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Patterns of Inter-Pregnancy Intervals and their Associated Factors among Childbearing Women in Ibadan, Nigeria

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Abstract

Purpose: The study assessed the patterns of inter-pregnancy intervals and the associated factors amongst childbearing women in Ibadan.

Methodology: The research utilized a descriptive cross-sectional design. The study population comprises women who attended post-natal and infant welfare clinics at University College Hospital, Ibadan, Adeoyo Maternity Teaching Hospital, Ibadan, and Ojoo Primary Health Centre, Ibadan. A simple random sampling method was used to select all the eligible participants who met the inclusion criteria for the study. The sample size of 227 was determined using Fisher's formula with 18% modern contraceptive rate. A self-administered questionnaire was used for data collection. Analysis was done using IBM-SPSS version 22.0 software. Findings are presented using descriptive and inferential statistics at 0.05 level of significance.

Findings: Results revealed that 58.1% of women had optimal inter-pregnancy interval (24-59 months). The majority of the women (79.7%) also used short acting contraceptives methods. The most significant factor associated with the patterns of inter-pregnancy intervals is socio-economic factor. There was a significant association between parity and inter-pregnancy interval (p=0.046). Meanwhile, there is no significant associations between inter-pregnancy interval and child spacing methods (p value= 0.648); inter-pregnancy interval and age of the women (p value=0.49).

Unique Contribution to Theory, Policy and Practice: This study reveals that suboptimal inter-pregnancy intervals in Ibadan are shaped by socio-economic factor. The findings extend existing demographic transition theory by contextualizing birth spacing within a Nigerian urban setting. Consequently, this evidence urges targeted health policy revisions and empowers nursing practice to integrate culturally sensitive family planning counselling into routine maternal and child health services.

Keywords: *Pattern, Inter-Pregnancy Interval, Women, Childbearing, Contraceptives*

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Background

The complex nature of the women's reproductive system and the changes that occur during pregnancy and child birth influences the outcome of women's reproductive health[1]. Many developing countries have been able to successfully improve women's reproductive health by expanding reproductive health service utilization through policy innovations. In Nigeria, about 40 million women of childbearing age (between 15 and 49 years of age) suffer a disproportionately high level of health issues surrounding birth[2]. Meanwhile, efforts are still being made to develop a system to improve women reproductive health. Poor reproductive health services for women leads to unmet need for contraception, unintended pregnancies, unsafe abortion and others[3]. Several studies have been conducted in Nigeria as regards the effect of short inter-pregnancy interval and not enough have been done as regards long inter-pregnancy internal.

According to Gurmu et al[4], inter-pregnancy interval (IPI) refers to the amount of time that passes between the conclusion of one pregnancy and the beginning of another. Inter-pregnancy interval (IPI) has been classified in studies as short or long inter-pregnancy interval. Some authors have defined short IPI as inter-pregnancy interval that is shorter than 18 months, while long IPI was defined as inter-pregnancy interval over 60 months between a live birth and the estimated time of conception of the subsequent pregnancy[5]. Meanwhile, the World Health Organization (WHO)[6] currently recommends an inter-pregnancy interval between the live birth and the next pregnancy as at least 24 months and stated short inter-pregnancy interval as an interval less than 24 months, long inter-pregnancy interval as an interval more than 60 months, and optimum inter-pregnancy interval as an interval between 25 months and 59 months to reduce maternal, foetal and child morbidity and mortality.

Adequate inter-pregnancy intervals on the other hand help women recover from macro- and micro-nutrient depletion which occurs during pregnancy and breastfeeding[7]. The length of inter-pregnancy interval depends on several factors which vary based on intention of pregnancy. The interaction between socio-demographic factors and inter-pregnancy intervals differs from society to society and they change over time[8]. In a study conducted in 2018, Maternal age, marital status, place of residence, social class, baby's sex, family income, use of contraceptive, parity and outcome of mother previous pregnancy were factors that influenced the pattern of inter-pregnancy interval[9]. However, the use of contraception is also an important factor in inter-pregnancy interval as the prevalence of contraceptives use among married women in Nigeria is 17%[10].

Based on the factors associated with the patterns of inter-pregnancy interval among child bearing women, it is therefore important to identify the patterns of IPI among childbearing women in other to improve women's reproductive health. The study therefore aimed to identify the pattern of inter-pregnancy interval and its associated factors among childbearing women in Ibadan, Oyo state Nigeria.

METHODS

Study design, setting, and population

The research was a descriptive cross-sectional study**.** The study was carried out at the three tiers of health care system (Primary, Secondary and Tertiary) post-natal department and infant welfare clinics of the University College Hospital (UCH), Ibadan, Adeoyo Maternity Teaching hospital, Yemetu, Ibadan amd Ojoo primary health centre, Ibadan from March 2023 to May 2023.

The University College Hospital (UCH) (tertiary healthcare facility) is strategically located in Ibadan, then the largest city in West Africa which is also the seat of the first University in Nigeria. The physical development of the Hospital commenced in 1953 in its present site and was formally commissioned after completion on 20 November 1957. it is the largest hospital in south western Nigeria. The department of Obstetrics & Gynaecology controls the antenatal, delivery, and postnatal services. The healthcare professionals in this hospital are well trained to handle different Obstetrics and Gynaecological conditions.

Adeoyo Maternity Teaching Hospital, Yemetu Ibadan (Secondary healthcare facility) was established in 1928, It was formerly used as a college hospital by then University of Ibadan between 1948 to 1954. The Hospital provides maternal and child healthcare services to people in Ibadan and its surrounding. It is made up of antenatal clinic, labor ward, antenatal ward, gynaecological ward, lying in ward or postnatal ward, children's ward, immunization clinic, post-caesarean section ward, gynaecological clinic and family planning clinic.

Ojoo Primary Health Centre, Ibadan (Primary healthcare facility) is under the Akinyele is a Local Government Area in Oyo State, Nigeria. It is one of the eleven local governments that make up Ibadan metropolis. The health centre is headed by a nurse and the other staff includes community health extension workers, community health officers, pharmacy technicians, laboratory technicians and maids. They health centre provides maternal and child health service ranging from antenatal care, prenatal care, delivery care, postnatal care and infant welfare clinic. The study population were childbearing women attending clinics in the three health care facilities.

Sample size calculation and sampling technique

The sample size of 227 was determined using Fisher's formula[11] with 18% modern contraception prevalent rate from recent findings from National Demographic and Health survey (10) inclusive of 10% attrition rate. Proportionate allocation of respondents to each of the study setting was done **(Table 1)**

Table 1: Proportionate allocation of Sample size to study settings

S/N	STUDY SETTINGS	ALLOCATED SAMPLE SIZE
1	Ojoo Primary Health Centre, Ibadan.	64
2	Adeoyo Maternity Teaching Hosital, Yemetu, Ibadan	87
3	University College Hospital, Ibadan.	76
	TOTAL	**227**

A simple random sampling technique was adopted for this study. Based on those who met the inclusion criteria, participants were randomly selected from women who visited postnatal care services and infant welfare clinics at the University College Hospital, Ibadan, Adeoyo Maternity Teaching Hospital, Yemetu, Ibadan and Ojoo Primary health center. This was done until the allotted numbers of participants were selected. Relevant data were collected using the standardized questionnaire among the population under study. The inclusion criteria are women of childbearing age over the age of 18 and women with more than one pregnancy, no cognitive disability, and attending the selected health institutions. The exclusion criteria were non-consenting women, women who have had just one pregnancy and women below 18 years of age.

Instrument for data collection: The study utilized a structured self-administered questionnaire which was designed based on objectives and from reviewed literatures. A pilot study was conducted in a different setting in other to test the reliability of the questionnaire. Based on the pre-test results, the needed modifications were carried out before the final data collection. The questionnaire covered information on socio-demographic data, past obstetrics history, pattern of inter-pregnancy interval, factors that influence IPI and methods of modern contraceptives used.

Ethical considerations: The study was approved by the University College Hospital, Ibadan Ethics Research Committee with IRB Number **UI/EC/23/0118,** and Oyo state research ethical review committee with NREC assigned number **NHREC/OYOSHRIEC/10/11/22.** A brief introduction of the purpose of the study were made known to the study participants and informed consent were gotten. Anonymity, voluntariness and confidentiality of the information were maintained, respondents were told not to write their names on the questionnaire.

Procedure for data collection and analysis: The researcher personally visited the selected health institutions and the research instrument (questionnaire) were explained to the participants individually and informed consent obtained before being self-administered by hand to the participants. Two research assistants were employed during the course of the study to ensure easy and fast data collection. The participants were expected to select any the options based on the response that best suits them. After filling the questionnaire, the completed questionnaires were collected from the participants. Data collection lasted for two (2) months. Data obtained were

cleaned and coded. Analysis was done using IBM-SPSS version 22.0 software. Descriptive and inferential statistics of frequency, simple proportion, percentage, mean ± SD unit were used to summarize the results using tables and pie chart. Inferential statistics of chi-square test at 0.05% level of significance was used to test the hypotheses.

Calculation of Inter-Pregnancy interval: The inter-pregnancy interval was specifically calculated by asking women the intervals between the delivery of their child(ren) and the next conception. For those with three or more children, they provided more details on each interval.

Validity: The questionnaire was constructed based on information from a literature review and empirical findings, using the study's objectives as a guide. Clearance, relevance, quantifiable and eligible usage was validated by the project supervisor.

Missing data: There were no missing data during the collection period because the researcher and assistants took the time to ensure that all data was collected and that the questionnaires were properly accounted for at the end of each collection.

RESULTS

Sociodemographic Characteristics of Respondents: The age ranges from 18 to 60years with the mean age being 35±5years. Majority were Christians (50.7%), Yoruba (87.7%), married (89.4%), tertiary institution graduates (56.6%) with educated husbands (70.9%). The result further shows that 78% of the women were within the age range of 18-30 for their first pregnancy with 36.6% having a male child at previous conception **(Table 2**

Table 2: Respondents sociodemographic characteristics.

Information	Responses	Frequency	Percentage %	Mean	Standard Deviation
Age	18-30 years	88	38.8		
	31-40 years	125	55.1		
	41-50 years	12	5.3		
	50 and above	2	0.9		
	Total	227	100.0	2	1
Age at first pregnancy	Below 18	3	1.3		
	18 years	12	5.3		
	18-30 years	177	78.0		
	30 and above	35	15.4		
	Total	227	100.0	2	1
Marital status	Single	4	1.8		
	Married	24	10.6		
	Widow	198	87.2		
	Divorced/separated	1	0.4		
	Total	227	100.0	2	0
Religion	Christianity	115	50.7		
	Islam	112	49.3		

	Total	227	100.0	1	1
Ethnicity	Yoruba	199	87.7		
	Igbo	9	4.0		
	Hausa	8	3.5		
	Others	11	4.8		
	Total	227	100.0	1	1
Educational status	No formal education	5	2.2		
	Primary	16	7.1		
	Secondary	78	34.5		
	Tertiary	127	56.2		
	Total	226	100.0	3	1
Husband Educational status	Primary	9	4.0		
	Secondary	57	25.1		
	Tertiary	161	70.9		
	Total	227	100.0	4	1
current occupational status	Self employed	145	63.9		
	Private employee	53	23.3		
	Government employee	9	4.0		
	Housewife	14	6.2		
	Student	6	2.6		
	Total	227	100.0	2	1
husband occupational status	Self employed	137	60.6		
	Private employee	47	20.8		
	Government employee	34	15.0		
	Unemployed	8	3.5		
	Total	226	100.0	2	1
Sex of previous children					
	Male	83	36.6		
	Female	76	33.5		
	Male and Female	68	30.0		
	Total	227	100.0	2	1

n=227, mean age=35±5years.

Past Obstetric History: The mean of the parity is 3±1, and it ranges from 1-8 children with 95% survival of every previous child before the recent conception. Majority (81%) claimed that their last pregnancy was intended while 19% disclosed that their last conception was not planned, it happened by chance. 72.2% breastfed their previous child above 12months period; of which only 61% made it exclusive breastfeeding. The remaining 39% did not observe exclusive breastfeeding for their previous pregnancies. The result finally shows that 79.7% representing the majority of the women attending the postnatal clinic and infant welfare clinics had a spontaneous vaginal delivery in their last pregnancies, while 18.9% delivered through caesarean section**.**

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Table 3: Obstetric History of Respondents

Information	Responses	Frequency	Percentage (%)	Mean	Standard Deviation
Total number of live births	1	3	1.3		
	2	103	45.4		
	3	68	30.0		
	4	41	18.1		
	5	9	4.0		
	6	2	0.9		
	7	1	0.4		
Total		227	100	2.83	1.005
Intention of last pregnancy	Intended	184	81		
	Unintended	43	19		
Total		227	100	1.18	0.439
Survival status of previous child before last pregnancy	Alive	215	95		
	Dead	12	5		
Total		227	100	1.03	0.229
Duration of breastfeeding of previous pregnancy	No breastfeeding	13	5.8		
	Less than 6 months	11	4.8		
	Between 6-12 months	39	17.2		
	Above 12 months	164	72.2		
Total		227	100	3.54	0.893
Was it exclusive breastfeeding	Yes	139	61		
	No	88	39		
Total		227	100	1.37	0.502
Mode of delivery of last pregnancy	Spontaneous Virginal	181	79.7		
	Del.	3	1.3		
	Instrumental Delivery	43	18.9		
	Caesarean Session				
Total		227	100	1.39	0.787

n=227

Pattern of Inter-pregnancy interval: The inter-pregnancy interval variable was categorized based on the number of months into 3 categories based on World Health Organization recommendations, as shown in **Figures 1 & 2.** Short inter-pregnancy interval (less than 24months), Optimal inter-pregnancy interval (24months to 59months) and Long inter-pregnancy interval (60 months and above). The results revealed that majority (58.1%) of the respondents practice optimal inter-pregnancy interval, while 23.8% practice a very short inter-pregnancy interval and only 18.1% practice long inter-pregnancy interval.

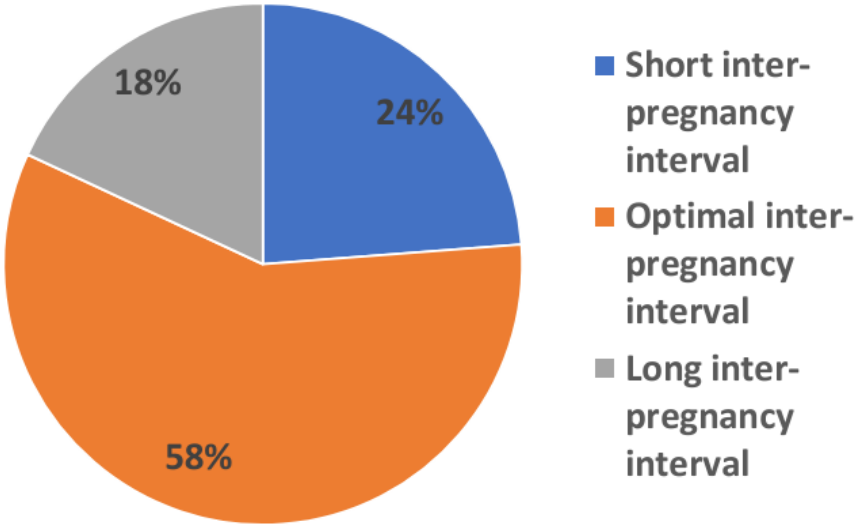

Figure 1: Pie chart showing pattern of inter-pregnancy interval *(Mean =39±5months. Range=5-19*

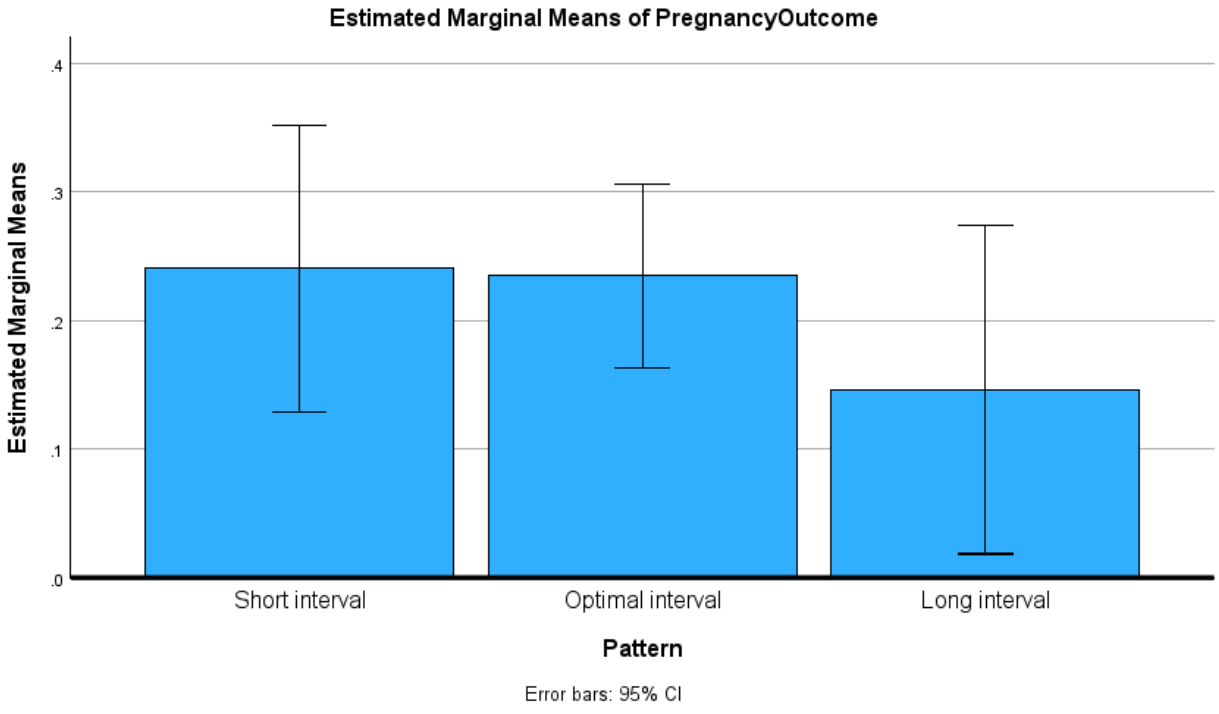

Figure 2: Estimated marginal means of pregnancy outcomes

Factors that influence Inter-pregnancy Interval: The result from **Table 4** shows; age (26%), level of education (26%), socioeconomic status (34.8%) and use of modern contraceptive after delivery (26%) as factors influencing inter-pregnancy interval. Other factors include outcome of

previous pregnancy (22%), number of live children (24.2%), mode of previous delivery (25.1%), breastfeeding of previous children (15.9%) and sex of the previous child (13.2%).

Table 4: Factors that influence Inter-Pregnancy Interval

Variables	Yes (%)	No (%)
My age	59(26%)	168(74%)
My level of education	59(26%)	168(74%)
The Outcome of my previous pregnancy	50(22%)	177(78%)
The number of live children I have	55(24.2%)	172(75.8%)
The Mode of my previous delivery	57(25.1%)	170(74.9%)
My socio-economic status	79(34.8%)	148(65.2%)
The Sex of my previous child	30(13.2%)	197(86.8%)
Breastfeeding of my previous child of children	36(15.9%)	191(84.1%)
The Use of Modern contraceptive after delivery	59(26%)	168(74%)

Use of Modern Contraceptives: Results from **Table 5** shows that 187(82.4%) of the women in this study are aware of contraceptive use after the delivery of their previous pregnancies. However, majority 142(62.6%) of the respondents in this study have not made use of contraceptives before their previous pregnancies. Meanwhile, majority of the respondents do not make use of any contraceptive either sooner or later after delivery. Only 22.5% make use of contraceptives within 6-12months after previous delivery.

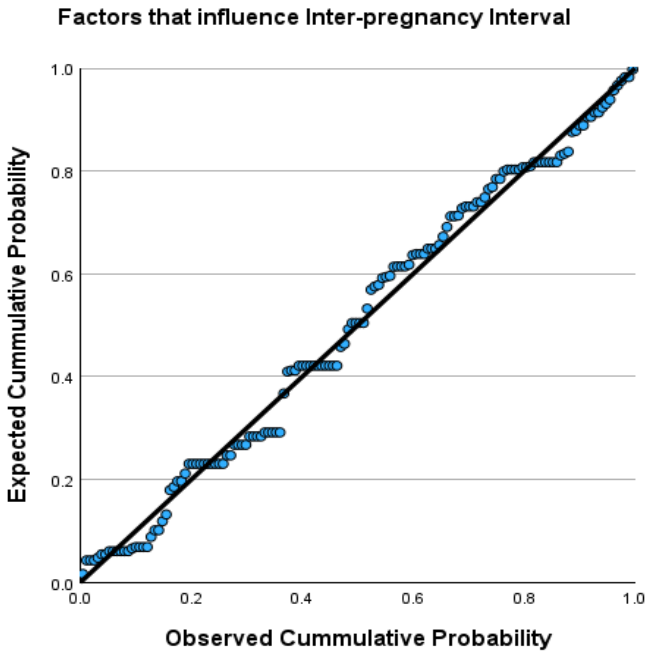

Figure 3: A Q-Q plot showing the distribution of the Inter-Pregnancy Interval variable

Based on WHO recommendations; the contraceptives method used variable was categorized into 2 categories which are short acting contraceptives (Barrier methods, injectables, pills, calendar and LAM) and long-acting contraceptives (Implants, IUDs). A Q-Q plot was used to assess the distribution of the Inter-Pregnancy Interval variable (Figure 3). The data points closely followed the diagonal line, indicating an approximately normal distribution, with only minor deviations at the extremes.

To confirm this visually observed normality, a Shapiro-Wilk test was conducted:

- Test Statistic: 0.9899
- p-value: 0.6552

Since the p-value is greater than 0.05, we fail to reject the null hypothesis, indicating that the data is not significantly different from a normal distribution. Therefore, parametric statistical methods, such as t-tests and regression analyses, can be applied without requiring data transformation.

Table 5 below shows that majority 181(79.7%) commonly make use of short acting contraceptives. Only 20.3% make use of long-acting contraceptives amongst the women under study.

Table 5: Categorical table for methods of contraceptives used by respondents.

Method	Frequency	Percentage (%)
Short-acting contraceptives	181	79.7
long-acting contraceptives	46	20.3
Total	227	100

There was a significant association between parity and inter-pregnancy interval (p=0.046). There wass no significant relationship between age of women and of inter-pregnancy interval (p=0.490). In addition, there was no association between the use of child spacing methods and the pattern of inter-pregnancy interval (p=0.648).

DISCUSSION

The study identified the pattern of inter-pregnancy interval and its associated factors among the childbearing women in Ibadan, Nigeria. Results of sociodemographic characteristics revealed that the majority of the respondents were between the ages of 18 to 60 years with a mean age of 35±5 years. The results also showed that the majority of the respondents were Christians, Yoruba and married. In addition, the majority of the women had tertiary education, and their husbands were educated. This is consistent with the sociodemographic information from a similar study conducted in Lagos[12] on Interpregnancy interval and pregnancy outcomes. The educational attainment of the women and their husbands in this study (56.6% tertiary education for women, 70.9% educated husbands) is also similar to what was reported in a study conducted in Ethiopia[13], which found that

the majority of women (67.5%) had attended secondary school or higher, while 73.7% of their husbands had also attained at least a secondary school education.

The Obstetric history and the pattern of inter-pregnancy among women in selected healthcare institutions revealed that majority of the respondents practice optimal inter-pregnancy interval. This finding of this study is consistent with similar studies conducted in Ethiopia and Nigeria[12,14]. In addition, the prevalence of short IPI (<24 months) in this study is similar to what was reported by Olusanya et al.[12]. The optimal IPI (24-59 months) was also the most common IPI category reported in both studies, with a slightly higher prevalence reported in this study (58.1%). Similarly, a study conducted in Ethiopia[13] reported that the majority of women had an optimal IPI (61.8%), while 19.3% had a short IPI. Additionally, the high rate of vaginal delivery among the respondents in their most recent pregnancy reported in this study (83.2%) is consistent with what was found by these authors[12,14].

Majority of women in this study reported that their most recent pregnancy was intended, this is in agreement with what was reported in a study conducted in Addis Ababa[15], which found that 85.4% of women had planned their most recent pregnancy. However, a significant percentage disclosed that their last conception was not planned, which happened by chance and slightly below average did not observe exclusive breastfeeding for their previous pregnancies. It is interesting to find out that the findings regarding the pattern of IPI of this current study is in contrast to the findings from a previous study[8] who only discussed that women living in urban areas had higher median birth spacing or interpregnancy interval length compared to women living in rural areas. This finding implies that there is a need for to inform policies and programs aimed at improving maternal and child health outcomes in similar settings, as a significant percentage disclosed that their last conception was not planned, which happened by chance and slightly below average did not observe exclusive breastfeeding for their previous pregnancies.

Factors associated with inter-pregnancy interval among childbearing women in this study are similar to other factors associated with inter-pregnancy interval found in literature; age, level of education, socioeconomic status, and use of modern contraceptive methods after delivery are all significant factors associated with inter-pregnancy interval, as found in other studies. This finding is in consistent with previous studies[16,17,18] which also found a significant association and highlighted the importance of maternal education, socio-economic status, and access to contraception for promoting healthy birth spacing and improving maternal and child health outcomes.

Interestingly, this study did not find significant associations between interpregnancy interval and the sex of the previous child or breastfeeding of previous children, which are factors that have been associated with short interpregnancy intervals in some previous studies[8,17] in which both authors found that the sex of the preceding child and survival of the previous child were significant factors

associated with interpregnancy interval. However, Pimemtel et al[16] also found that younger age, less education, negative outcome of the previous pregnancy, and lower socio-economic status were associated with short interpregnancy interval as found in this study which implies that this study provide additional evidence on the factors associated with interpregnancy interval and support existing literature on the importance of maternal education, socioeconomic status, and access to modern contraception in promoting healthy interpregnancy interval.

The common contraceptive methods used among childbearing women revealed that the majority of the respondents make use of short-acting contraceptives. The findings of this study align with previous research that has shown a low uptake of long-acting contraceptives in Nigeria[18] which affirmed that only 13% of Nigerian women use long-acting contraceptives, while short-acting methods remain more common. Additionally, another author[19] documented a similar report of a low uptake of long-acting contraceptives among Nigerian women, with only 10.6% using them. This low uptake of long-acting contraceptives could be because the short-acting methods are more prone to user error, leading to unintended pregnancies and shorter inter-pregnancy intervals among Nigerian women[20].

Moreover, the high prevalence of the withdrawal method as the chosen method of contraception in this study is also a cause for concern. Ugboaja et al[21] found that the withdrawal method was the most commonly used contraceptive method among Nigerian women, with a prevalence of 49.8%. Withdrawal method is known to be less effective in preventing pregnancy compared to other forms of contraception, and it can also increase the risk of sexually transmitted infections.

Even though a high proportion of women are aware of the use of contraceptives after delivery, a significant proportion do not desire to use them, leading to low uptake of contraceptives after previous pregnancies. This is a concerning trend, as inadequate inter-pregnancy spacing is known to have adverse effects on maternal and child health. Meanwhile, similar studies have also shown similar patterns of contraceptive use after delivery. For example, a study conducted in Nigeria and India[22,23] found that only 28% and 24% of women used modern contraceptives after their last delivery within 12 months after delivery. This implies that there is a need for increased awareness and education on the importance of contraceptive use after delivery and the benefits of adequate birth spacing. Counselling should also include a discussion of the benefits of long-acting contraceptives, such as their reliability and long-term effectiveness. Studies have shown that counselling and education programs can improve contraceptive uptake among women[18,21].

Conclusion

Most respondents in this study practiced an optimal inter-pregnancy interval and the majority make use of short-acting contraceptives. Meanwhile, factors such as age, level of education, socioeconomic status, and use of modern contraceptive methods after delivery were insignificant factors associated with interpregnancy interval. The study provides evidence on the importance of

maternal education, socioeconomic status, and access to modern contraception in promoting healthy pregnancy spacing.

Limitations of the Study

The limitations of the research findings include the following:

- Sampling Bias: The study only covers selected healthcare institutions in Ibadan, Nigeria, and may not be representative of the general population.
- Social Desirability Bias: Respondents may have given socially desirable answers, rather than their true opinions or behaviours', which may bias the results.
- Recall Bias: The data in this study was based on self-reports, which may be subject to recall bias, as respondents may not remember the exact details of their previous pregnancies and pregnancy spacing.
- Lack of Generalizability: The findings of the study may not be generalizable to other settings, as the socio-demographic characteristics and healthcare systems may differ from those in Ibadan, Nigeria.

Recommendations

Nurses and midwives should educate women on the importance of healthy birth spacing, the risks associated with short inter-pregnancy intervals, and the use of modern contraceptive methods. They should provide appropriate counselling to mothers on exclusive breastfeeding and how it can help in promoting healthy birth spacing.

Midwives should encourage women to plan their pregnancies to prevent unplanned pregnancies and improve maternal and child health outcomes.

Policy makers should develop policies aimed at promoting healthy birth spacing by improving access to modern contraceptive methods and promoting exclusive breastfeeding. They should collaborate with healthcare providers to develop programs and policies aimed at promoting healthy birth spacing. In addition they should make funding's available for family planning programs to improve access to modern contraceptive methods.

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