Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Prevalence, Knowledge, and Determinants of Non-Communicable Diseases among Women of Reproductive Age in Ilorin-West Local Government Area, Kwara State, Nigeria: A Cross- Sectional Study

AbdulRauf Segun Ibraheem

ibraheemabdulrauf@ymail.com

Federal Teaching Hospital

Babangida Saleh Ibrahim

Kano State Centre for Disease Control and Prevention, Kano Independent Research Centre Trust

Kamaldeen Funsho Ibraheem

Children's Specialist Hospital

Ahmed Ibrahim

Ministry of Livestock Development.

Chiderah Becky Ibrahim

Transcorp Hilton

Research Article

Keywords: Determinants, Knowledge, Nigeria, Non-communicable diseases, Prevalence, Women of Reproductive Age

Posted Date: November 1st, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11294928/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Non-communicable diseases (NCDs) are an increasing public health concern in Nigeria, including among women of reproductive age. However, local evidence on the prevalence of NCDs and women's knowledge of their associated risk factors remains limited. This study assessed the prevalence, knowledge of NCDs and sociodemographic determinants of NCDs knowledge among women of reproductive age in Ilorin West Local Government Area, Kwara State, Nigeria.

Methods

A facility-based descriptive cross-sectional study was conducted among 608 consenting women of reproductive age attending selected healthcare facilities in Ilorin West LGA from July to November 2025. Participants were recruited using multistage sampling. Data were collected with a pretested interviewer-administered questionnaire in English and Yoruba. NCD knowledge was measured using an 11-item index and classified as good, fair, or poor. Descriptive statistics summarized the data, chi-square tests assessed associations, and multivariable logistic regression identified predictors of good NCD knowledge. Statistical significance was set at $p \leq 0.05$.

Results

The respondents were predominantly aged 25–34 years (38.5%), married (53.5%), Muslim (77.6%), and had tertiary education (52.0%). Overall, 35.4% had at least one NCDs. The mean knowledge-index score was 9.55 ± 2.30 out of 11. Most respondents 79.4% had good knowledge, while 11.7% and 8.9% had fair and poor knowledge, respectively. Knowledge level was significantly associated with occupation ($p < 0.001$), education ($p < 0.001$), and religion ($p < 0.001$). In the adjusted model, tertiary education (AOR] = 3.66, 95% CI: 2.04–6.57; $p < 0.001$), artisan occupation (AOR = 3.39, 95% CI: 1.64–7.00; $p = 0.001$), and monthly income of at least ₦70,000 (AOR = 4.12, 95% CI: 2.16–7.84; $p < 0.001$) were independently associated with good knowledge. Average monthly income was the single strongest independent positive predictor of good NCD knowledge

Conclusion

NCDs prevalence was substantial among women of reproductive age in Ilorin West LGA despite generally high knowledge levels. Educational attainment, occupation, and income were important determinants of NCDs knowledge. Integrating routine NCDs screening into reproductive health services and implementing culturally appropriate health education and targeted interventions for low-income and less-educated women may improve early detection and prevention.

INTRODUCTION

Worldwide, non-communicable diseases (NCDs) are a major public health threat and the leading cause of morbidity and mortality, particularly cardiovascular diseases, chronic respiratory conditions, diabetes, and cancers.[1] NCDs affect all nations, irrespective of social or economic status, but have a disproportionate impact

on citizens in low- and middle-income countries (LMICs).[2] Previously, public health initiatives in LMICs primarily targeted infectious diseases and maternal and child health.[1] However, as globalization and urbanization intensify, LMICs are now experiencing a rapid epidemiological transition, resulting in a double burden in which NCDs are gradually overtaking infectious diseases.[1] NCDs are chronic, non-communicable conditions arising from a combination of genetic, metabolic, environmental, and behavioural factors, typically long-lasting and progressing slowly.[1,3] Traditionally, many NCDs were associated with economic growth and labelled as “diseases of the rich”.[4,5] However, their prevalence has surged in developing nations, whereas developed countries are witnessing a significant decline in NCD-related mortality. Factors such as ageing, unplanned urbanization, westernization and unhealthy lifestyles continue to exacerbate the effects of NCDs and their related risk factors in African countries.[5]

NCDs are a growing concern for societies and governments at all levels, largely due to their high mortality rates.[6,7] Each year, NCDs lead to 41 million deaths globally, accounting for 71% of all mortalities, a figure projected to rise as the population grows, particularly among older adults living in LMICs. [6,7] Each year, more than 15 million NCDs-related deaths occur among people aged 30 to 69, with 85% of these "premature" deaths occurring in developing countries. [6, 7] NCDs significantly affect people in low- and middle-income countries, where more than three-fourths of global NCD deaths (31.4 million) occur.[6, 8] Women of reproductive age face significant challenges and are vulnerable during ongoing health transitions.[9] Globally, nearly 65% of female deaths are due to preventable NCDs, with 75% occurring in LMICs.[10] In Nigeria, this issue is closely linked to high maternal mortality rates. The country is experiencing an "obstetric transition," where deaths from indirect causes such as chronic hypertension and cardiovascular diseases are rising among women of reproductive age.[10] The presence of chronic NCDs in women of reproductive age jeopardizes their immediate and future health and substantially raises the risk of pregnancy complications such as pre-eclampsia and gestational diabetes.[10] Broader clinical studies reveal that many women in this age group harbour undiagnosed NCDs (hypertension and diabetes), underscoring a silent epidemic demanding urgent action.[11]

The development and progression of these chronic diseases are primarily influenced by modifiable behavioural and metabolic risk factors, such as physical inactivity, poor diets, tobacco use, and harmful alcohol intake.[12] Unfortunately, limited understanding and poor knowledge of NCDs remain key drivers of delayed diagnosis, inadequate health-seeking behaviour, and the high death rates seen in developing regions.[5] Sociodemographic factors strongly influence health literacy and willingness to take preventive action. These include a woman's age, education level, socioeconomic status, and whether she lives in a rural or urban area, all of which have been shown to influence her knowledge of NCDs and her exposure to risk factors.[5, 12]

Despite the growing threat of NCDs, there is a notable lack of localized surveillance data on women of reproductive age in Nigeria, especially outside major cities.[10] Ilorin West Local Government Area (LGA) in Kwara State is a rapidly urbanizing semi-urban area undergoing significant lifestyle changes. These changes in the built environment, diet, and economic factors often increase NCDs risk factors. Yet data on how women perceive these risks and the true prevalence of NCDs in such settings remain critically limited. Thus, this study aims to fill this evidence gap by determining the prevalence of non-communicable diseases among women of reproductive age in Ilorin West LGA, Kwara State. It also aims to assess their baseline understanding of NCDs and identify socio-demographic factors that affect their health knowledge and risk levels. The results will provide valuable,

context-specific insights needed to develop targeted health promotion and early intervention strategies for this high-risk group.

MATERIALS AND METHODS

Study Area

The study was conducted among residents of Ilorin West Local Government Area (LGA), Ilorin, Kwara State, Nigeria. It was created in 1991 from the former Ilorin LGA; it covers about 105 km² and has a population of 364,666, of whom 47.4% are women, according to the 2006 Census.[13] Ilorin West is divided into 12 wards: Adewole, Ajikobi, Ubandawaki, Warrah-Osin, Alanamu, Oko-Erin, Magaji Ngeri, Ogidi, Oloje, Sarumi-Ojuekun, Baboko, and Badari. The area is predominantly urban and is considered the premier local council, hosting the Ilorin Emirate headquarters. Its administrative headquarters was briefly at Oja Oba in the Emir's palace but is now at Warrah village in Ilorin. Most residents practice Islam; others are Christian. The main occupations are farming and trading, with many civil servants involved.[14-16] This study was conducted over five months (July to November, 2025).

Study Population

All adult females within the reproductive age group (18-19 years), residing within the study area for the past 6 months, were recruited for the study and satisfied the inclusion criteria.

Study Design

The study design was a healthcare facility-based descriptive cross-sectional study.

Sample Size Estimation

The required sample size was determined using the Leslie Kish statistical formula $n_f = \frac{n}{1+(\frac{n}{N})}$

for estimating the minimum sample size in health studies.[17] Therefore, the estimated minimum sample size was 608.

Sampling technique

A multistage sampling method was used to select the respondents among the study population who satisfied the inclusion criteria.

Stage one

Selecting wards and healthcare centers: Ilorin West LGA has 12 political wards. Four wards were randomly chosen using simple random sampling (balloting). All wards were numbered for easy identification; the ballot papers were folded, placed in a ballot box, mixed thoroughly, and then drawn. Four papers were randomly chosen in sequence, and the numbers on these papers indicated the wards included in the study. Healthcare facilities within these wards were then chosen for the study.

Stage two

Respondent selection: Respondents were evenly distributed across each ward, requiring 152 participants from each healthcare centre in the chosen wards. This ensured equal representation of women of reproductive age from the LGAs. Recruitment was conducted at the outpatient clinics of each healthcare facility using systematic random sampling to reduce selection bias.

Sample Selection

The study involved all consenting adult women of reproductive age attending selected healthcare facilities in Ilorin West LGA who provided written consent. Excluded from the study were critically ill patients and individuals who refused to give consent.

Data Collection

Data were collected using pretested semi-structured and structured questionnaires developed by the researchers (details attached as a supplementary file). Four trained research assistants, alongside the researchers, conducted the survey, which was interviewer-administered. Interviews were conducted in English and Yoruba (the indigenous language). Each interview section lasted about 10 minutes. The questionnaire was translated into Yoruba and back-translated into English for Yoruba-speaking respondents. The back-translation was performed to retain the original meaning of the questions asked. Collected data included socio-demographic characteristics, the presence (prevalence) of NCDs among respondents, and their knowledge of non-communicable diseases. Respondents' knowledge was assessed using a knowledge index calculated by summing binary variables with pre-assigned values (maximum score 11, minimum 0). Higher scores indicated greater knowledge of NCDs. For ease of interpretation, knowledge was grouped into categories: Good (9–11), Fair (6–8), and Poor (0–5).

Data analysis

At the end of the study, the questionnaires were sorted and coded sequentially. All collected data were analyzed using the International Business Machines Statistical Package for the Social Sciences (IBM SPSS) Version 26 (2023). Descriptive statistics including means, percentages, frequency distributions, and tables were used for analysis. The chi-square test was used to assess the association between sociodemographic factors and respondents' knowledge of NCDs (knowledge category). Additionally, multivariate binary logistic regression was performed to determine predictors of good NCD knowledge. A p-value of ≤ 0.05 was considered statistically significant.

Ethical considerations

Ethical approval and permission to conduct the study were obtained from the Kwara State Ministry of Health, in collaboration with the Ilorin West LGA Medical Officer of Health, in accordance with the Declaration of Helsinki and Nigeria's National Code of Health Research and Ethics. Participants gave written informed consent before the interview and were aware that they could withdraw at any moment. Confidentiality was maintained by using anonymous questionnaires.

RESULTS

Figures 1 to 6 present the distribution of respondents' sociodemographic characteristics. Age (Figure 1): The age distribution was heavily concentrated in younger age groups (25–34 years), with over three-quarters (38.5%, n =

234), while the 45–49 group was the smallest segment (1.3%, n = 8). Marital Status (Figure 2): More than half, 53.5% (n = 325), of respondents were married, while a smaller proportion, 0.8% (n = 5), were widowed. Occupation (Figure 3): Artisans were the largest occupational group, representing 36.0% (n = 219) of respondents, and farmers were the smallest group, 3.5% (n = 21). Education (Figure 4): Educational attainment was generally high, with more than half having tertiary education, 52.0% (n = 316), while only 2.3% (n = 14) had no formal education. Religion (Figure 5): Most respondents were Muslim, 77.6% (n = 472), followed by Christians at 21.7% (n = 132). Average Monthly Income (Figure 6): Among income earners, more than two-thirds (85.1%, n = 521) earned the minimum wage or above.

Figure 7 below shows the prevalence of non-communicable diseases among the respondents. Slightly more than one-third of the 215 respondents (35.4%) had one type of NCDs.

Table 1 below shows the predefined thresholds for the respondents' knowledge level and grading. Table 2 shows that 483 participants (79.4%) demonstrated good knowledge, 71 (11.7%) had fair knowledge, and 54 (8.9%) had poor knowledge.

Table 1: Knowledge score distribution

Metric	Value
Mean (SD) knowledge Index	9.55 (2.30)
Median (IQR)	11 (9–11)
Min–Max	1–11
N	608

Table 2: Level of Knowledge of NCDs among Respondents. N = 608

Knowledge category	N	%
Good (9–11)	483	79.4
Fair (6–8)	71	11.7
Poor (0–5)	54	8.9
Total	608	100

Table 3 below presents the relationship between NCDs knowledge level (Good, Fair, Poor) and respondents' sociodemographic characteristics. Significant associations were observed between knowledge level and occupation, χ^2 (10) = 42.81, $p < 0.001$; education, χ^2 (6) = 43.61, $p < 0.001$; and religion, χ^2 (4) = 48.40, $p < 0.001$. The findings indicate that knowledge of non-communicable diseases varies meaningfully by education, occupation, and religion, whereas age and marital status show no clear association at the conventional $\alpha = .05$ level.

Table 3: The association between respondents' knowledge of NCDs (knowledge category) and socio-demographic characteristics. N = 608

Variable	Category	Good n (%)	Fair n (%)	Poor n (%)	Total n	Pearson χ^2 (df)	p-value
Age	15–24	170 (73.0)	37 (15.9)	26 (11.2)	233	10.743 (6)	.097
	25–34	194 (82.9)	23 (9.8)	17 (7.3)	234		
	35–44	113 (85.0)	10 (7.5)	10 (7.5)	133		
	45–49	6 (75.0)	1 (12.5)	1 (12.5)	8		
	Total	**483 (79.4)**	**71 (11.7)**	**54 (8.9)**	**608**		
Marital status	Single	205 (77.4)	35 (13.2)	25 (9.4)	265	2.495 (6)	.763[f]
	Married	264 (81.2)	33 (10.2)	28 (8.6)	325		
	Divorced/Separated	10 (76.9)	2 (15.4)	1 (7.7)	13		
	Widowed	4 (80.0)	1 (20.0)	0 (0.0)	5		
	Total	**483 (79.4)**	**71 (11.7)**	**54 (8.9)**	**608**		
Occupation	Unemployed	84 (77.8)	16 (14.8)	8 (7.4)	108	42.808 (10)	<.001
	Farmer	14 (66.7)	4 (19.0)	3 (14.3)	21		
	Trader	72 (78.3)	12 (13.0)	8 (8.7)	92		
	Civil Servant	50 (70.4)	7 (9.9)	14 (19.7)	71		
	Artisan	199 (90.9)	14 (6.4)	6 (2.7)	219		
	Others	64 (66.0)	18 (18.6)	15 (15.5)	97		
	Total	**483 (79.4)**	**71 (11.7)**	**54 (8.9)**	**608**		
Education	None	11 (78.6)	2 (14.3)	1 (7.1)	14	43.610 (6)	<.001[f]
	Primary	21 (77.8)	4 (14.8)	2 (7.4)	27		
	Secondary	230 (91.6)	16 (6.4)	5 (2.0)	251		
	Tertiary	221 (69.9)	49 (15.5)	46 (14.6)	316		
	Total	**483 (79.4)**	**71 (11.7)**	**54 (8.9)**	**608**		

Variable	Category	Good n (%)	Fair n (%)	Poor n (%)	Total n	Pearson χ^2 (df)	p-value
Religion	Muslim	387 (82.0)	53 (11.2)	32 (6.8)	472	48.396 (4)	<.001[f]
	Christian	96 (72.7)	18 (13.6)	18 (13.6)	132		
	Others	0 (0.0)	0 (0.0)	4 (100.0)	4		
	Total	**483 (79.4)**	**71 (11.7)**	**54 (8.9)**	**608**		

f is Fisher's exact probability value for cross-tabulation categories where there are at least 20% of cells with less than 5 expected frequencies

Table 4 shows a multivariable binary logistic regression with good knowledge as the outcome and socio-demographic variables as predictors, used to identify factors influencing respondents' knowledge of NCDs. After controlling for confounding, adjusted odds ratios with 95% confidence intervals and p-values are presented to quantify independent associations. Tertiary education was a strong independent predictor of knowledge. Compared with women with no formal education (reference), those with tertiary education had substantially higher odds of good knowledge (Exp[B] = 3.66, 95% CI [2.04, 6.57], p < .001). Occupation (artisans) was also independently associated with knowledge. Compared with the model's reference occupation category, artisans had higher odds of good knowledge (Exp[B] = 3.39, 95% CI [1.64, 7.00], p = .001). Household income was a strong correlate. Women in the higher income category (≥ ₦70,000) had roughly fourfold higher odds of good knowledge than those below the threshold (Exp[B] = 4.12, 95% CI [2.16, 7.84], p < .001), even after adjusting for education and other factors. The multivariable analysis revealed that tertiary education and higher income were the factors most strongly and consistently associated with higher odds of good knowledge.

Table 4: Binary logistic regression predicting good knowledge of NCDs based on respondents' socio-demographic factors:

Predictors	B	Exp(B)	S.E.	Sig.	95% CI for EXP(B)	
					Lower	Upper
Age			0.000			
Age(1)	-2.279	0.102	1.011	0.024	0.014	0.742
Age(2)	-0.449	0.638	0.913	0.623	0.107	3.818
Age(3)	-0.056	0.945	0.926	0.951	0.154	5.807
Marital_Status				0.397		
Marital_Status(1)	0.447	1.564	1.322	0.735	0.117	20.879
Marital_Status(2)	-0.128	0.880	1.248	0.918	0.076	10.157
Marital_Status(3)	-1.023	0.359	1.451	0.481	0.021	6.180
Education				0.000		
Education(1)	0.600	1.823	0.759	0.429	0.412	8.069
Education(2)	0.468	1.596	0.611	0.444	0.482	5.286
Education(3)	1.298	3.660	0.298	0.000	2.040	6.566
Occupation				0.000		
Occupation(1)	0.663	1.941	0.352	0.060	0.974	3.870
Occupation(2)	-0.994	0.370	0.670	0.138	0.100	1.377
Occupation(3)	-0.401	0.670	0.419	0.339	0.294	1.523
Occupation(4)	-0.024	0.976	0.413	0.954	0.434	2.195
Occupation(5)	1.220	3.389	0.370	0.001	1.641	6.998
Religion				0.060		
Religion(1)	23.331	13571400104.595	19816.445	0.999	0.000	
Religion(2)	22.717	7345959308.437	19816.445	0.999	0.000	
Average Income (1)	1.415	4.118	0.328	0.000	2.163	7.839
Constant	-22.679	0.000	19816.445	0.999		

DISCUSSION

The prevalence of NCDs among the women of reproductive age in Ilorin West LGA in this study was 35.4%. This represents the proportion of respondents who had one or more forms of NCDs (hypertension, diabetes, chronic respiratory diseases, depression and others). The finding further elucidates the significant burden of NCDs in the study area, and this aligns with broader inclusive trends reported across sub-Saharan Africa and Nigeria.[18] A similar finding was reported from the study conducted by Yadav et al. al in Nepal, India, where the prevalence of NCDs among similar respondents was 39.02%.[19] These prevalences indicate that NCDs are rapidly becoming the

dominant cause of morbidity and mortality in low- and middle-income countries. Current global data show that approximately 2 billion women of reproductive age worldwide are affected by NCDs and their associated risk factors.[20, 21]

In sub-Saharan Africa, the burden of NCDS has increased by 67% between 1990 and 2017, resulting in the proportion of total deaths rising from 18% to 30%.[21] The World Health Organization (WHO) African Region has a higher likelihood of premature NCDs mortality (21%) compared to the global average (18%), with 64% of NCDs deaths occurring under the age of 70, which is a rate well above the global average of 42%.[20] This trend is driven by unplanned urbanization, physical inactivity, and westernization of dietary patterns.[5,12] In Nigeria specifically, this high disease burden contributes to an ongoing "obstetric transition," where indirect medical causes such as pre-existing hypertension, gestational diabetes, and cardiovascular conditions increasingly drive maternal morbidity and mortality.[10] Because many NCDs remain asymptomatic during their early stages, a 35.4% prevalence in a healthcare facility sample suggests a significant underlying health burden that requires continuous clinical monitoring and early intervention.

The 35.4% prevalence reported in this study is notably significant when viewed in the context of recent research from Nigeria, even though individual NCDs were not specifically measured. A 2023 survey conducted in Lagos and the Federal Capital Territory revealed that 36% of women of reproductive age had elevated blood pressure, 10% had raised blood sugar levels, and 51.9% were classified as overweight or obese.[10] Likewise, a study carried out among similar respondents in urban slums across Lagos metropolis found that over one-quarter of participants were affected by hypertension, and more than half were either overweight or obese.[22]

The presence of NCDs such as hypertension during reproductive years has implications that extend beyond individual health outcomes to affect maternal and child health. Research shows that women with pre-existing hypertension are at a greater risk of developing pre-eclampsia and eclampsia, as well as other cardiovascular conditions that are leading causes of maternal mortality in Nigeria. The high prevalence of undiagnosed hypertension is particularly alarming, with fewer than 23% of women who have elevated blood pressure being aware of their condition.[10] This finding also reflects the broader epidemiological transitions across Nigeria, in which living in urban cities could increase the risk of developing one form of NCDs in one's lifetime. Reports from the studies show that lifestyle changes associated with urbanization, including dietary transitions toward processed foods, reduced physical activity, and increased exposure to environmental stressors, were risk factors for NCDs.[23] These transitions create conditions that promote NCDs development among women of reproductive age who may lack awareness of these emerging health risks.[24]

Studies from Nigeria and across the region consistently show a high burden of NCDs among women in their twenties and thirties. This early onset pattern reflects the complex interplay of genetic susceptibility, environmental factors, and lifestyle changes occurring in rapidly transitioning societies.[10, 21, 25] Economic gender-based discrimination in healthcare settings and competing demands from reproductive and child health responsibilities have been reported to make reproductive-age women vulnerable to accessing NCDs care, resulting in morbidity and mortality. Since NCDs care requires long-term financial commitments which many families may not be able to sustain, it can lead to treatment discontinuation and disease progression.[26]

With the higher prevalence of NCDs found in this study, advocacy should be towards prevention and the creation of interventions targeting women of reproductive age. Efforts should be made towards reducing or eliminating

the modifiable risk factors of NCDs, including physical inactivity, unhealthy diet, tobacco use, and excessive alcohol consumption, as key targets for intervention.[21,27] Successful intervention approaches documented in sub-Saharan Africa include community-based health promotion programs, integration of NCDs screening into reproductive health services, and multi-sectoral approaches addressing social determinants of health. Parts of the effective response from the stakeholders include greater awareness of the various ways to avoid the risk factors that could lead to NCDs and advocacy for early detection and prompt treatment to avoid complications. Future research priorities should focus on identifying the prevalence of specific NCDs among women of reproductive age, including longitudinal studies tracking NCDs development and progression among women from adolescence through menopause.

In this study, 79.4% of respondents demonstrated good knowledge of NCDs, with a mean score of 9.55 out of 11. This impressive knowledge performance among respondents sharply contrasts with the findings from a comparable study conducted in some countries across sub-Saharan Africa. Aribike et al. in Nigeria reported a low level of knowledge of NCDs among similar respondents, while Legesse et al. in Ethiopia found that 35% of women of reproductive age possessed low or poor knowledge of NCDs.[5, 28] However, their studies were community-based, which might affect the overall knowledge of the respondents regarding NCDs. Similarly, studies across rural South Asian settings have reported limited public awareness regarding NCDs prevention and long-term health risks.[29] The higher knowledge score in this study can be attributed to two main contextual factors. First, the study was healthcare facility-based, sampling women who were actively utilizing outpatient health services. Health facility attendance provides increased exposure to routine health talks, clinical consultations, and public health educational posters. Second, the study population had a high overall level of formal education, with 52.0% having completed tertiary education and 41.3% having completed secondary education. Higher educational attainment is consistently associated with greater health literacy and better processing of preventive health information.[2] Research reports have consistently demonstrated strong associations between educational level and health knowledge, with tertiary education serving particularly as a powerful predictor of health literacy.[30–33]

The findings in this study agree with recent community-based research in Nigeria and sub-Saharan Africa, which reports the influence of education and socioeconomic status on knowledge and health literacy among women of reproductive age regarding NCDs.[10,20,21] It is also in tandem with the study conducted in Rwanda, where 65% of the respondents had good knowledge of NCDs.[34] The similarity in findings may be attributed to the study areas, which were urban settings and the educational background of the respondents. The index study took place in Ilorin metropolis, where most residents have good education, in contrast to rural areas. Educated populations or communities typically demonstrate superior health knowledge to their counterparts in rural areas.[35] The educational advantage observed in this study also reflects broader patterns documented across sub-Saharan Africa; a meta-analysis of preconception care knowledge in the region found that women with higher educational attainment were significantly more likely to have good knowledge as compared to their counterparts with lower education.[32] Similarly, studies on knowledge of reproductive health concepts consistently identify education as the primary determinant of health literacy among women of reproductive age.[36,37]

The mechanism through which education influences health knowledge involves multiple pathways, including enhanced cognitive processing capabilities, increased exposure to health information sources, improved communication skills for healthcare interactions, and greater capacity for critical evaluation of health

information.[30] As observed in this study, the concentration of educational advantage among those with tertiary education suggests threshold effects where advanced education provides qualitatively different knowledge acquisition capabilities compared to basic education.[32]

Several studies conducted in sub-Saharan Africa consistently demonstrate that socioeconomic status is a key determinant of health knowledge and behaviours. For instance, research on the socioeconomic factors influencing non-communicable diseases in Kenya revealed that wealth status was independently associated with the various health outcomes. The study indicated that individuals in the wealthiest quintile exhibited better knowledge and preventive behaviours compared to those in lower income groups.[31] More than half of the respondents in this study earned above the national minimum wage, which serves as an added advantage for having better knowledge of their health status. The higher knowledge levels documented in this study represent significant assets for health system strengthening that can be leveraged for broader population health improvement. Rather than focusing solely on knowledge deficits, interventions should build on existing strengths while addressing identified gaps. The strong knowledge base observed provides a foundation for more sophisticated health promotion approaches, including peer education programs, community health advocacy, and participatory health promotion initiatives. A study on community health worker programs has documented the effectiveness of leveraging existing community knowledge assets rather than imposing external expertise.[38]

The multivariate logistic regression analysis from the index study indicated that education level, occupation, and income were predictors of good knowledge of NCDs, but not age and marital status. Tertiary-educated women were nearly four times more likely to have good knowledge than non-formally educated women (AOR = 3.66, 95% CI [2.04, 6.57], $p < .001$). This aligns with studies from Ethiopia, Bangladesh, and Nigeria, where university-level education greatly increased knowledge of health information and the adoption of preventive behaviours.[5,39,40] Occupation was also strongly associated with knowledge, with civil servants and qualified workers having better odds of good knowledge than the unemployed. Higher income was also shown to increase knowledge of healthcare conditions, possibly through greater access to the media and medical facilities.[41] Invariably, average monthly income is the single strongest independent positive predictor of good NCD knowledge among the study participants, demonstrating the largest effect size (highest Adjusted Odds Ratio) after controlling for all confounding variables. This is closely followed by educational level (tertiary education). These findings were corroborated by reports from previous studies: higher household income reduces structural and financial barriers to accessing media channels (smartphones, television, and internet connectivity), thereby enhancing both passive and active exposure to health promotion messages on NCDs.[42] Moreover, financial ability supports consistent access to healthcare services, allowing for opportunistic clinical advice and preventive screenings.[43] While formal education equips individuals with essential skills to evaluate health information critically, higher income reduces financial stress, giving people the mental space and resources to focus on preventing chronic diseases in the long term.[44]

CONCLUSION

Women of reproductive age in Ilorin West LGA, Kwara State, Nigeria, show a high prevalence of NCDs at 35.4%, and generally have good knowledge of these conditions. Factors such as higher education levels, certain occupations (notably artisanal work), and incomes above the minimum wage are linked to better knowledge and practices. The study confirms that comprehensive understanding is essential for adopting healthy behaviours,

consistent with the Knowledge-Attitude-Practice model. Since the prevalence of NCDs remains significant, there is an urgent need to strengthen health education and preventive screenings, particularly for vulnerable groups. These results highlight the importance of continuing and expanding health promotion efforts that take into account local cultural and socio-economic contexts.

RECOMMENDATIONS

To effectively combat NCDs among women of reproductive age, public health strategies must strengthen community-based education by equipping community health workers with culturally appropriate, local-language materials, and by leveraging informal networks, such as trade and faith-based associations, to disseminate preventive messaging. Clinically, NCDs risk reduction and routine screenings for blood pressure, blood sugar, and cancer should be seamlessly integrated into existing maternal and child health platforms. Crucially, interventions must prioritize unemployed and low-income women by addressing economic barriers to care. This requires robust policy advocacy for subsidized screenings and expanded health insurance coverage. Finally, longitudinal research is essential to track NCDs progression from adolescence through menopause and to identify strategies that increase women's attendance at structured health education sessions.

Abbreviations

NCDs – Non- Communicable Diseases

LMICs – Low- and Middle-Income Countries

LGA – Local Government Area

IBM SPSS - International Business Machines Statistical Package for the Social Sciences

WHO – World Health Organization

Declarations

Ethics Approval and Consent to Participate: Ethical approval for the study was obtained from the Kwara State Ministry of Health in Ilorin, Kwara State, under reference number ECR/MOH/2025/08/495, in accordance with the Declaration of Helsinki and the Nigerian National Code of Health Research Ethics. Written informed consent was secured from all participants, ensuring that all collected data remained confidential. There were no financial incentives or coercion involved throughout the study.

Consent for Publication: Not Applicable

Availability of Data and Materials: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests: The authors have no competing interests to declare

Funding: The authors did not receive financial support from any organization for the submitted work.

Authors' Contributions: ASI: Conceptualization, literature search and literature review, manuscript review, manuscript writing, manuscript revision, final approval, and a major contributor to the final draft of the manuscript. **BSI:** Conceptualization, literature search and literature review; **KFI:** Conceptualization, Literature search, Literature review, data collection, and manuscript revision; **AI:** Conceptualization, literature search, data collection, data analysis and manuscript review. **CBI:** Conceptualization, Literature review, data analysis and manuscript review. All authors have critically read and approved the final manuscript.

Acknowledgements: The authors express their gratitude to all healthcare personnel at the selected health centres for their support throughout the study. The authors also thank Dr Ibraheem AS for his critical review of the manuscript.

References

1. Piot P, Caldwell A, Lamptey P, Nyrirenda M, Mehra S, Cahill K. et. al. Addressing the growing burden of non–communicable disease by leveraging lessons from infectious disease management. J Global Health. 2016;6(1):010304. https://doi.org/10.7189/jogh.06.010304.
2. Budreviciute A, Damiati S, Sabir DK, Onder K, Schuller-Goetzburg P, Plakys G. et. al. Management and prevention strategies for non-communicable diseases (NCDs) and their risk factors. Front Public Health. 2020;8:574111.
3. Physiopedia. Non-Communicable Diseases. Available at: https://www.physio-pedia.com/Non-Communicable_Diseases. 2055. Accessed on June 21, 2025.
4. Boutayeb A, Boutayeb S. The burden of non-communicable diseases in developing countries. Int J Equity Health. 2005;4. https://doi.org/10.1186/1475-9276-4-2.
5. Legesse E, Nigussie T, Girma D, Geleta LA, Dejene H. Level of adequate knowledge of non-communicable diseases and associated factors among adult residents of North Shewa Zone, Oromia Region, Ethiopia: a Mixed-Method Approach. Front Public Health. 2022;10:892108. https://doi.org/10.3389/fpubh.2022.892108.
6. Bhattacharya S, Heidler P, Varshney S. Incorporating neglected non-communicable diseases into the national health program—A review. Front Public Health. 2023;10:1093170. https://doi.org/10.3389/fpubh.2022.1093170.
7. Dyer O. COVID-19: Pandemic is having severe impact on non-communicable disease care, WHO survey finds. BMJ. 2020;m2210. https://doi.org/10.1136/bmj.m2210.
8. World Health Organization (WHO) African Region. (2025). Noncommunicable diseases. Available at: https://www.afro.who.int/health-topics/noncommunicable-diseases#:~:text=Related%20Health%20Topics-,Overview,injuries%20and%20mental%20health%20disorders. Accessed June 19, 2025.
9. Heise L, Greene ME, Opper N, Stavropoulou M, Harper C, Nascimento M. Gender inequality and restrictive gender norms: framing the challenges to health. Lancet. 2019;393(10189):2440–54. https://doi.org/10.1016/S0140-6736(19)30652-X.
10. Ogboye A, Akpakli JK, Iwuala A, Etuk I, Njoku K, Jackson S, Okoli U, Hill K, Omoera V, Oludara F, Ekong I. Prevalence of non-communicable diseases and risk factors of pre-eclampsia/eclampsia in four local government areas in Nigeria: a cross-sectional study. BMJ Open. 2023;13(10):e071652. https://doi.org/10.1136/bmjopen-2023-071652.

11. Chowdhury SR, Islam MN, Sheekha TA, Kader SB, Hossain A. Prevalence and determinants of non-communicable disease risk factors among reproductive-aged women: Findings from a nationwide survey in Bangladesh. PLoS ONE. 2023;18(6):e0273128. https://doi.org/10.1371/journal.pone.0273128.
12. Sodipo OY, Afolaranmi TO, Agbo HA, Envuladu EA, Lar LA, Udofia EA, Zoakah AI. Co-occurrence of non-communicable disease risk factors among adolescents in Jos, Nigeria. Afr J Prim Health Care Family Med. 2024;16(1):1–8. https://doi.org/10.4102/phcfm.v16i1.4342.
13. Makama SI. Report of Nigeria's National Population Commission on the 2006 census. Popul Dev Rev. 2007;33(1):206–11.
14. Independent National Electoral Commission (INEC. [IREV]. 2025. Available at: https://www.inecnigeria.org. Accessed on July 15, 2025.
15. Idowu A, Olowookere SA, Fagbemi AT, Ogunlaja OA. Determinants of Cervical Cancer Screening Uptake among Women in Ilorin, North Central Nigeria: A Community-Based Study. J Cancer Epidemiol. 2016:6469240.
16. Kwara State Government. Welcome to Kwara State. Kwara State Government. Available at: https://kwarastate.gov.ng/. 2020. Accessed on July 15, 2025.
17. Upadhyay HP, Pradhan BL. Sample Size Estimation in Medical Research Based Upon Study Design. J Coll Med Sciences-Nepal. 2023;19(2):237–45.
18. Yaya S, Uthman OA, Ekholuenetale M, Bishwajit G. Socioeconomic inequalities in the risk factors of noncommunicable diseases among women of reproductive age in sub-Saharan Africa: a multi-country analysis of survey data. Front Public Health. 2018;6:307. https://doi.org/10.3389/fpubh.2018.00307.
19. Yadav I, Jyoti S, Bahik C, Acharya J, Bohaju A, Yadav SK. Non-communicable diseases among women of reproductive age visiting the department of obstetrics and gynaecology of a Tertiary Care Hospital. JNMA: Journal of the Nepal Medical Association. 2024; 62(270):95.
20. Barry A, Impouma B, Wolfe CM, Campos A, Richards NC, Kalu A. Non-communicable diseases in the WHO African region: analysis of risk factors, mortality, and responses based on WHO data. Sci Rep. 2025;15(1):12288.
21. Domba MM, Argefa TG, Kebede BM, Sako S. Magnitude and determinants of behavioral risk factors of non-communicable diseases among reproductive age women in Gofa and Basketo zones, Southern Ethiopia: a community-based cross-sectional study. Front Public Health. 2025;13:1550043.
22. Pheabian AO, John OL, Adejoh P, Adewale AA, Kazeem AA, Adesola MZ. Survey of Hypertension, Diabetes and Obesity in Three Nigerian Urban Slums. Iran J Public Health. 2013;42(9):972–9.
23. Olamoyegun MA, Alare K, Afolabi SA, Aderinto N, Adeyemi T. A systematic review and meta-analysis of the prevalence and risk factors of type 2 diabetes mellitus in Nigeria. Clin Diabetes Endocrinol. 2024;10(1):43.
24. Okonofua F, Ntoimo LF, Ogu R, Isikhuemen M. Public policy and health system responses to diabetes mellitus in Nigeria: a call for reform. Health Syst Reform. 2025;11(1):2477941. https://doi.org/10.1080/23288604.2025.2477941.
25. Yuyun MF, Sliwa K, Kengne AP, Mocumbi AO, Bukhman G. Cardiovascular Diseases in Sub-Saharan Africa Compared to High-Income Countries: An Epidemiological Perspective. Glob Heart. 2020;15(1):15.
26. Odunyemi A, Rahman T, Alam K. Economic burden of non-communicable diseases on households in Nigeria: evidence from the Nigeria living standard survey 2018-19. BMC Public Health. 2023;23(1):1563. https://doi.org/10.1186/s12889-023-16498-7.

27. Ekpenyong CE, NE U, Akpan EE, Samson TK. Double burden, non-communicable diseases and risk factors evaluation in sub-Saharan Africa: The Nigerian experience. Eur J Sustainable Dev. 2012;1(2):249.
28. Aribike O, Okafor I, Roberts A, Odugbemi T. Are Nigerian women pro-active about noncommunicable disease prevention? A quantitative survey. Annals Global Health. 2019;85(1):38. https://doi.org/10.5334/aogh.2355.
29. Akter M, Parveen S, Jahan F. Awareness Regarding Risk Factors of Non-Communicable Diseases among College Students in Bangladesh. Int J Clin Stud Med Case Rep. 2023;27(5):005. https://doi.org/10.46998/ijcmcr.27.5.
30. Ezenwaka CE, Nwankwo CU, Analike RA, Moriyama M, Afonne AJ, Ottiwu PC. The baseline self-efficacy scores to manage chronic diseases amongst Nigerian patients with non-communicable diseases are sub-optimal. INQUIRY: J Health Care Organ Provis Financing. 2024;61:00469580241248102.
31. Mwangi KJ, Mwenda V, Gathecha G, Beran D, Guessous I, Ombiro O. Socio-economic and demographic determinants of non-communicable diseases in Kenya: a secondary analysis of the Kenya Stepwise Survey. Pan Afr Med J. 2020;37:351.
32. Woldeyohannes D, Tekalegn Y, Sahiledengle B, Hailemariam Z, Erkalo D, Zegeye A. Preconception care in sub-Saharan Africa: A systematic review and meta-analysis on the prevalence and its correlation with knowledge level among women in the reproductive age group. SAGE Open Med. 2023;11:20503121231153511.
33. Idris IO, Oguntade AS, Mensah EA, Kitamura N. Prevalence of non-communicable diseases and its risk factors among Ijegun-Isheri Osun residents in Lagos State, Nigeria: a community based cross-sectional study. BMC Public Health. 2020;20(1):1258.
34. Biraguma J, Mutimura E, Frantz JM. Knowledge about modifiable risk factors for non-communicable diseases adults living with HIV in Rwanda. Afr Health Sci. 2019;19(4):3181–9. https://doi.org/10.4314/ahs.v19i4.41.
35. Ogweno S, Harrison R, Bonface O, Murithi B. mHealth Interventions for Health Promotion in Sub-Saharan Africa: Assessing Impact on Health Literacy and Comparative Analysis of Online Communication Channels. Br J Healthc Med Res. 2025; Vol – 12(01). 28–48.
36. Zegeye AF, Tamir TT, Mekonen EG, Workneh BS, Negash WD, Mekonnen CK. Individual and community-level determinants of knowledge about fertile periods among adolescent girls and young women (10–24 years) in Sub-Saharan Africa: a multilevel mixed-effects analysis of a recent demographic and health survey. Heliyon. 2024;10(5).
37. Diress M, Gashaneh BD, Abdu Seid M, Birhan EH, Ayelign KA, Chilot D. et.at. Determinants of knowledge of the highest conception probability period among reproductive age women in Low-Income African countries: A multilevel analysis based on the recent Demographic and Health Survey. PLoS One. 2023;18(6):e0287164.
38. Kagaruki GB, Karoli PM, Rutahoile WM, Chillo P, Mutagaywa R, Banduka A. Assessment of community knowledge on non-communicable diseases to inform the pilot of WHO PEN-Plus initiatives in selected two districts in Tanzania. PLoS ONE. 2025;20(4):e0321695. https://doi.org/10.1371/journal.pone.0321695.
39. Biswas T, Pervin S, Tanim MI, Niessen L, Islam A. Bangladesh policy on prevention and control of non-communicable diseases: a policy analysis. BMC Public Health. 2017;17(1):582.
40. Osiberu AA, Oluwasanu MM, Omobowale M, John-Akinola Y, Oladepo O. A cross-sectional study of the knowledge and screening practices of diabetes among adults in a south western Nigerian city. J Prev Med Hyg. 2021;62(2):E529.

41. Lago-Peñas S, Rivera B, Cantarero D, Casal B, Pascual M, Blázquez-Fernández C, Reyes F. The impact of socioeconomic position on non-communicable diseases: what do we know about it? Perspect Public Health. 2021;141(3):158–76. https://doi.org/10.1177/1757913920914952.
42. Akubire B, Gmayinaam VU, Anaba EA, Appiah PK, Asalu GA. Determinants of health literacy among older adults in Saboba district in Ghana: a cross-sectional study. BMC Public Health. 2025;25(1):2212.
43. Akanbi RT, Oluwabamide AJ, Abubakar MB, Ngaski GS, SOCIO-DEMOGRAPHIC DETERMINANTS OF HEALTH-SEEKING. BEHAVIOUR AMONG HYPERTENSIVE ADULTS IN NIGER STATE, NIGERIA. Zaria Sociol J. 2026;1(2):189–212.
44. Stormacq C, Van den Broucke S, Wosinski J. Does health literacy mediate the relationship between socioeconomic status and health disparities? Integrative review. Health Promot Int. 2019;34(5):e1–7.

Figures

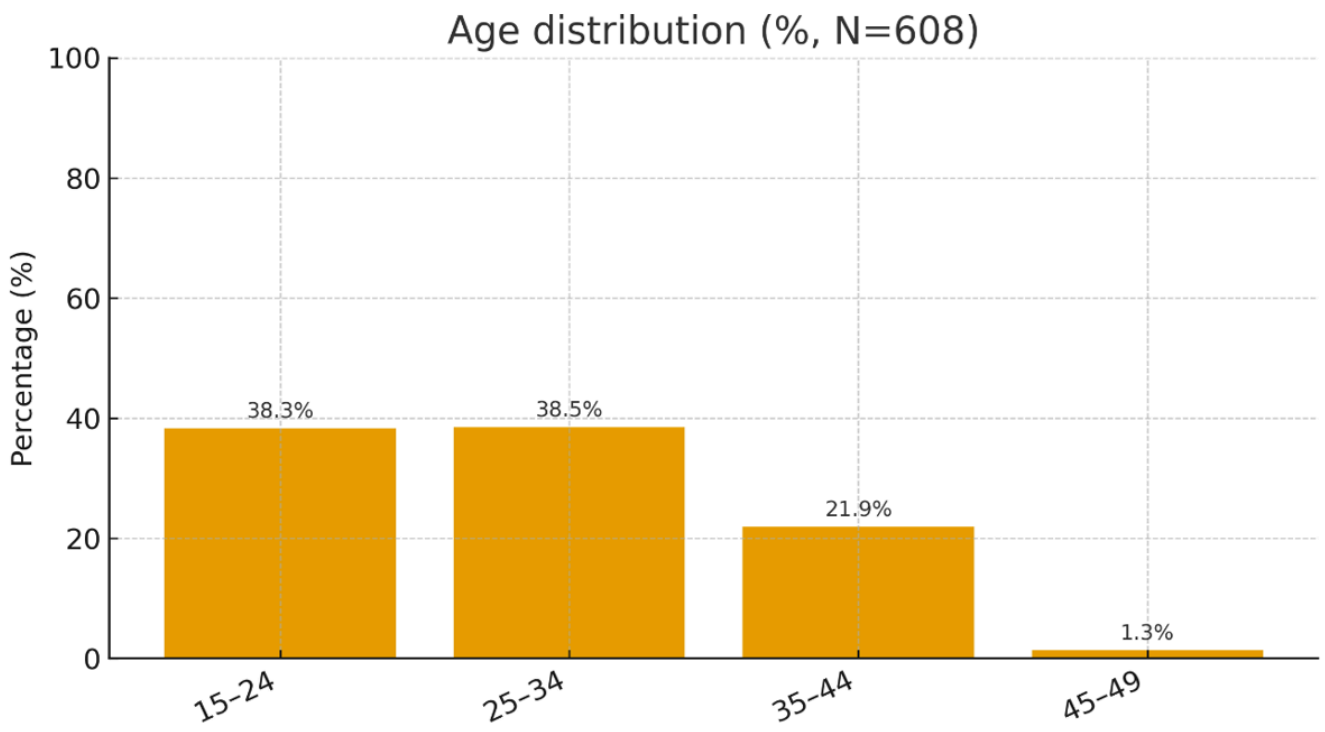


Figure 1

Age: Percentage distribution of Respondents

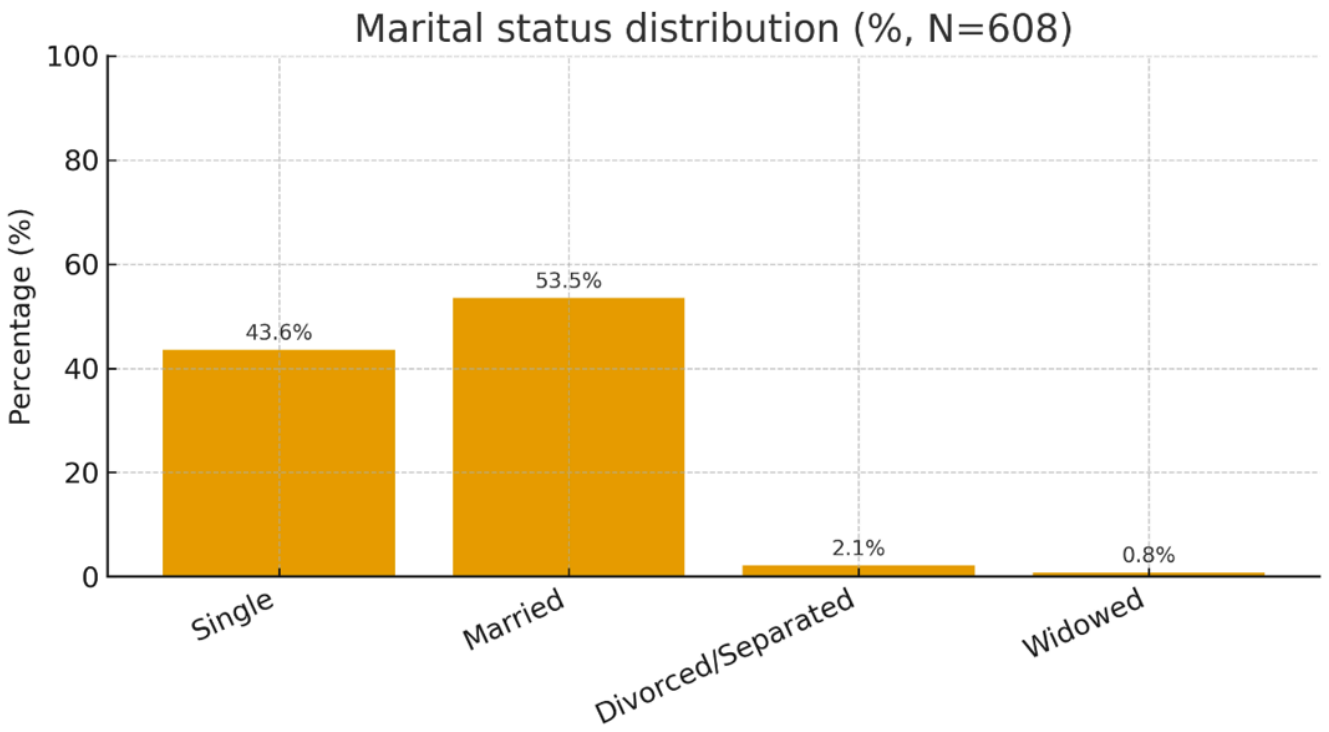


Figure 2

Marital status: Percentage distribution of the Respondents

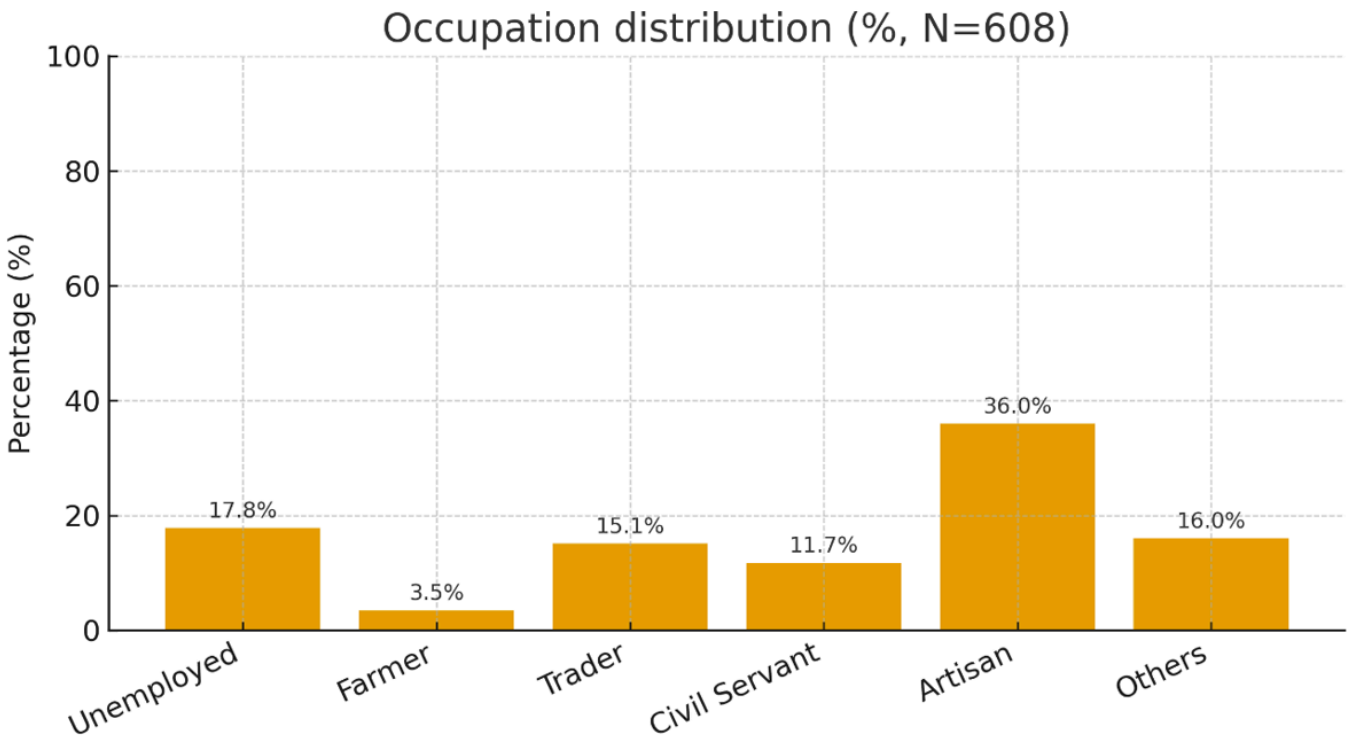


Figure 3

Occupation: Percentage distribution of the Respondents

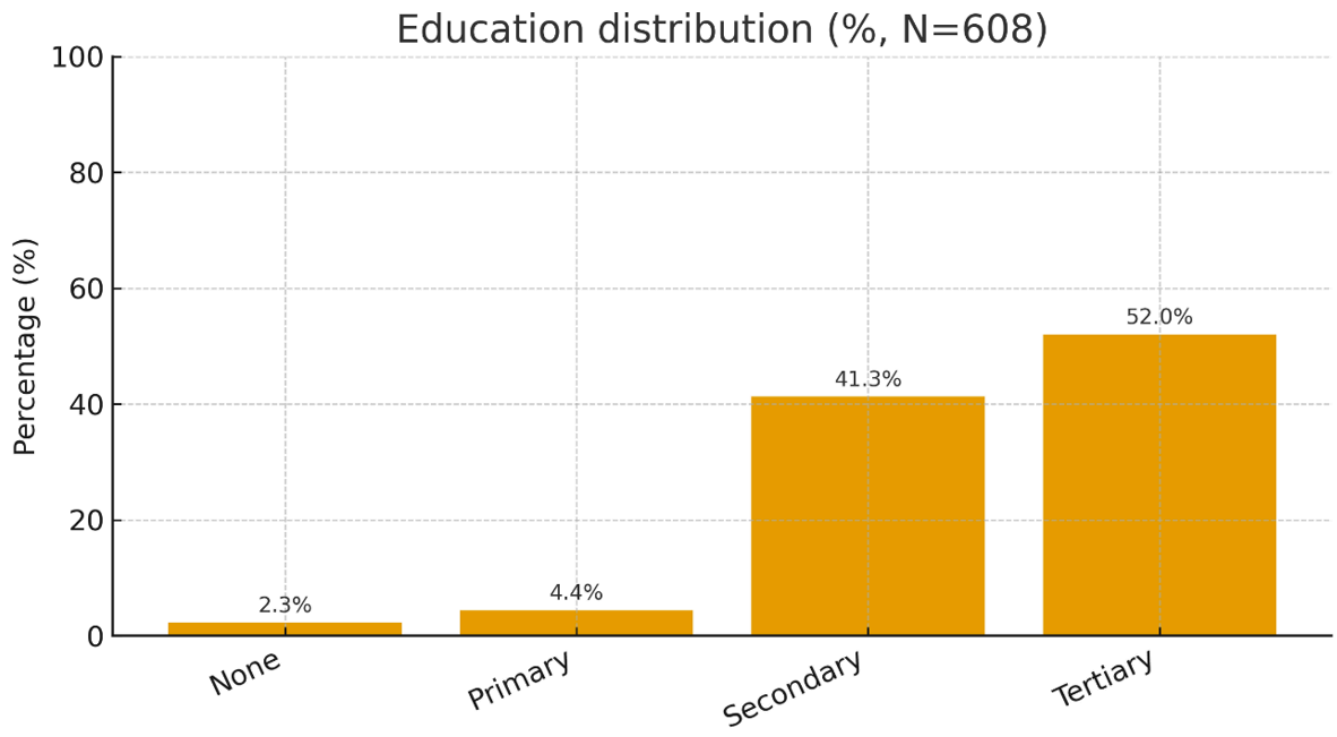


Figure 4

Education: Percentage distribution of Respondents

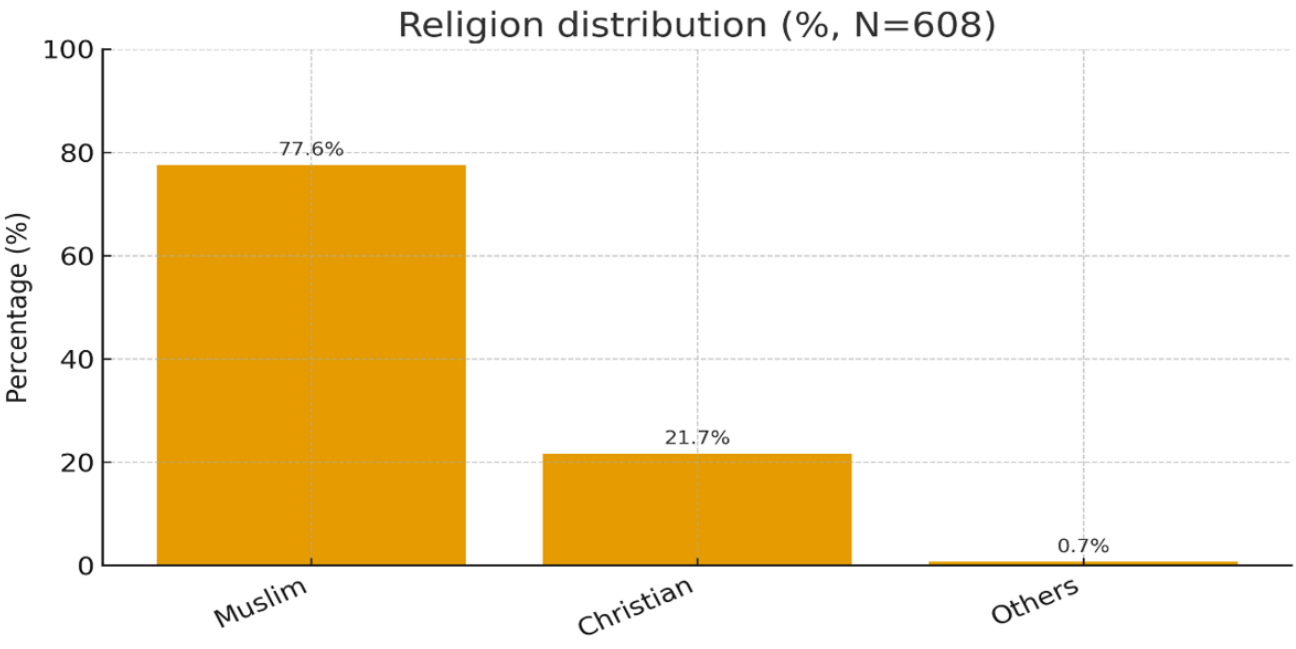


Figure 5

Religion: Percentage distribution of Respondents

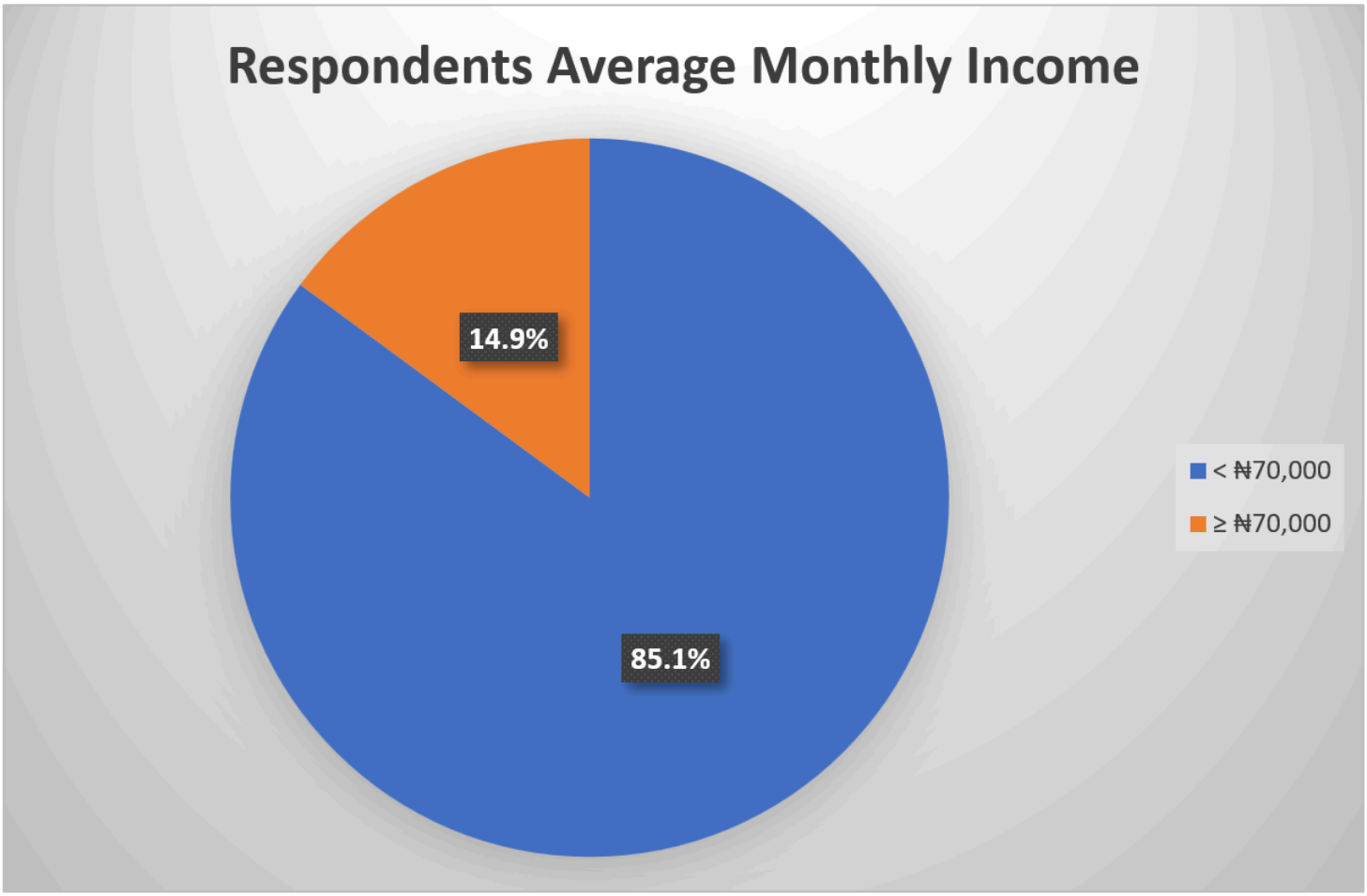


Figure 6

Pie Chart showing the respondents' average monthly income.

(NB: N70,000.00 – Current Nigeria National minimum wage for civil servants)

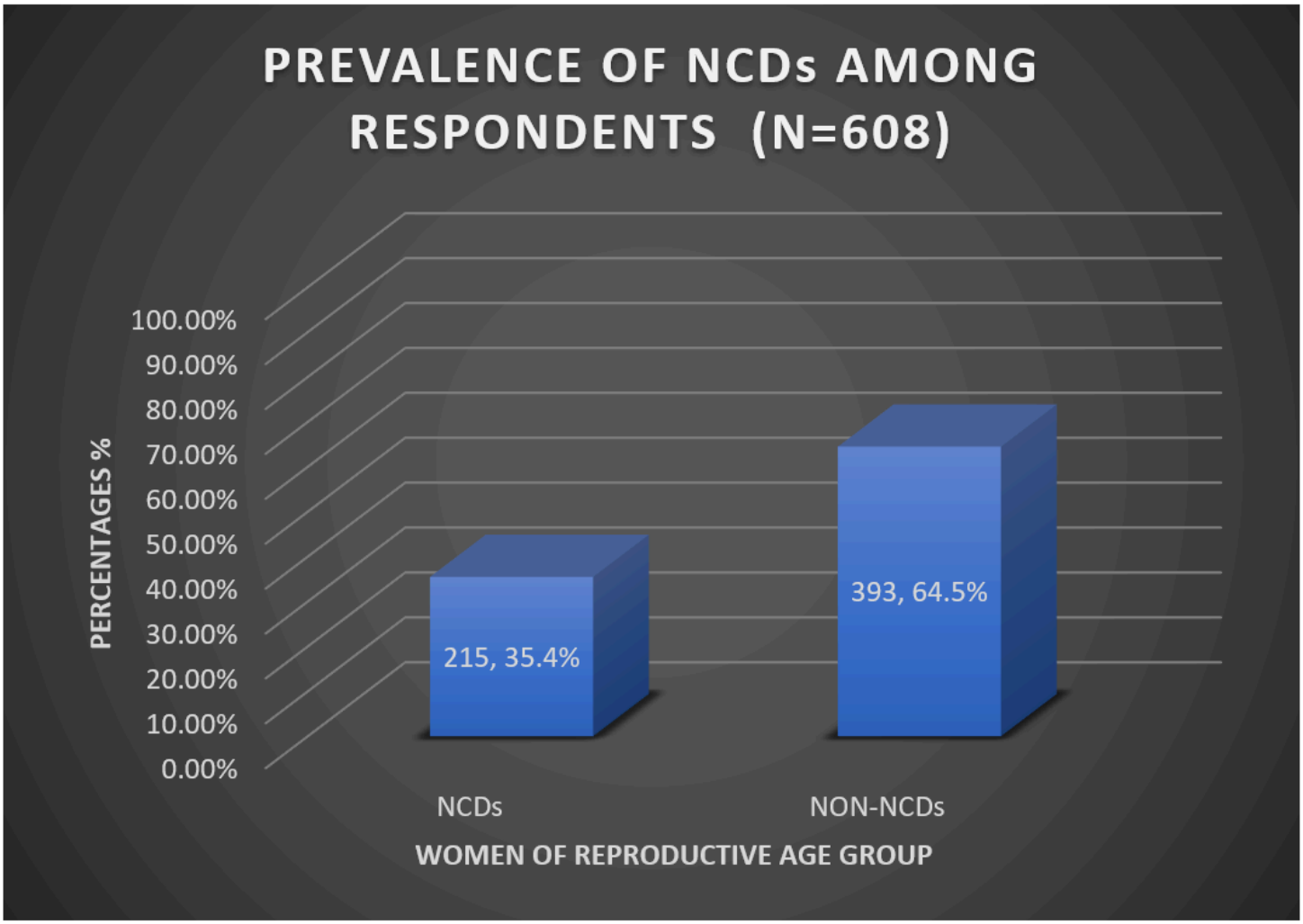


Figure 7

Prevalence of NCDs among the respondents