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RESEARCH ARTICLE

The Prevalence and Correlates of Pre-Diabetes and Diabetes Mellitus Among Public Category Workers in Akure, Nigeria

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Abstract:

Background:

Limited epidemiological data on pre-diabetes and diabetes mellitus among public service workers, considered an at-risk population, may undermine the government's efforts toward addressing the scourge of non-communicable diseases in Nigeria. This study aimed to address this gap by determining the prevalence of pre-diabetes and diabetes mellitus (DM), and to examine their correlates.

Methods:

We conducted a workplace cross-sectional survey of 4828 public service workers across 47 ministries, departments and agencies in Ondo State, Nigeria. An adapted World Health Organisation (WHO) STEPwise surveillance questionnaire was utilised to obtain relevant items of demographic factors, medical history and lifestyle behaviour. Height, weight, blood pressure and fasting blood sugar were measured according to standard protocols. Pre-diabetes and DM were defined as fasting blood glucose 5.6-6.9mmol/L and greater than or equal to 7.0mmol/L, respectively. We performed univariate and multivariate model analyses to determine the associated factors of pre-diabetes and DM.

Results:

Overall, 2299 men and 2529 women participated in the study. The mean age of the participants was 40.4 years (SD±9.7) and the age range was 19 to 76 years. The prevalence of pre-diabetes and DM was 11.7% (n=563) and 5.3% (n=254), respectively. Women had a higher prevalence of pre-diabetes than men did (12.5% versus 10.8%). In univariate analysis, the following factors were associated with pre-diabetes and DM; aging ($p<0.0001$), marital status ($p<0.0001$), lower level of education ($p=0.008$), body mass index (BMI) ($p<0.0001$) and hypertension ($p<0.0001$). In multivariate model analysis, after adjusting for confounding factors, age ≥45 years (OR=1.8, 95%CI 1.3-2.4), lower level of education (OR=1.7, 95%CI 1.2-2.4), hypertension (OR=2.0, 95%CI 1.5-2.6) and overweight/obesity (OR=2.2, 95%CI 1.6-3.0) were the independent and significant determinants of DM.

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Conclusion:

We found a high prevalence of pre-diabetes and DM in the study population. Cardio-metabolic screening of public category workers might contribute significantly towards bridging the gap of undiagnosed DM in the study setting.

Keywords: Diabetes mellitus type 2, Dysglycaemia, Hypertension, Nigeria, Obesity, Akure, Pre-diabetes, Public category workers.

1. BACKGROUND

Diabetes mellitus (DM) is a chronic debilitating non-communicable disease (NCD) and a major cardiovascular disease (CVD) risk factor [1, 2]. An estimated 415 million adults were living with DM in 2015; 215.2 million men and 199.5 million women [3]. Shaw *et al.* [4] projected that 439 million adults would have DM by the year 2030, with a significant increase (69%) in its prevalence in developing countries in comparison to a 20% increase in developed countries. These projections may fall short of current estimates due to an accelerated increase in the incidence of DM worldwide.

In sub-Saharan Africa, the burden of DM among adults aged 20 to 79 years is estimated at 14.2 million, with four countries: South Africa, DR Congo, Nigeria and Ethiopia; accounting for nearly half of all adults living with DM in the region [3]. Nigeria is estimated to have 1.6 million individuals with DM [3]. Underpinning the pandemic of DM is rapid urbanisation, dietary changes, decreased physical activity, alcohol use disorders, smoking and other unhealthy lifestyles [2, 5].

About 193 million people living with DM are undiagnosed worldwide; half of all individuals with DM in the developed world are undiagnosed in comparison with two-thirds (67%) in sub-Saharan Africa [3]. The rates of undiagnosed DM vary by region and screening programmes [6]. Some of the reasons for variations are a lack of diagnostic tools and glucose monitoring equipment and the high cost of treatment. Individuals with undiagnosed DM are unlikely to seek health care or to adopt lifestyle changes. DM complications such as chronic kidney disease, heart failure, retinopathy and neuropathy are diagnosed in the majority of patients [7 - 10].

Pre-diabetes is defined as impaired fasting glucose (IFG) of 5.6 - 6.9mmol/L and/or when the 2-hour postprandial blood glucose is between 7.8 and 11.1mmol/L (impaired glucose tolerance) or both (impaired homeostasis) [11, 12]. A pre-diabetic condition results in a two to ten fold increase in the absolute risk for developing DM and a comparable risk for cardiovascular disease [13]. There is compelling evidence to support early prevention measures and management of patients with pre-diabetes in order to reduce the incidence and complications of DM [14].

Despite evidence of the growing influence of pre-diabetes and DM on cardiovascular health, there is scanty information on the prevalence and associated factors of pre-diabetes and DM among public service workers in Ondo State, Nigeria. Such data is crucial for crafting workplace intervention strategies to address non-communicable diseases in this population. The aim of this study was to estimate the prevalence of pre-diabetes and DM among public service workers in Akure, Ondo State, Nigeria; and also to examine their associated factors.

2. METHODS

2.1. Study Area and Design

We undertook a workplace population study (cross-sectional study) of public service workers drawn from the 47 ministries, departments and agencies (MDAs) in Akure, the state capital of Ondo State, Nigeria. The majority of the MDAs are located within the state secretariat at Alagbaka, Akure.

2.2. Participants and Sample Size

All public category workers (about 50 000) in Akure, Ondo State were eligible to participate in the study. The majority of the workers (about 30 000) in Ondo State work across various ministries, departments and agencies in Akure, while the rest work outside the state capital. A convenient sample of workers (N=5000), corresponding to one-sixth of the workers in Akure across the various MDAs, was considered adequate for sample representativeness. Participants were included if they were available and had observed the minimum eight-hour fasting protocol for the study. However, we excluded workers who were younger than 18 years, pregnant or lactating women from the study. A communique detailing the purpose, process and specified dates for each ministry was sent to the relevant authorities and all workers. Each MDA was allocated three days for testing to ensure the active participation of all workers.

2.3. Data Collection

We employed and trained 12 professional nurses as research assistants who took measurements and conducted the interviews. In total, 4828 workers participated in the study. A number of eligible workers were excluded after confirming that they had not observed the mandatory eight-hour fasting protocol for the study. All participants were selected serially across the various MDAs over a period of three months (June – August, 2015).

The consent forms and questionnaires were written in both English and *Yoruba* (the local language). Participants were interviewed using an adapted version of the World Health Organisation (WHO) STEP wise questionnaire for the surveillance of non-communicable disease (NCD) risk factors at the country level [15]. The questionnaire was pre-tested in a pilot study that included 25 workers in the Ministry of Health and finalised after necessary amendments.

The pilot study was utilised to validate the study instrument and pilot data were not included in the main study. The questionnaire included items on sex, age, grade level of employment, marital status, smoking status, alcohol intake, diet, hours of sleep and physical activity. Level of education was defined according to the grade level attained in school and participants were categorised as having no formal education, primary (grade 1–6), secondary (7–12), tertiary (first degree in university or colleges of higher learning) or post-graduate (minimum of second degree). Public service workers were categorised based on their grade level into: senior management staff (13–17), middle level staff (8–12) and junior management staff (less than 8). Participants were questioned on daily consumption of red meat (Western-type diet), cigarette smoking status (considered smokers if they had ever smoked cigarettes, not only if they currently smoked), excessive consumption of alcohol (if they had ever consumed three or more units of alcohol per day for men and two for women) [16]. Physical activity was based on self-reporting and participants were categorised as inactive (sedentary lifestyle) if they spent eight or more hours in a sitting position per day. Additional information on prior access to NCD screening was obtained by self-reporting. Participants were asked if whether or not they ever had their blood pressure and blood sugar measured by health workers.

2.4. Measurements

Participants with abnormal measurements were provided with referral forms to the staff clinics or state specialist hospital in Akure. Glycaemia was measured using ACCUTREND^{R} test strips for capillary blood glucose (fasting state). Pre-diabetes was defined as a fasting blood glucose of between 5.6 and 6.9 mmol/l. DM was defined as being pre-diagnosed with such by a clinician and/or receiving anti-diabetic medications and/or a fasting glucose level greater than or equal to 7.0mmol/l. Blood pressure (systolic and diastolic) was measured in accordance with the standard protocol [17] with a validated Microlife BP A100 Plus model which provided an average of two readings for each participant. Hypertension was defined as an average of two systolic blood pressure readings of $\geq$ 140mmHg and/or diastolic of $\geq$ 90mmHg and/or if the individual was on current treatment for hypertension [18].

Body weight was measured in light clothing to the nearest 0.5 kg in the standing position using a Soehnle Scale (Soenle-Waagen Gmbh Co., Muurhardt, Germany). Height was measured by stadiometer in a standing position with closed feet (without shoes to the nearest 0.5cm), holding the breath in full inspiration and with a Frankfurt line of vision [19]. Body mass index (BMI) was calculated as weight divided by height in square metres. BMI was categorised in accordance with WHO criteria [16] as <18.5kg/m^2, 18.5–24.9kg/m^2, 25.5–29.9kg/m^2 and >30.0kg/m^2 as underweight, normal, overweight and obese respectively.

2.5. Data Analysis

Data were analysed using the Statistical Package for Social Science (SPSS) version 21 for windows (SPSS Inc., Chicago, IL, USA). Data were expressed as mean value ± standard deviations (SD) for continuous variables. Frequencies (n) and proportions (%) were reported for categorical variables. Counts (frequency = n) and proportions (%) were reported for categorical variables. Percentages were compared using the chi-square test. Student's t-test was used to compare means between groups. We calculated the univariate odds ratios (ORs) using the Maentel-Haenszel test, and multivariate ORs and their 95% confidence intervals (95%CIs) using logistic regression to identify the predictors of DM in our sample. A logistic regression model analysis was performed, adjusted for sex, age, level of education, hours of sleep, formal exercise programme, excessive alcohol intake, cigarette smoking and red meat consumption. A p-value of < 0.05 was considered statistically significant.

3. RESULTS

A total of 4828 participants, 2299 (48%) were men and 2529 (52%) women with a male: female ratio of 1:1. The mean age of the participants was 40.4 years (SD±9.7) and the age range was 19 – 76 years. The majority of the participants had at least a secondary education (86.5%), were married (76.6%), and of middle-level category (53.2%). Men compared to women were more likely to smoke cigarettes, consume red meats daily and consume alcohol excessively. A sedentary lifestyle (spending up to 8 hours daily in a sitting position) was reported by 24.5% of study participants with no significant difference between the sexes (Table **1**).

Table 1. Baseline characteristics.

	Overall n (%)	Male n(%)	Female n(%)	*p*-value
Age groups				
≤24 years	215 (4.5)	91 (4.0)	124 (4.9)	
25 – 34	1185 (24.5)	541 (23.5)	644 (25.5)	
35 – 44	1673 (34.7)	773 (33.6)	900 (35.6)	0.000
45 – 54	1408 (29.2)	681 (29.6)	727 (28.7)	
55 – 64	333 (6.9)	200 (8.7)	133 (5.3)	
≥65	14 (0.3)	13 (0.6)	1 (0.0)	
Level of education				
No formal education	59 (1.3)	49 (2.2)	10 (0.4)	0.000
Primary education	568 (12.4)	356 (16.1)	212 (8.9)	
Secondary education	1258 (27.7)	556 (25.2)	702 (29.6)	
Tertiary education	1783 (38.9)	779 (35.3)	1004 (42.3)	
Post-graduate education	911 (19.9)	467 (21.2)	444 (18.7)	
Marital Status				
Single	934 (19.8)	442 (19.9)	492 (19.8)	
Married	3606 (76.6)	1766 (79.3)	1840 (74.1)	0.000
Widowed	131 (2.8)	10 (0.4)	121 (4.9)	
Separated	38 (0.8)	8 (0.4)	30 (1.2)	
Employment Grade Level				
Junior staff	1162 (29.1)	555 (28.8)	607 (29.5)	
Middle level	2125 (53.2)	962 (49.8)	1163 (56.4)	0.000
Senior level	704 (17.6)	413 (21.4)	291 (14.1)	
History of cigarette smoking	138 (2.9)	99 (4.3)	39 (1.5)	0.000
Consumes red meat daily	1555 (32.1)	816 (35.4)	735 (29.1)	0.000
Excessive alcohol consumption	411 (8.5)	353 (15.3)	58 (2.3)	0.000
Spend up to 8 hours daily in sitting position	1187 (24.5)	560 (24.3)	627 (24.7)	0.005

N=frequency

Prior screening for DM occurred in 67.5% of the participants, with women (69.5%) more likely to access blood glucose screening than men (65.4%) (p=0.007). Prior diagnosis of DM occurred in 198 participants (4.1%) with no sex differences between the two groups (p=0.063). The prevalence of pre-diabetes and DM was 11.7% (n=563) and 5.3% (n=254) respectively. Women had a higher prevalence of pre-diabetes than men (12.5% versus 10.8%). There was a positive linear association between age of participants and DM (Table **2**). DM was strongly associated with marital relationship, level of education, increasing body mass index and hypertension.

Table 2. Prevalence of diabetes by background characteristics.

Variable	Normal	Pre-diabetes	Diabetes	*p*-value
Age group				
≤ 24 years	185 (86)	25 (11.6)	5 (2.3)	
25-34	1031 (87.4)	126 (10.7)	22 (1.9)	
35-44	1388 (83.4)	197 (11.8)	80 (4.8)	0.000
45-54	1136 (81.3)	157 (11.2)	105 (7.5)	
55-64	235 (71.0)	58 (17.5)	38 (11.5)	
≥ 65	9 (64.3)	2 (14.3)	3 (21.4)	

(Table 2) contd.....

Variable	Normal	Pre-diabetes	Diabetes	*p*-value
Sex				
Male	1917 (83.8)	248 (10.8)	122 (5.3)	
Female	2078 (82.3)	315 (12.5)	315 (5.2)	0.213
Level of Education				
No formal education	48 (82.8)	5 (8.6)	5 (8.6)	
Primary education	442 (78.8)	71 (12.7)	48 (8.6)	
Secondary Education	1048 (83.7)	141 (11.3)	63 (5.0)	0.008
Tertiary Education	1507 (84.8)	194 (10.9)	77 (4.3)	
Post-Graduate Education	746 (82.4)	114 (12.6)	45 (5.0)	
Marital Status				
Single	820 (88.0)	89 (9.5)	23 (2.5)	
Married	2933 (81.9)	433 (12.1)	217 (6.1)	0.000
Widowed	107 (82.3)	18 (13.8)	5 (3.8)	
Separated	31 (83.8)	4 (10.8)	2 (5.4)	
Grade Level				
Junior staff	960 (83.2)	133 (11.5)	61 (5.3)	
Middle level	1767 (83.6)	237 (11.2)	109 (5.2)	0.263
Senior level	561 (80.5)	86 (12.3)	50 (7.2)	
Cigarette smoking status				
Smoked	105 (76.6)	23 (16.8)	9 (6.6)	
Never smoked	3778 (83.1)	531 (11.7)	238 (5.2)	0.237
No response	113 (86.3)	11 (8.4)	7 (5.3)	
Consume red meat daily				
Yes	1283 (83.0)	191 (12.4)	71 (4.6)	
No	2018 (82.5)	282 (11.5)	145 (5.9)	0.277
Not sure	695 (84.2)	92 (11.2)	38 (4.6)	
Excessive alcohol consumption				
Yes	353 (86.7)	41 (10.1)	13 (3.2)	
No	3363 (82.6)	486 (11.9)	222 (5.5)	0.232
Not sure	280 (83.1)	38 (11.3)	19 (5.6)	
Spend up to 8 hours daily in sitting position				
Yes	973 (82.2)	138 (11.7)	73 (6.2)	
No	2608 (83.3)	368 (11.8)	154 (4.9)	0.612
Not sure	415 (82.8)	59 (11.8)	27 (5.4)	
BMI				
Underweight	98 (91.6)	9 (8.4)	0 (0.0)	
Normal	1724 (87.5)	185(9.4)	62 (3.1)	
Overweight	1313 (80.9)	206 (12.7)	103 (6.4)	0.000
Obesity	643 (77.3)	125 (15.0)	64 (7.7)	
Hypertension				
Yes	1344 (80.0)	190 (11.3)	145 (8.6)	0.000
No	2648 (84.5)	375 (12.0)	109 (3.5)	
Not sure				

BMI=body mass index

After adjusting for a confounding factor (marital status) in the multivariate logistic regression model analysis, aging, lower level of education, overweight/obesity and hypertension remained significant and independent predictors for DM (Table **3**). A two-fold increased risk of developing DM was found among workers with ages greater than or equal to 45 years, primary or no education, those with concomitant hypertension and overweight/obesity.

Table 3. Multivariate predictors of diabetes.

Variable	Beta	Wald	OR	95% CI	*p*-value
Level of education					
Primary or no education	0.52	9.3	1.7	1.2-2.4	<0.001

(Table 3) contd.....

Variable	Beta	Wald	OR	95% CI	*p*-value
Post primary education (reference)			1		
Age					
≥45 years	0.58	15.8	1.8	1.3-2.4	<0.001
<45 years (reference)			1		
Hypertension status					
Hypertensive	0.67	21.1	2.0	1.5-2.6	<0.001
Normal (reference)			1		
BMI					
Overweight/obese	0.78	24.9	2.2	1.6-3.0	<0.001
Normal/underweight (reference)			1		

BMI=body mass index, CI=confidence interval, OR=odd ratio

4. DISCUSSION

This study estimated the prevalence and determinants of pre-diabetes and DM among public-category workers in Akure, Nigeria. This study also highlights the growing trend of pre-diabetes and DM among the workforce in this setting. The prevalence of DM was 5.3% in our study sample. We further diagnosed an additional 1.2% of workers living with DM without prior awareness of its existence. This is crucial in view of the high rate of undiagnosed DM in the country and the rest of sub-Saharan Africa.

The prevalence of pre-diabetes was 11.7% in our study sample. This cohort will benefit from lifestyle changes, linkage and retention in care. Therefore, our findings highlight the inherent benefit of conducting workplace screening for cardio-metabolic conditions in the study setting. Prior screening for cardiovascular diseases was reported more frequently by women. This is however, not surprising, given the structural (more women-friendly services) and cultural barriers (perception that men should be strong and healthy) to accessing screening services among men in African settings [20 - 24].

Our finding of 5.3% for DM is slightly higher than the prevalence of DM among ministry workers in Oyo State, Nigeria of 4.7% [25] and 4.8% reported in the predominantly rural and semi-urban communities of Ekiti State, South-west Nigeria [20]. A similar figure, 5.4% was reported from a population survey consisting of both rural and urban indigenes of Delta State by Oguoma *et al.* [26]. However, our study found a higher prevalence (11.7%) of pre-diabetes in comparison to 4.9%, 3.3% and 3.8% reported by Oguoma *et al.* [26], Ojewale *et al.* [25] and Ogunmola *et al.* [20], respectively. A similarly high prevalence of pre-diabetes and DM has been reported elsewhere within Nigeria and sub-Saharan Africa [25, 27, 28]. However, earlier studies from South-west Nigeria reported a lower pre-diabetes prevalence of 2.2% and 3.3% [25, 29]. Our results further draw attention to the influence of urbanisation, changing lifestyles and dietary changes in the African population [30, 31].

Our findings provide epidemiological data for health managers to institute periodic workplace screenings as a policy specifically to target pre-diabetes and DM among the workforce both in Ondo state and other regions in Nigeria. The broader goal of promoting lifestyles that are associated with low blood pressure and cholesterol, ideal body weight, and non-smoking is supported by our findings. Such a strategy requires tackling the roots of CVD risk factors by health promotion, healthy public policies (workplace NCD screening) and improved physical environments conducive to healthy lifestyles [32, 33].

The high prevalence of pre-diabetes in this study has clinical significance for the workforce of the state and the country, as one-third of this cohort might progress to DM within the next ten years without interventions. If this happens, a further increase in the incidence and prevalence of DM among the workforce is expected. This, by implication, could lead to poor quality of life, disability, premature mortality and lower productivity, as well as strain the already overburdened healthcare system. The strategy of linking the pre-diabetic cohort to care offers the opportunity for initiation of lifestyle interventions. This will potentially prevent or delay the onset of DM and its associated micro- and macro-vascular complications [31, 34].

Our study found a linear relationship between DM and aging. We found a lower DM prevalence of 1.9% among individuals aged 25–34 years; however, the prevalence reached 21.4% among participants 65 years and above. This further supports the extant literature on the association of aging with an increasing incidence and prevalence of DM at population level [25 - 28, 35]. Older adults (≥65 years) are at higher risk for developing DM due to the combined effects of insulin resistance and impaired islet cell function [35]. Insulin resistance is associated with increased body adiposity and physical inactivity in older individuals [36]. With aging, the pancreatic islet cell function and the proliferative capacity declines, leading to new-onset DM [37, 38]. It should be noted that the prevalence of DM among the study sample age range 55–64 years was 11.5%; however, the prevalence of pre-diabetes was 17.5% in this age group. Both pre-diabetes and DM should be aggressively managed with lifestyle interventions. Most senior staff were within the age group 55 years and above, the group most affected by pre-diabetes and DM. It is very crucial to preserve the health of this age group, for, among other reasons, institutional memory and mentoring for junior staff in the workplace.

The association of socioeconomic indicators and pre-diabetes/DM is an important finding in our study. The paradox of a high prevalence of DM among individuals with a lower educational attainment can be explained by the aging factor. Most workers with only a primary education or without formal education are older staff within our cohort. Whether the workers with higher educational levels were making lifestyle changes and experiencing a lower prevalence of DM as a result of their educational level is a plausible hypothesis. It is supported by evidence suggesting that increasing knowledge about disease conditions influences dietary decisions and lifestyle adjustments [39, 40].

We also found that being married or widowed was associated with a high prevalence of pre-diabetes and DM. Pre-diabetes was commoner among the married (12.1%) and widowed (13.8%). People in marital relationships tend to have regular feeding habits for the stable food items (pounded yam and cassava products) which are high-energy diets. It should be noted that there was a gradual increase in the prevalence of DM from 5.3% among junior staff to 7.2% among senior management staff. This supports the finding of Kuntz and Lampert [41] and Booth and Hux [42] which demonstrated a significant association between diabetes prevalence and socioeconomic status.

We found significant associations between pre-diabetes/DM and overweight/obesity, and hypertension in both univariate and multivariate analyses. This is not surprising, given the biological plausibility for clustering of cardio-metabolic conditions in certain individuals. There was a two-fold increased risk of developing DM among individuals who were hypertensive in our study sample. We also found a high DM prevalence of 7.7% and 8.6% among those who were obese and hypertensive respectively. A similar trend of increasing prevalence was observed for pre-diabetes among those who were overweight (12.7%) and obese (15%) respectively. There is a biological explanation for our findings; a strong pathophysiological link between hypertension and DM with obesity, inflammation, oxidative stress, insulin resistance and atherosclerosis being central to the development of these diseases [43 - 45].

In designing interventions towards addressing pre-diabetes and DM, an integrated strategy focussing on all the cardiometabolic conditions would yield better results. This is in keeping with the call for action against DM by the International Diabetes Federation [3]. While some of the traditional cardiovascular risk factors – cigarette smoking, excessive consumption of alcohol, daily consumption of red meat and sedentary lifestyles – were not statistically significant in our study, the evidence for their control has been documented worldwide [46, 47]

5. STRENGTHS AND LIMITATIONS

Our findings should be interpreted with caution in the light of the convenience sampling and cross-sectional design of the study which does not allow for causal associations to be drawn. Self-reporting of some of the lifestyle measures may have introduced bias. Notwithstanding the limitations of our study, the credibility of our study is supported by the large sample size, involving all MDAs and different grade levels of workers.

In addition, the study offered blood glucose screening for 1571 participants (32.5%) who had never screened for DM. Our study identified a large cohort of pre-diabetic individuals who were linked to a health facility for further evaluation and follow up. Also, this study is a pointer to a need for workplace policy screening for non-communicable diseases as a strategy to further reduce the gap of undiagnosed DM in sub-Saharan Africa. Our study provides useful baseline epidemiological data on pre-diabetes and DM screening among public category workers in Ondo state, as well as workers in the informal sector in the country.

CONCLUSION

There is a high prevalence of pre-diabetes and DM in our study population. An aging population, lower level of education and modifiable conditions such as overweight, obesity and hypertension were the most important associated factors for DM among the public service workers in the study setting. Workplace screenings for pre-diabetes and DM might provide an innovative strategy for reaching this population. Health managers should therefore consider a workplace policy on integrated screening for cardiometabolic diseases as an intervention towards addressing the sustainable development goal agenda on non-communicable diseases in Nigeria and sub-Saharan Africa.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was granted by the Ondo State Health Research Ethics Committee (SHREC – AD4693/307). Prior to each day's interviews, a public lecture was delivered to the participants describing all information regarding the study. Information sheets and consent forms were provided to the participants. All participants provided written informed consent before they were enrolled for the study. Participants were interviewed in a secured room to ensure the privacy and confidentiality of each worker.

HUMAN AND ANIMAL RIGHTS

No Animals/Humans were used for studies that are base of this research.

CONSENT FOR PUBLICATION

All authors approved the submission of this final draft towards publication in a peer reviewed journal.

AVAILABILITY OF DATA AND MATERIALS

Data from this study will be made available on request.

AUTHORS' CONTRIBUTIONS

IA[1], OF[3], MA[4]: conceptualised, designed the protocol and collected data. OVA[2], DTG[4], JI[7]: provided intellectual input to the design of the protocol and drafted the manuscript. AIA[6]: conducted the statistical analysis. All authors read the manuscript and approved the final version.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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