

RESEARCH ARTICLE

Assessment of Non- Communicable Disease Risk Factors in Jigawa State, Nigeria: A Cross-Sectional Study

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Abstract

Background: Non-communicable diseases (NCDs) represent a predominant cause of adult mortality worldwide, with a rise in these deaths in developing countries. In Nigeria, the prevalent NCD risk factors include high blood pressure (BP) and blood sugar levels. Assessing NCD risk factors is essential for early detection, preventing the risk of developing chronic diseases, and leading healthier lives. **Methods:** A cross-sectional community-based study with a two-stage cluster sampling method is conducted. The study examines demographic factors including age, gender, and marital status, alongside established NCD risk factors including systolic blood pressure, diastolic blood pressure, random blood sugar (RBS) levels, and pulse rate. The Chi-square test was performed to determine the association between the participants' demographics and NCD risk factors. **Results:** A total of 125 respondents took part in the study, comprising 76.0% females and 24.0% males, aged between 15 and 64. The prevalence rates of hypertension, high pulse rate, and high RBS were 31.2%, 7.2%, and 5.6%, respectively. Furthermore, the results indicate a significant association between age and raised BP ($P < 0.001$), age and raised RBS ($P = 0.006$), gender and raised BP ($P = 0.036$), and gender and raised RBS ($P = 0.035$). **Conclusion:** The findings of the study demonstrate a high prevalence of NCD risk factors among older males, emphasizing the need for tailored preventive and therapeutic measures within this demographic group.

Keywords: Diabetes, disease, heart, hypertension.

Introduction

Non-communicable diseases (NCDs), also referred to as chronic diseases, are medical conditions characterized by prolonged duration and gradual progression (Budreviciute et al., 2020; WHO, 2020). The majority of NCDs are not infectious and originate from a variety of influences, including genetic predisposition, physiological factors, behaviors, and environmental elements (WHO, 2020). NCDs are the primary cause of mortality globally, accounting for 71% of all annual deaths. Among NCDs, the most significant contributors to mortality are cardiovascular diseases (resulting in 17.9 million deaths annually),

cancer (9.0 million), respiratory diseases (3.9 million), and diabetes (1.6 million) (WHO, 2020). Nonetheless, the scope of NCDs has expanded to encompass a broad spectrum of health issues, including hepatic, renal, gastroenterological conditions, endocrine, haematological, and neurological disorders, as well as mental health disorders (Devaux et al., 2019).

Majority of African nations are experiencing an epidemiological shift, transitioning from a predominant prevalence of infectious diseases to an increasing burden of NCDs (Dahal et al., 2021; Idris et al., 2020; Olawuyi & Adeoye, 2018). For instance, in 2012,

NCD-related mortality in the African region alone accounted for 28 million deaths (WHO, 2014). Factors such as urbanization, industrialization, longer life expectancies, sedentary behaviors, and dietary shifts from traditional fruits and vegetable-rich diets to energy-dense, fatty foods contribute to this transition (Boakye et al., 2023; Maimela et al., 2016; Olawuyi & Adeoye, 2018).

Numerous studies have highlighted the escalating prevalence of NCDs within the Nigerian populace (Agaba et al., 2017; Ige et al., 2013; Olawuyi & Adeoye, 2018). In Nigeria, prevalent NCDs include cardiovascular diseases, hypertension, diabetes, and cancer (WHO, 2011). Hypertension is estimated to affect between 20.9% and 52.8% of the adult population, while nearly 5.8% are diagnosed with diabetes (Morounke et al., 2017; Odili et al., 2020; Uloko et al., 2018).

Individuals afflicted with NCDs, or those predisposed to develop them, require personalized, proactive, and sustainable long-term care (Budreviciute et al., 2020). Various factors contribute to the likelihood of developing NCDs and can be categorized in different ways. One classification method differentiates between modifiable and non-modifiable risk factors (Budreviciute et al., 2020). Modifiable risk factors include high blood pressure, smoking, diabetes mellitus, physical inactivity, obesity, and elevated blood cholesterol levels, whereas non-modifiable risk factors include age, gender, genetic predisposition, race, and ethnicity (Agaba et al., 2017; Imamura et al., 2015; Maiyaki & Garbati, 2014; Ogah et al., 2013; Tagurum et al., 2015). Primary healthcare initiatives play a pivotal role in organizing and implementing healthcare strategies tailored to managing NCDs within each community and facilitating early disease detection (Budreviciute et al., 2020). This proactive approach can significantly mitigate the challenges associated with high healthcare costs.

The primary barrier leading to the rise in NCDs within low- and middle-income communities is the lack of a systematically well-defined plan to prevent disease onset and transmission (Budreviciute et al., 2020). The World Health Organization (WHO) has advocated for NCDs surveillance and their associated risk factors to guide the implementation of suitable public health

interventions (WHO, 2020). Various effective models have validated low-cost approaches to prevent, detect, and manage NCDs. For instance, an economic strategy aimed at early diagnosis of diabetes and hypertension has been initiated in numerous regions across Nigeria (Ige et al., 2013; Maiyaki & Garbati, 2014; Ogah et al., 2013; Oladimeji et al., 2014). Therefore, the objective of this study is to assess the prevalence of key risk factors associated with NCDs in Dutse, Jigawa State. This information will elucidate the burden of these risk factors and serve as a foundation for shaping policies, initiatives, and interventions.

Methods

The Study Design

The research is a cross-sectional community-based study conducted during a three-day medical outreach program.

The Study Area

The study was carried out in Dutse, which is the state capital of Jigawa state. The state is one of the 36 states that make up Nigeria. Dutse Local Government Area serves as both a town and the headquarters of the LGA, with a total population of about 153,000 residents.

Sample Size Determination

The sample size was estimated using the formula for single proportions (Taherdoost, 2017) based on the prevalence of the risk factor for NCD.

$$n = \frac{Z^2 P(1-P)}{E^2}$$

The utilized parameters include $Z = 1.96$ (corresponding to a significance level of 0.05), a margin of error (E) = 0.05, and $P = 0.07$ (7%) as reported by Dahiru and Ejembi (2013). Initially, the calculated sample size was 100. After adding 20% to accommodate potential missing values and data entry errors, the adjusted sample size was determined to be 125. The researchers consequently finalized the sample size estimate at 125.

Sampling Technique

A two-stage cluster sampling method was employed to select the participants for the study. Initially, Danmasara town was randomly selected using a simple random sampling technique by balloting from among the 11 district wards within Dutse LGA. Subsequently, a systematic random sampling technique was used to finally select the participants. The sampling interval was determined by dividing the total attendance of the medical outreach program at Danmasara Primary Healthcare Center by the sample size of 125. A sampling interval of two was derived and data were collected from every other participant throughout the three-day duration.

The Study Variables

The study examines demographic factors including age, gender, and marital status. In addition, known NCD risk factors, including systolic blood pressure, diastolic blood pressure, random blood sugar levels, and pulse rate are also analysed. Blood pressure and pulse rate were assessed using standard battery-operated automatic monitors (Omron HEM-7120). Measurements were conducted after the respondents had sat for at least 10 minutes, with two readings taken at a three-minutes interval (Chobanian et al., 2003). The analysis utilizes the average of these two readings. High blood pressure is defined as systolic BP \geq 140 mmHg and/or diastolic BP \geq 90 mmHg, while an abnormal heart rate is characterized as pulse rate above 100 or below 60 beats per minute (bpm) at rest (Mensah et al., 1993). Moreover, a random blood sugar screening was performed with the Accu-Check Active Glucometer, with capillary blood obtained by pricking the participants' thumbs. High blood sugar was determined as a random blood sugar level \geq 11.1 mmol/L (American Diabetes Association, 2014).

Statistical Analysis

We initially conducted data cleaning to address missing values and incorrect data entries. The statistical analyses used in this study include descriptive analysis and Chi-square test, both using Statistical Product and Service Solutions (SPSS) version 27. Descriptive analysis is employed to present frequencies and

percentages. We performed the Chi-square test to determine the association between the participants' demographics (i.e., age, gender, and marital status) and NCD risk factors (i.e., BP, heart rate, and RBS level). A p-value of less than 0.05 is considered statistically significant.

Results

The participant's general characteristics and NCD risk factors are shown in Table 1. A total of 125 respondents took part in the study, comprising 76.0% females and 24.0% males. Approximately half of the participants are aged between 15 and 34 (48.0%), with the majority being married (77.6%). Additionally, the prevalent rates of hypertension, high pulse rate, and hyperglycaemia are 31.2%, 7.2%, and 5.6%, respectively.

Table 1: Participants' General Characteristics and NCD Risk Factors (n = 125)

Variables	Frequency	Percentage (%)	
Age	15-24	30	24.0
	25-34	30	24.0
	35-44	28	22.4
	45-54	13	10.4
	\geq 55	24	19.2
Gender	Female	95	76.0
	Male	30	24.0
Marital Status	Single	28	22.4
	Married	97	77.6
BP	Normal	86	68.8
	High	39	31.2
Pulse Rate	Normal	116	92.8
	High	9	7.2
RBS	Normal	118	94.4
	High	7	5.6

Table 2 illustrates the association between participants' general characteristics and NCD risk factors. The results indicate a significant association between age and raised BP ($P < 0.001$), age and raised RBS ($P = 0.006$), gender and raised BP ($P = 0.036$), as well as gender and raised RBS ($P = 0.035$). The findings for age group reveal a notable increase in raised BP and RBS with increasing age, with individuals aged 55 years and older exhibiting the highest prevalence of high BP (79.2%) and high RBS (20.8%). For gender, the males possess a higher prevalence of high BP

(46.7%) and RBS (13.3%) compared to the females. Marital status shows no significant association with BP ($P = 0.084$) or RBS ($P = 0.143$). However, the married reported a higher prevalence of high BP (35.1%) and RBS (7.2%) compared to the singles. Moreover, there is no observed significant association between the participants' general characteristics and pulse rate ($P > 0.05$).

Discussion

Researchers have predicted that NCDs will become a leading cause of morbidity and mortality in Nigeria by 2030 (WHO, 2014). Recognizing risk factors associated with these diseases is crucial for addressing these emerging public health challenges, especially in low- and middle-income countries. However, studies in this area are only just beginning to emerge in Nigeria (Budreviciute et al., 2020; Ogah et al., 2013; Oladimeji et al., 2014; Olawuyi & Adeoye, 2018). Therefore, in the present study, we conducted a cross-sectional survey to evaluate the prevalence of some key risk factors linked to non-communicable diseases in Jigawa State, Nigeria. These findings will clarify the burden of these risk factors and form a basis for shaping policies, initiatives, and interventions.

High BP stands as the primary risk factor for cardiovascular diseases (CVDs), encompassing conditions such as coronary heart disease, cerebrovascular disease, and peripheral vascular disease, among others, thereby emerging as a significant global concern (Dahal et al., 2021). In the present study, we observed that approximately, one-third of the participants exhibit high BP (31.2%). These findings closely align with prior research among civil servants in Ibadan (33.1%) (Olawuyi & Adeoye, 2018) and other studies conducted in Nigeria (Ajayi et al., 2016; Ogah et al., 2013; Oguoma et al., 2015), slightly surpassing the prevalence recorded in previous studies involving civil servants in Kaduna (29%) (Oladimeji et al., 2014) and paid workers in Ilorin (27.1%) (Oghagbon et al., 2008). The increased prevalence in our study may be attributed to its rural community setting, which is recognized as a predictor of hypertension (Ogah et al., 2013).

Diabetes, one of the NCDs, commonly runs in families. Blood sugar testing is less frequent than blood pressure monitoring. This discrepancy arises because measuring blood pressure is a standard procedure in most formal healthcare settings, whereas blood sugar testing typically occurs either upon a doctor's recommendation or when there's suspicion of diabetes (American

Diabetes Association, 2014). The present survey found a 5.6% prevalence of high blood sugar, aligning with previous research conducted in Nigeria by Idris et al. (2020), Odeyinka and Ajayi (2017) and Sani et al. (2010), but below the findings reported by Olawuyi and Adeoye (2018). Additionally, the invasive nature of the screening test has added to the challenge of conducting it within a healthy study population. Nevertheless, it remains essential for researchers to evaluate the extent of elevated blood sugar within the Nigerian population to address this growing public health issue.

The current study found advancing age and gender to have a significant association with high blood pressure and high random blood sugar. Prior studies have demonstrated that advancing age is a risk factor for elevated blood pressure (Idris et al., 2020; Oladimeji et al., 2014; Olawuyi & Adeoye, 2018). This phenomenon arises due to physiological changes within the cardiovascular system, such as arterial wall thickening (Commodore-Mensah et al., 2016). On the issue of gender, studies into the current prevalence and distribution of hypertension in Nigeria have indicated a higher occurrence among males compared to females (Akinlua et al., 2015; Zühlke et al., 2015). Furthermore, advancing age and gender are acknowledged as the risk factors for diabetes mellitus among Nigerians (Uloko et al., 2018). In accordance with a prior study involving diabetic patients in Dutse, Jigawa State, it was demonstrated that males were approximately four times more likely to experience poor glycemic control compared to females (Yakubu et al., 2020).

This study presents a significant contribution to the surveillance of NCD risk factors in Nigeria. However, it is not without limitations. Being a cross-sectional study, it is difficult to establish temporal associations and causality among the variables investigated. A longitudinal study in the future would offer more valuable insights into these relationships. Secondly, the sample size, although adequate, may have influenced some of the estimates. Thirdly, the recruitment method employed in this study is another limitation, potentially leading to the inclusion of some individuals with underlying health issues and thereby overestimating the prevalence of the reported NCDs. Furthermore, it is important to note that the reported prevalence of NCDs in this survey only offers a partial glimpse into the NCD landscape among the residents of Dutse.

Table 2: The Association Between Participants’ General Characteristics and NCD Risk Factors (n = 125)

Variable	BP			RBS			Pulse rate		
	Normal n (%)	High n (%)	P	Normal n (%)	High n (%)	P	Normal n (%)	High n (%)	P
Age			< 0.001			0.006			0.178
15-24	28 (93.3)	2 (6.7)		30 (100)	0 (0)		25 (83.3)	5 (16.7)	
25-34	27 (90.0)	3 (10.0)		30 (100)	0 (0)		29 (96.7)	1 (3.3)	
35-44	18 (64.3)	10 (35.7)		27 (96.4)	1 (3.6)		27 (96.4)	1 (3.6)	
45-54	8 (61.5)	5 (38.5)		12 (92.3)	1 (7.7)		13 (100)	0 (0)	
55-64	5 (20.8)	19 (79.2)		19 (79.2)	5 (20.8)		22 (91.7)	2 (8.3)	
Gender			0.036			0.035			0.897
Female	70 (73.7)	25 (26.3)		92 (96.8)	3 (3.2)		88 (92.6)	7 (7.4)	
Male	16 (53.3)	14 (46.7)		26 (86.7)	4 (13.3)		28 (93.3)	2 (6.7)	
Marital Status			0.084			0.143			0.414
Single	23 (82.1)	5 (17.9)		28 (100)	0 (0)		25 (89.3)	3 (10.7)	
Married	63 (64.9)	34 (35.1)		90 (92.8)	7 (7.2)		91 (93.8)	6 (6.2)	

n = number.

Conclusion

Various forces of globalization cause the burden of NCDs to increase in Nigeria, despite the potential for curtailing most of its predisposing factors through early detection and treatment, as well as behavioral modification. In this study, we conducted a cross-sectional community-based survey to evaluate the prevalence of some risk factors linked to NCDs in Dutse, Jigawa State. We found age and gender to be significantly associated with high blood pressure and blood sugar levels. These findings will provide insights into the extent of these risk factors and will be instrumental in guiding the development of policies, programs, and interventions aimed at addressing them.

Conflict of Interest:

The authors declare no competing interests.

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Authors' Contributions:

Conceptualization: ASI, AS; Data Curation: AS, ASI; Formal Analysis: AS, Investigation: AS, ASS, AAA, KA, IMS, US, MAA; Methodology: ASI, AS, IMS; Supervision: AS, US, IMS, MAA; Writing the Original Draft – ASI; Writing, Review and Editing – AS, ASS, AAA, KA, IMS, US, MAA.

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