)								
Living together	0.037	0.475***	0.177***	0.259***	0.015	-0.310*	-0.652*	-0.477
Separated	-0.138	0.035	0.281**	0.128	-0.057	-0.654*	-0.187*	-0.264
Widowed	-0.162***	-0.138	-0.069	-0.331	-0.888*	-0.005*	0.001	-0.126
House Fund Decision (Ref: No Choice)								
Full choice	0.179***	0.262***	0.289***	0.567***	0.207**	0.368**	-0.210	0.001
Medium choice	0.136***	0.111*	0.151***	0.124**	0.142**	0.135**	-0.669*	0.286
Others Decide	-0.358***	-0.261**	-0.456**	0.146*	-0.443*	-0.065	-0.097	0.001
Affects health(Ref: Yes)	-0.475***	-0.505***	-0.048*	-0.334***	-0.395*	-0.461*	0.191**	-0.293
Region (Ref: Abuja)								
Zaria	-0.680***	-0.368***	-0.947***	-0.208***	-0.852*	-0.198*	-0.087*	-0.810
Kaduna	-0.331***	-0.215***	-0.348***	-0.111	-0.351*	-0.150*	-0.480*	-0.244*
Ibadan	0.143***	0.103*	0.096**	0.038	0.079*	0.136**	0.062	-0.31
Ilorin	-0.104*	-0.164***	0.062	-0.120**	-0.120*	-0.118*	-0.229*	0.118
Benin	-0.343***	-0.227***	-0.012	-0.189**	-0.368*	-0.208*	0.110	-0.341*
R^2	**0.167**	**0.175**	**0.149**	**0.157**	**0.192**	**0.162**	**0.188**	**0.152**

***** p < 0.001, **p < 0.01,*p < 0.05**

Table A2: Margins by sub-groups in modern contraceptive use

	Sons		No Sons	
Modern Use	**2009**	**2014**	**2009**	**2014**
	Coef.	**Coef**	**Coef.**	**Coef**
Education (Ref: No Education)				
Primary	0.266***	0.252***	0.080	-0.081
Secondary	0.339***	0.276***	0.344**	0006
Higher	0.407***	0.226***	0.514***	0.001
Wealth (Ref: Poorest)				
Poorer	0.122***	0.031	0.138	-0.021
Middle	0.139***	0.034	0.147	-0.105
Richer	0.183***	0.103**	0.199*	0.022
Richest	0.141***	0.104**	0.113	-0.051
Religion (Ref: Non-Muslim)				
Muslim	-0.267***	-0.137***	-0.087	-0.126
Age	0.106***	0.120***	0.026	0.021
Age^2	-0.001***	-0.001**	-0.001	-0.001
Marital Status (Ref: Never married)				
Living together	-0.045*	-0.287	0.222	-0.311
Separated	-0.072	-0.520**	0.013	-0.494
Widowed	-0.108***	-0.775***	-0.387	0.001
House Fund Decision (Ref: No Choice)				
Full choice	0.233***	0.444***	-0.060	0.150
Medium choice	0.180***	0.056***	-0.126*	0.111
Others Decide	-0.393***	0.026*	-0.694**	-0.673
Affects health(Ref: Yes)	-0.402***	-0.464***	-0.377***	-0.110***
Region (Ref: Abuja)				
Zaria	-0.919***	-0.231***	-0.464***	-0.113
Kaduna	-0.414***	-0.164***	-0.106	0.066
Ibadan	0.026	0.157***	0.313**	0.257*
Ilorin	-0.158***	-0.063	0.021	-0.232
Benin	-0.437***	-0.195***	-0.156	-0.431**
R^2	**0.138**	**0.187**	**0.117**	**0.117**

***** p < 0.001, **p < 0.01,*p < 0.05**

Table A3: Margins by sub-groups in use of FP service

	Older		Younger		Child		No child	
Use of FP	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**	**2009**	**2014**
	Coef.	**Coef**	**Coef.**	**Coef**	**Coef**	**Coef**	**Coef**	**Coef**
Education (Ref: No Education)								
Primary	0.091*	0.148**	0.099**	0.126	0.033**	0.037	0.038*	0.633
Secondary	0.203***	0.210***	0.094**	0.291***	0.097***	0.097**	0.189**	0.067**
Higher	0.199***	0.396***	0.053	0.259**	0.147***	0.108***	0.400***	0.965
Wealth (Ref: Poorest)								
Poorer	0.061	0.059	-0.021*	0.135*	0.020	0.070	0.034*	0.181
Middle	0.049	-0.121*	0.049**	-0.061	0.028*	-0.051	0.035*	0.074
Richer	0.083	0.133**	0.005**	-0.045	0.022*	0.034	0.117*	0.187
Richest	0.142**	0.265***	0.058**	0.017*	0.032*	0.029	0.175*	0.189
Religion (Ref: Non-Muslim)								
Muslim	0.222***	0.204**	0.008	0.054	0.044	0.162***	0.071	0.965**
Age	-	-	-	-	0.096***	0.074***	0.218***	0.132
Age^2	-	-	-	-	-0.004***	-0.002***	-0.004***	-0.004
Marital Status (Ref: Never married)								
Living together	0.692***	0.195***	0.961***	0.280***	0.631***	0.928***	0.533***	0.965**
Separated	-0.244	-0.199	0.194***	0.602***	-0.327**	-0.025	0.024**	0.802**
Widowed	0.139	0.052	0.231***	0.218***	0.127	0.057	0.001	0.001
House Fund Decision (Ref: No Choice)								
Full choice	0.102*	-0.164**	0.050*	-0.047	0.084**	-0.097*	-0.165	0.189
Medium choice	0.162***	-0.114**	0.132***	-0.020*	0.135***	0.135**	-0.058	0.374
Others Decide	-0.038	-0.021**	-0.201***	-0.155*	-0.143***	-0.030**	-0.406	0.487
Affects health(Ref: Yes)	0.022	0.022	-0.021	0.107**	-0.022	0.070**	-0.130**	0.145
Region (Ref: Abuja)								
Zaria	-0.055	0.404***	0.125***	0.271***	0.091	0.304***	-0.250	0.062
Kaduna	-0.219**	-0.020	0.089*	0.082*	-0.069	0.047	-0.323**	-0.003
Ibadan	-0.271***	-0.056	0.011	0.089	-0.103***	-0.003	-0.292**	-0.033
Ilorin	-0.392***	0.115	0.119**	0.257**	-0.081	0.188***	-0.213	0.205
Benin	-0.012	0.055	0.028	-0.030**	0.059	0.008	-0.384**	-0.202
R^2	**0.132**	**0.159**	**0.282**	**0.302**	**0.122**	**0.196**	**0.289**	**0.32**

Table A4: Margins by sub-groups in use of FP service

	Sons		No Sons	
Modern Use	**2009**	**2014**	**2009**	**2014**
	Coef.	**Coef**	**Coef.**	**Coef**
Education (Ref: No Education)				
Primary	0.052	0.054	0.061	-0.012
Secondary	0.079*	0.068	0.287***	0.228**
Higher	0.112**	0.110*	0.453***	0.407**
Wealth (Ref: Poorest)				
Poorer	0.023*	0.085	0.005	-0.036
Middle	0.014*	0.065	0.141*	0.006
Richer	0.070*	0.007	0.023*	0.199
Richest	0.025*	0.031	0.061*	0.027
Religion (Ref: Non-Muslim)				
Muslim	0.071**	0.182***	-0.066	-0.011
Age	0.092***	0.077***	0.091**	0.082*
Age^2	-0.002***	-0.002***	-0.003***	-0.003**
Marital Status (Ref: Never married)				
Living together	0.607***	0.907***	0.849***	0.836**
Separated	-0.438**	0.006	0.011*	0.021
Widowed	0.156	0.166	-0.162*	-0.095
House Fund Decision (Ref: No Choice)				
Full choice	0.066	-0.077	0.151	0.121
Medium choice	0.13***	0.056	0.104	0.107
Others Decide	-0.125**	-0.077**	-0.216*	-0.175*
Affects health(Ref: Yes)	-0.009	0.069**	-0.086	0.094
Region (Ref: Abuja)				
Zaria	0.051	0.317***	0.165	0.176
Kaduna	-0.140**	0.025*	0.142	-0.083
Ibadan	-0.155**	0.001*	0.119	-0.031
Ilorin	-0.161**	0.181**	0.202*	0.317**
Benin	0.027	0.039	0.196*	-0.176
R^2	**0.128**	**0.197**	**0.114**	**0.203**

***** p < 0.001, **p < 0.01,*p < 0.05**

Table A5: Probit model results for the estimation of the propensity score

Variables	Coef.	SE
Education (Ref: No Education)		
Primary	0.218***	0.066
Secondary	0.463***	0.066
Higher	0.615***	0.079
Wealth (Ref: Poorest)		
Poorer	0.299***	0.042
Middle	0.403***	0.071
Richer	0.545*	0.081
Richest	0.831	0.081
Parity (Ref: No children)		
1-4	0.363***	0.024
5-8	0.358	0.024
9-12	0.278	0.024
Religion (Ref: Non-Muslim)		
Muslim	0.341***	0.054
Marital Status (Ref: Never married)		
Living together	0.094	0.019
Separated	0.384	0.101
Widowed	0.681***	0.022
Decision Index (Ref: No Choice)		
Full choice	0.242***	0.074
Medium choice	0.505***	0.058
Others Decide	-0.128***	0.088
Has Sons(Ref:No)	0.138***	0.061
Age	-0.068***	0.021
Age^2	0.002***	0.02
Health Facility last 12 months (Ref:No)	0.386***	0.048
Has Television(Ref:No)	0.149***	0.069
Purchasing power per LGA	0.133***	0.001

*** $p < 0.001$, **$p < 0.01$,*$p < 0.05$, R^2-0152

A6: Literature search terms

Database(s): Ovid MEDLINE(R) 1996 to August Week 1 2017

#	Searches	Results
1	Nigeria.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	14007
2	sub-saharan africa.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	8880
3	contraceptives.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	5912
4	contraceptive use.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	3406
5	modern contraceptive use.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	1321
6	family planning.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	6460
7	family planning programme.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	4581
8	education.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	144834
9	education programme.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	1239
10	health care utilization.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	3451
11	health care delivery.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	4604

12	health service accessibility.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	15
13	health status.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	93696
14	social class.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	23159
15	health inequalities.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	2142
16	poverty.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	31489
17	socio-economic factors.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	1278
18	1 or 2	22456
19	3 or 4 or 5 or 6	15997
20	7 or 15	6648
21	8 or 9 or 10 or 11 or 12	151827
22	14 or 16 or 17	53347
23	13 and 18 and 19 and 20 and 21 and 22	22

Database(s): Embase 1996 to 2017 Week 30

#	Searches	Results
1	Nigeria.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	21381
2	sub-saharan africa.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	11854
3	contraceptives.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	7728
4	contraceptive use.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	4443
5	modern contraceptive use.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	1829
6	family planning.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	8971
7	family planning programme.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	6176
8	education.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	241761
9	education programme.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	37305
10	health care utilization.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	39335
11	health care delivery.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	100810
12	health service accessibility.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]	59

13	**health status.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]**	**91399**
14	**social class.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]**	**17641**
15	**health inequalities.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]**	**2983**
16	**poverty.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]**	**29755**
17	**socio-economic factors.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]**	**1930**
18	**1 or 2**	**32493**
19	**3 or 4 or 5 or 6**	**21459**
20	**7 or 15**	**9050**
21	**8 or 9 or 10 or 11 or 12**	**354452**
22	**14 or 16 or 17**	**47684**
23	**13 and 18 and 19 and 20 and 21 and 22**	**35**

Database(s): Global Health 1973 to 2017 Week 29

#	Searches	Results
1	Nigeria.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	20284
2	sub-saharan africa.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	7576
3	Contraceptives.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	3039
4	Contraceptive use.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	833
5	Modern contraceptive use.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	776
6	Family planning.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	2728
7	Family planning programme.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	4872
8	Education programme.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	33838
9	health care access.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	518
10	health care utilization.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	4955
11	health care delivery.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	1037
12	health service accessibility.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	12
13	health status.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	9843
14	social class.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	2068
15	health inequalities.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	4461
16	poverty.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	10874
17	socio-economic factors.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	917
18	1 or 2	27383
19	3 or 4 or 5 or 6	6645
20	7 or 15	5758
21	8 or 9 or 10 or 11 or 12	38278
22	14 or 16 or 17	13708
23	13 and 18 and 19 and 20 and 21 and 22	25

Database(s): CAB Abstracts 2000 to 2017 Week 25

#	Searches	Results
1	Nigeria.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	29837
2	sub-saharan africa.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	7645
3	Contraceptives.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	4426
4	Contraceptive use.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	1306
5	Modern contraceptive use.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	666
6	Family planning.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	2924
7	Family planning programme.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	1541
8	Education programme.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	44647
9	health care access.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	185
10	health care utilization.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	2302
11	health care delivery.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	415
12	health service accessibility.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	5
13	health status.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	8021
14	social class.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	814
15	health inequalities.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	1482
16	poverty.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	18463
17	socio-economic factors.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	1229
18	1 or 2	36984
19	3 or 4 or 5 or 6	8624
20	7 or 15	1818
21	8 or 9 or 10 or 11 or 12	46598
22	14 or 16 or 17	20385
23	13 and 18 and 19 and 20 and 21 and 22	10

Database(s): CAB Abstracts 2000 to 2017 Week 40, Embase 1996 to 2017 Week 41, Global Health 1973 to 2017 Week 40, Ovid MEDLINE(R) 1996 to October Week 1 2017, PsycINFO 2002 to October Week 2 2017

#	Searches	Results
1	Nigeria.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	87606
2	sub-saharan africa.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	37699
3	Contraceptives.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	27423
4	Contraceptive use.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	17199
5	Modern contraceptive use.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	5652
6	Family planning.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	27738
7	Family planning programme.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	22161
8	Education programme.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	1
9	access.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	514246
10	health care access.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	40087
11	health care utilization.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	57784
12	health care delivery.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	117640
13	health service accessibility.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	100
14	health status.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	212402
15	socio-economic factors.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	0
16	social class.mp. [mp=ab, ti, ot, bt, hw, id, cc, sh, tn, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, tm]	48249
17	1 or 2	123046
18	3 or 4 or 5 or 6	71142
19	7 or 8	22162
20	9 or 10 or 11 or 12 or 13	655102
21	14 or 15 or 16	254774
22	17 and 18 and 19 and 20 and 21	5