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10-YEAR PREDICTED CARDIOVASCULAR DISEASE RISK AMONG CLINICAL HEALTH WORKERS IN THE UNIVERSITY OF PORT HARCOURT TEACHING HOSPITAL

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Original Article

ABSTRACT

Background: Cardiovascular diseases (CVDs) are diseases that affect the heart and the vascular system. The highest rate of mortality resulting from non-communicable diseases is majorly from CVDs. 10 – year predicted risk of CVD is the chance that one can develop CVD due to poor lifestyle modifications. Clinical health workers are people employed by hospitals that take care and maintain patients' health. Finding the 10 – year predicted CVD risk of clinical staff at the University of Port Harcourt Teaching is the goal of this study.

Methods:

In data collection, a descriptive cross-sectional study, and WHO STEP instruments for NCDs were used. Current and 10 – year predicted risk of CVD among clinical health workers was determined by making use of WHO/ISH risk prediction tool and Risk Score-Category. WHO/ISH risk prediction tool was adjusted so that low risk represents below 10%, moderate risk represents 10% to less than 20% and high risk represents 20% and above. With the use of the Risk Score-Category,

a risk score of 1 was given to participants if there is any risk factor present. Those considered to be at low risk were having a score between 0 – 2, moderate risk between 3 – 5, and above 6 overall risk factors were classified as high-risk category.

For all continuous variables were presented as means while mainly categorical variables were presented as frequencies and percentages. In testing whether the identified risk factor and risk category of CVD, and professional cadre and risk category of CVD were in any way associated, Chi-square was used. To ascertain the predictors of CVD and in quantifying the identified predictors, factor analysis and multinomial logistic regression were done respectively.

Results: 334 health workers responded and 76 (22.75%) were males while 258 (77.25%) were females. 214 (60.07%) were overweight/obese, 30 (45.78 %) of male participants had waist circumference above 94 cm, and 217 (90.79%) female participants had waist circumference above 80 cm. 51 (15.32%) had systolic blood pressure above 140 mmHg, 46 (13.77%) had diastolic blood pressure above 90 mmHg, and 10 (2.99%) were diabetic. 132 (39.52%) were at low risk, 192 (57.49%) were moderate risk and, 10 (2.99%) were at the category of a high risk of developing CVD. The identified risk factors and the risk category of CVD were found to be associated with a p-value = <0.001, and professional cadre was not associated with the risk category of CVD Fisher's exact = 0.416. Hypertension, poor intake of fruits and vegetables, diabetes, and physical inactivity were the identified predictors of CVD among the respondents.

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Blood pressure represented a stronger claim while physical inactivity and poor intake of fruit and vegetable demonstrated a less strong claim. Physical inactivity and blood pressure were identified as predictors of moderate CVD risk.

Conclusion: Health education and sensitization are needed to put clinical health workers from both high and moderate risk to low CVD risk. UPTH should make available early diagnosis and a treatment for clinical health workers to easily access it.

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INTRODUCTION

Cardiovascular diseases (CVDs) are diseases that affect the heart and the vascular system. These diseases include congenital heart disease, stroke, deep vein thrombosis, coronary heart disease, pulmonary embolism, and peripheral arterial disease. Behavioral lifestyle changes that put people at risk of developing these diseases include poor intake of fruits and vegetables, raised blood pressure, diabetes, tobacco use, physical inactivity, alcohol abuse, obesity or overweight, and eating an unhealthy diet. [1,2] 10-Year predicted risk of CVD is the probability of developing the disease by exposing to the risk identified risk factors over ten years. Clinical health workers (CHWs) are staff that takes care of the sick and maintain patients' health in the hospital.[3] Certain professions place high demands on staff and required extra time and energy to complete assigned task, and this creates stress thereby putting staff at high risk of developing CVD.[4] CHWs are well informed about CVD risk factors, and it is expected that this knowledge should have an impact on their behavior. [5,6] With the availability of rich source of information at CVD, it is presumed that CHWs should be in good health compared to the general population.[6] Studies have shown that female health workers have an increased risk of developing CVD compared to male, and it is important however that gender-specific prevalent risk factors must be taken into consideration in designing intervention programs.[7] In Nigeria, health workers are looked to for advice regarding diseases and cures by family members, friends, and close associates. It has been observed that healthy lifestyle practices among healthcare workers are very poor, and the ability routinely screen for existing CVD risk factors is nonexistent. Early detection and treatment of CVD-related risk factors is one way to prevent the disease from developing, thereby preventing it from causing further damage.[8] University of Port Harcourt Teaching Hospital (UPTH) is a major referral point in the Rivers States for neighboring states and towns, and this creates stress and pressure on CHWs. This can in turn impact their behavioral lifestyle changes thereby putting them at risk for developing CVD. The specific objectives of this study are to determine the 10-Year predicted risk and associated predictors of CVD among CHWs in UPTH.

SUBJECTS AND METHODS

Research Design

This is an observational study and it is written entirely according to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement guidelines. [28]

A descriptive cross-sectional study design was used in this study. The study was conducted between March 2020 to June 2022, and data was collected for one month. The population under study includes clinical health workers in UPTH. The clinical staff that attends to patients, mainly doctors (physicians), nurses, medical scientists, pharmacists, and technicians (dietitians/nutritionists, respiratory therapists, occupational therapists, radiologic technologists, and medical technologists).

Sample size determination

To calculate the sample size, fisher's formula was used which is

$$n = \frac{z2\ p.\ q}{d^2}$$

Where z is the standard normal deviation which is usually arranged to be 1.96 and it corresponds to a 95% confidence level. p is the estimated prevalence. The current attribute present in the population was

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assumed to be 50%. [13] q is 1 – p. d = degree of accuracy usually put at 0.05.

By using the above-stated formula, the sample size calculated is 385.

Since UPTH has a finite population of 2000 health workers, a further calculation was done on the sample size with the use of a formula for the finite population. The formula used to calculate sample size for a finite population is

$$nf = \frac{no}{1+\frac{(no-1)}{N}}$$

Where nf is a finite population. *no* is calculated sample size above. N is the entire finite population which is 2000. With the above formula, my calculated sample size calculated is 321. With a 5% non-response rate, the sample size finally used is 338

Sampling technique

The inclusion criteria were to select CHWs that are employed full-time with one year and above employment history. Staff with already advanced chronic conditions of CVD and those on leave break were excluded from the study.

A simple random sampling method was used for data collection. The CHWs were stratified according to the different professional cadre mainly doctors (physicians), nurses, medical scientists, pharmacists, and technicians (dietitians/nutritionists, respiratory therapists, occupational therapists, radiologic technologists, and medical technologists). There are 36 departments in UPTH of which 33 are clinical. 20 of the 33 clinical departments were chosen by balloting without replacement. The sample size was divided equally between the day shift and the night shift during data collection. Participants were randomly selected from the different clinical departments chosen using a proportional allocation from the different professional cadres.

Data Collection

An interviewer-structured questionnaire obtained by modifying the WHO STEPS instrument for noncommunicable disease surveillance was used for data collection. The questionnaire was categorized into four sections: Demographic Information (income, education, sex, professional cadre, age, ethnic group, and marital status), Behavioral Measurements (Alcohol consumption, tobacco use, diet, physical activity, raised blood pressure history, and diabetes history), Physical Measurements (Height, waist circumference weight, and blood pressure), and Biochemical Measurements (blood glucose). The prediction tool called WHO/ISH is a chart used to find the 10-year predicted CVD risk by looking at current exposure to risk factors, mainly the presence or absence of diabetes, gender, systolic blood pressure, and age. The risks were shown by categories based on exposure in percentages. For this study, only the first three colors on the chart were considered. The green color indicates <10% which represents a low risk, the yellow color indicates 10% to <20% which is a moderate risk, and the orange color indicates 20% and above which represents a high risk of developing CVD. The information given was not shared with anyone and was only with the researcher. ID numbers were taken instead of names to assure confidentiality. Since the WHO/ISH risk prediction tool can only account for participants 40 years and above, a risk score category [12] was also applied in finding the risk category of the clinical health workers below and above 40 years.

The risk score category was used to determine the risk category aged below and above 40 years. This risk score

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category includes diabetes, physical inactivity, sex, alcohol use, age, obesity/overweight, low fruit/vegetable consumption, smoking, high salt consumption, and hypertension. The variables were explained below.

- Smoking was explained as presently using either smoke or smokeless tobacco products.[14]
- Alcohol intake was explained as whether an individual takes alcoholic beverage or not.[12]
- Low fruit/vegetable intake was defined as consuming fruits or vegetables at most once a week.[14]
- Physical inactivity was explained to be not doing any activity either moderate or vigorous intensity at work or home.[15]
- Hypertension was explained by looking at both high systolic blood pressure (≥130 mmHg) and diastolic blood pressure (≥80 mmHg). Also, if the individual is at the moment on any anti-hypertensive drug, that individual is considered to be hypertensive[1,2]
- Overweight/Obesity was defined with BMI of ≥25.0Kg/m^2 [1,2]
- Diabetes was explained as having a measurement of fasting blood glucose at ≥7.0 mmol/L. Also, diabetes was defined as taking antidiabetic drugs [16].
- For an individual to have age as a risk factor, that individual must be ≥40 years above.[12]

Participants with any risk factor of CVD were given a risk score of 1. Those with an overall risk score between 0-2 were classified as low risk, 3–5 as moderate risk, and above 6 overall risk factors were placed at high risk.

Data Analysis

A template of the modified questionnaire was prepared on Epi Info version 7.3.1 where all the data collected were entered before being exported to a Microsoft Excel spreadsheet for cleaning of the entered data. After data cleaning, the data was exported to STATA for analysis.

Means were used to present continuous variables. Categorical variables were presented as CVD frequencies and percentages.

In testing the association between the identified risk factor and the CVD risk category, and between the professional cadre and CVD risk category, chi-square was used with a level of significance of 0.05.

The chi-square test will be used to test the null hypothesis which is there is no significant difference in groups in the risk factors of participants below and above forty years of age.

To ascertain the predictors of CVD among clinical health workers, factor analysis was applied.

Ethical Considerations

Ethical clearance was obtained from the University of Port Harcourt Research Ethics Committee and the Research Committee of the University of Port Harcourt Teaching Hospital. A consent form explaining the purpose of the study, the benefits, risks, and assurance of confidentiality was attached to each questionnaire for participants to read.

RESULTS

Sociodemographic characteristic

334 health workers responded and 76 (22.75%) were males while 258 (77.25%) were females. 172 (51.50%) were between the ages range 20 - 30. A total of 190 (56.59%) were currently married. A greater proportion of the participants were nurses 117 (35.03%) followed by the medical scientist (27.84%). 172 (51.50%) of the

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respondents were found between 20 – 30 years which is the highest among the other age ranges, and this constitutes a larger population of female participants. An increase in the age range is inversely proportional to the number of participants. The lowest number of participants is found in the highest age range which is between 51 – 60 years.

Prevalence of CVD Risk Factors

The prevalent modifiable risk factors revealed by the study among the clinical health workers are overweight/obesity214 (60.07%), alcohol use 238 (71.26 %), physical inactivity 168 (50.30%), poor consumption of fruits and vegetables 143 (54.17%), reported hypertension 52 (15.17%), and diabetes 6 (1.8%) (Table 2).

120 (53.57%) of the participants were overweight (25–29.9 Kg/m2) and 94 (28.14%) were obese (≥30 Kg/m2). 38 (45.78%) of the male participants have a waist circumference >94cm while 217 (90.79%) of the female participants with waist circumference participants >80cm.

Table 2 Prevalence of CVD Risk Factors among Study Participants

Risk Factor	Count	Percent
Reported Hypertension		
Yes	52	15.6
No	282	84.4
Systolic Blood Pressure		
≥ 140 mmHg	51	15.3
< 140 mmHg	283	84.7
Diastolic Blood Pressure		
≥ 90 mmHg	46	13.8
< 90 mmHg	288	86.2
Diabetes		
≥ 7.0 mmol/l	6	1.8
< 7.0 mmol/l	328	98.2
Overweight/obesity		
Yes	214	60.1
No	120	35.9
Poor Fruits and Vegetable Consumption		
Yes	143	54.2
No	121	45.8
Physical Inactivity		
Yes	168	50.3
No	166	49.7

51 (15.32%) are participants with systolic blood pressure greater than 140 mmHg and diastolic blood pressure greater than 13.77%). (Table 3)

Table 4. Prevalence of physical and biochemical risk factors of cardiovascular disease among study participants.

Physical and biochemical risk factors	**Freq**	**Total number (%)**
BMI		
Underweight (<18.5 Kg/m2)	3	0.9
Normal (18.5–24.9 Kg/m2)	117	35
Overweight (25–29.9 Kg/m2)	120	53.6
Obese (≥30 Kg/m2)	94	28.1
Waist Circumference for male		
<94cm	45	54.2
>94cm	30	45.8
Waist Circumference for female		
<80cm	22	9.2
>80cm	217	90.8
Systolic blood pressure		
<120 mmHg	144	43.2
120 - 139 mmHg	138	41.4
>140 mmHg	51	15.3
Diastolic Blood Pressure		
<80 mmHg	159	47.6
80 - 89 mmHg	129	38.6
>90 mmHg	46	13.8
Fasting Blood Glucose		

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Normal (<5.5 mmol/l)	293	87.7
Prediabetes (5.5 - 6.9 mmol/l)	31	9.3
Diabetes (≥7.0 mmol/l)	10	3

The distribution of CVD risk factors by age shows significant differences with diabetes, fruit/vegetable consumption, obesity/overweight, and hypertension (Table 4). The sex distribution of CVD risk factors revealed significant differences in fruits/vegetable diabetes, obesity/overweight, and raised blood pressure (Table 5).

Table 5. Distribution of Modifiable risk factor by age.

Modifiable risk factor of CVD	<40 years n (%)	>40 years n (%)	χ2	p-value
Alcohol consumption				
Yes	128 (74.4)	110 (67.9)	1.73	0.19
No	44 (25.6)	52 (32.1)		
Poor fruit and vegetable consumption				
Good	80 (60.6)	63 (47.7)	4.40	0.04*
Poor	52 (39.4)	69 (52.4)		
Physical Inactivity				
Yes	87 (50.6)	81 (50.0)	0.01	0.92
No	85 (49.4)	81 (50.0)		
Diabetes				
Yes	12 (7.0)	29 (1.8)	9.23	0.002*
No	160 (93.0)	133 (82.1)		
Obesity/Overweight				
Yes	92 (53.5)	122 (75.3)	17.20	0.001*
No	80 (46.5)	40 (24.7)		
Hypertension				
Yes	15 (8.7)	37 (22.8)	12.610	0.001*
No	157(91.3)	125 (77.2)		

10-Year predicted cardiovascular disease risk.

Using the WHO/ISK Risk Prediction tool, the study revealed t 331 (99.01%) of the participants have a very low risk (<10%) of developing CVD. Only 4 (1.2%) of the female participant were found in the moderate risk (>10% to <20%) category. When the Risk Category Score was used 132 (39.52%) participants were at low risk, 192 (57.49%) were at moderate risk and 10 (2.99%) were at high risk. Participants in the high-risk category show significant differences with prevalent risk factors such as increased age, sex, alcohol consumption, diabetes, and physically inactive (Table 6).

Table 6. Distribution of Modifiable risk factors by Gender

Risk Factor	Female (%)	Male (%)	χ2	P-value
Yes	179 (69.4)	59 (77.6)	1.95	0.16
No	79 (30.6)	17 (22.4)		
Poor fruit and vegetable consumption				
Good	123 (59.4)	20 (35.1)	10.62	0.01*
Poor	84 (40.6)	37 (64.9)		
Physical Inactivity				

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Yes	129 (50.0)	39 (59.1)	0.04	0.84
No	129 (50.0)	27 (40.9)		
Diabetes				
Yes	22 (8.5)	19 (25.0)	14.75	0.001*
No	236 (91.5)	57 (75.0)		
Obesity/Overweight				
Yes	175 (67.8)	39 (51.3)	6.93	0.008*
No	83 (31.2)	37 (48.7)		
Hypertension				
Yes	27 (10.5)	25 (32.9)	22.40	0.001*
No	231 (89.5)	51 (67.1)		

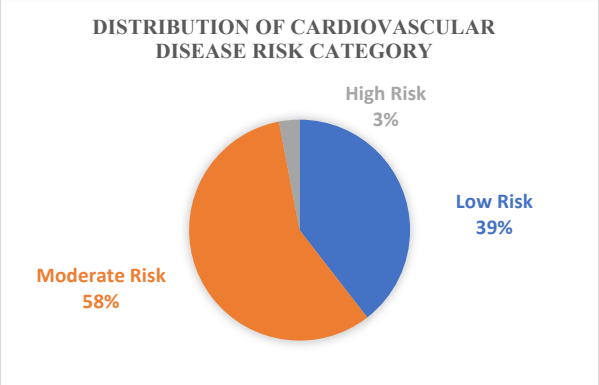

Figure 1: Distribution of Cardiovascular disease risk category

All the identified risk factors were significantly associated with the risk category of CVD of the clinical health workers (p <0.05) (Table 7).

Table 8. Distribution of cardiovascular risk category by gender of participants

Risk Category	Male n (%)	Female n (%)	χ2	p-value
Low Risk	26 (34.2)	106 (41.1)	13.42	0.0012*
Moderate Risk	43 (56.6)	149 (57.8)		
High Risk	7 (9.3)	3 (1.2)		

* P<0.05 connotes Significant association

The Factor loading in Table 8 identified 3 Factors or components that are identified by the study. To consider any variable for interpretation, they must be 0.400 and above (recommended by Steven's 2009 to retain Factor loadings to be 0.4 and above), and the loading of the individual risk variable as shone in Table 8 varied from -0.0726 to 0.8233. As revealed in the study, Factor 3 has no possession of a variable equal to or greater than 0.4000 no overlap was discovered among individual risk variables. Significant predictors at Factor 1 are fasting blood glucose and raised blood pressure and at Factor 2 is physical activity.

DISCUSSION

Prevalence of CVD risk factors among study participants.

The study revealed that prevalent risk factors for CVD among the participants are hypertension, overweight/obesity, poor fruit and vegetable intake, physical inactivity, alcohol abuse, and diabetes.[9] Smoking as a major risk factor for CVD was not found to be prevalent among participants and this may likely be attributed to their knowledge of its danger, and the regulations against smoking around the premises of the hospital.[9-11,17-19] Some of the clinical health workers were reported hypertensive and taking anti-

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hypertensive drugs, and most of these were reported to be above the age of forty years and above. [10, 11] These prevalent risk factors will put health workers in a high-risk group for developing CVDs. CHWs are presumed to have open access information available at their disposal about CVD risk exposure, but for reasons related to work shifts and pressure in the workplace most CHWs do not pay attention to these modifiable factors and thereby putting themselves at high risk of developing CVDs. Being a CHW does not exempt one from developing diseases when lifestyle does not march with behavior. Most CHWs especially physicians are high-income earners with a salary scale few above a million naira monthly, and this can provide a perfect recipe for sedentary behavioral practice leading to CVD risk. Most of the departments visited during data collection have some instruments used in measuring risk factors like blood pressure, BMI, fasting blood glucose, and so on. There should be intervention targeting specifically identified behavioral risks like raised blood pressure, alcohol abuse, poor intake of fruit and vegetable, etc. Intervention programs targeting mainly these lifestyles along with the danger they caused must be addressed.

When speaking about CVD, a greater proportion of the CHWs relate it to smoking, neglecting raised blood pressure, obesity and overweight, physical inactivity, poor fruit, and vegetable intake, and alcohol abuse. The study revealed that despite some of the identified risk factors being the major ones for cardiovascular diseases, a small proportion of the clinical health workers were actually at high risk [2-5,9]. A major proportion of the CHWs who participated after informed consent was revealed to be at moderate risk of developing the disease, and these were found between the ages of twenty to thirty. Within this age range, the probability of finding cardiovascular disease prevalent will reduce compared to participants above forty years. [1,12] Also, the hospital is a no-smoking zone and abstinence from tobacco products may likely be a major cause for a reduced risk category. Distribution of lifestyle change risk factors of the CHWs by gender, and those younger than forty years with those forty and above revealed a significant association with fruit and vegetable consumption, obesity and overweight, hypertension, and diabetes[5,9,20-27]

The majority of the CHWs are at low and moderate risk of developing CVD.[5-7] Most of the health workers were nonsmokers and the hospital environment prohibits workers, patients, and visitors from smoking around its vicinity. The nature of the job of the CHWs allows them to move freely on the stairs multiple times while at work thereby to some extent being physically active. [5,7]

It was noticed during the time of collection of data that a good proportion of the clinical departments visited have most instruments to measure the physical lifestyle risk namely a tape measure, blood pressure machine, weight, and height measuring instruments. The regular measurement of these parameters by oneself may lead to self-motivation for modifiable lifestyle changes that do not tally with the knowledge they have about non-communicable diseases in general. Also, some of the dishes prepared around the hospital environment contain some amount of vegetables and this may likely be because there was a high record of fruit and vegetable intake.

STUDY LIMITATION

The intended sampling method was stratified sampling, but simple random

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sampling was applied. The ethical approval from UPTH was granted in late April 2020 and by early May 2020. There were some concerns regarding the availability and willingness of CHWs to participate in the study due to the COVID-19 outbreak**.**

CONCLUSION

Findings from this study discovered an increase in prevalent CVD risk factors among CHWs. Risk factors including alcohol use, hypertension, overweight and obesity, diabetes, poor fruit, and vegetable intake, and physical inactivity were found prevalent among the clinical health workers. Smoking, a major risk factor for CVD development, was not recorded as prevalent among CHWs. The proportion of clinical health workers that are in the moderate risk category of developing CVD was strikingly more than low-risk category clinical health workers despite the age of the CHWs being skewed toward twenty to thirty years.

Any intervention with emphasis to reduce these prevalent modifiable lifestyle factors will put clinical health workers at low risk and enhance the protection against other NCDs. Health education programs along with screening for prevalent cardiovascular disease risk factors are needed to help behavioral lifestyle change.

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