ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan1481

Modeling Reproductive Health Services Use, and Some Associated Factors Among Youths in Bonny Island, Nigeria

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Publication Date: 2026/02/04

Abstract: Despite improvements in availability, young adults in many low- and middle-income countries still do not use reproductive health (RH) services much. However, there is not much research on this in oil producing and semi urban areas like Bonny Island, Nigeria. This study aims to model and understand how young adults in Bonny Island use RH services and to find the social-demographic, knowledge based and access related factors that affect this use. A community based cross sectional survey was done with 800 participants aged 15 – 29 years. The use of a single RH service was used to define RH service utilization. A pretested questionnaire was used for the purpose of data collection. Descriptive statistics were used to summarize the characteristics of the participants. Chi-square tests were then used to examine the relationships between pairs of variables. In addition, multivariable logistic regression using cluster-robust standard errors was used to calculate adjusted odds ratios (AORs) and 95% confidence intervals (CIs). The model's performance was evaluated using the area under the receiver operating curve (AUC), pseudo –R^2 and calibration metrics. This showed that 59.6% of the participants reported using RH services. Furthermore, awareness of RH services was high, as 73.8% and 45.0% of the participants found the service locations convenient. In the multivariable analysis, none of the predictors reached statistical significance, and the effect estimates were small and uncertain, as indicated by confidence intervals that included one for all variables examined. These included gender [AOR: 1.01, 95% CI: 0.73 – 1.41], age groups, education, awareness of RH services [AOR: 0.87, 95% CI: 0.60 – 1.26], and service convenience [AOR: 0.86, 95% CI: 0.64 – 1.16]. The model showed poor discrimination [AUC: 0.549], had limited explanatory power (pseudo- R^2) and demonstrated poor calibration. Traditional socio-demographic, knowledge based and access related factors explained little of the RH service utilization observed among young people in Bonny Island. The model's weak performance and the wide confidence intervals suggest that unmeasured factors, particularly service quality, confidentiality, stigma, and the nature of provider–youth interactions, are significant influences on utilization.

Keywords: *Reproductive Health Services, Young Adults, Service Utilization, Logistic Regression, Bonny Island.*

How to Cite: Aminobiren Charles Omovidonor; Nama Kiinebari Faket (2026) Modeling Reproductive Health Services Use, and Some Associated Factors Among Youths in Bonny Island, Nigeria. *International Journal of Innovative Science and Research Technology*, 11(1), 2704-2711. https://doi.org/10.38124/ijisrt/26jan1481

I. INTRODUCTION

Reproductive health difficulties in teenagers and young adults continue to be a serious concern as regards public health, not just in Nigeria but the world at large. These factors contribute to high rates of unwanted pregnancies, which transcend to some extent unwanted births and unsafe abortions, along with sexually transmitted illnesses and infections, and also HIV. All these metamorphose into social and economic problems [14, 17].

Reproductive health, which encompasses complete physical, mental, and social well-being in all aspects of the reproductive system, is very important for Nigerian youths. This demographic, consisting of a substantial segment of the nation's population is undergoing a transition in their lives which significantly shapes their long-term health and socioeconomic outcomes.

These youths often struggle to find health care that actually caters for them, adequate sex education and reliable information especially when they begin exploring the dating world. The very strong societal and strict religious rules the average African society is known for, are some of the gaps that worsen open discussions about sex, birth control, and openly seeking medical help for sexual and reproductive health (SRH) difficulties [27, 23]. Unsafe sexual behaviours, inadequate or no contraceptive use, and delays in seeking medical care contribute to high rates of adolescent pregnancy, maternal health, and school dropout, as well as the propagation of STIs and HIV [22, 30].

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According to the United Nations, youth refers to persons between the age range of 15 and 24 years. This set of individuals make up about 16% of the global population but in the, they make up about 20% of the sub-Saharan African population. There are other varying definition of a youth, for example the African Youth Charter defines it as people between the ages of 15 and 35 years while Nigeria's National Youth Policy defines a youth as anyone between the ages 18 and 29 years.

Nigeria's youthful demographic has over 42% of its populace under 15 years of age and a projected 28% aged between 15 and 29. This simply insinuates that the sexual and reproductive health of its youth is a crucial aspect in the country's development. National as well as international policies have stressed the significance and importance of prioritizing sexual and reproductive health SRH for adolescents and young individuals.

The Sustainable Development Goals and the International Conference on Population and Development ICPD Nairobi summit in 2025 emphasize accessibility, acceptability, confidentiality, and equity as essential components for successfully delivering SRH services [29]. Despite these, research so far has consistently demonstrates a gap between policy goals and the realities young people confront especially in places with little resources and strong social conservatism.

National surveys and regional studies in Nigeria show that access to services for young adults that is STI treatment, HIV testing, contraception is unequal [17, 18]. Even where reproductive health treatments are physically present, young people and adolescents hardly use them. This indicates that there are still challenges beyond just the availability of the services.

Research shows that factors like age, gender, income, living situation, sexual history, and educational background influence how Nigerian youths utilize reproductive health services [2, 3, 10]. Another factor that influences the use of SRH services is attitudes about how well condoms work, electronic media exposure to SRH information and also knowledge of available SRH services [19]. In contrast, obstacles within the healthcare system like negative provider attitude, stigma and fear of gossip, restrictive social and cultural norms and religious disapproval, financial costs, as well as psychological factors severely discourage these youths, even those who are willing, from obtaining medical assistance [9, 20, 23]. These issues mentioned above are obvious in Rivers state, located in southern Nigeria. Comparative studies of some urban and rural areas have shown that despite the availability of reproductive health care, access and use of these services is surprisingly low. Reference [20] found out that about 25% of Nigerian youth population reported using RHS, though there are discrepancies in economic access between urban and rural areas, with an approximate 32% of urban teenagers having access in comparison to 3% of their rural counterparts. It also shows that despite the availability of STI/HIV treatment and safe motherhood care, underuse of these services was observed [19]. The results show a reoccurring issue between accessibility and effective use, a conflict generated by interconnected factors ranging from personal, societal, community and the health care system.

Bonny Island, located 40 km southwest of Rivers State, Nigeria, offers a unique site for study on young people's sexual and reproductive health. Bonny Island's character is shaped by its youthful demographic, its blend of rural and semi-urban communities, and its social interactions, which reflect a blend of old traditions, the impact of migration tied to the oil and gas sector, and the effects of industrialization. The island's lack of youth-specific reproductive health services along with its limited health care facilities raises problems regarding fair access for adolescents and young adults. Despite shared similarities with other communities in Rivers State, there's an obvious dearth of local research on how youths in Bonny Island obtain and use reproductive health services and what variables strongly impact their behaviours. In small communities, worries about privacy can be heightened, and the use of SRH services could be limited by how the providers attend to them, cost implications, and accessibility to health facilities, especially for those in the riverine communities. In order to find both socially and effectively acceptable solutions, there is a need to fully grasp the distinct dynamics of the situation.

This study aims to explore how young people in Bonny Island use reproductive health care, obtain a model, and also understand the factors that affect their usage. It intends to investigate who uses RH care, what services they utilize, and the socio-demographic, informational, psycho-cultural, and health system factors that affect access and usage. This study draws on prior studies done in Rivers State and other locations in Nigeria. In a semi-urban coastal town, the quality-of-service delivery, like geographic accessibility, financial implication, provider friendliness, secrecy, and confidentiality, as well as demographic correlations are examined. The study applied descriptive statistics, multivariable modeling, and bivariate analysis to the collected data. The goal is to help develop policies that are suitable for youths on the island. Unique areas like Bonny Island that are temporarily connected by road at the moment to other areas of the state—this kind of evidence is critical for reducing unmet sexual and reproductive health requirements, thereby reducing unfavorable outcomes and supporting the overall health of the young adults [11].

II. METHODS

We evaluated cross-sectional survey data from 800 adolescents and young adults, aged 15 to 29. The data collection used John Cleland's illustrated questionnaire, which is designed for interviews and surveys with young people, along with previous research in the appropriate areas, was used to generate a structured and pretested questionnaire. The questionnaire accommodated areas such as socio-demographic information, sexual and reproductive behaviours, knowledge, access and how services rendered were used. A reliability test was carried out on the prepared questionnaire and the test showed a Cohen's Kappa coefficient

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan1481

of 0.754, which shows that the instrument for use was sufficiently reliable for the study. The key finding was the difference in using RH services between those who use them and those who did not. Variables considered were age, gender, education, awareness of reproductive health RH, family discussions on sex, distance (more than 30 minutes versus 30 minutes or less), convenience of the nearest healthcare facility, payment method (Yes/No/No response), history of RH concerns, sexual relationship status and a 9 – item knowledge score (0 - 9).

➢ *Population*

The study included participants in Bonny Island between the ages of fifteen to twenty-nine. Location of study encompasses Bonny town, Sandfield, Finima, Iwoama and others. It also included the hinterland, home to villages like Kalabiama, Oloma, Ayama and Kuruma which are the riverine fishing communities. People who had lived in the research areas for less than six months, or who were under the weather at the period when data collection was taking place were not included in the study

➢ *Sample Size Determination*

The minimum sample size for a simple random sample SRS was calculated using Cochran's formula. This calculation employed an assumed prevalence of 50%, a margin of error of 5% and a confidence level of 95%, gave a sample size of 384. To account for clustering and allow for subgroup analysis, a design effect of 1.6 was utilized, assuming an intra-cluster correlation of roughly 0.03 and 20 participants in each cluster, resulted in a sample size of 603. Giving an allowance of 10 – 15% non-response rate, the target is adjusted to roughly 670 – 710. To ensure precision, account or potential non-response and allow for estimates broken down by age and gender, a final sample size of was selected.

➢ *Sampling Design*

The fieldwork used a two-staged cluster sampling design. In the first stage, communities were selected using a probability proportional to size PPS method. A Kish selection method guarantees random assignment within a family. In the second stage, a careful selection of homes with enough eligible youths each defined a cluster. To create a sample that was self-weighting, we reduced travel costs by setting a fixed payment for each cluster, which included twenty young people in each of forty clusters. To account for clustering in the survey analysis, we used design factors (PSU, weights) and robust variance estimations.

➢ *Statistical Analysis*

Frequencies and percentages were presented to analyze the main factors. We used t-test for the knowledge score and chi-square testing for the categorical predictors to analyze how different related to usage. Adjusted odds rations (AORs) were generated with 95% confidence intervals (CIs) using a multivariable logistic regression model. More so, the association between gender and reproductive health awareness was studied where the model performance was evaluated using the Hosmer-Lemeshow test, McFadden's pseudo R^2 and the area under the receiver operating characteristics curve (AUC). Given that the discrimination was only moderate, we carefully assessed the threshold dependent metrics, calculating sensitivity, accuracy, specificity and predictive values using a threshold of 0.5.

III. RESULTS

➢ *Socio-Demographic Characteristics of Respondents*

Collected data were entered into EpiData version 3.3 and exported to SPSS version 25 for analysis. Out of the 800 participants observed for the study, about a quarter were from the riverine communities, 53.6% were males while 46.4% were females. Regarding age, the participants were split into three categories; 15 – 19 years (35.9%), 20 – 24 years (38.6%) and 25 – 29 years (25.5%). The observed mean age of the participants was 21.5 years (SD +3.9) with a median age of approximately 21.3 years. There was an expected marital proportion of the youth population with 70.5% single and about a quarter (24.6%) of them married. As regards living arrangement, 40.5% lived with both parents, 26.9% with their mothers, 10.6% lived alone while about 13% were cohabiting. Educational attainment was quite appreciative as over 80% had primary and secondary education but very little, 18.2% had tertiary education. This may be unconnected to the fact that job opportunity openings for indigenes in the various oil producing companies' request for little to no formal education for placement. Parental education levels showed that most fathers (60.1%) and mothers (48.6) has at least secondary education. Occupationally, students occupied 35.5%, followed by self-employed 14.5% and traders (14.2%).

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan1481

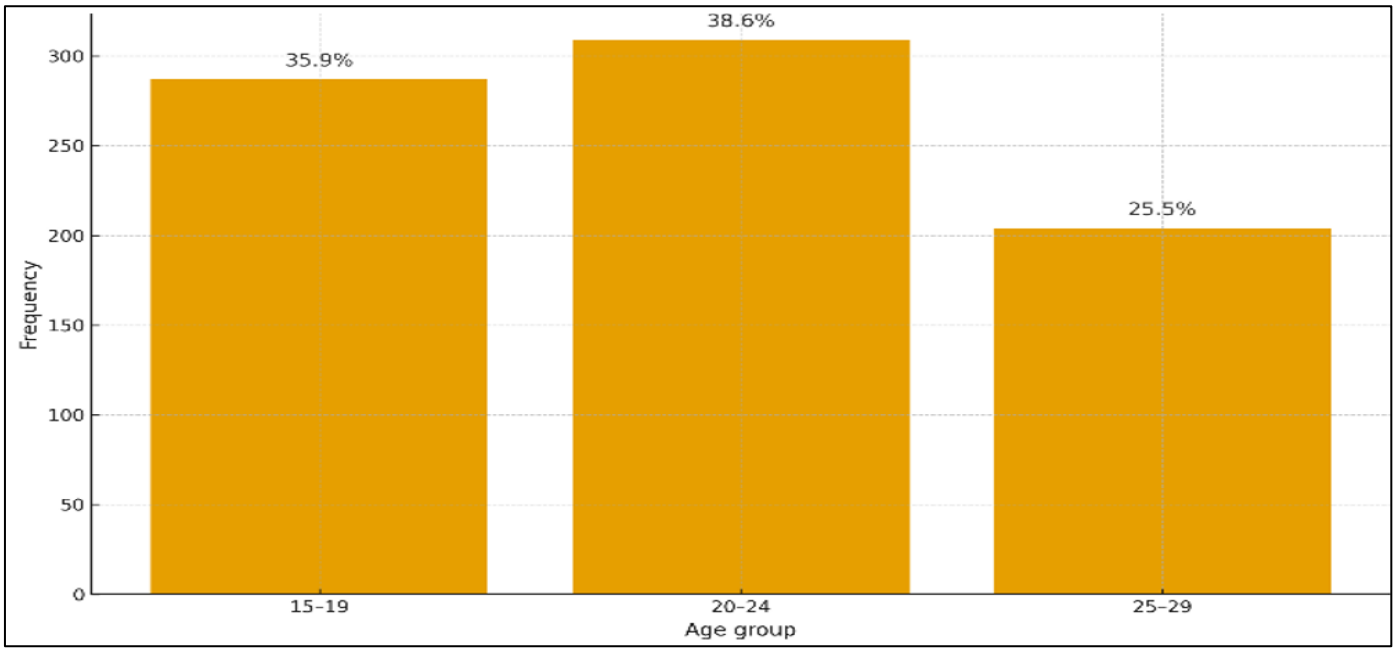

Fig 1 Age Distribution of Respondents ($n = 800$).

➢ *Experiences and Access Related to Sexual and Reproductive Health*

Recognition of reproductive health was quite high, with 73.8% of participants reporting awareness, with diverse information sources indicating exposure from both formal and informal channels. 67.6% reported ever having a sexual partner, while 52.2% had ever had sexual intercourse. Among the sexually active ones, 39.8% reported having multiple sexual partners, which suggests heterogeneous risk profiles. Payment for RH services was reported by 62.4% of the participants, and 45% claim the service locations were convenient, while approximately 70% lived within 30 minutes of a facility.

➢ *Knowledge of Reproductive Health Services*

This varies across domains which was not surprisingly, highest for STI diagnosis and treatment (74.8%), HIV counselling and testing (70.6%), confidentiality and privacy was 69.1%. for reproductive health rights was 59.8%, and a below average was observed for safe abortion care (47.2%). Overall, 71.8% showed general knowledge of RH services but variation across service components showed that RH knowledge is multidimensional.

➢ *Reproductive Health Services Utilization*

59.6% of the respondents reported utilization of at least one RH service. The most common were STI diagnosis and treatment (58%) and abortion-related services (57.5%); HIV testing (36.5%) was the least frequent. 37.8% utilized maternal health services reflecting a subset for whom these services were relevant while counselling services showed a fair uptake of 38.8%

➢ *Bivariate Associations*

Table 1 shows the relationships between the different characteristics and the use of reproductive health care, using both correlation and chi-square testing. The study discovered significant connections between awareness and how easy it was to use the service. However, differences based on demographics were less noticeable. The "Sig" column is often blank for many predictors. This is because most demographic variables didn't show statistical significance according to standard criteria. This highlights the poor quality of the basic connections found between socio-demographic factors and how services were used.

Table 1 Bivariate Associations with RH Service Utilization (X^2 Tests)

Variable	Utilization (%)	Chi-square	p-value	Sig
Gender	59.6	0.0	0.9664	
Age	59.6	0.44	0.803	
Education	59.6	3.87	0.1448	
Awareness of RH	59.6	0.49	0.4826	
Convenient location	59.6	0.49	0.4824	
Distance	59.6	0.29	0.593	
Marital status	59.6	2.05	0.563	

➢ *Multivariable Regression and Model Performance*

Demographic factors had no effect in the simplified model (table 2), though after adjustments, both awareness of RH and service convenience were connected to a higher likelihood of using the service. The results showed minimal difference (fig. 2), and the calibrations were not very good (fig.

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan1481

3). The regression model's components, as shown in table 2, didn't approach significance; the confidence intervals crossed unity, which reduced statistical certainty, though the observed effects were as expected. For instance, more knowledge and convenience were linked to higher odds.

Table 2 Parsimonious Multivariable Logistics Regression (Cluster-Robust AORs)

Variable	Adjusted OR	95% CI (lower)	95% CI (Upper)	p-value	Sig.
Female vs Male	1.01	0.73	1.41	0.9332	
Age 15–19 vs 20–24	0.87	0.60	1.26	0.4665	
Age 25–29 vs 20–24	0.95	0.68	1.32	0.7583	
Tertiary vs Secondary	1.55	0.93	2.60	0.0915	
Aware of RH (Yes)	0.87	0.60	1.26	0.4645	
Service location convenient (Yes)	0.86	0.64	1.16	0.3314	
>30 mins to facility vs ≤30	1.11	0.82	1.51	0.4907	
Married vs other	0.83	0.60	1.15	0.2635	

Model discrimination was modest, and explanatory power was low (a pseudo-Brier score of 0.238 shows poor calibration with misalignment between observed and predicted probabilities across deciles (fig. 3).

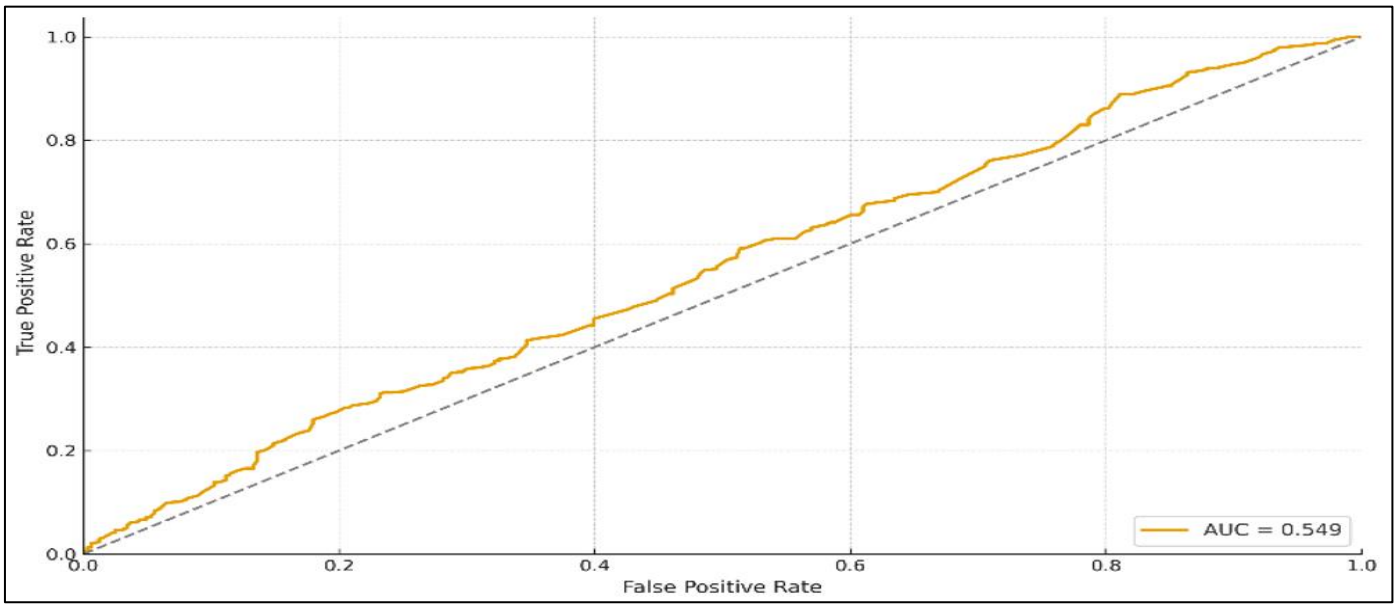

Fig 2 ROC Curve for Logistic Regression Model.

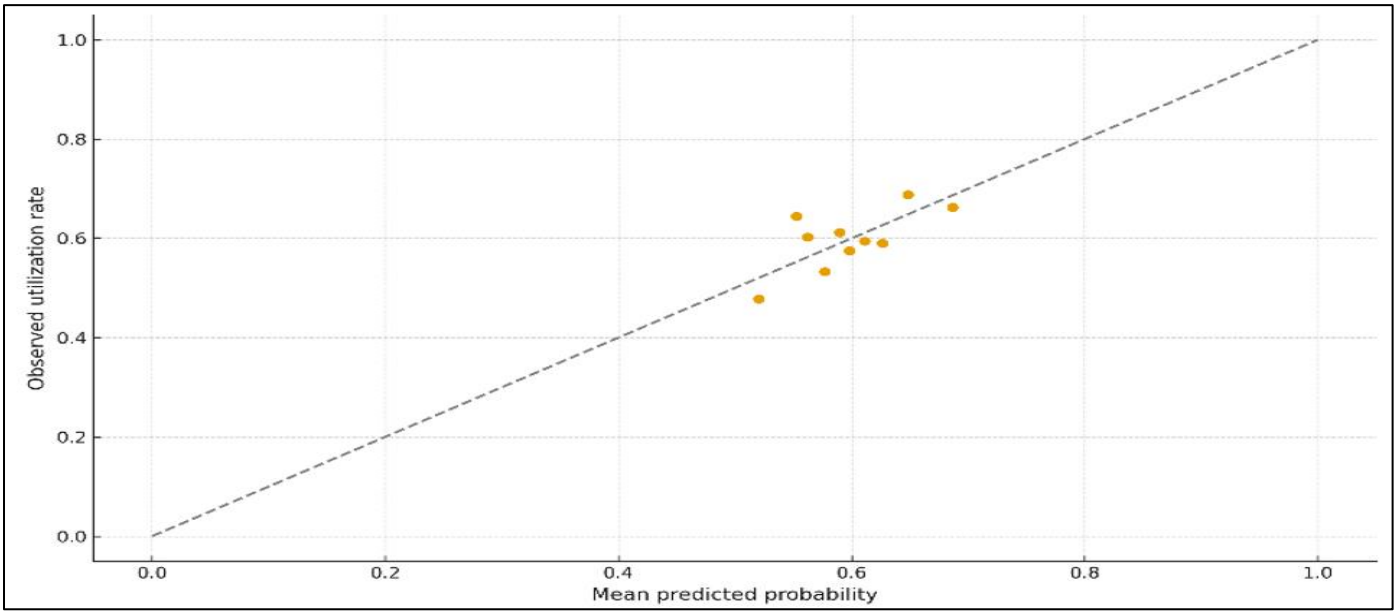

Fig 3 Calibration Plot (Observed vs. Predicted Probabilities by Deciles).

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan1481

IV. DISCUSSION

The survey demonstrated a moderate level of service use, with an overall rate of 59.6%. Bivariate and multivariable analysis showed that traditional socio-demographic factors and knowledge- and access related features didn't explain much of the variation in service use.

The modelling results, when examined using effect sizes, confidence intervals and model performance metrics suggests that several important factors seem to influence how young people use reproductive health services might not be captured in household surveys. Despite the heterogeneity in age, gender, education, and the like, socio-demographic characteristics did not significantly predict the utilization of reproductive health services. In the adjusted model, the odds of utilization were similar for men and women [AOR: 1.01, 95% CI: 0.73 – 1.41]. This suggests there was no significant difference, indicating practical and statistical neutrality.

Adolescents aged 15–19 years had a slightly reduced likelihood of use, as indicated by an adjusted odds ratio [AOR: 0.87, 95% CI: 0.60–1.26], in comparison with their 20–24-year-old counterparts. Conversely, the age group of 25 – 29 years showed odds that were nearly equivalent with an [AOR: 0.95, 95% CI: 0.68 – 1.32]. The effects of age were weak and not too clear, as these findings were consistent with research undertaken in sub-Saharan Africa and Nigeria, which indicates that when considering wider contextual limitations, young people's demographic characteristics do not substantially influence their use of reproductive health services [2, 3].

The Nigeria Demographic and Health Survey (NDHS) disclosed that demographic targeting is not very effective for program design because it reveals continuous differences in how young people use RH services across demographic groups [17]. Though awareness of RHS was relatively high (73.8%) and general RH knowledge at 71.8%, studies that accounted for other factors did not demonstrate a notable rise in service use. Awareness of reproductive health services showed a slight connection with a reduced chance of using them [AOR: 0.87, 95% CI: 0.60 – 1.26], which contains both positive and negative effects. References [4, 7] revealed that this trend reflects a well-documented gap in how young people apply the understanding about sexual and reproductive health. This gap occurs when the available information is not enough to encourage them to use health services.

Different domains of the RH exhibit varying levels of understanding, as shown by the separate knowledge items. Knowledge of HIV testing and services related to sexually transmitted infections was quite high, with about 70 – 75% of participants showing understanding, but it wasn't the case for post-abortion sexuality counseling, confidentiality, and reproductive health rights, as knowledge ranged from 20 – 25%. Similar tendencies were reported among Nigerian youths, where a lack of understanding of their rights and need of secrecy lowers their use of RH care even if they were aware of these RH services [21, 24]

The data suggests a telling need for reproductive health services based on the sexual attitudes of the participants. Practically four out of ten participants reported numerous sexual partners, with more than half acknowledging having engaged in sexual activity and about a quarter revealing a past with reproductive health concerns. Despite all these, utilization of critical preventive services was still below a desired level, where 45.2% of those surveyed reported taking contraceptives and just 36.5% had access to HIV testing and counseling. The observed divergence between the possibility of encountering risks and the actual use of RH services aligns with findings from Nigeria and its neighbouring regions where youth's choices most likely reflect a greater concern for perceived social risks, such as stigma, fear of being judged, and confidentiality, rather than focusing on health-related risks [5, 6]. Not too many obvious differences reported in the current models can be explained by the fact that these deterrents are effective across different demographic groups.

Just a little above an average of the participants (59.5%) reported discussing reproductive health concerns with their families, but communications of this kind do not necessarily lead to situations that support independence or provision of assistance. Earlier studies have suggested that family discussions on reproductive health in Nigeria typically admonish moral and restrictive viewpoints, which discourages these young adults from seeking RH services on their own [1, 12]. Moreover, over two-thirds of the participants lived with parents, a situation that often leads to increased supervision and reduced privacy, limiting them from using these services even when they are aware of it [15, 16]. These relational dynamics, which are difficult to access and not well reflected by standard survey variables, led to weaker statistical linkages.

In contrast to structural access, only 45% of those surveyed considered RH service sites easily accessible, while about 60% of participants reported being asked to pay for RH services even though 69.4% of them lived within 30 minutes of a healthcare institution. In the revised model, the distance to the healthcare facility didn't significantly affect the outcome [AOR: 1.11, 95% CI: 0.82 – 1.51]. This simply suggests that being close by the location of the facility doesn't guarantee the use of the service. Similar to the perceived convenience, a weak and unclear relationship was found [AOR: 0.86, 95% CI: 0.64–1.16]. These findings support prior studies demonstrating that young people use reproductive health services more because of their experiences with accessibility, such as cost, waiting times, confidentiality, and how comfortable they feel about providers, not just how close the services are [25, 29].

Confidence intervals for each predictor were consistently wide and included the null value 1.0; this suggests that the estimated effects were not very precise. Educational attainment serves as a pertinent illustration, specifically higher education [AOR: 1.55, 95% CI: 0.93 – 2.60], being the model's most substantial point estimate, despite the confidence interval encompassing a null impact. Married young adults showed a somewhat reduced probability of using the services in comparison to others [AOR: 0.83, 95% CI: 0.60–1.15], and marital status seems not to be a significant

ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan1481

factor. The overlap and width of these confidence intervals suggests that any real effects are probably minute and hidden by differences that were not measured. The observed weak ability to show the difference between groups [AOR: 0.549] and the very low explanatory power (pseudo - R^2) are consistent with the patterns seen in the confidence intervals. Despite the sample size of 800 participants, the model's impact estimations were not very precise. This suggests that increasing the number of participants would not considerably improve the ability to draw conclusions. Considering these fact, the model's capacity to yield credible, policy relevant effect estimates and predict individual level reproductive health service consumption is limited. These findings suggest that utilizing socio-demographic or basic access criteria to target programs or make predictions based on models is not a good idea. Moreover, they highlight the need for both reporting and understanding confidence intervals, in addition to p-values especially in practical public health models where uncertainty directly affects policy decisions.

The finding aligns with both national and international research in the sense that it emphasizes the significance of young adults' experiences, confidentiality, and service quality in shaping the usage of reproductive health services, as indicated by [8, 26]. The World Health Organization's (WHO) paradigm for adolescent-friendly health services, which highlights acceptability, respect, and confidentiality as crucial factors in encouraging youth engagement, is backed by the limited ability of demographic and access related factors to predict such participation [29]. The combined results suggest that strategies focusing just on certain groups or simply raising awareness are unlikely to significantly boost the use of reproductive health care. Effective programs should prioritize confidentiality, non-judgmental attitudes from service providers, removal of informal fees, flexible service hours, and a systematic evaluation of experiences in juvenile care. Future modelling efforts should include established psychological, normative, and service quality factors. These factors include perceived stigma, trust in providers, and previous experience with care. These factors are anticipated to improve both predictive and inferential performance, which would narrow confidence intervals and reduce the variance of the residuals.

V. CONCLUSION

The limited use of reproductive health services by young adults in Bonny Island cannot be fully explained by traditional socio-demographic characteristics, knowledge, and accessibility concerns. The presence of unmeasured social and institutional elements is revealed by the combination of poor explanatory power, weak discrimination, and broad confidence intervals. To improve reproductive health for young people and create more accurate models of how they utilize RH services, we need to address these variables through interventions that are friendly to young adults, based on rights and focused on quality.

ACKNOWLEDGMENT

Appreciation to the entire management of the Federal Polytechnic of Oil and Gas, Bonny, for the opportunity to carry out this research. We are also indebted to the local council members and guidance for their support during data collection. We also thank the data collectors, supervisors, and study participants for their help.

- *Data Availability*

The collected data for this study is available in the supplementary material, further inquiries can be directed to the corresponding author.

- *Ethics Statement*

The study involved human participants which was reviewed and approved by the ethical review committee of the health center of the federal polytechnic of oil and gas, bonny. Written informed consent for underage participants in this study was provided by their legal guardians.

- *Authors' Contribution*

Study conception and design was done by AC0. Data collection was done by ACO and NKF. Data analysis and interpretation was done by all authors. First drafting of the article was done by NKF. ACO and NFK did a critical revision of the entire article. Both authors read and approved the final manuscript.

- *Funding*

This research was supported by the Tertiary Education Trust Fund (TETFund), Nigeria in the 2024/2025 Institutional Based Research intervention for research project. The funder had no role in study design, analysis, interpretation, or writing of the manuscript.

- *Conflict of Interest*

The authors declare no competing interests.

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