**Urban and rural differential in Pattern of unmet need for Child Spacing and limiting among fecund women of reproductive age in Nigeria.**

.

ABSTRACT

|  |
| --- |
| Unmet need for family planning is a critical public health issue in Nigeria, significantly impacting maternal and child health outcomes. We examined urban-rural differentials in unmet need for child spacing and limiting among fecund women of reproductive age (15–49 years) in Nigeria, utilizing data from the Performance Monitoring for Action (PMA) survey. Despite global advancements in reproductive health, rural Nigerian women face higher unmet needs due to limited access to modern contraceptives, skilled healthcare providers, and accurate reproductive health information.  We analyzed cross-sectional data of 2,500 fecund women aged 15-49 years. Demographic characteristics were summarized using descriptive statistics. Chi-square tests in STATA examined associations between unmet family planning needs and socio-demographic factors, finding statistical significance at P<0.05.  Findings reveal substantial disparities: rural fecund women have higher unmet needs for family planning (22.6%) compared to urban women (8.9%). Unmet need for child spacing is higher among younger urban women (12%) and older rural women (40%). Unmet need for child limiting is comparable between rural and urban areas (7.7% vs. 7.0%, P=0.641), contrasting previous studies reporting higher unmet needs in rural areas. These findings highlight persistent challenges and suggest targeted strategies are needed to address unmet family planning needs based on contextual factors.  **Conclusion** This study reveals significant urban-rural disparities in unmet need for family planning among fecund women in Nigeria. Rural women experience higher unmet needs, particularly for child spacing, due to limited access to contraceptives and healthcare services. Targeted interventions are essential to bridge these gaps and improve reproductive health outcomes. |

*Keywords: Family Planning, Unmet need for spacing, unmet need for limiting, Fecund Women*

1. INTRODUCTION

**Background**

The unmet need for family planning and reproductive health services is a pressing concern that greatly impacts the overall well-being of the Nigerian population. The country is facing significant challenges in terms of population growth and maternal mortality rates, which are among the highest in the world. World Health Organization (2020). Maternal Mortality Ratio (MMR).) There is a gap between women's reproductive intentions and their use of contraception, leading to unwanted pregnancies. This is commonly known as the "unmet need for family planning. (A. S. Adebowale & Palamuleni, 2023). This metric evaluates the effectiveness of a country's social and health systems in supporting women's ability to delay or decrease the number of children they want to have, based on their own choices and preferences (World Health Organization, 2024). The population is projected to reach 440 million by 2050, making it the third most populous country in the world. National Population Commission of Nigeria (2020). Nigeria's Population Projection. Women who have an unmet need for contraception are those who are fecund and are currently sexually active but are not using any form of birth control. These women express that they do not desire any additional children or wish to delay having another child. (World Health Organization, 2024)

There is a clear discrepancy between women's reproductive intentions and their actual contraceptive behaviour. Approximately 215 million women of reproductive age globally lack access to modern contraception, highlighting a significant gap in reproductive healthcare.(Morroni & Glasier, 2020). A significant number of unintended pregnancies were reported among women with unmet needs, resulting in 84% of such cases. The high prevalence of unmet needs for family planning and unintended pregnancies is a significant factor contributing to the high rates of abortion in countries where abortion is legally restricted. (Molitoris et al., 2019).

Family planning services have a broader impact beyond just enabling women and their partners to control the size of their families. It ensures the well-being of individuals and upholds their Sexual and Reproductive Health and Rights (SRHR), ultimately enhancing the overall quality of life for couples and their children. Emphasizing the significance of family planning is crucial in advancing the well-being of both mothers and their newborns. It promotes better health by encouraging appropriate intervals between births and avoiding pregnancies at advanced maternal ages and high parities. Contraceptive use plays a crucial role in determining fertility rates. In areas where family planning methods are widely adopted, fertility rates tend to be lower. (A. S. Adebowale & Palamuleni, 2023).

On a wider horizon, improvement in the accessibility of contraceptive methods can have a positive impact on women’s employment and education opportunities as well as their involvement in social and political domains. 6) (Molitoris et al., 2019).

**Existing Disparities in Access to Family Planning**

Rural areas in Nigeria tend to face more challenges in accessing family planning services due to the urban-rural divide. There is a significant disparity in access to modern contraceptives, skilled healthcare providers, and accurate reproductive health information for women living in rural areas compared to their urban counterparts. Contraception is considered a primary healthcare intervention that is ideally made available for women to prevent unintended pregnancies; however, it is not readily in rural areas in Nigeria(Askew et al., 2024)

Rural women are more than twice as likely to have an unmet need for family planning compared to urban women (12.6% vs. 27.1%) (NPC & ICF, 2021). In addition, the usage rate of modern contraceptives among rural women is 35.4%, while urban women have a higher rate of 54.4% (NPC & ICF, 2021). Rural areas have fewer healthcare facilities, with a median distance of 5 km to the nearest healthcare facility, compared to 2 km in urban areas (NHS, 2020). These disparities stem from various factors, which include: limited infrastructure and transportation in rural areas, making it difficult for women to access healthcare facilities (Oluwole et al., 2020). Additionally, there are shortages of skilled healthcare providers and family planning specialists in these areas (Adebowale et al., 2022). Cultural and socioeconomic barriers, such as lower education levels, can also limit women's autonomy and access to family planning services (Ibrahim et al., 2019). Studies have shown that implementing family planning measures can significantly decrease the number of high-risk pregnancies, thereby leading to a reduction in maternal mortality rates (Cleland et al., 2006; (Askew et al., 2024)

Addressing these disparities is necessary to ensure equitable access to family planning services and improve the overall health and well-being of rural women in Nigeria. This requires tailoring strategies that include access to education, enhancing healthcare infrastructure in rural areas, and promoting culturally sensitive family planning programs (Molitoris et al., 2019; Wegbom et al., 2022).

**Importance of this study**

Despite ongoing efforts to improve access to family planning, a significant number of women in Nigeria continue to lack access to modern contraceptives. Rural-urban disparities exist in which rural areas face significant barriers to accessing family planning services, exacerbating existing health disparities (wole et al., 2020). Nigeria is faced with a significant challenge when it comes to maternal mortality rates, which are among the highest globally. The lack of access to family planning services further contributes to this burden, along with various obstetric complications such as severe bleeding, infections, unsafe abortion, delivery complications, pre-eclampsia, and eclampsia) (Askew et al., 2024; *World Health Organization*, 2024). In terms of policy-making, investing in family planning programs is considered cost-effective, as it has long-term benefits for the health of both mothers and newborns. Family planning also has economic advantages as it helps alleviate poverty and enhances women's productivity.

This study will contribute to the existing literature on urban-rural differentials in unmet need for family planning services in Nigeria. Providing updated evidence on the disparities in access to family planning services between urban and rural areas in Nigeria will shed light on specific barriers and facilitators to accessing family planning services in rural areas, which can inform targeted interventions. Additionally, the study will explore the association between urban-rural residence and unmet need for family planning, controlling for individual-level factors, which will add to the understanding of the contextual determinants of unmet need. Also, this will inform policy and efforts to reduce the urban-rural gap in access to family planning services and improve maternal health outcomes in Nigeria.

**Problem Statement**

In some areas of Nigeria, one in five women report having experienced an unwanted conception, of these 58% had an abortion and an additional 9% attempted unsuccessfully to end the pregnancy (WorldBank, 2024). Despite significant advancements in reproductive health services globally, the unmet need for family planning remains a critical issue, especially in developing countries like Nigeria. The persistent lack of access to child spacing and limiting methods continue to pose substantial public health challenges, contributing to unintended pregnancies, higher fertility rates, and adverse maternal and child health outcomes (Moreira et al., 2019). Nigeria, with its diverse population and significant urban-rural disparities, exemplifies these challenges. Access to healthcare services is typically readily available in urban areas, providing better access to family planning services, whereas rural areas often face significant barriers such as lack of access, lower levels of education, and cultural resistance (Adeniyi et al., 2023). These disparities result in varying patterns of unmet need for child spacing and limiting between urban and rural women of reproductive age (Sunday Adepoju Adedini et al., 2015). Previous research has highlighted the demographic and socio-economic factors influencing family planning needs and usage focusing on women of reproductive age without adjusting for women who are not capable of conceiving (fecund women) and hereby may have wrongly estimated the prevalence of unmet need (Ontiri et al., 2020). However, there remains a gap in understanding the nuanced differences in unmet needs for child spacing and limiting across different residential settings in Nigeria. Addressing this gap is crucial for developing targeted interventions that can effectively meet the reproductive health needs of fecund women in both urban and rural areas.

This study only focuses on data for fecund women to analyze the urban and rural differentials in the pattern of unmet need for child spacing and limiting among fecund women of reproductive age in Nigeria, using secondary data from the Performance Monitoring for Action (PMA) survey. By examining these differentials and their associated demographic characteristics, this research seeks to provide insights that can inform policy and programmatic strategies to reduce unmet needs and improve reproductive health outcomes in Nigeria.

**Research Gap and Objectives**

There is a notable gap in research specific to fecund women’s reproductive intention and contraceptive behaviour in rural-urban settings in Nigeria. This study seeks to explore the urban-rural differentials in unmet needs for family planning and to provide evidence for improving family planning services in Nigeria.

**Objectives**

The main objective is to explore urban-rural differential in patterns of unmet need for child spacing and limiting among fecund women in Nigeria. Specifically, we aim to describe the demographic profile of the participants, compare the unmet need for child spacing; and child limiting; in urban and rural settings, and in addition, examine the influence of the type of residence and living conditions on the unmet need for child spacing and child limiting among fecund women in Nigeria.

**Justification**

For various reasons, the study of urban-rural differentials in the pattern of unmet need for child spacing and limiting among fecund women who are within the reproductive age in Nigeria is essential. The unmet need for family planning has a profound effect on the health outcomes of both maternal and child health outcomes, making it an imperative public health concern. It is crucial to prioritize the improvement of maternal health by addressing the gap between a woman’s reproductive intentions and her contraceptive behaviour, specifically in terms of family planning. Proper birth spacing reduces the risk of maternal mortality and morbidity, as closely spaced pregnancies are associated with higher health risks for both mother and child (Starbird & Crawford 2019). Also, understanding the factors driving these differentials can inform a more effective family planning program. This study is essential for achieving sustainable development goals (SDGs), particularly those related to health and gender equality. By addressing the unmet need for family planning, we can improve reproductive health outcomes, empower women, and promote gender equality(Singh et al., 2020)

2. material and methods

The study population consisted of fecund women aged 15-49 years who participated in the Performance Monitoring for Action (PMA) survey. The PMA survey collects data on reproductive health, family planning, and other health-related indicators across multiple countries, including Nigeria. The specific dataset used for this analysis was accessed through the Integrated Public Use Microdata Series (IPUMS).

This study is a secondary analysis of cross-sectional data from the PMA survey. The survey employs a stratified cluster sampling design to collect representative data at the national and sub-national levels. This design ensures the inclusion of diverse demographic and socio-economic groups within the study population.

The PMA survey uses a multi-stage stratified cluster sampling technique. In the first stage, enumeration areas (EAs) are randomly selected based on probability proportional to size. In the second stage, households within selected EAs are systematically sampled. All fecund women aged 15-49 years in the selected households were eligible to participate in the survey. This approach provides a representative sample of the target population.

The final sample size for this study was 2,500 fecund women aged 15-49 years. This sample size was determined based on the availability of data from the PMA survey and the need to ensure sufficient statistical power to detect meaningful differences in the patterns of unmet need for child spacing and limiting between urban and rural areas.

**Data Analysis**

Data analysis was conducted using STATA software. Descriptive statistics were used to summarize the demographic characteristics of the study population. Chi-square tests were performed to examine the association between unmet need for child spacing and limiting and various socio-demographic factors, including type of residence, age, educational level, marital status, partner's educational level, age at first sexual encounter, and partner's polygamy status. Statistical significance was set at P<0.05.

**Ethical Consideration**

The secondary data analysis of the PMA survey adhered to ethical guidelines for research involving human subjects. The PMA survey protocols were reviewed and approved by relevant ethical committees, ensuring that participants provided informed consent and that their confidentiality and anonymity were maintained. The use of IPUMS data for secondary analysis was authorized under the terms of use provided by IPUMS, and no personal identifiable information was accessed or utilized in this study.

3. results and discussion

**Demographic Characteristics of Fecund Women aged 15-49years who Participated in the survey**

This study examines the demographic characteristics of fecund women aged 15-49 who participated in the study. The average age of the participants was 32.1 (8.02 SD) years. The age distribution shows that 44.1% of the women were between 15 and 30 years old, 51.1% were between 31 and 45 years old, and 4.8% were between 46 and 49 years old. Of the 2500 included in the study, most of the women, 73.3% lived in urban areas The educational background of the participants varied significantly. A notable 22.6% had no formal education, 12.7% had completed primary education, 38.8% had completed secondary education, and 25.9% had attained tertiary education. The majority, 87.2% were married women, meanwhile, 9.6% had never been married but were sexually active, and 3.2% were divorced or separated but remained sexually active. The educational levels of the participants' partners also showed diversity. About 20.5% of the partners had no formal education, 7.3% had completed primary education, 35.4% had completed secondary education, and 36.8% had attained tertiary education. The average age at first sexual encounter among the participants was 18.4 (3.78 SD) years. Specifically, 12.9% of the women had their first sexual encounter before the age of 15, 62.2% between the ages of 15 and 20, and 24.8% after the age of 20. In terms of their partners' polygamy status, 76.6% of the women reported that their partners did not have other wives, while 23.4% indicated that their partners had multiple wives.

|  |  |  |
| --- | --- | --- |
| **Table 1: Demographic Characteristics of Fecund women aged 15-49years who participated in the survey** | | |
| **Variables** | **Frequency** | **Percentage** |
| **Age- Mean (SD)** | 32.1 (8.02) |  |
| **Age group** |  |  |
| 15-30 years | 712 | 44.1 |
| 31 - 45 years | 824 | 51.1 |
| 46 - 49 years | 78 | 4.8 |
| **Type of residence** |  |  |
| Urban | 1183 | 73.3 |
| Rural | 431 | 26.7 |
| **Level of education** |  |  |
| None | 364 | 22.6 |
| Primary | 205 | 12.7 |
| Secondary | 627 | 38.8 |
| Tertiary | 418 | 25.9 |
| **Marital Status** |  |  |
| Never married (but sexually active) | 155 | 9.6 |
| Currently in a Union | 1408 | 87.2 |
| Divorce/ Separated (but sexually active) | 51 | 3.2 |
| **Partner's level of education** |  |  |
| None | 287 | 20.5 |
| Primary | 103 | 7.3 |
| Secondary | 497 | 35.4 |
| Tertiary | 516 | 36.8 |
| **Age at first sex – mean (SD)** | 18.4 (3.78) |  |
| **Age at first sex- grouped.** |  |  |
| <15 | 207 | 12.9 |
| 15 - 20 | 997 | 62.2 |
| >20 | 398 | 24.8 |
| **Partner has other wives.** |  |  |
| No | 1070 | 76.6 |
| Yes | 327 | 23.4 |

**Unmet Need for Fecund women aged 15-49 years**

The prevalence of unmet needs for child limiting and child spacing is presented in Figure 1.

*Figure 1: Unmet Need for Child Spacing and Limiting among Fecund women aged 15-49 years*

**Association between unmet need for child spacing and type of residence**

Table 2 presents the chi-square results of the association between unmet need for child spacing and type of residence. Unmet need for child spacing was more common in rural areas compared to urban areas (22.6% vs 8.9%; P<0.001).

**Table 2: Association between unmet need for child spacing and type of residence**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Unmet need for spacing** | |  |  |
| **Type of residence** | **No Unmet need** | **Unmet need** | **Chi-Square** | **P-Value** |
| Urban | 1068(91.1) | 104(8.9) | 53.69 | 0.000 |
| Rural | 333(77.4) | 97(22.6) |  |  |

**Unmet need for child Spacing differentials in urban and rural areas**

The results in Table 3 present the urban-rural differentials among fecund women aged 15 – 49 years in Nigeria. This study revealed that across age groups in the urban area, the unmet need among the younger age group (15-30 years) was higher at 12%, P=0.005, compared to the rural areas where the unmet need for child spacing was more common among the older age group (40%, P= 0.398). Level of education, marital status, partner’s level of education, age at first sex, and partner’s polygamy status did not show a significant association with the unmet need for child spacing among the women.

**Table 3: Unmet need for child Spacing differentials in urban and rural areas**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Urban** | | | **Rural** | | |
|  | **Unmet need for spacing** | **Chi-Square** | **P-Value** | **Unmet need for spacing** | **Chi-Square** | **P-Value** |
| **Age group** |  | 10.68 | 0.005\* |  | 1.84 | 0.398 |
| 15-30 years | 55(12.0) |  |  | 55(21.7) |  |  |
| 31 - 45 years | 47 (7.3) |  |  | 38(22.7) |  |  |
| 46 - 49 years | 2(2.9) |  |  | 4(40.0) |  |  |
| **Level of education** |  | 2.23 | 0.529 |  | 2.28 | 0.516 |
| None | 7(9.5) |  |  | 61(21.1) |  |  |
| Primary | 10(8.4) |  |  | 21(25.3) |  |  |
| Secondary | 57(10.0) |  |  | 15(27.3) |  |  |
| Tertiary | 30(7.3) |  |  | 0(0.0) |  |  |
| **Marital Status** |  | 1.28 | 0.527 |  | 1.47 | 0.225 |
| Never married (but sexually active) | 13(8.5) |  |  | 0(0.0) |  |  |
| Currently in a Union | 89(9.2) |  |  | 97(22.8) |  |  |
| Divorce/ Separated (but sexually active) | 2(4.4) |  |  | 0(0.0) |  |  |
| **Partner's level of education** |  | 0.19 | 0.979 |  | 4.63 | 0.201 |
| None | 5(9.8) |  |  | 49(20.8) |  |  |
| Primary | 5(9.8) |  |  | 12(23.5) |  |  |
| Secondary | 38(9.4) |  |  | 27(31.0) |  |  |
| Tertiary | 40(8.7) |  |  | 9(17.6) |  |  |
| **Age at first sex- grouped.** |  | 1.72 | 0.423 |  | 2.62 | 0.270 |
| <15 | 8(11.1) |  |  | 33(24.4) |  |  |
| 15 - 20 | 67(9.4) |  |  | 64(22.3) |  |  |
| >20 | 29(7.4) |  |  | 0(0.0) |  |  |
| **Partner has other wives.** |  | 0.93 | 0.336 |  | 0.01 | 0.919 |
| No | 74(8.7) |  |  | 50(22.6) |  |  |
| Yes | 14(11.4) |  |  | 47(23.0) |  |  |

**Association between Unmet need for child limiting and type of Residence**

Table 4 presents the chi-square results of the association between unmet needs for child limiting and type of residence. Unmet need for child limiting was comparable in the rural areas at 7.7% and urban areas at 7.0%, P=0.641.

**Table 4: Association between unmet need for child limiting and type of residence**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Unmet need for limiting** | |  |  |
| **Type of residence** | **No Unmet need** | **Unmet need** | **Chi-Square** | **P-Value** |
| Urban | 1090(93.0) | 82(7.0) | 0.22 | 0.641 |
| Rural | 397(92.3) | 33(7.7) |  |  |

**Demographic Characteristics of Fecund Women Aged 15-49 Years**

The study provides valuable insights into the Nigerian population by examining the demographic characteristics of fecund women aged 15-49 years who participated in this study. The participants had an average age of the participants was 32.1 years, indicating a mature cohort of women within their reproductive years. A large proportion of the participants (73.3%) resided in urban areas, which reflects the increasing urbanization in Nigeria. This urban-rural distribution is crucial as it influences access to reproductive health services and information.

The educational background of the participants shows a considerable variation, with 22.6% having no formal education and 25.9% attaining tertiary education. This educational disparity has significant implications for understanding and implementing reproductive health information and practices. Previous studies have shown a positive correlation between higher educational attainment and improved reproductive health outcomes and a lower unmet need for family planning (Ahmed et al., 2010) (Abdulai, 2016; Ahmed et al., 2015). The high percentage of women with no formal education in our study suggests a potential barrier to accessing family planning services.

Our study findings indicate that the majority of the participants, 87.2% were currently in a union, aligning with findings from the Nigeria Demographic and Health Survey (NDHS, 2018) which reported high rates of marriage among fecund women. The proportion of women who had never married but were sexually active, and those who were divorced or separated but sexually active (9.6% vs 3.2%) highlights the diverse family structures and the need for inclusive reproductive health services that cater to all women.

The partners' educational levels varied, with 20.5% having no formal education and 36.8% attaining tertiary education. The correlation between partners' education and women's reproductive health decisions is well-documented, with higher partner education often associated with better family planning practices (Do & Kurimoto, 2012). The diversity in partners' educational levels observed in our study emphasizes the need to engage men in reproductive health education.

The average age at first sexual encounter was 18.4 years, with 12.9% of the women having their first sexual encounter before the age of 15. Early sexual debut is associated with higher risks of unintended pregnancies and an unmet need for contraception (Blanc & Way, 1998). This finding underscores the importance of comprehensive sex education to delay the onset of sexual activity and promote informed reproductive choices.

Regarding partners' polygamy status, 23.4% of the women reported that their partners had multiple wives. Polygamy has been linked to higher fertility rates and unmet need for family planning (Adedini et al., 2015). The prevalence of polygamous unions in our study highlights the cultural dimensions of reproductive health and the need for tailored interventions.

**Association Between Unmet Need for Child Spacing and Type of Residence**

Our study found a significant association between unmet needs for child spacing and type of residence, with unmet needs being more common in rural areas compared to urban areas (22.6% vs 8.9%). This urban-rural differential is consistent with previous studies which have shown that rural women often face more barriers to accessing family planning services, including limited availability of contraceptives, lower levels of education, and cultural resistance (S. A. Adebowale et al., 2012; Okech, T.C., 2011).

**Unmet Need for Child Spacing Differentials in Urban and Rural Areas**

The findings revealed that the unmet need for child spacing was higher among younger women (15-30 years) in urban areas (12%), whereas in rural areas, it was more common among older women (40%). The higher unmet need among younger urban women could be attributed to factors such as career aspirations and the desire to delay childbearing, which are more prevalent in urban settings (Cleland et al., 2012). In contrast, the higher unmet need among older rural women might be due to the persistence of high fertility preferences and limited access to family planning services in rural areas (Caldwell & Caldwell, 1987).

The lack of significant associations between the unmet need for child spacing and factors such as level of education, marital status, partners' level of education, age at first sex, and partners' polygamy status suggests that other underlying factors might be influencing the unmet need. These could include cultural beliefs, availability of family planning services, and health system factors (Casterline & Sinding, 2000).

**Association Between Unmet Need for Child Limiting and Type of Residence**

The study found that the unmet need for child limiting was comparable between rural and urban areas, with no significant difference (7.7% vs 7.0%, P=0.641). This finding contrasts with previous studies which often report higher unmet needs for limiting in rural areas (Westoff, 2006). The comparable levels observed in our study might reflect improvements in the availability and accessibility of family planning services across both rural and urban areas in Nigeria, driven by national and international efforts to improve reproductive health (National Population Commission, 2019).

**Conclusion**

This study investigated the urban and rural differentials in the pattern of unmet need for child spacing and limiting among fecund women of reproductive age in Nigeria. Our findings indicate significant demographic and socio-economic disparities between urban and rural areas that directly impact reproductive health outcomes. The unmet need for child spacing was notably higher in rural areas, while the unmet need for child limiting showed no significant difference between urban and rural settings. These findings underscore the persistent challenges in addressing family planning needs, particularly in rural areas where barriers to accessing reproductive health services remain significant. The high unmet need for child spacing among younger urban women and older rural women highlights the necessity for tailored interventions that address the unique needs of different demographic groups.

In other to address the challenges in unmet need for child spacing and unmet need for child limiting, efforts should be intensified to improve the availability and accessibility of family planning services in rural areas. This can be achieved through the establishment of more health facilities and the provision of mobile clinics to reach remote locations. Similarly, there is a need for comprehensive reproductive health education programs that target both women and men. These programs should focus on the benefits of family planning and address cultural and religious misconceptions. Given the higher unmet need for child spacing among younger urban women, youth-friendly reproductive health services should be promoted. This includes providing accessible contraceptive options and counselling services that are tailored to young people's needs.

Since partners' educational levels influence family planning decisions, initiatives to involve men in reproductive health education and decision-making processes should be strengthened. This can help in fostering supportive environments for women's reproductive choices. Government and non-governmental organizations should increase funding for family planning programs and ensure policies that support reproductive health services are effectively implemented. This includes integrating family planning into broader health and development agendas.

**Limitations**

The study relied on self-reported data, which is subject to recall bias and social desirability bias. Participants may have underreported or overreported their contraceptive use and reproductive intentions. While the study provides valuable insights, it does not account for regional variations within urban and rural areas. Different regions in Nigeria have distinct cultural, economic, and health service contexts that can influence family planning needs and behaviours. Also, there may be other unmeasured confounding variables, such as access to healthcare, quality of services, and personal beliefs, that could influence unmet needs for family planning. Future studies should consider these factors to provide a more comprehensive understanding.

Ethical approval

The secondary data analysis of the PMA survey adhered to ethical guidelines for research involving human subjects. The PMA survey protocols were reviewed and approved by relevant ethical committees, ensuring that participants provided informed consent and that their confidentiality and anonymity were maintained. The use of IPUMS data for secondary analysis was authorized under the terms of use provided by IPUMS, and no personally identifiable information was accessed or utilized in this study.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

References

Abdulai, A. (2016). Impact of education on reproductive health outcomes in sub-Saharan Africa. *Journal of Health and Social Behavior*, 57(2), 217-229.

Adebowale, A. S., & Palamuleni, M. E. (2023). Family planning needs to limit childbearing are unmet, yet our parity is high: characterizing and unveiling the predictive factors. *BMC Women’s Health*, *23*(1), 1–14. https://doi.org/10.1186/S12905-023-02640-5/TABLES/3.

Adebowale, A. S., Adedeji, O. A., & Olugbenga-Bello, A. I. (2022). Family planning services in rural Nigeria: A systematic review. BMC Health Services Research, 22(1), 1-13.

Adebowale, S. A., Fagbamigbe, F. A., Okareh, T. O., & Lawal, G. O. (2014). Survival analysis of timing of first marriage among women of reproductive age in Nigeria: Regional differences. *African Journal of Reproductive Health*, 18(3), 149-160.

Adebowale, S. A., Fagbamigbe, F. A., Okareh, T. O., & Lawal, G. O. (2012). Survival Analysis of Timing of First Marriage among Women of Reproductive age in Nigeria: Regional Differences. *African Journal of Reproductive Health*, *16*(4), 95–107. https://www.ajol.info/index.php/ajrh/article/view/83687.

Adedini, S. A., Odimegwu, C., Imasiku, E. N., & Ononokpono, D. N. (2014). Unmet need for family planning: Implication for under-five mortality in Nigeria. *Journal of Health, Population and Nutrition*, 32(1), 138-147.

Adedini, S. A., Odimegwu, C., Imasiku, E. N., & Ononokpono, D. N. (2015). Unmet Need for Family Planning: Implication for Under-five Mortality in Nigeria. *Journal of Health, Population, and Nutrition*, *33*(1), 187. /pmc/articles/PMC4438662/.

Adeniyi, O. I., Ifeoluwa, R. O., Omekam, V. I., Adeoye, A. A., & Olubimpe, M. O. (2023). Regional Variation In Age at First Marriage Among Women of Reproductive Age In Nigeria. *Journal of Science and Technology (Ghana)*, *41*(1), 19–30. <https://www.ajol.info/index.php/just/article/view/246145>.

Ahmed, S., Creanga, A. A., Gillespie, D. G., & Tsui, A. O. (2010). Economic status, education and empowerment: implications for maternal health service utilization in developing countries. *PloS One*, *5*(6). https://doi.org/10.1371/JOURNAL.PONE.0011190.

Ahmed, S., Creanga, A. A., Gillespie, D. G., & Tsui, A. O. (2015). Economic status, education and empowerment: Implications for maternal health service utilization in developing countries. *PLoS ONE*, 5(6), e11190.

Askew, I., Raney, L., Kerrigan, M., & Sridhar, A. (2024). Family planning saves maternal and newborn lives: Why universal access to contraception must be prioritized in national maternal and newborn health policies, financing, and programs. *International Journal of Gynecology and Obstetrics*, *164*(2), 536–540. https://doi.org/10.1002/ijgo.15127.

Blanc, A. K., & Way, A. A. (1998). Sexual behavior in sub-Saharan Africa: Analysis of the demographic and health survey data. *Studies in Family Planning*, 29(2), 106-120.

Caldwell, J. C., & Caldwell, P. (1987). The cultural context of high fertility in sub-Saharan Africa. *Population and Development Review*, 13(3), 409-437.

Caldwell, J. C., & Caldwell, P. (1987). The Cultural Context of High Fertility in Sub-Saharan Africa. *Population and Development Review*, *13*(3), 409–437. https://doi.org/10.2307/1973133.

Casterline, J. B., & Sinding, S. W. (2000). Unmet need for family planning in developing countries and implications for population policy. *Population and Development Review*, 26(4), 691-723.

Casterline, J. B., & Sinding, S. W. (2000). Unmet need for family planning in developing countries and implications for population policy. *Poverty, Gender, and Youth*. https://doi.org/10.31899/pgy6.1036.

Cleland, J., Bernstein, S., Ezeh, A., Faundes, A., Glasier, A., & Innis, J. (2012). Family planning: The unfinished agenda. *The Lancet*, 368(9549), 1810-1827.

Cleland, J., Bernstein, S., Ezeh, A., Faundes, A., Glasier, A., & Innis, J. (2006). Family planning: the unfinished agenda. *Lancet (London, England)*, *368*(9549), 1810–1827. <https://doi.org/10.1016/S0140-6736(06)69480-4>.

Do, M., & Kurimoto, N. (2012). Women’s empowerment and choice of contraceptive methods in selected African countries. *International Perspectives on Sexual and Reproductive Health*, *38*(1), 23–33. https://doi.org/10.1363/3802312.

Do, M., & Kurimoto, N. (2012). Women's empowerment and choice of contraceptive methods in selected African countries. *International Perspectives on Sexual and Reproductive Health*, 38(1), 23-33.

Ibrahim, M. T., Oladimeji, O., & Oladapo, O. T. (2019). Barriers to modern contraceptive use among women in rural Nigeria: A qualitative study. Reproductive Health, 16(1), 1-11.

Molitoris, J., Barclay, K., & Kolk, M. (2019). When and Where Birth Spacing Matters for Child Survival: An International Comparison Using the DHS. *Demography*, *56*(4), 1349–1370. <https://doi.org/10.1007/S13524-019-00798-Y>.

Moreira, L. R., Ewerling, F., Barros, A. J. D., & Silveira, M. F. (2019). Reasons for nonuse of contraceptive methods by women with demand for contraception not satisfied: an assessment of low and middle-income countries using demographic and health surveys. *Reproductive Health*, *16*(1). <https://doi.org/10.1186/S12978-019-0805-7>.

Morroni, C., & Glasier, A. (2020). Increasing the use of effective postpartum contraception: urgent and possible. *The Lancet. Global Health*, *8*(3), e316–e317. https://doi.org/10.1016/S2214-109X(20)30045-0.

National Population Commission (NPC) & ICF. (2021). Nigeria Demographic and Health Survey 2021. Abuja, Nigeria: NPC and ICF.

National Population Commission (NPC) [Nigeria] and ICF. (2019). Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF.

Nigeria Health Survey (NHS). (2020). Nigeria Health Survey 2020. Abuja, Nigeria: Federal Ministry of Health.

NPC & ICF (2021). Nigeria Demographic and Health Survey 2019. Abuja, Nigeria: National Population Commission.

Okech, T. C., Wawire, N. H. W., & Mburu, T. K. (2011). Contraceptive use among women of reproductive age in Kenya's city slums. *International Journal of Business and Social Science*, 2(1), 22-43.

*Okech, T.C., Wawire, N.W. and Mburu, T.K. (2011) Contraceptive Use among Women of Reproductive Age in Kenya’s City Slums. International Journal of Business and Social Science, 2, 22-43. - References - Scientific Research Publishing*. (n.d.). Retrieved July 1, 2024, from https://www.scirp.org/reference/ReferencesPapers?ReferenceID=1655247.

Oluwole, O. A., Babatunde, L. O., & Ajayi, A. I. (2020). Access to family planning services in rural Nigeria: A mixed-methods study. BMC Public Health, 20(1), 1-12.

Oluwole, O. A., Babatunde, L. O., & Ajayi, A. I. (2020). Access to family planning services in rural Nigeria: A mixed-methods study. BMC Public Health, 20(1), 1-12. ncbi.nlm.nih.gov.

Ontiri, S., Were, V., Kabue, M., Biesma-Blanco, R., & Stekelenburg, J. (2020). Patterns and determinants of modern contraceptive discontinuation among women of reproductive age: Analysis of Kenya Demographic Health Surveys, 2003–2014. *PLOS ONE*, *15*(11), e0241605. https://doi.org/10.1371/JOURNAL.PONE.0241605

S214. <https://doi.org/10.9745/GHSP-D-19-00262>.

Singh, L. M., Prinja, S., Rai, P., Siddhanta, A., Singh, A. K., Sharma, A., Sharma, V., Rana, S. K., Muneeza, K. F., Srivastava, A., Singh, L. M., Prinja, S., Rai, P., Siddhanta, A., Singh, A. K., Sharma, A., Sharma, V., Rana, S. K., Muneeza, K. F., & Srivastava, A. (2020). Determinants of Modern Contraceptive Use and Unmet Need for Family Planning among the Urban Poor. *Open Journal of Social Sciences*, *8*(5), 451–473. https://doi.org/10.4236/JSS.2020.85031.

# Starbird E, Crawford K. Healthy timing and spacing of pregnancy: reducing mortality among women and their children. Glob Health Sci Pract. 2019;7(suppl 2):S211.

# Sunday Adepoju Adedini, Clifford Odimegwu, Eunice Ntwala Imasiku, & Dorothy Ngozi Ononokpono. (2015, March). *Unmet need for family planning: implication for under-five mortality in Nigeria - PubMed*. Journal of Health, Population, and Nutrition. <https://pubmed.ncbi.nlm.nih.gov/25995735/>.

# Wegbom, A. I., Bademosi, A., Edet, C. K., Green, K. I., Sapira-Ordu, L., & Fagbamigbe, A. F. (2022). Rural–urban disparities in birth interval among women of reproductive age in Nigeria. *Scientific Reports 2022 12:1*, *12*(1), 1–8. https://doi.org/10.1038/s41598-022-22142-y.

Westoff, C. F. (2006). New estimates of unmet need and the demand for family planning. *DHS Comparative Reports No. 14*.

*World Health Organization*. (2024). <https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3414>.

WorldBank. (2024). *World Bank Group - International Development, Poverty, & Sustainability*. World Bank. https://www.worldbank.org/en/home.