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DETERMINANTS OF PREVENTIVE PRACTICES FOR NON-COMMUNICABLE DISEASES AMONG PRIMARY HEALTH CARE WORKERS IN BENUE STATE

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Abstract

This study aimed to identify factors that influence how primary healthcare workers adopt and implement preventive measures for non-communicable diseases (NCDs) in Benue State. A quasi-experimental design involving 400 PHCWs was adopted, with the experimental group receiving WHO PEN training and the control group without training. Data were collected via structured questionnaires focusing on NCD-related and clinical practices. Statistical analyses included chi-square and multiple regression to explore sociodemographic influences. PHCWs demonstrated high baseline knowledge of NCD preventive practices related to lifestyle modifications, screening, pharmacological management, and patient self-care, consistent with national guidelines and prior sensitization efforts. Clinical practices showed mixed patterns: although routine blood pressure screening remained suboptimal, patient education and counseling activities improved markedly, with all trained PHCWs consistently integrating key preventive measures into care. Sociodemographic factors influenced outcomes; age and professional cadre were significantly associated with preventive practices, with older and higher-cadre workers demonstrating better implementation, whereas no significant effect was observed for sex and years of experience. This study concluded that age and professional cadre played a notable role while sex and years of experience were not significantly associated with

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NCD preventive practices. Specifically, older health care workers and those in clinical or public health-focused roles demonstrated stronger engagement in the prevention of NCD. Overall, the findings affirm that targeted interventions can significantly enhance the capacity of healthcare workers to prevent and manage NCDs at the primary health care level. This underscores the importance of continuous professional development and the integration of structured NCD prevention strategies into routine clinical practice to mitigate the growing burden of chronic diseases in the population. It was recommended amongst others that health centers should be adequately equipped with standardized, evidence-based tools for non-communicable disease (NCD) education and counseling, ensuring that healthcare workers have access to reliable resources for effective patient engagement.

Introduction

Non-communicable diseases (NCDs) are chronic conditions that are not transmitted from person to person and tend to progress slowly. According to the WHO (2024), NCDs are diseases of long duration and generally slow progression, primarily including cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes. According to Budreviciute et al. (2020), NCDs are chronic illnesses that result from a combination of genetic, physiological, environmental, and behavioral factors, often requiring long-term medical attention and management. Similarly, Calcaterra and Zuccotti (2022) described NCDs as a group of diseases that are not infectious but are responsible for significant morbidity and mortality worldwide, particularly in low- and middle-income countries. In this study, NCDs refer to diseases that are not directly transmissible from one person to another. According to the WHO (2024), the main types of NCDs are cardiovascular diseases (such as heart attacks and stroke), diabetes, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and cancers.

Cardiovascular diseases (CVDs) are a group of disorders affecting the heart and blood vessels (WHO, 2021). These conditions represent the leading cause of death globally, accounting for approximately 17.9 million deaths annually (WHO, 2021). Lopez et al. (2024) stated that the types of CVDs include coronary heart disease, which is a disease of the blood vessels supplying the heart muscle; cerebrovascular disease, which is a disease of the blood vessels supplying the brain; peripheral arterial disease, which is a disease of the blood vessels supplying the arms and legs; rheumatic heart disease, which is caused by streptococcal bacteria and causes damage to the heart muscle and heart valves from rheumatic fever; congenital heart disease, which is caused by birth defects that affect the normal development and functioning of the heart caused by malformations of the heart structure; and deep vein thrombosis and pulmonary embolism, which are caused by blood clots in the leg veins, which can dislodge and move to the heart and lungs. The World Health Organization (2024) asserted that heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. The most common reason for this is a build-up of fatty deposits on the inner walls of the blood vessels that supply the heart or brain. When a blood vessel in the brain rupture or leaks, hemorrhagic stroke happens (WHO, 2024).

Olié et al. (2024) attributed the high prevalence of CVDs to a combination of modifiable risk factors, such as unhealthy diet, physical inactivity, tobacco use, and harmful alcohol consumption, and non-modifiable factors

like genetics and age. This complex interplay of risk factors has made cardiovascular disease a significant public health concern, especially in low- and middle-income countries where health care resources may be limited (Olié et al., 2024). In addition to their high mortality rate, cardiovascular diseases contribute substantially to long-term morbidity and disability, affecting the quality of life and imposing economic burdens on societies. Cardiovascular diseases (CVDs) are closely linked with diabetes because both conditions share common risk factors.

Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels due to either insufficient insulin production by the pancreas or the body's inability to use insulin effectively (Sapra & Bhandari, 2024). Insulin is a hormone that regulates blood sugar levels, and its dysfunction leads to prolonged hyperglycemia, which can cause serious complications affecting the heart, kidneys, nerves, and eyes (Rahman et al., 2021; WHO, 2024). According to the WHO (2024), diabetes is a growing public health concern, with millions of people worldwide affected by the disease. It is a leading cause of cardiovascular diseases (CVDs), kidney failure, blindness, and lower-limb amputations.

There are various types of diabetes mellitus. According to Lee and Huda (2021), Type 1 diabetes is an autoimmune condition in which the immune system attacks insulin-producing beta cells in the pancreas, leading to little or no insulin production. It is commonly diagnosed in children and young adults and requires lifelong insulin therapy. Type 2 diabetes is the most common form of diabetes, occurring when the body becomes resistant to insulin or does not produce enough of it (Lee & Huda, 2021). This type is often associated with obesity, physical inactivity, and genetic predisposition. Lifestyle modifications and medications are key in managing this condition. Nugroho (2025) defined gestational diabetes as a temporary form of diabetes that develops during pregnancy, leading to high blood sugar levels that can affect both the mother and the baby. Women with gestational diabetes are at increased risk of developing type 2 diabetes later in life (Nugroho, 2025). Other specific types include rare forms of diabetes caused by genetic mutations, pancreatic diseases, hormonal disorders, or the use of certain medications. Examples include Maturity-Onset Diabetes of the Young (MODY) and Latent Autoimmune Diabetes in Adults (LADA) (Lee & Huda, 2021).

The management of diabetes mellitus includes lifestyle modifications such as a balanced diet, regular physical activity, blood sugar monitoring, and medication adherence (Garedow et al., 2023). Insulin therapy is essential for type 1 diabetes, whereas type 2 diabetes can often be controlled with oral medications, lifestyle changes, or insulin if necessary (Roglic & Norris, 2018). Prevention strategies include maintaining a healthy weight, engaging in regular exercise, and avoiding excessive sugar intake. Early diagnosis and proper management can significantly reduce diabetes-related complications and improve quality of life (Garedow et al., 2023). Diabetes and chronic respiratory diseases are interconnected because diabetes increases the risk of respiratory infections.

Chronic respiratory diseases (CRDs) are long-term conditions that affect the airways and other structures of the lungs, leading to breathing difficulty and reduced lung function (WHO, 2024). Although these diseases are not fully curable, they can be managed to improve the quality of life. According to Bagheri-Hosseinabadi et al. (2024), the risk of CRDs were attributed to tobacco smoke, air pollution, occupational hazards, allergens, and genetic predisposition. According to the WHO (2024), millions of people suffer from CRDs globally, with the burden increasing due to environmental and lifestyle factors. Individuals with CRDs are also at higher risk of complications from other chronic diseases, including diabetes and cardiovascular diseases (WHO, 2024).

Different types of chronic respiratory diseases exist. According to Agarwal et al. (2021), chronic obstructive pulmonary disease (COPD) is a progressive lung disease that includes emphysema and chronic bronchitis, causing airway obstruction and breathing difficulties. It is primarily associated with long-term smoking and exposure to harmful pollutants. Asthma is a condition marked by airway inflammation and narrowing, leading to wheezing,

breathlessness, and coughing (Swed et al., 2024). The triggers include allergens, cold air, and physical activity. Asthma can be controlled using medications such as inhalers. Pulmonary fibrosis is a disease characterized by scarring (fibrosis) of lung tissue, leading to stiff lungs and breathing difficulties. The cause may be unknown (idiopathic) or linked to environmental exposures and autoimmune diseases (Swed et al., 2024). Lung cancer is a severe chronic respiratory condition often associated with smoking, air pollution, and occupational hazards. Early detection and treatment significantly improve survival rates (Bade and Dela Cruz, 2020). Occupational lung diseases are conditions like pneumoconiosis, asbestosis, and silicosis, result from long-term exposure to harmful workplace substances, such as dust, chemicals, and fumes (Jumat et al., 2021).

Abdool-Gaffar et al. (2019) emphasized that the prevention of CRDs involves avoiding tobacco smoke, reducing exposure to air pollution, maintaining good indoor air quality, and receiving vaccinations for respiratory infections. Management includes bronchodilators, corticosteroids, oxygen therapy, and pulmonary rehabilitation to improve lung function and symptom control (Abdool-Gaffar et al., 2019). For patients with coexisting conditions such as diabetes and cardiovascular diseases, integrated health care strategies are crucial in preventing severe complications. CRDs could increase the risk of cancer.

Cancer is a group of diseases characterized by uncontrolled cell growth that spreads to other parts of the body (Hausman, 2019). According to Brown et al. (2023), cancer occurs when normal regulatory mechanisms fail, leading to the formation of tumors, which can be benign (non-cancerous) or malignant (cancerous). Malignant tumors invade nearby tissues and can metastasize (spread) through the blood or lymphatic system (Fares et al., 2020). According to the WHO (2025), cancer is one of the leading causes of death worldwide, with millions of new cases diagnosed annually. Various factors contribute to the development of cancer, including genetic mutations, lifestyle choices (such as smoking, poor diet, and physical inactivity), environmental exposures, and infections (such as human papillomavirus for cervical cancer and hepatitis B for liver cancer) (WHO, 2025).

Cancer can develop in virtually any part of the body. According to De Silva and Alcorn (2022), carcinomas are the most prevalent type of cancer, originating in the epithelial cells that line organs and tissues. Breast, lung, prostate, and colorectal cancers are examples (De Silva & Alcorn, 2022). Sarcomas are cancers that arise from connective tissues such as bones, muscles, fat, and cartilage (Popovich et al., 2023). Examples include osteosarcoma (bone cancer) and liposarcoma (fat tissue cancer). Chennamadhavuni et al. (2023) described leukaemia as cancers of blood-forming tissues, such as the bone marrow, leading to abnormal white blood cell production. Examples include acute lymphoblastic leukemia (ALL) and chronic myeloid leukemia (CML). Lymphomas are cancers that originate in the lymphatic system and affect immune cells known as lymphocytes. Common types include Hodgkin lymphoma and non-Hodgkin lymphoma (Jamil & Mukkamalla, 2023). Central nervous system (CNS) cancers are cancers that develop in the brain and spinal cord, such as glioblastoma and astrocytoma (Dorsey et al., 2019).

Sarfati and Gurney (2022) opined that cancer prevention focuses on reducing risk factors, such as quitting smoking, maintaining a healthy diet, engaging in regular physical activity, avoiding excessive alcohol consumption, and protecting against infections that can lead to cancer (such as HPV and hepatitis B vaccination). Early detection through screening programs, such as mammography for breast cancer and Pap smears for cervical cancer, significantly improves treatment outcomes (Anand et al., 2022). According to Debela et al. (2021), treatment options vary based on cancer type and stage and may include surgery, chemotherapy, radiation therapy, targeted therapy, and immunotherapy. Advances in cancer research continue to improve survival rates and treatment effectiveness, making early detection and lifestyle modifications key strategies in reducing cancer-related deaths (Debela et al., 2021). Effective knowledge of non-communicable diseases (NCDs), including their risk factors, prevention, and management, is essential for individuals and healthcare workers to adopt healthier lifestyles, improve early detection, and reduce the global burden of these chronic conditions.

According to the projection of the WHO, by 2025, NCDs will account for over 70% of deaths globally, with 85% of these occurring in developing countries (WHO, 2015). Evidence shows that if proper preventive approaches are not designed and applied, an estimated 40 million people in low-resource countries will die of non-communicable diseases (NCDs) by 2025, mainly due to cardiovascular disease (CVDs) (48%), Cancer (21%), chronic respiratory disease (CRD) (21%), and diabetes (3%) (WHO, 2014). This is a clear indication that cardiovascular disease, cancer, chronic respiratory disease, and diabetes are the leading NCDs around the globe. Khorrami et al. (2011) posited that most deaths from NCDs are caused by cardiovascular diseases, followed by cancer and respiratory diseases. NCDs affect people of all age groups, countries, and geographical regions. The leading causes of these diseases include increased unhealthy food consumption, increased physical inactivity and population aging. These factors are mediated through metabolic risk factors for NCDs, the most common of which include hypertension and type 2 diabetes. Cancer is another common non-communicable disease (NCD) identified by the World Health Organization (WHO) (Tekalign &Teshome, 2022).

The overall estimated global pooled prevalence of late-stage presentation among patients with cervical cancer with a random-effects model was 60.66% (95%CI: 56.27, 65.06). The subgroup analysis revealed that the prevalence of late-stage presentation was 62.60% in Africa, 69.30% in Asia, 46.51% in Europe, and 50.16% in North America. According to the 2015 Global Burden of Disease report, asthma was the most common chronic respiratory disorder, with an estimated prevalence of 358 million cases (GBD 2015 Chronic Respiratory Disease Collaborators, 2017). It is prevalent and can affect people at all stages of life, from infancy through childhood and adulthood, and into older ages (>66 years old) Asthma prevalence is highest in those aged 45 to 64 years. Significant differences in asthma prevalence by sex across ages were also observed. In Australia, among children (aged 0-14 years), the prevalence was higher for males than for females, but among those older than 15 years, current asthma was more prevalent in females (10.9%) than in males (8.9%). Among males, the highest prevalence was in those aged 5–9 years (15.1%; CI, 11.0%-19.3%), whereas among females, it was highest in those older than 75 years (13.4%; CI, 10.3%-16.5%). These trends are similar across nations. (Busse et al., 2020).

Sub-Saharan African research indicates a rise in the occurrences of NCDs, especially in cardiovascular disease, cancer, respiratory disease, and diabetes. According to the WHO (2014), NCDs are set to overtake Communicable, Maternal, Neonatal, and Nutritional (CMNN) diseases combined as the leading causes of mortality in sub-Saharan Africa by 2023. In the Lancet Global Health, Gouda et al (2017) presented an in-depth analysis of the disability burden of NCDs in sub-Saharan Africa from 1990-2017. Their studies revealed a substantial cause of the large and growing burden of death and disability in SSA, with regional hypertension prevalence of 48%, diabetes of 5.1% and obesity of 20% (Lelijveld et al 2016). Report from Guinea–Bissau on cardiovascular diseases is estimated to be the second most frequent cause of death, with arterial hypertension and dietary factors having an important contribution to the overall number of disability-adjusted life years (DALY). Turé et al. (2022) further stated that the overall prevalence of hypertension was 26.9% and was higher among men than women, with 29.6% and 24.2%, respectively.

According to the WHO (2014), NCDs are becoming a significant burden in Sub-Saharan Africa as they occur at younger ages than elsewhere; for example, the average age of death from NCD is at least 10 years younger than in developed countries. Half of the deaths caused by NCDs in Africa occur in people aged. The death rate is even higher in women, especially in developing nations (World Bank 2007). Dalal et al (2011) identified that the prevalence of NCDs and risk factors varied considerably between countries, urban and rural areas, and subpopulations. The prevalence of stroke ranges from 0.07 to 0.03%, diabetes mellitus from 0 to 16%, hypertension from 6 to 48%, obesity from 0.4 to 43% and current smoking from 0.4 to 71%, respectively. Considering that Nigeria is the Giant of Africa owing to its large population and Economy (The Round Table 1959), the NCDs burden may be at its high prevalence. Hypertension and diabetes are the leading NCDs in Sub-Saharan Africa.

The burden of NCDs in Nigeria can never be overemphasized, according to the WHO (2018) country profile, NCDs accounted for an estimated 29% of deaths in Nigeria, with cardiovascular disease as the primary cause of NCDs. Related death (11%), followed by cancer (4%), chronic respiratory disease (2%), and diabetes (2%). According to the current report, more than 80% of cardiovascular diseases, stroke, hypertension, type 2 diabetes,

and cancers can be prevented and controlled by eradicating the common risk factors, mainly tobacco use, unhealthy diets, physical inactivity, and harmful alcohol use (WHO, 2018). Hence, there is a need to control and prevention of NCDs.

The 2013–2020 global action plan for prevention and control of NCDs 2013-2020 identified a main focus of the action plan on four types of non-communicable disease—cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes that make the largest contribution to morbidity and mortality due to non-communicable diseases, and on four shared behavioral risk factors—tobacco use, unhealthy diet, physical inactivity, and harmful use of alcohol. It recognizes that the conditions in which people live and work and their lifestyles influence their health and quality of life. The risk of NCDs can be achieved by reducing risk factors such as smoking, drinking harmful alcohol, being physically inactive, and eating unhealthy diets. Amini et al. (2022) asserted that, in alignment with the Sustainable Development Goals, a global reduction of one-third in fatalities caused by non-communicable diseases (NCDs) by 2030 through prevention, treatment, and improvements in mental health and well-being. A crucial strategy for mitigating the burden of NCDs is the adoption and implementation of the World Health Organization (WHO) Package of Essential Interventions for NCDs, particularly in low-resource settings.

Accordingly, this study aimed to identify the factors influencing the adoption and implementation of preventive measures for NCDs by primary health care workers (PHCWs) in Nigeria, with a specific focus on Benue State. However, the situation in Benue State presents a stark contrast to these objectives. NCDs, such as cardiovascular diseases, diabetes, chronic respiratory diseases, and cancer, are becoming increasingly prevalent, yet many PHCWs lack the requisite training, knowledge, and resources to implement effective prevention and control measures. The limited awareness of an inadequate integration of WHO PEN interventions among PHCWs contribute to poor diagnosis, delayed treatment, and ineffective management of NCDs. Additionally, systemic challenges—including inadequate health care infrastructure, a lack of professional development opportunities, and insufficient policy implementation—further impede PHCWs' ability to effectively address the growing burden of NCDs.

Aim and Objectives of the Study

This study aimed to identify the factors that influence how primary healthcare workers adopt and implement preventive measures for non-communicable diseases (NCDs) in Benue State. This study aimed to determine factors associated with preventive practices among primary healthcare workers in Benue State.

Research Questions

1. What are the factors associated with preventive practices among primary healthcare workers in Benue State?

Significance of the Study

The findings of this study will benefit health care policymakers, public health authorities, and institutions. Policymakers can leverage the evidence to advocate for the broader integration of WHO PEN interventions into Nigeria's primary health care system. Public health organizations and government agencies can tailor capacity-building programs based on the study's insights, ensuring PHCWs are well-equipped to manage NCDs effectively. Additionally, the study will provide valuable feedback to the World Health Organization (WHO) and other international health organizations on the practical implementation of WHO PEN in resource-limited settings. Ultimately, the study aims to reduce the burden of NCDs in Benue State, decrease complications, and promote proactive disease prevention and management, with potential applicability across Nigeria and sub-Saharan Africa.

Methods and Materials used

This study employed a quasi-experimental pre-test-post-test non-randomized control group design and was conducted in Benue State, north-central Nigeria. The study population comprised primary healthcare workers (PHCWs), including 8 doctors and 1,561 community health workers (CHWs), specifically 50 community health officers (CHOs), 1,138 community health extension workers (CHEWs), and 373 junior community health extension workers (JCHEWs). Eligible participants were health care professionals with at least six months of experience who were actively working in primary healthcare facilities in Benue State, including doctors, nurses, and public health scientists, CHOs, CHEWs, and JCHEWs. Excluded were non-practicing health care workers, those who declined informed consent, and those who withdrew participation at any stage were excluded. A sample size of 400 PHCWs was selected for the study. This study employed a two-stage sampling procedure. First, four

local government areas (LGAs) in Benue State were randomly selected from 23 LGAs. Then, 100 primary health care workers (PHCWs) were randomly chosen from each LGA, resulting in a total sample of 400 PHCWs for both the control and intervention groups.

Data collection was performed using a researcher-developed instrument based on the WHO PEN guidelines for NCD prevention and control. The instrument was divided into sections, with face validity established by three public health experts and construct validity confirmed through principal component analysis (PCA), retaining items with loadings of 0.40 and above. Reliability was assessed using Kuder-Richardson-20 (KR-20) and Cronbach's Alpha, with an acceptable reliability benchmark of 0.70. Data analysis was performed using SPSS version 25, including descriptive statistics (frequency distributions, percentages, means, and standard deviations) and inferential analyses (chi-square and logistic regression) to identify factors influencing NCD prevention practices. All analyses were conducted at a 95% confidence interval, with a significance threshold of $p \leq 0.05$. Ethical approval was obtained from the University of Port Harcourt Ethics Committee, the Benue State Primary Health care Management Board, and facility heads, and written informed consent was obtained from all participants.

Results

Table 1: Respondents' sociodemographic characteristics

Variable	Intervention				
	Pre	Post	Total	X^2	p-value
Age (years)					
20-29	187(46.8)	194(48.5)	381(47.6)		
30-39	139(34.8)	164(41.0)	303(37.9)		
40-49	57(14.2)	36(9.0)	93(11.6)	12.194	0.007*
50 and above	17(4.3)	1(0.5)	23(2.9)		
Total	400(100.0)	400(100.0)	800(100.0)		
Sex					
Male	126(31.5)	126(31.5)	252(31.5)	0.000	1.000
Female	274(68.5)	274(68.5)	548(68.5)		
Cadre of health workers					
CHEW	253(63.2)	274(68.5)	527(65.9)		
CHO	77(19.3)	60(15.0)	137(17.1)		
Dental Therapist	2(0.5)	4(1.0)	6(0.8)		
Doctors	6(1.5)	8(2.0)	14(1.8)		
Health Records	4(1.0)	2(0.5)	6(0.8)		
JCHEW	15(3.8)	14(3.5)	29(3.6)	10.081	0.344
Medical Lab	7(1.8)	12(3.0)	19(2.4)		
Nurses	28(7.0)	16(4.0)	44(5.5)		
Pharmacy technician	3(0.8)	2(0.5)	5(0.6)		
Public Health Scientist	5(1.3)	8(2.0)	13(1.6)		
Professional training with a certificate					
No	6(1.5)	10(2.5)	16(2.0)	1.020	0.312
Yes	394(98.5)	390(97.5)	784(98.0)		
Years of working experience					
0-4 years	226(56.5)	260(65.0)	486(60.8)		
5-9 years	88(22.0)	88(22.0)	176(22.0)		
10-14 years	31(7.8)	18(4.5)	49(6.1)	10.786	0.029*
15-19 years	32(8.0)	20(5.0)	52(6.5)		
20years and above	23(5.8)	14(3.5)	37(4.6)		

Location of Primary Health Center					
Rural	285(71.3)	306(76.5)	591(73.9)	2.856	0.091
Urban	115(28.7)	94(23.5)	209(26.1)		

Table 1 indicates that several 187(46.8%) respondents in the pre-phase compared to majority 194(48.5%) of the respondents in the post-phase are of ages 20-29 years with a statistically significant difference at *p*=(0.007). There was found an equal proportion 274(68.5%) female participants were found in the pre- and post-phases with no statistically significant difference at *p*=(1.000). Majority 253(63.2%) of the respondents in the pre-phase are CHEW compared to a larger number 274(68.5%) of the respondents in the post-phase with no statistically significant difference at *p*=(0.344). Most 394(98.5%) of the respondents in the pre-phase have gone through professional training with a certificate, compared with a lesser proportion 390(97.5%) of the respondents in the post-phase, with a statistically significant difference at *p*=(0.312). A lesser number 226(56.5%) of the respondents in the pre-phase compared with a larger number 260(65.0%) of the participants in the post-phase have 0-4years working experience, with a statistically significant difference at *p*=(0.029). Majority 285(71.3%) of participants in the pre-phase compared to more 306(76.5%) in the post-phase, Primary Healthcare Centers are located in rural areas with no statistical significance *p*=(0.091).

Table 2: Logistics regression of factors associated with preventive practices for NCDs among healthcare workers

Parameter	Response Category	Odds Ratio	p-value	95% C.I. of Odds Ratios Lower	Upper
Sex	Male	Ref	0.778		
	Female	1.064		0.693	1.634
Age (Years)	20-29	Ref			
	30-39	0.426	0.106	0.151	1.200
	40-49	0.347	0.048	0.121	0.992
	50 and above	0.273	0.025	0.087	0.850
Cadre of health workers	CHEW	Ref			
	CHO	0.314	0.209	0.051	1.916
	Dental Therapist	0.721	0.728	0.114	4.557
	Doctors	1076983228.567	0.999	0.0001	.
	Health Records	0.667	0.741	0.060	7.352
	JCHEW	0.667	0.765	0.047	9.472
	Medical Lab	1.833	0.576	0.219	15.333
	Nurses	1.667	0.680	0.147	18.874
	Pharmacy technician	1.200	0.855	0.171	8.426
	Public Health Scientist	0.333	0.472	0.017	6.654
Professional training with a certificate	No	Ref			
	Yes	0.278	0.244	0.032	2.398
Years of working experience	0-4 years	Ref			
	5-9 years	0.847	0.513	0.515	1.393

	10-14 years	0.794	0.588	0.344	1.831
	15-19 years	1.256	0.581	0.559	2.826
	20years and above	0.670	0.412	0.258	1.742
Location of Primary Health Center	Rural	Ref			
	Urban	0.986	0.951	0.636	1.530

Table 2 shows that the covariate sex was not statistically significantly associated with preventive practices of NCDs among health care workers in the bivariate model. However, age was statistically significantly associated with preventive practices of NCDs among health care workers in the bivariate model at (p=0.048 and p=0.025). The age range of (40-49 and 50 years and above were more predicted). Cadre of the participants was statistically significantly associated with preventive practices of NCDs among health care workers in the bivariate model at (p = 0.051, p= 0.0001, p= 0.047). Also, being CHO, Doctors, JCHEW, Public Health Scientist had a great influence on preventive practices of NCDs among healthcare workers. The years of working experience of the participants was not significantly associated with preventive practices of NCDs among health care workers in the bivariate model at (p>0.05). Lastly, location of primary health center was not significantly associated with preventive practices of NCDs among health care workers in the bivariate model (p>0.05).

Discussion of the Findings

The findings indicate that sex was not significantly associated with the preventive practices of non-communicable diseases (NCDs) among primary healthcare workers (PHCWs), suggesting that both male and female workers demonstrated comparable levels of practice. This result is largely expected, as professional training, institutional support, and individual motivation influence preventive practices in clinical settings more than by gender. The finding aligns with the study by Aribike et al. (2019), which found no significant gender-based differences in adherence to NCD guidelines among PHC providers in southern Nigeria. However, it contrasts with the findings of Onyenwenyi and Mchunu (2019), who reported that female health workers tended to show slightly higher compliance with preventive care protocols, possibly due to stronger patient-centered communication styles. The discrepancy may stem from differences in the study context, population, or cultural norms influencing professional behavior. In this study, uniform training through the WHO PEN intervention likely neutralized gender-related variations, reinforcing the importance of standardized continuing education. This finding implies that policy efforts to improve NCD preventive practices should focus more on training, resources, and systemic enablers than on demographic attributes like sex.

The findings also reveal that age was statistically significantly associated with preventive practices of non-communicable diseases (NCDs) among primary healthcare workers (PHCWs), with those aged 40–49 years and 50 years and above demonstrating higher levels of preventive practices. This outcome is not entirely surprising, as older health care workers may possess more clinical experience, maturity, and exposure to training opportunities, which can positively influence their application of NCD preventive measures. This finding aligns with previous studies by Ding et al. (2021) and Ochie et al. (2022), who found that older PHCWs were more likely to adhere to evidence-based guidelines due to their professional experience and accumulated knowledge. In contrast, Tajudeen et al. (2023) reported no significant age-related differences in NCD practices, attributed to equal training exposure and workload distribution across age groups in their study setting. The variation may be due to differences in the frequency of institutional training or workforce structure. The implication of the current finding is important for workforce planning: tailored interventions may be necessary to enhance preventive

practices among younger PHCWs through mentorship, targeted training, and practice-based support to ensure uniform competence in NCD care delivery across all age groups.

The findings from the study further indicate that the cadre of primary healthcare workers (PHCWs) was statistically significantly associated with their preventive practices of non-communicable diseases (NCDs), with Community Health Officers (CHOs), doctors, Junior Community Health Extension Workers (JCHEWs), and Public Health Scientists demonstrating greater influence on these practices. This result is expected because the professional cadre often determines the scope of training, depth of knowledge, and responsibility in clinical settings. Higher-cadre professionals, such as doctors and CHOs, typically receive more advanced and targeted training on NCDs, while even among lower cadres like JCHEWs, exposure to structured interventions (e.g., WHO PEN training) can still significantly improve practice. This aligns with the findings of Tesema et al. (2020) and Onagbiye et al. (2020), who reported that healthcare worker cadre strongly influences adherence to NCD preventive guidelines due to variations in training intensity and clinical experience. However, the findings contrast with those of Musoke et al. (2021), who found no significant difference across cadres, possibly due to a uniform training approach and shared workload structure in that study setting. The implication of the current finding underscores the need to tailor continuing professional development programs based on cadre-specific knowledge gaps and roles, ensuring that all cadres, especially those with limited formal training, are adequately supported to improve preventive practices.

The study also found that years of working experience were not statistically significantly associated with preventive practices of non-communicable diseases (NCDs) among primary health care workers (PHCWs), which is somewhat surprising. One might expect that increased years of experience would naturally translate into better practice due to accumulated knowledge and clinical exposure. Findings from this study, reveals that service duration does not always translate into following the most recent best practices, especially when it comes to NCD prevention, which frequently calls for continual training and revised protocols. This finding aligns with the study by Ajisegiri et al. (2023), which also found no significant relationship between years of service and preventive practices for NCD, highlighting that experience alone may not improve outcomes without targeted capacity-building programs. Conversely, Oliveira et al. (2022) reported that more experienced PHCWs had better NCD-related practices, possibly due to informal learning and greater clinical confidence. The inconsistency is described by linking the institutional practices and the availability of professional development. The likely reason for the non-significant association in this study could be the uniform effect of the WHO PEN training across participants, regardless of their years of experience. The implication is that consistent, structured training is more critical than mere tenure in improving preventive practices, and workforce development policies should prioritize regular capacity-building over assumptions based on experience alone.

Finally, the findings of the study indicate that the location of the primary health center was not statistically significantly associated with preventive practices of non-communicable diseases (NCDs) among healthcare workers, which is somewhat surprising, as one might anticipate disparities in service delivery and resource availability between urban and rural settings. Result of the current study implies that policy and training may have a more consistent impact on the adoption of preventative measures than regional variations. This result aligns with the findings of Oyebode et al. (2015), who reported that standardized training programs, such as the WHO PEN interventions, tend to equalize practice outcomes across different facility locations. In contrast, findings by Akinwumi et al. (2021) showed that urban PHC workers were more likely to engage in evidence-based NCD prevention due to better infrastructure and access to updated guidelines. The lack of significant difference in this study may be due to the training intervention received by all participants, which likely mitigated the influence of

geographic disparities. This finding implies that structured and inclusive training programs can help bridge urban-rural gaps in preventive practices, ensuring equitable health care service delivery regardless of facility location.

Conclusion

This study concluded that age and professional cadre played a notable role while sex and years of experience were not significantly associated with NCD preventive practices. Specifically, older health care workers and those in clinical or public health-focused roles demonstrated stronger engagement in the prevention of NCD. Overall, the findings affirm that targeted interventions can significantly enhance the capacity of healthcare workers to prevent and manage NCDs at the primary health care level. This underscores the importance of continuous professional development and the integration of structured NCD prevention strategies into routine clinical practice to mitigate the growing burden of chronic diseases in the population.

Recommendations

Based on the findings and conclusions reached in this study, the following recommendations were made;

1. Health centers should be adequately equipped with standardized, evidence-based tools for non-communicable disease (NCD) education and counseling, ensuring that health care workers have access to reliable resources for effective patient engagement.
2. Policymakers should integrate NCD prevention, early detection, and health education strategies into national and local health care policies to enhance comprehensive disease management and ensure their inclusion in the basic primary healthcare package.
3. Longitudinal studies and structured monitoring frameworks should be established to evaluate the sustained impact of training and preventive interventions among health care workers, with a particular focus on translating acquired knowledge into consistent clinical practice.

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