Leeds Institute of Health Sciences
FACULTY OF MEDICINE AND HEALTH

UNIVERSITY OF LEEDS

WORKING PAPER NUMBER: WP17_04

The Nigerian Urban Reproductive Health Initiative: a decomposition analysis of the changes in modern contraceptive use

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This working paper should cited as:

Adeyanju, O., Tubeuf, S., Ensor, T. The Nigerian Urban Reproductive Health Initiative: a decomposition analysis of the changes in modern contraceptive use [Internet]. Leeds: Leeds Institute of Health Sciences (LIHS), Academic Unit of Health Economics (AUHE); 2017 [modified Year Month Day; cited Year Month Day].

Additional information

Funding

This work was supported by Nigeria Debyl Education Fund

Ethical approval

A quantitative secondary analysis study does not require ethical review. Datasets are anonymised and permission to use them has been obtained from the Measurement, Learning & Evaluation (MLE) of the Nigerian Urban Reproductive Health Initiative (NURHI).

Conflict of interest

The authors declare that they have no conflicts of interest

Acknowledgements

The authors would also like to acknowledge the Measurement, Learning & Evaluation (MLE) of the Nigerian Urban Reproductive Health Initiative (NURHI) for giving access to the NURHI survey datasets used in this article. The views expressed herein do not necessarily reflect the views of the NURHI.

Key words

Modern Contraceptive use, Family Planning, Fairlie Decomposition, Nigeria

JEL classification: J13, I14, I12

Abstract

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. Between 2009 and 2014 the Nigerian Urban Reproductive Health Initiative (NURHI) was initiated among urban Nigerian women in 6 states with the aim of increasing the use of modern contraceptive. The objective of this paper is to assess the changes in modern contraceptive use within the NURHI programme participants and understand the characteristics explaining the changes. We use data collected before and after the programme and apply the Fairlie decomposition method to evaluate the contribution of socioeconomic and other individual factors to the changes in contraceptive use over time. Results show an increase in modern contraceptive use in the programme areas over time. 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.

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 8 in Northern Nigeria (NPC, 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 25% of Nigerian women (NPC, 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, Weil, and Wilde 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, avoid 70% of maternal deaths, 44% of new-born deaths, and 73% of unsafe abortions, and reduce by 76% the number of women needing medical care due to complications related to unsafe abortion. They also suggested that, the resulting reduction in fertility and population growth would bring numerous socioeconomic and environmental benefits (Singh et al, 2010).

Research on the determinants of modern contraceptive use in Nigeria has shown that there is an association between modern contraceptive use and socio-demographic characteristics among women of reproductive age. Solanke (2017) showed that education, wealth, age, parity, employment status and experience of child mortality were all seen to be associated with modern contraceptive use.

In this paper, we focus on the impact on contraceptive use of the Nigerian Urban Reproductive Health Initiative (NURHI), which ran between 2009 and 2014 in six Nigerian states. 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 Oaxaca decomposition method and evaluate the contribution of socioeconomic and other individual factors to the changes in contraceptive use over time. We also use cross-sectional data from the Nigerian Demographic and Health Survey (NDHS) to compare the changes in the programme with the observed changes in similar regions in Nigeria during the same period. This comparison exercise allows us to interpret our results further.

We observe an increase in modern contraceptive use in the programme areas over time. Some factors such as wealth and education that were important factors in modern contraceptive use pre-programme were not found as important post-programme. The results suggest that the programme has had an impact

in improving overall modern contraceptive use in the programme areas from 2009 to 2014 and reduced the strength of the link between education and wealth with contraceptive use.

The paper proceeds as follows. Section 2 presents the Nigerian context regarding contraceptive use and fertility. The NURHI is presented in section 3. Section 4 presents the datasets and variables that are used. Sections 5 and 6 respectively present our methods and the results while section 7 discusses the findings.

2. Context

2.3 Fertility and family planning

Nigeria has an estimated 35 million women of reproductive age, and the total fertility rate (TFR) of 6 children per woman contributes to population growth of 3.2% with around 7 million births per annum (NPC, 2014).

Family planning is the ability of individuals and couples to attain their desired number and spacing of their children through contraceptive use; it is pivotal to reducing the country's fertility (Graff and Bremner, 2014). In the past, family planning programmes and policies were not a priority for the Nigerian government and therefore were mainly driven by development partners and nongovernmental organizations. However, following the analysis of the consequences of unregulated population growth on health and development in Nigeria, in 1988, the Nigerian government began formulating policies aimed at improving reproductive health outcomes and reducing fertility levels through family planning. This includes Nigeria's national population policy, which focused on increasing uptake of modern contraceptives for health and national demographic goals (Federal Republic of Nigeria 1988).

The national contraceptive prevalence rates have shown little change since 1990. Motivation to use contraceptives is low in the country and pronatalism is one of the reasons for high fertility and low contraceptive prevalence (Federal Ministry of Health, 2008). These national aggregate indicators mask wide variations in the uptake of contraceptives across the country. The southern zones of the country have higher contraceptive prevalence compared with the northern zones. The northern part of Nigeria has one of the lowest rates of contraceptive use in the world. Across the states of the country, contraceptive prevalence ranges from approximately 26% in Lagos State in South-western Nigeria to less than 1% in Jigawa and Kano States, north-western Nigeria (Federal Ministry of Health, 2008). The 2013 Nigerian Demographic and Health Survey (NDHS) data aggregated by zones showed wide variations in fertility intentions and contraceptive use. While the national total fertility rate is 6 children per woman, it ranges from 4.3 children per woman in the South Zone to 7.7 children per woman in the North West Zone. Apart from the many socio-cultural drivers of high fertility, poor investment in family planning programmes has also contributed to low demand for family planning. The main sources of information on family planning in the country are friends or siblings, media, formal education and health

workers (Ankomah et al., 2013; Monjok et al., 2010; Oye-Adeniran et al., 2006) and these are not always available to Nigerian women. There are also a number of supply-related factors that limit contraceptive use. These include erratic supply of modern contraceptives, gaps in logistics supply chain, donor dependence, poor-quality services and dearth of skilled health personnel to provide family planning services (Federal Republic of Nigeria, 2014).

2.4 Variations in contraceptive use and determinants

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, socioeconomic and behavioural variables are associated with contraceptive use. Factors influencing the use of contraceptives include age, parity, marital status and marriage type. Women's age has a curvilinear effect on contraceptive use, with lower levels of use at younger and at older ages (Njogu, 1991). In Africa, sexually active single women are more likely to use contraceptives than married women (Adebayo et al., 2012; Caldwell and Cadwell, 2000). Polygamous marriage has a mixed effect on uptake of contraceptives, which is made more complex by spousal age differences and inequalities in the distribution of material resources between co-wives (Hertrich, 2005).

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 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 (Bawah, 2002; Burgard, 2004). 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). Partner's level of education is equally important, as it may operate through many of the same pathways as the woman's own education, given that education levels of husbands and wives are positively correlated (Malwade, 2002). A study from Nigeria showed that the likelihood that a woman and her partner were using contraception was higher if at least one partner had at least primary education than if both had no

education (Ibisomi, 2014). However, women who are more educated than their husbands tend to use contraceptives more than women who are less educated (Stephen and Enoch, 2014).

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; Storey 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).

2.5 Contextual factors

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.

3. The Nigerian Urban Reproductive Health Initiative (NURHI)

2.6 The study objectives and design

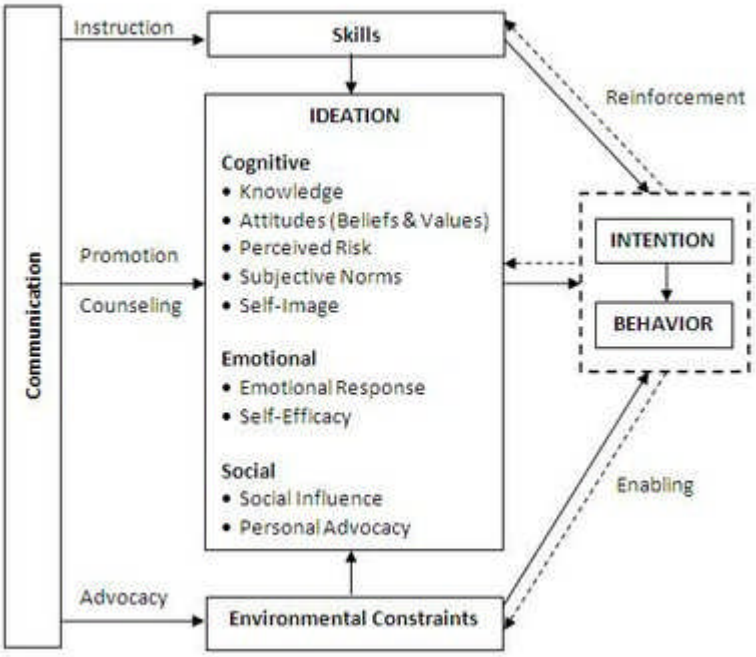
This study is based on the Nigerian Urban Reproductive Health Initiative (NURHI), which is a family planning programme aimed at increasing modern contraceptive use in Nigeria. The NURHI was strategically designed from a good understanding of (i) the barriers to contraceptive use in intervention cities 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 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'. 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 (Kincaid, 2000) as represented by Figure 1. Many of the 'ideation factors' are personal for example what someone knows about family planning and what they think affects them while others embody a social standard such as what people believe other people will think of them if they use family planning. The NURHI 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 as knowledge creation, service delivery to back up demand and changing the social norms. NURHI knowledge creation strategy focused on demedicalising 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; increasing understanding, appreciation, and social approval for planning one's family; improving knowledge and perceptions of family planning methods; and reinforcing existing contraceptive use and reducing discontinuation. The main NURHI 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. The service delivery aspect of the programme was based on best practices in service integration and quality improvements. The NURHI programme operated through existing health facilities in the intervention cities. In these facilities, they launched a new family planning facility that built support for these 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. The programme additionally added another aspect of treating the service providers as an audience for behaviour change. NURHI ensured that the service provider was 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.

The NURHI programme also focused on implementation by changing the social norms. The programme enrolled prominent leaders of multiple faiths to speak in the media about family planning. The project also developed advocacy kits for each city's policy makers. NURHI was also delivered by people coached in the intricacies of local-level budgeting, requesting processes, and spending decisions, with

results that modest amounts of funding began flowing in Local Government Areas (LGA) to be invested in healthcare.

Figure 1: NURHI based Ideation Model of Communication



Source: Health Communication Capacity Collaborative (2014)

2.7 NURHI dataset

The Nigerian Urban Reproductive Health Initiative (NURHI) collected data via a baseline survey in 2009 and a follow-up survey in 2014. The NURHI 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. Data were collected from a representative sample of more than 16,000 households. 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 final end-line survey that was conducted in 2014 interviewed a sample of 10,400 women from the original survey and marked the end of the programme[1]. The collected information in both surveys included social background of respondents, sexual activity,

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

fertility levels, fertility preference, knowledge and use of family planning methods, maternal and child health, spousal communication and decision-making.

As the study sample was based on a selected sample of women, which were all involved in the programme, we do not have a control sample to compare outcomes and to undertake a causal investigation of the programme on changes in contraceptive use. A second-best solution in this context is for us to consider how contraceptive use has changed over the same period using data from the Nigerian part of the Demographic Health Survey (NDHS). We especially consider the 2008 and 2013 rounds of the NDHS, which cover the period over which the programme was implemented and the urban NDHS sample so that we can try to get results that can be comparable to the same as the programme areas. The NDHS surveys are nationally representative and cross-sectional data with more than 30,000 households included. The restricted urban sample we used consisted of 10,489 and 15,545 households respectively. The surveys were conducted by the Federal Office of Statistics and intended to provide programme managers and policymakers with detailed information including levels and trends in fertility; marital status; sexual activity; fertility preferences; awareness and use of family planning methods; infants and young children feeding practices, early childhood mortality and maternal mortality; maternal and child health; and awareness and behaviour regarding HIV/AIDS and other sexually transmitted infections. Information was gathered from respondents through face-to-face interviews, including socio-economic status and health service utilisation and spending on health. The same core variables were available in NURHI and NDHS facilitating comparisons between the two samples.

2.8 *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, gender, 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 number of children (full decision (if respondent decides alone), partial decision (if shared with spouse), no decision (if the respondent's partner or others decide)), 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 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).

We finally include a set of interaction effect variables. Interaction effects are the variation that influences the strength or the direction of a relationship between an independent and a dependent variable (Baron and Kenny, 1986), therefore two variables interact if a particular combination of variables leads to results that would not be expected on the basis of the main effects of those variables. Our preliminary results led us to consider four interaction effects (i) poorest and uneducated, (ii) Muslim and never married, (iii) uneducated and others choice and (iv) no education and no decision-making.

4. Methods

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_i and unobserved characteristics represented by ϵ_i, which is assumed to be probabilistically distributed. The estimated model is defined as follows:

$$y_i = 1 \text{ if } y_i^* > 0$$

$$y_i = 0 \text{ otherwise.}$$

$$\text{where } y_i = \beta_k X_{ik} + \varepsilon_i \qquad \text{(Eq. 1)}$$

This study aims to measure and decompose the observed changes in modern contraceptive use in the NURHI programme between 2009 and 2014. We also measured and decomposed the observed changes in modern contraceptive use in the NDHS between 2008 and 2013 in order to emphasise the existing differences in urban Nigeria while the NURHI programme was undergoing. 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.

The method consists in decomposing the changes in modern contraceptive use in the NURHI in 2009 and 2014 (respectively in the NDHS 2008 and 2013 for the sake of the comparison), we consider the following equations for each year

$$y_i^{2009} = \beta_k^{2009} X_{ik}^{2009} + \epsilon_i^{2009} \quad \text{(Eq.2)}$$

$$y_i^{2014} = \beta_k^{2014} X_{ik}^{2014} + \epsilon_i^{2014} \quad \text{(Eq.3)}$$

The changes in between the two years can be written using the decomposition for a nonlinear equation:

$$y_i^{2014} - y_i^{2009} = \left(\sum_{i=1}^{N^{2009}} \frac{F(\beta_k^{2009} X_{ik}^{2009})}{N^{2009}} - \sum_{i=1}^{N^{2014}} \frac{F(\beta_k^{2009} X_{ik}^{2014})}{N^{2014}}\right) + \left(\sum_{i=1}^{N^{2014}} \frac{F(\beta_k^{2009} X_{ik}^{2014})}{N^{2014}} - \sum_{i=1}^{N^{2014}} \frac{F(\beta_k^{2014} X_{ik}^{2014})}{N^{2014}}\right) \quad \text{(Eq.4)}$$

where N is the sample size.

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. Results

2.9 Descriptive statistics

Descriptive statistics are available for both years in Table A1. Modern contraceptive use over time in the NURHI increased from 19.72% to 28.17%. There was also an increase in the NDHS urban sample from 9.37% to 16.76%. Some of the most interesting changes overtime can be observed in education, religion marital status and wealth. We observe that modern contraceptive use of women with no education appears to have increased from 11.18% in 2008 to 22.97% in 2014 in the NURHI sample. Modern contraceptive use increased across education group and across the poorest, poorer and middle wealth groups over-time. Women with no education, women in the poorest wealth group and widowed women represent the groups with the lowest rates of modern contraceptive use in both years. The picture slightly differs in the NDHS sample. While we observe that contraceptive use of women with primary, secondary and tertiary education and women in middle, richer and richest groups increased over time,

the contraceptive use of women with no education and women in the poorest and poorer wealth groups recorded a decrease.

2.10 Marginal effects

We first present the results of the Probit estimation as marginal effects. Results are presented in Table A2. 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 contraceptive 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 use. Lastly, women who had either had a child who died or believed that modern contraceptive use affected health were all negatively correlated to modern contraceptive use in both years and the marginal effects were also seen to increase from 2009 to 2014.

2.11 Interaction Effects

Results from interactive effects show that in 2009, women who were both poor and uneducated were less likely to use modern contraceptives, and exhibited a magnified marginal effect. The marginal effect of the combined characteristics remained associated with reduced probability to use modern contraceptive in 2014 but the magnitude of the marginal effect has halved between the two time-points. Women who were Muslim and never married were also less likely to use modern contraceptives and the marginal effect of the combined variables on contraceptive use substantial dropped over time. The results also show that women who had no education and who reported other family members such as their mother-in-laws deciding on their households' funds while being less likely to use modern

contraceptives, the marginal effect was 10 times lower at follow-up and not significant anymore. Finally, women who had no education and no decision-making choice were less likely to use modern contraceptives in 2009 in 2014 than in 2009 (See Table A2).

2.12 Decomposition Analysis

We observe an increase in modern contraceptive use from 19.7% in 2009 to 28.2% in 2014. The decomposition analysis results presented in Table 1 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 NDHS surveys in 2008 and 2013, we observe that wealth also makes the largest contribution to the changes in modern contraceptive use. Most of the contribution came from being in the richest wealth group and being the only group that contributed to the change in modern contraceptive use over-time. This is 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 1: Decomposition results for NURHI and NDHS

	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

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

6. 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 (Austin, 2015; OlaOlorun et al., 2014). 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. 2008). 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 woman 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 that their mothers- in-laws as being at best non-supportive and at worst overtly anti-family planning. The mother-in-law's in this study described the wives as controlling their sons and encouraged their sons against the use of contraceptives because in their view, it will offer 'licence for women to be loose'. One Nigerian study by Isiugo-Abanihe (1994), also suggested that mother and sister-in-laws play a big role in when they decide on the women's households. In the study, he found out that if the in-laws in some families perceived that children where in short supply, they may pressure the couple by not supporting contraceptive use and constantly reminding them that it is "time to give us what we lack." With regards to the interactive effective 2 that is 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 decreases over time at the end of the programme. These results are encouraging in the fact that we expected this to increase over time. This result may suggest that the programme may have impacted the change in modern contraceptive use by affecting the religion and marital status.

The Fairlie decomposition analysis helped us separate clearly the component of the difference in modern contraceptive prevalence rate (CPR) 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 is 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 corroboration to modern use in education at the baseline of the programme but by the end of the programme, the programme can been seen to enable the decline in the impact of education by lowering the relationship between contraceptive use and education (decline in barriers). Breaking down the contribution of education, it shows that most of the contribution to the increase 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 prevalence trends. As recognized in previous studies (UNFPA 2011), the association between religion and health care has become more important over time. In 2009, 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, 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. However, studies may need to understand the major reasons for slow progress in adopting family planning, in order to identify factors with programme relevance. The findings imply that appropriate strategies may be needed to improve service access and benefits of family planning programs, 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 improved and available, this 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.

7. Conclusion

We conclude that the NURHI programme helped to achieve an increase in modern contraceptive use between 2009 and 2014 allowing an increasing number of Nigerian women to access family planning services. When compared with the women observed in the NDHS, we observe a larger increase in modern contraceptive use in the programme. Women's decision-making power within their households enables them to make more personal decisions regarding their reproductive health, like use of modern contraception. This suggests that when women are encouraged to be involved in the decision-making process with their partners, they become empowered to make other decisions about their health, including the use of modern contraceptives. Programmes and policies should include interventions to improve a woman's ability to negotiate with her partner, in-laws and community leaders regarding involvement in decision-making within the household, including decisions related to her fertility. Gender equality needs to become well engrained in the Nigerian culture, so that men will always treat their partners' decision-making opinion as important. Health care providers and opinion leaders such as priests, clergy men and imams need to disseminate clear, culturally appropriate messages that will help women and their partners understand the importance of contraceptive use.

Despite our positive findings in regards to the NURHI programme, we understand there may be the need to account for other concomitant programmes going on in the same targeted areas to be able to confirm whether the change in modern contraceptive use is as a result of the NURHI programme on its own or a result of a combination of concurrent family planning and education programmes. Further research looking at investigating the causal impact of the programme using methods like the difference-in-difference (DID), would enable us to decipher this.

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9. Appendix

Table A1: Modern contraceptive use by background characteristics in the NDHS (urban) and NURHI

	Data	NDHS	NURHI	NDHS	NURHI
Variables	**Year**	**2008 (%)**	**2009 (%)**	**2013(%)**	**2014(%)**
Education	No education	4.95	11.18	4.1	22.97
	Primary	13.88	18.67	15.29	29.91
	Secondary	15.86	18.1	17.31	29.22
	Tertiary	25.73	29.94	27.06	30.71
Wealth Index	Poorest	2.78	16.75	1.74	23.15
	Poorer	5.41	19.59	4.74	28.99
	Middle	8.09	20.18	9.79	28.17
	Richer	13.8	20.54	15.59	29.49
	Richest	20.21	21.14	22.46	28.06
Marital Status	Never married	14.74	16.13	17.9	22.04
	Living together	26.81	22.16	18.66	31.01
	Separated	16.71	18.02	12.2	18.75
	Widowed	5.42	4.38	6.42	10.19
Religion	Muslim	40	13.4	37.47	24.49
	Non-Muslim	59.47	23.2	62.12	25.7
Region	North E (Zaria)	4.99	20.51	5.67	18.6
	North W (Kaduna)	5.15	14.01	7.63	24.66
	North C (Abuja)	17.01	30.16	19.5	36.01
	South W (Ibadan)	22	29.39	24.61	37.95
	South E (Ilorin)	11.18	21.7	13.61	31.45
	South S (Benin)	21.74	24.24	21.1	27.38

Table A2: Marginal effects table NURHI in 2009 and 2014

NURHI	2009		2014	
Education (Ref: No Education)	**Coef.**	**SE**	**Coef.**	**SE**
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
Parity (Ref: No children)				
1-4	0.558***	0.013	0.105***	0.034
5-8	0.803***	0.015	0.314***	0.027
9-12	0.809***	0.027	0.165***	0.035
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
Child died	-0.109	0.043	-0.101***	0.039
Believes contraceptive affects health	-0.235***	0.025	-0.422***	0.031
Interactive effect 1				
Poor and uneducated	-0.165*	0.101	-0.079*	0.128
Interactive effect 2				
Muslim and never married	-0.124***	0.009	-0.012***	0.020
Interactive effect 3				
No education and other choice	-0.126*	0.050	-0.011	0.101
Interactive effect 4				
No education and no decision-making	-0.149***	0.081	-0.275*	0.186

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