

## ORIGINAL RESEARCH ARTICLE

# Drivers of contraceptive use choice in Zambia

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## Abstract

Modern approaches of birth control have emerged as broadly accepted family planning methods in replacement of traditional alternatives. However, the effectiveness of modern contraceptives has been challenged by serious side effects, either experienced or expected, with inhibiting consequences on the acceptability and utilisation of family planning service. This paper disentangles the drivers of none-use, traditional and modern contraceptive use in Zambia using the 2018 Zambian Demographic Health Surveys (DHS) data. The Conditional logit choice modelling technique is employed to account not only for the differences in alternative contraceptive options but also the socioeconomic and demographic characteristics of individual woman making the choice. Empirical results indicate that educated, older and poorer women are likely to adopt the traditional contraceptive methods whereas employed women are indifferent between traditional and modern birth control options. Furthermore, Christian women and those from other religions as well as women with no education prefer no birth control method. The study concludes that employment has the potential to serve as an alternative and safer birth control tool in developing countries and namely in Zambia. Therefore, government's effort to expand family planning program should mainly target non-educated women while promoting safer contraceptive methods. This can be achieved through women education and job creation. (*Afr J Reprod Health* 2022; 26[5]:13-27).

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**Keywords:** Traditional contraceptive, modern contraceptive, choice modelling

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## Résumé

Les approches modernes de contrôle des naissances sont apparues comme des méthodes de planification familiale largement acceptées en remplacement des alternatives traditionnelles. Cependant, l'efficacité des contraceptifs modernes a été mise à mal par de graves effets secondaires, ressentis ou attendus, avec des conséquences négatives sur l'acceptabilité et l'utilisation des services de planification familiale. Cet article démêle les facteurs de non-utilisation, d'utilisation de contraceptifs traditionnels et modernes en Zambie à l'aide des données des enquêtes démographiques et de santé (EDS) de 2018 en Zambie. La technique de modélisation du choix logit conditionnel est utilisée pour tenir compte non seulement des différences dans les options contraceptives alternatives, mais également des caractéristiques socioéconomiques et démographiques de chaque femme faisant le choix. Les résultats empiriques indiquent que les femmes instruites, plus âgées et plus pauvres sont susceptibles d'adopter les méthodes contraceptives traditionnelles tandis que les femmes employées sont indifférentes entre les options de contrôle des naissances traditionnelles et modernes. De plus, les femmes chrétiennes et celles d'autres religions ainsi que les femmes sans éducation ne préfèrent aucune méthode de contrôle des naissances. L'étude conclut que l'emploi a le potentiel de servir d'outil de contrôle des naissances alternatif et économe dans les pays en développement et notamment en Zambie. Par conséquent, les efforts du gouvernement pour étendre le programme de planification familiale devraient principalement cibler les femmes non éduquées tout en promouvant des méthodes contraceptives plus sûres. Cela peut être réalisé grâce à l'éducation des femmes et à la création d'emplois. (*Afr J Reprod Health* 2022; 26[5]: 13-27).

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**Mots-clés:** Contraceptif traditionnel, contraceptif moderne, modélisation des choix

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## Introduction

The 1994 International Conference on population and Development saw governments, international agencies, and donor organisations redoubling efforts to ensure family planning services are universally available in sub-Saharan Africa and elsewhere<sup>1-2</sup>. Since the 2012 London Summit on

family planning which augmented renewed interest and international emphasis on family planning by highlighting the potential of family planning to hasten progress to meet the then Millennium Development Goals number 4 and 5, there has been an expansion in research that focused on family planning experience of women. The 2013 International Conference on family planning in

Ethiopia (Addis Ababa), which saw technical experts drafting the strategies for family planning for use as a reference by those involved in family planning and placed emphasis on low and middle-income environments, reinforced this commitment<sup>3</sup>.

Many developing countries, including Zambia, have invested in family planning programs to reduce fertility and these programs are mainly focused on improving knowledge about birth control and access to contraceptives. Zambia ranks as one of the top 10 countries with high fertility rates (5.5 births/woman). The country has an estimated population of 18.4 million and a total fertility rate of 4.7. Towards 2030, the Zambian government has also committed to the Sustainable Development goals (SDGs), which are linked up to key metrics in sexual and reproductive health including FP access<sup>4</sup> articulated in SDG 3.7. SDG 3.7 aims to “ensure universal access to sexual and reproductive services, including for family planning, information and education and the integration of reproductive health into strategies and programmes”<sup>5</sup>.

Despite the increase in family planning from 15% in 1992 to 50% in the 2018 period, the country has realised a marginal drop in the fertility rate from 6.5 births per woman in 1992 to its current level. Noteworthy, modern contraceptive use has increased from 9% to 48% over the same period. Women in rural area have a fertility rate of 5.8 whilst those in the urban areas average 3.4 children per woman. Modern contraceptive use prevalence stands at 50% and this also varies between rural and urban women. Modern method use among modern women is 53% and 44% among rural women<sup>6</sup>.

Modern family planning methods have become more broadly accepted and used in replacement of traditional methods. Modern methods of contraception include oral contraceptive pills, injectables, implants, intrauterine devices (IUDs), condoms, male and female sterilisation, lactational amenorrhea methods whilst traditional methods include herbal medicine, cervical mucus, calendar method, withdrawal, prolonged breast feeding and periodic abstinence<sup>7-8</sup>. Despite the availability of modern contraceptive methods and the well-documented need for modern family planning, a large number of women in SSA still forgo modern contraceptives due to experienced or anticipated side effects. Side effects of modern

contraceptive use, either experienced or expected, have been identified as one of the key reasons why women choose to either not start or discontinue contraceptives<sup>9-10</sup>. These include weight changes, menstrual changes (heavier bleeding, amenorrhea or oligomenorrhea), dizziness, headaches, nausea and cardiovascular effects<sup>11</sup>. Additionally, women may harbour fears of long-term impacts of contraceptive use such as infertility and childbirth complications<sup>12,13</sup>.

A 2018 WHO systematic review found that a significant number of women linked their unmet need for family planning to a fear of side effects with 23%, 28% and 35% of women from Asia, Africa and Latin America and the Caribbean respectively reporting these fears<sup>7</sup>. These fears of side effects may arise from experience or from knowledge of someone who has experienced these side effects, from rumours or rare complications they are eventually considered factual<sup>14-15</sup>. Side effects experienced or perceived have been also cited as one of the key factors leading to the actual discontinuation of modern contraceptive use<sup>16</sup>. A recent study by Bellizzi<sup>17</sup> that analysed the reasons for discontinuation of contraception among women with a current unintended pregnancy in 36 low and middle countries showed that 41.3% of the 663 622 women in the pooled dataset discontinued short-acting modern methods due to side effects and health concerns and whilst 40.2% discontinued long-acting methods for the same reasons. Some studies have shown that modern contraceptives have an impact, at varying degrees, on women's health-related quality of life (HRQoL)<sup>18-21</sup>.

Against this background, improving access to contraceptives may be necessary to reduce fertility rates but the suitable birth control option remains hypothetical. According to Pörtner *et al.*<sup>22</sup>, there is a lack of convincing empirical evidence on the effectiveness of family planning programs due to the challenge of measuring their “true” impact. Particularly, studies on family planning programs have normally covered periods of rapid economic development and fertility decline, thereby making it problematic to isolate the fertility effect of family planning programs from that of economic growth. In addition, the historic fertility declines in Western countries happened before the diffusion of modern contraceptives<sup>23</sup>. Therefore, while birth control is generally advocated as a poverty mitigating strategy, this paper argues that modern

contraceptive use might not necessarily be the efficient fertility control option. Considering the potential health consequences of modern contraceptive utilisation<sup>7,11,15,17,24-26</sup>, it is imperative to explore safer alternative birth control methods. This is particularly important for low-income countries characterised by meagre health and social security systems. Since policies to improve reproductive health outcomes vary across countries depending on the level of development, accountability and transparency levels, governed principles, and social capital of the populace<sup>27,28</sup>, the suitable birth control option becomes an empirical question.

This study investigates the determinants of contraceptive choice in a developing context, Zambia with the objective to identify and promote the preferred birth control option in this country rather than focusing on the expansion/supply of modern family planning conventionally considered the birth control *panacea* across the world. To this end, a conditional logit choice model is employed to disentangle the drivers of non- use, traditional and modern contraceptive use. Surprisingly, it emerges that educated, older, non-Muslim and poorer women are likely to adopt the traditional contraceptive methods. Furthermore, employed women are indifferent between traditional and modern birth control options. These findings are useful for addressing policy and research gaps around maternal health in Zambia and other countries from sub-Saharan Africa, as it assists in identifying efficient development of family planning programmes by policymakers and wider family planning organisations such as NGOs. The rest of the study is structured as follows: the following section is the literature review, followed by the methodology and the empirical results. The last section is the conclusion.

### **Relevant literature**

Underpinned the fertility control behaviour is the choice theory developed by Glasser<sup>29</sup>, which assumes that all behaviour is chosen and that individuals have control over their own feelings and actions. Accordingly, fertility control behaviour can be modelled as a basket of three options a woman might choose from: none contraceptive use; traditional contraceptive use and modern contraceptive use.

Through a systematic review, Ayanore *et al*<sup>30</sup> assess determinants and outcome measures used in previous studies in a quest to provide evidence on the adequacy of determinants and outcome measures related to unmet need for contraceptives and reproductive health needs. These can be categorised into socio-cultural determinants, institutional or clinical factors, economic factors and knowledge and risk factors. In some instances, strong associations between family planning use and some socio-economic, socio-demographic, socio-cultural characteristics of women and other significant factors have been established. Some studies found individual-level determinants as factors influencing contraceptive uptake including age, education, relationship status, income and religion<sup>31</sup>. Others found psychological factors that are encompassed in theories of behaviour change such as knowledge of contraceptive methods<sup>32</sup>, beliefs towards efficacy and safety of contraceptives<sup>33,34</sup> and self-efficacy toward contraceptive use<sup>35</sup> are key determinants.

At an interpersonal level, the influence of the male partner on women's reproductive health and decision making is noted, more importantly in resource-limited settings. Gender norms and unequal power dynamics in relationships may manifest in numerous ways that impact women's ability to use contraceptives, for instance, gendered sexual decision-making<sup>36</sup>. Further, customs that prohibit communication about sexual health<sup>37</sup>, and intimate partner violence<sup>38</sup> also play a role in influencing contraceptive use. The importance of contextual determinants of family planning in resource-limited settings is increasing in importance<sup>39</sup> such as health system factors: access to health care, access to trained staff, follow up care, cost and health facilities environments (e.g. space)<sup>40,41</sup>.

The majority of sub-Saharan studies that investigate contraceptive use focus on determinants of modern contraceptive use and have identified several factors associated with modern contraceptive use which are either analogous or contrasting owing to differences in the study site, that influences the socioeconomic, sociodemographic and socio-cultural factors. Modern contraceptive use is influenced by education levels, income, exposure to mass media, desire to have children, women's empowerment, parity and family planning knowledge<sup>42-51</sup>. Other

studies have shown that health worker visits, family planning education and health facilities also positively influence modern contraceptive use<sup>52-54</sup>. The husband's desire to have more children is found to be a significant factor determining contraceptive use in other studies<sup>47,50,52-55</sup>.

Some studies have been conducted to determine the factors influencing contraceptive that have highlighted women's employment status as a key determinant. Balew *et al*<sup>56</sup> analyse the structural determinants of contraceptive using a multilevel logistic regression model using data from individual women observation in the 2011 Ethiopian Demographic and Health Survey data. The findings reveal the significant influence of socio-economic factors including respondent's education, ethnicity, partner's education, employment status and urbanisation in explaining contraceptive use. Health extension visits and access to media were also found to determine the use of contraceptives. A Tanzanian study by Kidayi<sup>47</sup> that utilized Demographic Health Survey data through univariate and multivariate logistic regression models showed that women's empowerment, and male-female age differences as well as health care facilities are essential predictors of contraceptive use.

Jalang'o<sup>9</sup> employ bivariate chi-square test on qualitative data collected from a county hospital in rural Kenya to investigate the determinants of contraceptive use among postpartum women. Age, marital status, education level, religion, employment status and availability of contraceptives at a health facility emerge as the key driving factors of contraceptive use. Solanke<sup>57</sup> adopts a multinomial logistic regression model on 2008-2013 data drawn from the Nigerian Demographic health survey to assess the factors that influence the use and non-use of contraceptives among women of advanced age. The study considers demographic and socio-economic factors and show that none-use of contraceptives is influenced by the women's age, age at first birth, parity, child mortality experience, ideal family size, desire for more children (fertility), education levels, place of residence, employment status, geographical location, and remarriage. Nevertheless, a few of these factors such as maternal education, parity, desire for more children (fertility), and wealth size of household and geographical region affect the use of modern or traditional contraceptives.

Women's employment status is one of the components of women's empowerment individual-level factors that affect contraceptive use and fertility. Other components include decision-making power, knowledge (education) level and disagreement with reasons to justify wife-beating<sup>58</sup>. Investigations into the relationship between employment and contraceptive use often indicate a negative relation but results are mixed if sub-groups are considered including rural versus rural women, women working in the formal or informal sector.

Shapiro and Tambashe<sup>59</sup> examine the relationship between women's education, employment, and fertility behaviour (including contraceptive use) using the 1990 household survey of 2400 Kinshasa women in the age range of 13-49. The results from the weighted logistic regressions show that both self-employed and wage-employed women have greater chances of adopting any kind of contraception than those who are not wage employed. The probability is higher for wage-employees. Results further indicate that women employed in the informal sector tend to have a slightly lower chance of using modern contraceptives than non-employed women whilst there is no significant difference between those who work in the formal sector and non-employed women on the use of modern contraceptives.

According to results from a Bangladesh study by Laskar<sup>60</sup>, contraceptive use prevalence is significant and higher for employed women (65.5%) than women not working for any remuneration (58.2%). This is based on an analysis of 1999-2000 Demographic Health Survey data for 8748 women in the 15-49 age group that employed multivariate logistic regression modelling technique. Islam<sup>61</sup> use binary logistic regression analysis to examine the relationship between women's employment status and contraceptive use among 16 616 married women in Bangladesh. The study found contraceptive use to be higher among employed women than that of unemployed women. Factors including women's age, education, region, number of living children, child preferences, husband's education, residence, knowledge of family planning are found to influence the use of modern contraceptives.

A study by Pekkurnaz<sup>62</sup> corroborates with the findings of Islam<sup>61</sup> and Laskar<sup>60</sup>. The study adopts probit regression methodology to investigate the impact of the employment status of Turkish

women with young children on contraceptive choices using the 2013 Tukey Demographic Health Survey (TDHS) data. Results indicate the significance of employment status on the contraceptive behaviour of women with children under the age of 6 in Turkey. Employed women are found to have 23 percentage points higher chances of using a contraceptive method than unemployed women. Among users of contraceptives, employed women have a 36-percentage points likelihood of using modern methods over traditional methods and the likelihood is even higher for government employees (44.5 percentage points). These results are in tandem with the findings of another Turkish study by Dayioglu and Kirdar<sup>63</sup> who find that women who work for pay have lower chances of using withdrawal or other traditional methods over modern methods. These women have a higher likelihood of avoiding any contraception use over modern methods. The analysis is conducted on the 1998 TDHS data.

Van den Broeck<sup>64</sup> analyses the link between women's employment and family planning in rural Uganda using panel data of 800 women of ages 15-49 drawn from the Uganda National Panel survey. According to the study findings, employment was not associated with modern contraceptive use, but off-farm wage employment was associated with higher chances of using traditional contraception. Overall, the study finds that the provision of rural employment opportunities is insufficient to increase the uptake of modern contraceptives. In a Chinese based study Xu *et al*<sup>65</sup> use data from China's based 2000 census to investigate the association between gender equity (sex ratio at birth, health, employment, education, and political participation) on women's contraceptive use in 30 provinces. They find that regions with mid-textile female employment in the tertiary sector are more likely to use contraception among married women of ages 15-19 years.

Utilising data from the Ghana Demographic Health survey, Blackstone<sup>66</sup> investigates the impact of women's empowerment and status on contraceptive use using the 2014 survey data of 1828 women aged 15-49 by employing binary logistic regressions. Indicators of household status such as employment and education were found to be correlated with improved contraceptive use. The study, however, is unclear as to which type of contraceptive is related

to employment, either modern contraception or traditional contraception.

In Zambia, Lasong *et al.*<sup>67</sup> utilize the 2013-2014 Zambian Demographic Health survey data of married or cohabiting rural women of ages between 15-49 years to examine the factors associated with contraceptive use. They find that age, education, wealth, parity, knowledge of family planning, religion, past pregnancy experiences (miscarriage/abortion or still birth) and knowledge of husband desire to have children are significant factors that determine contraceptive use. Chola *et al.*<sup>68</sup> use multilevel logistic regression to investigate the patterns, trends and factors associated with contraceptive use among adolescents in Zambia based on Demographic Health Survey data sets for the period 1996-2014. The study identifies age, level of education and marital status as contributing factors to contraceptive use, with employment status omitted as a potential explanatory variable.

Using Zambia, Ghana, Kenya, Madagascar's most recent Demographic Health Surveys, Larsson and Stanfors<sup>69</sup> adopt bivariate and multivariate logistic regression techniques to examine the impact of women's education and empowerment on contraceptive use among married women of ages 15-49. The study finds that women's education is an important determinant of contraceptive use in all countries (except Kenya), but was not crucial in the choice of method effectiveness. Empowerment was seen as less important factors in determining contraceptive use. It is important to highlight that the empowerment variables adopted in this study did not incorporate the employment status of the women and the influence of employment status was not fully explored.

Other studies have shown that women's age, partner's age, area of residence, woman and partner/ husband education levels, employment status, desire for more children, ethnicity, number of living children and age at first birth are significant factors determining contraceptive use in Zambia<sup>70,71</sup>. Studies that have investigated the determinants of contraceptive use have often indicated the significance of employment status on contraceptive use and studies that have analysed this relationship have been in localized settings such as cities and nationwide studies. Further, their analyses focused on binary outcomes namely traditional and modern contraceptive use outcomes.

Results from these studies generally indicate that women employment is associated with contraceptive use as compared to women unemployment but if results are at sub-groups level, they are mixed (for instance rural versus urban women).

Though the determinants of contraceptive use have been widely explored, most studies examine the determinants of modern birth control methods and a few of them compare the drivers of contraceptive use between traditional and modern methods with limited attention to non-users of either method. However, none-use option is very important in low prevalence contraceptive context as it helps identify the specific target and understand what drives their preferences. This is particularly important for the African context including Zambia where sociocultural norms and values are unlikely to be favourable to the use of contraceptive. Ignoring this choice option may result in skewed distribution with significant impact on the estimates. Differently from previous studies, this paper expands the choice attributes to include none-user option, in order to disentangle the drivers of none-use, traditional and modern contraceptive use in Zambia based on the Conditional logit choice modelling technique. This technique has the advantage to mitigate the potential issue of endogeneity that may arise either from the measurement error bias or from the omitted variables bias.

## Methods

In this section, the empirical model used to investigate the impact of employment status on contraceptive use and non-use in Zambia is specified. In carrying out this analysis, the study will focus on contraceptive use (or non-use outcomes) as a function of socio-cultural and socioeconomic factors. The main variable of interest is female employment within the group of socio-economic and cultural factors since this variable is used to assess the net effect (after controlling for other factors) on the risk of contraceptive use and non-use. The choice of these variables is informed by the literature<sup>29</sup> and the availability of data. The functional form can be noted as:

$$C=f(S, E) \quad (1)$$

where, CU= contraceptive use, S= socio-cultural determinants and E=economic factors.

The study adopts choice modelling as the method of analysis. Choice models are models for data with outcomes that are choices<sup>72</sup>. A study of choice behaviour is described firstly by the objects of choice and sets of alternatives available to decision-makers. Secondly by the observed attributes of decisions makers and thirdly by the model of individual choice and behaviour and distribution of behaviour pattern in the population<sup>73</sup>.

The Conditional logit (McFadden's) choice model (cmclgit) is adopted to analyse this relationship. Conditional logit models are appropriate when investigating choice behaviour as in this case which is an investigation of choice behaviour of women (decision-makers) who are faced with three alternatives (choices), non-use of contraceptives, use of traditional or modern contraceptives. Whilst the most widely used model specification in discrete choice modelling is the multinomial logit model, it has a widely known potentially important drawback of the independence from irrelevant alternatives property<sup>73</sup>. The key difference in choice models largely relies on an assumption known as independence of irrelevant alternatives (IIA). This assumption means that the relative probability of selecting alternatives should not change if there is introduction or elimination of another alternative choices. Of all the choice models, the McFadden choice model is the only one that requires the IIA assumption<sup>72</sup>. This makes it the most appropriate model in this case given that the women in this investigation are faced with a limited set of alternatives, that is, either they do not use contraceptives, use traditional or modern methods. Hence, it is not possible to either remove or add any alternatives, thereby implying the alternatives meet the IIA criteria.

In the Conditional logit (McFadden's) choice model, the independent variables come in two forms namely alternative specific variables that vary across cases and within cases by alternative as well as case-specific variables that are constant within cases (Greene, 2018).

A set of unordered alternative are indexed by 1, 2, ..., J. Let  $Y_{ij}$ ,  $j = 1, \dots, J$ , be an indicator variable for the alternative chosen by the  $i$ th individual

(case), that is,  $Y_{ij}=1$  if individual  $i$  chose alternative  $j$  and  $Y_{ij}=0$  otherwise.

The set of possible alternatives across individual, otherwise known as choice sets, can be unbalanced. In this case, choice sets can vary by case. For instance, an individual 1 could have a choice set  $\{1, 2, 3\}$  whereas individual 2 could have a choice set  $\{1, 2, 4\}$ . The 4<sup>th</sup> alternative was not available for individual 1 and the 3<sup>rd</sup> alternative unavailable for the individual 2, .....  $J$  represent all possible alternatives taken across all individuals. Assuming that there are  $p$  alternative specific variables such that for case  $i$  there is a  $J \times p$  data matrix  $X_i$ . Additionally, assuming that there are  $q$  case-specific variables so that there is a  $1 \times q$  data vector  $z_i$  for case  $i$ . The random utility model can be expressed as:

$$\mathbf{u}_i = X_i\beta + (z_iA)' + \epsilon_i \quad (1)$$

Where  $\mathbf{u}_i$  is the utility for case  $i$ ,  $\beta$  is a  $p \times 1$  vector of alternative-specific regression coefficients, and  $A = (\alpha_1 \dots \alpha_2)$  is a  $q \times J$  matrix of case-specific regression coefficients. The elements of  $J \times 1$  vector are independent type 1 (Gumbel-type) extreme value-random variables with mean  $\gamma$  (the Euler-Mascheroni constant, approximately 0.577) and variance  $\pi^2/6$ . One of the  $\alpha_j$  must be fixed to be the zero vector to normalize location. If  $\alpha_k=0$ ,  $k$  is specified as the base alternative option. The vector  $\mathbf{u}_i$  quantifies the utility that the individual gains from the  $J$  alternatives. If the alternative  $j$  is not available to the  $i$ th individual, the  $j$ th row in  $\mathbf{u}_i$  is omitted. The alternative chosen by the individual  $i$  is the one that maximises utility.

### **Data and preliminary analysis**

#### **Data**

To investigate the impact of employment on contraceptive use, the study draws on data from the 2018 Zambian Demographic Health Surveys (DHS). The DHS surveys are conducted by the US Agency for International Development (USAID) and its local partners. The DHS surveys are specific to family planning and collect data on knowledge and use of contraceptive methods, including traditional and modern methods<sup>74</sup>. Women who are eligible to be included in the survey are either permanent residents or visitors in households that were randomly selected. Visitors included must

have stayed in the household for at least a night before the survey. A formal request to access and analyse the data was processed through online submission of the topic and immediate authorization was granted. All surveys are carried out by well-trained staff for each round of the survey<sup>74</sup>. The subset utilised is for individual female respondents, limited to the reproductive age (15-49).

The outcome variable is current contraceptive use, which has three possible outcomes, namely non-use (1), use of traditional methods (2) and use of modern methods (3), which form the outcomes of interest. The outcomes of interest are non-use and use of either traditional or modern methods. Women who reported “non-use” of any methods were classified as “non-use” and women who reported use of traditional methods such as periodic abstinence, withdrawal and folkloric method were grouped as “using the traditional method”. Users of condoms, implants, injectables, sterilization, pills to mention and a few were grouped as “using modern methods”.

The explanatory variables are a set of socio-cultural and socio-economic factors. The former includes woman's age, woman's age at first birth, the number of living children, marital status, fertility desire and religious beliefs. Wealth index, education, employment status and type of place of a residence constitute the latter set of explanatory variables. Some variables were re-grouped. All the different denominations of the Christian faith grouped into “Christians” (reference group), separate from other religions namely Muslims and other religions. In terms of desire for more children, those who are unsure and undecided about having more children, the sterilised and declared infecund and those who “don't want any more” were re-coded to form one group. Those who still want children, either within or after 2 years are also put in one group and the reference group is those who do not want any more children. For marital status, the widowed and divorced/ no longer living together are included and analysed as one group with those never in union being the reference category. The wealth index re-grouping involved combining the “poorer” and “poorest” as well as the “richer” and “richest” respectively. The middle-income earners are the reference group. Secondary and higher education level women were considered as being in the same group (reference group) and

separated from the primary school level women, and those without any education.

### ***Descriptive statistics***

Table 1 presents the descriptive statistics of contraceptive use in Zambia. Across the countries, a majority of the respondents do not use any form of contraception (53.68%) either modern contraceptive (43.86%) or traditional methods (2.47). The most commonly used traditional method is the withdrawal method (2%) whilst the least used is periodic abstinence. Injections are the most prevalent modern contraceptive method as 22.54% of the women who participated in the survey use this method and constitutes about half of all modern contraceptive users. The female condom and emergency contraception are the least prevalent method of modern contraception. The pill (6.39%) and the implants/norplants (8.48%) are also the most common modern contraceptive method used in Zambia. Of the women who participated in the survey, none reported the use of the 2-month injections, the diaphragm and the contraceptive patch as modern methods.

### ***Empirical results***

Table 2 below shows the results of multivariate influence (average marginal effects) on contraceptive non-use and the use of modern and traditional methods. These are separated for each of the three outcomes. The main results of interest are the cmogit results for each of the outcomes, and the Multinomial logistic regression (mlogit) results serve as the benchmark model. The Multinomial logistic regression (mlogit) is a special case of McFadden's choice model (cmlogit) when there are only case-specific variables in the model and the choice sets are balanced, that is, every case has the same alternative, cmlogit and mlogit results are the same<sup>72</sup>. This makes it prudent to have mlogit model results a natural benchmark for the cmlogit model results. Table 2 shows that the mlogit estimates are the same as the cmlogit estimates, confirming to the expectations. Choice models have reputation of being difficult to interpret and the coefficients estimated rarely allow the researcher to directly test the hypothesis of interest<sup>72</sup>. Against this background, the study reports average marginal effects which are more meaningful from an interpretation point of view.

### ***Socio-economic factors***

#### ***Employment status***

Results show that the probability of not using contraceptive is lower for women who are employed than those who are not employed. Employed women have a 0.0391 lower probability of not using any form of contraception relative to women who are not employed. In fact, employed women have a 0.0047 and 0.0344 higher probability of using traditional and modern methods respectively. This reinforces the role of employment as a birth control measure among Zambian women with ages ranging 15-49 years. This is in line with findings from previous studies including Jalang'o<sup>9</sup>, Kidayi<sup>48</sup> Balew *et al*<sup>56</sup>, Solanke<sup>57</sup>, Laskar<sup>60</sup>, Pekkurnaz<sup>62</sup>, Blackstone<sup>66</sup> but partially in line with Van den Broeck<sup>64</sup> who find that employment is not associated with modern contraceptive use but traditional contraceptive use in Uganda. However, employed women are indifferent between traditional and modern methods of birth control.

#### ***Education***

The maternal level of education is a significant factor in determining the non-use or use of contraceptive methods according to the study findings. Firstly, for women who have no education relative to those with tertiary education, it seems that the former women are more likely to avoid using any form of contraception than the latter by a factor of 0.0943. The same applies to women who only have primary education, they have a 0.0285 higher probability of not using any form of contraception. Further, women who have no form of education are less likely to adopt traditional contraceptive methods as compared to women who have acquired tertiary education. The chances of these women using traditional methods is 0.0074 times lower. In the same vein, women who did not attain any form of education are 0.0869 times less likely to adopt modern contraceptive methods. Whilst women with primary education have a 0.0061 greater probability of using traditional methods, they have a 0.0347-lower probability of using modern contraceptive methods. In a nutshell, the higher the education level, the greater the probability of using either traditional or modern

**Table 1:** Zambia contraceptive use patterns of women aged 15-49 by type of contraceptive method

Contraceptive method	Freq.	%
<b>Traditional method</b>		
Periodic abstinence	90	0.23
Withdrawal	770	2
Folkloric method	92	0.24
<b>Total traditional method</b>	<b>952</b>	<b>2.47</b>
<b>Modern method</b>		
Pill	2,455	6.39
IUD	245	0.64
Injections	8,664	22.54
Male condom	995	2.59
Female sterilization	874	2.27
Male sterilization		
Implants/norplant	3,262	8.48
Female condom	4	0.01
Lactational amenorrhea (lam)	255	0.66
Emergency contraception	2	0.01
Standard days method (sdm)	95	0.25
Diaphragm	-	-
Contraceptive patch	-	-
Injections 2 month	-	-
Other modern method	6	0.02
<b>Total modern methods</b>	<b>16857</b>	<b>43.86</b>
<b>Non users</b>		
Total non-users	20,637	53.68
<b>Total</b>	<b>38,446</b>	<b>100</b>

contraceptive methods by Zambian women falling in the 15-49 age bracket, and the effect is stronger towards modern contraceptive methods.

### Wealth index

The wealth status of Zambian women of the ages between 15-49 significantly influences the non-use or use of contraceptives. Poor women are more prone to not using any form of contraceptives as compared to women of middle-income status by a factor of 0.0735. As compared to middle-income women, poor women are also more likely to adopt traditional contraceptives by a factor of 0.0070 and have a 0.0805 lower probability of using modern contraceptives. Women who fall within the rich category have a 0.0275 lower chance of not using contraceptives and a 0.0249 higher probability of utilising modern contraceptive methods. Their income status, however, has no bearing on the choice of using traditional methods. Hence, the richer the women are, the higher the probability of adopting modern contraceptive methods, given that they have the resources to access modern contraceptives.

### Place of residence

According to the study results, rural residents are more likely not to use contraceptive as compared to women from the urban areas by a factor of 0.0311. Additionally, they are also less likely to adopt traditional methods (0.0100 lower probability) or modern methods (0.0212 lower probability), a phenomenon that can be explained by the lack of access to family planning services as well as a culture of bigger families among the rural folk.

### Socio-cultural factors

#### Woman's age

Results show that the respondent's age does have a significant influence across all 3 choices. Specifically, an increase in the women's age by a year means that the chances of either not using any contraceptive method or using traditional methods increase by 0.014 and 0.0004 times respectively among Zambian women in the 15-49 age group. However, the probability of using modern contraceptives decreases by 0.014 as the woman's age increases by one year. Hence, as women's age increases, there are more likely to stop using any form of contraceptive or use traditional methods. Reasons that could explain this pattern are, fear of side effects, in agreement with Gonie<sup>10</sup> who find that fear of side effects is a major barrier to the use of modern methods. Others include misconceptions about modern family planning methods and husband's refusal to allow their wives to use family planning services<sup>48</sup>. Some studies find that most older women hardly think that they can get pregnant due to infrequent sex, marital disruption, lack of a regular partner, menopause status or perceptions of infertility. Therefore, they do not see the need for modern contraceptives to either prevent unwanted pregnancy or even for the prevention of sexually transmitted diseases<sup>75</sup>.

#### Women's age at first birth

The woman's age at first birth is a statistically significant factor in determining whether a woman uses modern contraceptive methods or does not use any form of contraceptive at all. The woman's age at first birth does not have a bearing on the use of traditional methods as seen by the non-significance

**Table 2:** Zambia average marginal effects of contraceptive use and non-use

Variables	No method		Traditional method		Modern method	
	mlogit	cmlogit	mlogit	cmlogit	mlogit	cmlogit
Age	0.0140*** (0.0004)	0.0140*** (0.0005)	0.0004*** (0.0002)	0.0004*** (0.0002)	-0.0144*** (0.0005)	-0.0144*** (0.0005)
Age at first birth	-0.0032*** (0.0009)	-0.0032*** (0.0009)	0.0003 (0.0003)	0.0003 0.0002956	0.0029*** (0.0009)	0.0029*** (0.0009)
Number of living children	-0.0316*** (0.0017)	-0.0316*** (0.0017)	0.0043*** (0.0005)	0.0043*** (0.0005)	0.0273** (0.0017)	0.0273*** (0.0018)
Marital status: married	-0.2224*** (0.0109)	-0.2224*** (0.0109)	-0.0272*** 0.0109	-0.0272*** (0.0021)	0.1952*** (0.0108)	0.1952*** (0.0108)
Marital status: No longer living together/separated	-0.0093 (0.0120)	-0.0093 0.0120	-0.0002 (0.0019)	-0.0002 (0.0019)	0.0110 (0.0119)	0.0111 (0.0119)
Desire: Wants more children	0.0515*** (0.0065)	0.0515*** (0.0065)	0.0069*** (0.0025)	0.0069*** (0.0025)	-0.0584*** (0.0064)	-0.0584*** (0.0064)
Desire: undecided	0.1035*** (0.0106)	0.1035*** (0.0106)	-0.0175*** (0.0020)	-0.0175*** (0.0020)	-0.0860*** (0.0105)	-0.0860*** (0.0105)
Education: no education	0.0943*** (0.0091)	0.0941*** (0.0091)	-0.0074*** (0.0025)	-0.0074*** (0.0025)	-0.0869*** (0.0091)	-0.0869*** (0.0091)
Education: primary	0.0285*** (0.0066)	0.0285*** (0.0066)	0.0061*** (0.0022)	0.0061*** (0.0022)	-0.0347** (0.0066)	-0.0347*** (0.0066)
Wealth: poor	0.0735*** (0.0066)	0.0735*** (0.0066)	0.0070*** (0.0020)	0.0070*** (0.0020)	-0.0805*** (0.0066)	-0.0805*** (0.0066)
Wealth: rich	-0.0275*** (0.0082)	-0.0275*** (0.0082)	0.0026 (0.0024)	0.0026 0.0024	0.0249*** (0.0083)	0.0249*** (0.0083)
Employed	-0.0391*** (0.0050)	-0.0391*** (0.0050)	0.0047*** (0.0016)	0.0047*** (0.0016)	0.0344*** (0.0050)	0.0344*** (0.0050)
Rural resident	0.0311*** (0.0075)	0.0311*** (0.0075)	-0.0100*** (0.0030)	-0.0100*** (0.0030)	-0.0212*** (0.0074)	-0.0212*** (0.0074)
Muslim	-0.2184*** (0.3200)	-0.2184*** (0.0300)	0.0458*** (0.0171)	0.0458*** (0.0171)	0.1727*** (0.0322)	0.1727*** (0.0322)
Other religion	0.0873*** (0.0242)	0.0873*** 0.0242	-0.0168*** (0.0046)	-0.0168*** (0.0046)	-0.0705*** (0.0241)	-0.0705*** (0.0241)
Observations	38,446	38,446	38,446	38,446	38,446	38,446

of the coefficient. The higher the age at first birth, the lower the likelihood of non-use of contraceptives. If the women's age at first birth increases by a year, the probability of not using any contraceptives decreases by 0.003 units. The odds of using modern contraceptives, however, are 0.0029 times higher as women's age at first birth increases by a year.

Overall, the age of first birth influences the decision either to use modern methods or not use contraceptives but does not influence the decision to use traditional methods. By looking at the magnitudes of the coefficient of women's age at first birth, it seems the influence is greater towards non-use of any contraceptive method (0.0032) and compared to the use of modern methods (0.0029). One can, therefore, conclude that those who have delayed giving births are more likely to not use any form of contraceptives as they grow older than they are to use modern contraceptive methods.

### ***The number of living children***

The number of living children is also a significant factor in determining whether to use traditional and modern contraceptive methods or not to use any contraception. Results indicate that women who have one extra child are 0.0316 times less likely to not use any form of contraception. In fact, they are more likely to either use traditional methods (0.0043 times) and modern contraceptives (0.0273 times).

### ***Marital status***

In comparison to the reference category of those never in a union, married women are 0.224 times likely to not use any and 0.0272 less likely to use traditional methods. There is a 0.1952 higher chance that they will use modern contraception. The fact that a woman is no longer living with a partner or separated does not seem to have any impact on the contraceptive choice of Zambian women in the 15-49 age range. In essence, married women are more likely to use modern contraceptives than those who have never been in a union, a phenomenon that could easily be explained by the fact that married women will be more sexually active than women without partners or women who have never been in a union.

### ***Fertility desire***

We analyse how fertility desires or plans influence contraceptive (either modern or traditional) use or non-use. The first analysis relates to women who want more children in comparison to those who no longer have fertility desires (including those who are sterilised and declared infecund). The likelihood of not using contraceptives is 0.0515 times higher for women who want more children as compared to those who do not want any more children. Women who still want more children have a 0.0069 times greater probability of using traditional methods than those who do not want any more children. On the contrary, these women have a 0.0584 lesser chance of using any form of modern contraception. In tandem with prior expectations, therefore, women who want more children are less likely to use any form of contraception and if they do, they utilize the less effective form of contraception, traditional methods. The chances that women in either the unsure or undecided category compared to those who no longer have any fertility desires do not use any form of contraception is 0.1035 times greater. Also, women in this category are less likely to use traditional methods or modern methods in comparison to women who still want more children. Their probability to use traditional methods and modern methods is 0.0175 and -0.0860 times lower than women who still want more children, respectively.

### ***Religious beliefs***

In comparison to the Christian reference group, the probability of non-use of contraceptives by Muslim women is 0.2184 times lower among Zambian women of childbearing age. However, women from other religions are more likely to avoid any form of contraception than Christian women and the probability of women from other religions not adopting any form of contraception increases by 0.0873 points. Muslim women are more likely to use traditional methods or modern methods than Christian women, with the probability increasing by 0.0458 and 0.1727 points, respectively. On the contrary, women from other religions are less prone to adopting either traditional or modern contraceptive methods in relation to Christian women. Specifically, the likelihood of them using

traditional methods is 0.0168 times lower and the probability of using modern contraception is 0.0705 lower among these women relative to Christian women. In sum, whilst Muslim women are more prone to using contraceptive methods as compared to Christian women, women from other religions are more inclined not to use any form of contraception.

In summary, more educated, older, non-Muslim and poorer women are less likely to adopt modern contraceptive methods while employed women are indifferent between traditional and modern birth control options. Older, poor women and women who desire more children appear to be indifferent between none-use and traditional contraceptive methods. This may suggest that traditional contraceptive methods are perceived as safer option. With the exception of Muslim, Christian women and those from other religions as well as women with no education prefer no birth control method. However, contraceptive choice is possible to change across time. A dynamic analysis is therefore required to shed further light on the possible switching fertility control behaviour, which is, however, not supported in cross sectional analysis.

## Conclusion

This paper analysed the determinants of contraceptive choice in Zambia. Results indicate that socio-cultural factors and socio-economic factors contribute to the decision of whether to use traditional methods, modern methods or not to use any form of contraception. These socio-cultural factors include age, age at first birth, number of living children, fertility desire, religious beliefs. The socio-economic factors comprise wealth status, education, employment, and place of residence. Specifically, educated, older, non-Muslim and poorer women are likely to adopt the traditional contraceptive methods. In terms of employment, this paper finds that unemployed women are more likely not to use any form of contraceptives than their employed counterparts. Employed women have a higher probability of adopting either traditional or modern forms of contraception. Furthermore, Christian women and those from other religions as well as women with no education prefer no birth control method. Therefore, government's effort to expand familial planning

program should target non-Muslim and non-educated women while promoting safer contraceptive method. These findings are useful for addressing policy and research gaps around maternal health in Zambia and other countries from sub-Saharan Africa, as it assists in identifying efficient development of family planning programmes by policymakers and wider family planning organisations such as NGOs. It is an opportunity for the sustained impetus for intensifying commitments towards the successful improvement of maternal outcomes in Zambia and sub-Saharan Africa.

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