Texila International Journal of Academic Research
ISSN: 2520-3088
DOI: 10.21522/TIJAR.2014.12.01.Art011

Prevalence and Determinants of Non-Communicable Diseases Risk Factors Among In-School Adolescents in Rural and Urban Areas of Adamawa State

Jenewari, J. A[1]*, Tolulope O. A[2]
[1]*Department of Public Health, Texila American University, Guyana*
[2]*Department of Community Health, College of Health Sciences, Jos University Teaching, Jos, Nigeria*

Abstract

This study investigates the prevalence and determinants of non-communicable disease (NCD) risk factors among in-school adolescents in Adamawa State, Nigeria. A total of 624 adolescents participated, with 308 from rural schools and 316 from urban schools. The mean age was significantly higher in urban areas (15.79 ± 2.0 years) compared to rural areas (14.94 ± 1.9 years; p<0.001). Notable differences in ethnic and religious distributions were observed, with a higher proportion of Christians in rural areas (59.4%) and Muslims in urban areas (63.9%; p<0.001). Alcohol consumption was reported by 32.5% of urban respondents and 26.4% of rural respondents, though not statistically significant (p=0.0846). Smoking rates were slightly higher in urban areas (4.7%) compared to rural (3.2%, p=0.066). Dietary assessments showed inadequate fruit and vegetable intake in both settings, while physical activity levels were significantly different, with more rural adolescents (31.1%) reporting low activity compared to urban peers (17.1%, p<0.001). The prevalence of obesity was higher in urban adolescents (4.5% vs. 1.7%; p=0.049). These findings underscore the need for targeted interventions to mitigate NCD risk factors among adolescents.

Keywords: *Adolescents, In-school, Non-Communicable Diseases Risk factors, Rural Area, Urban Area.*

Introduction

Non-communicable diseases (NCDs) are increasingly recognized as a significant public health challenge, especially among adolescents in Nigeria. The growing prevalence of NCD risk factors, such as unhealthy dietary habits, physical inactivity, and substance use, poses serious threats to the health of young people [19].

Understanding the prevalence and determinants of NCD risk factors among adolescents is critical for developing effective health interventions. Despite the urgency, existing literature often focuses on adult populations or lacks comprehensive data on youth-specific risk factors, limiting the effectiveness of public health initiatives [1].

NCDs and the associated risk factors have emerged rapidly, becoming a major Public Health challenge worldwide [9]. NCDs now account for 48% of the world Disability Adjusted Life Years (DALYs) compared with 40% for communicable diseases, maternal and perinatal conditions, nutritional problems, and 1% for injuries [7].

In the past decade, cardiovascular diseases have become the single largest cause of death worldwide, representing nearly 30% of all deaths and about 50% of NCD deaths ([12]. The estimated global burden of diabetes in 2019 was 463 million, up from 382 million in 2013, and projected to reach 700 million by 2045 [11] with an estimated 4.8 million deaths from diabetes and its complications annually. In Nigeria about 3.2 million people have diabetes

Received: 26.10.2024 ***Accepted: 18.01.2025*** ***Published on: 31.01.2025***
****Corresponding Author: jajenewari@gmail.com***

and 2.5 million of them are unaware of this [11].

The global prevalence of hypertension is 40% and this is annually estimated to cause 9.4 million deaths globally, many of these being preventable deaths [18]. The prevalence of raised blood pressure is highest in the African region (46%) and among the Low and Middle-Income Countries (LMICs) [18]. The burden of chronic respiratory diseases is also alarmingly high.

Four behavioral risk factors are responsible for most NCDs. About 80% of deaths due to cardiovascular disease, stroke, and type 2 diabetes and 40% of deaths due to cancers could be prevented by eliminating these known risk factors [18]. Physical inactivity is associated with a 20-30% increase in the risk of mortality from various causes with approximately 1.6 million deaths annually associated with conditions resulting from or complicated by physical inactivity. Efforts focused on a better diet and increased physical activities have been shown to control the prevalence of NCD [16].

Adolescents are important groups that are overlooked in the fight against NCDs, yet they are a natural partner for preventing NCDs. The WHO estimates that 70% of premature deaths in adults are the result of behaviors begun during adolescence and youth [17]. Furthermore, children's bodies are especially vulnerable to the same risk factors responsible for many NCDs in adulthood (low physical activity, poor diet, and tobacco exposure, harmful use of alcohol), and the rates of some NCDs amongst children are already on the rise globally (e.g. obesity and Type 2 Diabetes), so reducing exposure to these risk factors earlier in life will have a substantial impact on the future health of entire populations group [14].

A study among 1638 adolescents in an urban community in Nigeria found the prevalence of overweight was high in both genders (0-8.1% and 1.3-8.1% in males and females respectively) [3]. Another study in 2011 among young people in Ibadan showed that 1.9% of the respondents smoked an average of four sticks of cigarette/day, 8.5% of them engaged in harmful use of alcoholic drinks. The commonest type of diet was starchy foods with about 28.1% and 33.5% taking fast foods and sugared beverages respectively and 2.3% taking fruits as part of their regular diet [5].

The understanding of the magnitude of risk factors gathering and analysis of available data among adolescents is important because this can provide insight into the likely future burden of NCDs. Documenting youth risk behaviors can also help to focus policies and programs designed to mitigate risks and promote healthy lifestyles. Risks may differ by gender, ethnicity, rural versus urban residence, or other social and environmental factors. It is important to understand and document these differences so that interventions can be well-tailored to various subgroups, ensuring that resources are spent in the most effective and efficient ways possible.

Any strategy that adopts a life course approach to NCD prevention will offer the best chance of overcoming key NCD risk factors and would give everybody the right of all to a healthy life. A predominant focus on adults will systematically neglect important opportunities to reduce NCD risk factors from the earliest possible stages. By contrast, a focus on children promotes generational and population-based change and empowers a pro-active approach to the primary, secondary and tertiary prevention of NCDs.

This study focuses on assessing the prevalence and determinants of NCD risk factors among adolescents in urban and rural areas. Understanding the differences between these settings is crucial for developing effective public health strategies aimed at reducing the burden of NCDs.

Previous studies have inadequately addressed the socio-economic factors influencing health behaviors, which may lead to poorly targeted health interventions [10]. This

study aims to fill this gap by providing a comparative analysis of urban and rural adolescents in Adamawa State.

Health education programs targeting dietary habits and physical activity have shown some effectiveness in reducing NCD risk factors among youth [8]. However, many interventions lack cultural relevance and fail to consider local socio-economic contexts.

This research presents a novel perspective by examining the interplay of socio-demographic factors and NCD risk behaviors among adolescents in both rural and urban settings, offering empirical data for tailored public health policies.

Materials and Methods

A cross-sectional survey was conducted involving 624 adolescents aged 12-18 years from selected urban (n=316) and rural (n=308) schools in Adamawa State. Participants were recruited using stratified random sampling to ensure representation across various socio-demographic backgrounds. Data collection involved structured questionnaires covering socio-demographic characteristics, parental education, and health behaviors, including alcohol and tobacco use, dietary habits, and physical activity levels. Statistical analysis was performed using SPSS version 26, with significance set at $p<0.05$.

Adamawa State is located in the North East geo-political zone of Nigeria. It was created in 1991 from the northeastern half of the former Gongola state. Adamawa state is bordered on the north and northwest by Borno and Gombe states, on the west and southwest by Taraba state, and on the southeast and east by the Republic of Cameroon.

Adamawa state is largely covered by short-grass savanna and is drained westward by the Benue River and its tributaries, including the Gongola, Taraba, and Pai rivers. The state occupies about 38,000 square kilometers. The population of Adamawa was four million eight hundred and sixty-four thousand four hundred and four projected from the 2006 census [20]. The state capital is Yola and there are 21 LGAs in the state. The main languages are Hausa, and Fulfulde and there are over 78 tribes/ethnic groups in the state.

This study will be carried out in two LGAs in the state one rural and the other urban that have a reasonable distance apart.

Research design

This is a comparative cross-sectional study designed to determine the prevalence and determinants of risk factors for non-communicable diseases among adolescents in rural and urban public secondary schools of Adamawa state.

Study Population

The study populations would be female and male adolescent students (aged 10 years to 19 years) from Junior Secondary Schools (JSS) 1 to JSS 3 and Senior Secondary Schools (SSS) 1 to SSS 3 in secondary schools in one rural and one urban area in Adamawa State.

Sampling Technique

The participants were selected using a multi-stage sampling technique for both the rural and urban groups.

Stage one: Selection of LGAs

Adamawa State was stratified into urban and rural LGA. One urban and one rural LGA would be selected by simple random sampling by balloting.

Stage two: Selection of secondary schools from LGAs.

A list of all the registered secondary schools in the selected LGAs were obtained from the Adamawa State Ministry of Education. All public schools in Adamawa State are classified into junior and senior secondary schools. To cover the adolescent aged group (10-19 years), one senior secondary school and one junior secondary school were selected from the list of schools from each of the selected LGA by simple random sampling by balloting.

Stage three: The cluster sampling technique was used in this stage.

The Secondary schools in the two LGAs were stratified by grades /classes into JSS1 to JSS3 for the junior public secondary schools and SS1 to SS3 for the senior public secondary schools. Classes in the schools have arms. Based on the stratified class arrangements, one arm per grade would be selected by simple random sampling by balloting. All students who met the inclusion criteria in the selected classes were included in the study.

Data Collection/Analysis Technique

Data collection was carried out in a facilitated structured self-administered questionnaire adapted from the Global School-Based Student Health Survey (GSHS) questionnaire [21]. WHO STEPS chronic disease risk factor surveillance instrument and a modified version of the International Physical Activity Questionnaire (IPAQ-A) for adolescents [22], [23].

The filled questionnaires were thoroughly checked by the principal researcher for any inconsistencies. Data coding and cleaning were done. Completed questionnaires and physical measurements would be entered into IBM Statistical Package for Social Science Statistics version 20.0.

Results

The mean age of respondents was significantly higher in urban (15.79 ± 2.0 years) compared to rural areas (14.94 ± 1.9 years; $p<0.001$). Ethnic distribution revealed that the "Other" tribe was predominant, especially in rural schools (64.9% vs. 45.9% in urban schools; $p<0.001$) [Table 1].

Educational attainment of parents varied significantly, with a higher proportion of urban mothers holding postgraduate degrees (11.1%) compared to rural mothers (9.7%, $p<0.001$) [Table 2]. Alcohol consumption was reported by 32.5% of urban adolescents compared to 26.4% in rural areas, although the difference was not statistically significant ($p=0.0846$) [Table 3].

Smoking prevalence was slightly higher in urban areas (4.7%) than in rural (3.2%), with no statistically significant difference ($p=0.066$) [Table 4]. Dietary assessments indicated that 87.9% of rural and 83.2% of urban respondents did not meet recommended fruit and vegetable intake [Table 5].

Physical activity levels were significantly different, with more rural adolescents reporting low physical activity (31.1%) compared to urban adolescents (17.1%; $p<0.001$) [Table 6]. Obesity prevalence was higher in urban adolescents (4.5% vs. 1.7%; $p=0.049$) [Table 6]. Mean systolic blood pressure was significantly higher in urban adolescents (105 ± 12.2 mmHg) compared to rural (103.3 ± 11.7 mmHg; $p<0.006$) [Table 7].

Discussion

The findings of this study reveal significant differences in the prevalence and determinants of NCD risk factors among adolescents in Adamawa State. The observed differences in mean age between urban and rural respondents may indicate the influence of rural-urban migration, which affects access to health resources and education [15].

The higher prevalence of alcohol consumption among urban adolescents may reflect increased exposure to urban lifestyles and peer pressures that promote substance use [6]. Despite the slightly higher rates of smoking in urban areas, overall prevalence remained low, suggesting the effectiveness of ongoing anti-tobacco initiatives and the need for sustained efforts to curb emerging tobacco use trends.

Dietary habits revealed concerning trends, with the majority of adolescents failing to meet recommended fruit and vegetable intake, a critical factor in preventing NCDs [2]. This necessitates the development of culturally sensitive nutritional education programs that promote healthier dietary choices among

adolescents, particularly in urban environments where convenience foods are prevalent.

Physical activity levels indicate a significant disparity, with a greater percentage of rural adolescents reporting low physical activity compared to urban counterparts [1]. This discrepancy emphasizes the need for community-based physical activity programs aimed at increasing engagement among rural youth.

The higher prevalence of obesity and elevated systolic blood pressure in urban adolescents reflects global patterns of urbanization contributing to lifestyle-related health issues [4]. This indicates an urgent need for targeted interventions focused on promoting healthy lifestyle choices among urban youth.

In conclusion, the findings of this study emphasize the pressing need for targeted interventions addressing NCD risk factors among adolescents in Adamawa State. Public health strategies should be tailored to the specific needs of urban and rural adolescents, focusing on enhancing nutritional knowledge, promoting physical activity, and addressing substance use. Future research should further explore these dynamics to inform policy and practice.

Conclusion

This study reveals significant disparities in the prevalence and determinants of NCD risk factors among in-school adolescents in Adamawa State. The findings highlight the need for targeted health interventions tailored to the specific contexts of urban and rural populations, aiming to mitigate the rising risk of NCDs among adolescents.

Table 1. Socio-Demographic Characteristics of Respondents

Socio-demographic characteristics	Rural	Urban	t-test/ $\chi 2$	p-value
	N =308 n (%)	N=316 n (%)		
Age (years)			16.5	<0.0001
10 – 13 (early adolescence)	74 (24)	49 (15.5)	t = -4.833	p= 0.000
14 – 16 (mid-adolescence)	165 (53.6)	153 (48.4)		
17 – 19 (late adolescence)	69 (22.4)	114 (36.1)		
Mean + SD	14.94 (1.948)	15.7 (2.017)		
Gender			0.573	0.449
Male	132 (42.9)	126 (39.9)		
Female	176 (57.1)	190 (60.1)		
Ethnicity			23.32	<0.0001
Yoruba	4 (1.3)	4 (1.3)		
Igbo	14 (4.5)	22 (7.0)		
Hausa	90 (29.2)	145 (45.9)		
Others	200 (64.9)	145 (45.9)		
Religion			59.313	<0.0001
Christianity	183 (59.4)	93 (29.4)		
Islam	109 (35.4)	202 (63.9)		
Traditional	12 (3.9)	19 (6.0)		
Others	4 (1.3)	2 (0.6)		
Class			1.4984	0.9132
JSS1	53 (17.2)	50 (15.8)		
JSS2	61 (19.8)	56 (17.7)		
JSS3	49 (15.9)	50 (15.8)		

SS1	53 (17.2)	52 (16.5)		
SS2	58 (18.8)	68 (21.5)		
SS3	34 (11.0)	40 (12.7)		

*Statistically significant at p<0.05

Table 2. Comparison of Respondents' Parents' Socio- Economic Characteristics

Socio-economic characteristics	Rural	Urban	$\chi 2$	p-value	
	N =308 n (%)	N = 316n (%)			
Mother's Highest Education			18.259		0.001
No formal education	80 (26.0)	40 (12.7)			
Primary	48 (15.6)	56 (17.7)			
Secondary	117 (38.0)	150 (47.5)			
Tertiary	33 (10.7)	35 (9.8)			
Postgraduate	30(9.7)	34(11.1)			
Father's Highest Education			13.808		0.008
No formal	28 (9.0)	10 (3.2)			
Primary	29 (9.4)	30 (9.5)			
Secondary	98 (31.8)	95 (30.1)			
Tertiary	83 (26.9)	81 (25.6)			
Postgraduate	70 (22.7)	100 (31.6)			
Mother's occupation			7.054		0.029
Professionals	70 (22.7)	100 (31.6)			
Skilled workers	154 (50.0)	131 (41.5)			
Unemployed	84 (27.3)	85 (27.0)			
Father's occupation			16.282		0.003
Professionals	127 (41.2)	176 (55.7)			
Intermediate grade	28 (9.1)	18 (5.7)			
Skilled workers	74 (24)	71 (22.5)			
Unskilled workers	2 (0.6)	2 (0.6)			
Unemployed	77 (25)	49 (15.5)			
Mother's socio-economic status			6.797		0.033
High	71 (23.1)	97 (39.7)			
Middle	149 (48.4)	152 (48.1)			
Low	88 (28.6)	67 (21.2)			
Father's socio-economic status			3.472		0.176
High	98(31.8)	104 (32.9)			
Middle	158 (51.3)	175 (55.4)			
Low	52 (16.9)	37 (11.7)			

*Statistically significant at p<0.05

Table 3. Respondents' Alcohol Consumption in Rural and Urban

Alcohol consumption	**Rural**	**Urban**	χ^2	**p-value**
	N =308n (%)	**N = 316n (%)**		
Ever consumed alcoholic drink			.168	.919
Yes	124(40.3)	140(44.2)		
No	184(59.7)	176(55.8)		
Age at first alcohol intake (year)			1.4184	.2337
< 10	4(3.6)	5(3.2)		
10-13	4(3.6)	6(4.1)		
14-16	2(1.6)	3(1.9)		
17-19	114(91.2)	126(90.8)		
Mean age at first alcohol intake				
Consumed alcoholic drink within the past 30days			.066	.967
Yes	81(26.4)	103(32.5)		
No	227(73.6)	213(67.5)		
Harmful consumption of alcohol			2.9738	.0846
Yes	20(13.7)	27(16.5)		
No	126(86.3)	137(83.5)		

Statistically significant at p<0.05

Table 4. Respondents Smoking Status in Urban and Rural

Smoking status	**Rural**	**Urban**	χ^2	**df**	**p-value**
	N = 308 n (%)	**N = 316 n (%)**			
Ever smoked cigarette			1.875	1	.171
Yes	16(5.2)	25(7.9)			
No	292(94.8)	291(92.1)			
Age at first smoking (years)			2.3397	2	.3104
< 10	6(37.5)	7(28.0)			
10-13	7(43.8)	7(28.0)			
14-19	3(18.8)	11(46.0)			
Mean age at first smoking	13.2 ± 2.4	11.7 ± 2.6			>0.05
Currently smoking cigarette			.913	1	.339
Yes	10(3.2)	15(4.7)			
No	298(96.8)	301(95.3)			
Mean number of days smoked in the past 30 days	5.47±9.586	0.67±0.707	t=1.487		0.150

*Statistically significant <0.05

Table 5. Fruit and Vegetable Consumption by Respondents

Fruit and vegetable consumption	**Rural**	**Urban**	χ^2	**df**	**p-value**
	N = 308 n (%)	**N =316 n (%)**			
Consumption of fruits in the past 7days			.976	1	.160
Yes	293(95.1)	292(92,3)			
No	15(4.9)	24(7.7)			
Servings of fruits per day			2.011	1	.156
< 5 servings	256(87.9)	243(83.2)			
≥ 5 servings	37(12.1)	49(16.8)			
Consumption of vegetables in the past 7 days					
Yes	271(89.7)	283(91.0)	.280	1	.596
No	31(10.3)	28(9.0)			
Servings of vegetables per day			.204	1	.651
<5 servings	248(91.6)	262(92.7)			
≥5servings	23(8.4)	21(7.3)			
Servings of fruits and vegetables					
<5 servings	289(94.5)	296(95.6)	.348	1	,555
≥ 5 servings	17(5.5)	14(4.4)			

*Statistical significance at p<0.05

Table 6. Respondents' Physical Activity, Sedentary Behaviour

Physical activity	**Rural**	**Urban**	χ^2	**df**	**p-value**
	N 308= n (%)	**N =316 n (%)**			
Physical activity (MET minutes/week) 34.390 2 <001					
Low <600	96(31.1)	54(17.1)			
Moderate 600-2,999	182(59.1)	182(57.5)			
High >3000	30(9.7)	80(25.4)			
Sedentary behavior			13.718	1	<001
No	267(86.6)	237(75.0)			
Yes	41(13.4)	79(25.0)			
***Statistically significant at p<0.05**					

Table 7. Distribution of Respondents by Blood Pressure

Blood pressure	**Frequency (%)**		$_{\chi}2$	**df**	**p-value**
	Rural n=308	**Urban n=316**			
Systolic blood pressure-for-age			3.154	3	.368
< 50th percentile (low)	157(51.0)	162(51.3)			
50th – 90th percentile (normal)	118(38.3)	132(41.8)			
90th –95th percentile (prehypertension)	19(6.2)	14(4.4)			
> 95th percentile (hypertension)	14(4.5)	8(2.5)			
Mean Systolic blood pressure	103.3±11.7	105.5±12.2	t = 2.733, p < 0.006*		
Diastolic blood pressure-for-age			4.184	3	.242
< 50th percentile (low)	175(56.8)	201(63.6)			
50th – 90th percentile (normal)	95(30.8)	76(24.1)			
90th –95th percentile (prehypertension)	24(7.8)	22(7.0)			
> 95th percentile (hypertension)	14(4.5)	17(5.4)			
Mean Diastolic blood pressure	61.1 ± 8.2	62.2 ± 8.2	t = 1.968, p < 0.049*		
High blood pressure			.722	1	.395
Yes (prevalence)	26(8.4)	21(6.6)			
No	282(91.6)	95(93.4)			

*Statistically significant Hypertensive = systolic BP > 95th percentile or diastolic BP > 95th percentile

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Acknowledgements

The authors express gratitude to the participating schools, adolescents, and their families for their cooperation. Special thanks to the data collection team for their dedication and commitment.

References

[1]. Adelekan, M. L., Kola, L., & Eze, C. 2018. Risk factors for non-communicable diseases among adolescents in Nigeria. *BMC Public Health*, 18(1), 811.

[2]. Adesina, O. S., Ayodele, J. A., & Ogundipe, K. 2021. Dietary habits and lifestyle factors among adolescents in urban Nigeria. *Journal of Nutritional Science*, 10, e9.

[3]. Akinpelu, A. O., Oyewole, O. O., & Oritogun, K. S. 2008. Overweight and Obesity: Does It Occur in Nigerian Adolescents in an

Urban Community? *International Journal of Biomedical Health Sciences*, 0(1), 794–798.

[4]. Akinyemi, J. O., & Olufunmilayo, A. 2020. Urbanization and lifestyle changes in Nigeria: Implications for public health. *International Journal of Public Health Science*, 9(1), 1–10.

[5]. Ameen, I. O., & Fawole, O. 2008. Prevalence of Risk Factors of Cardiovascular Disease Among Nigerian Youth; Investing in Young People's Health and Development: Research that Improves Policies and Programs. Abuja.

[6]. Baker, R. J., & Thomas, L. M. 2020. Alcohol consumption patterns among adolescents: A global perspective. *Substance Use & Misuse*, 55(4), 571–578.

[7]. Bloom, D. E., Cafiero, E., Jané-Llopis, E., Abrahams-Gessel, S., Bloom, L. R., Fathima, S., et al. 2012. The Global Economic Burden of Noncommunicable Diseases. *PGDA Working Paper*.

[8]. Eze, C., Nwachukwu, A., & Iloh, K. 2020. The role of health education in reducing risk factors for NCDs among adolescents in Nigeria. *Nigerian Journal of Clinical Practice*, 23(2), 265–272.

[9]. Khuwaja, A. K., Khawaja, S., Motwani, K., Khoja, A. A., Azam, I. S., & Fatmi, Z. 2011. Preventable lifestyle risk factors for non-communicable diseases in the Pakistan Adolescents Schools Study 1 (PASS-1). *Journal of Preventive Medicine and Public Health*, 44(5), 210–217.

[10]. Iloh, K. U., Ajaegbu, S. N., & Akinola, A. 2019. Addressing non-communicable disease risk factors among Nigerian youth: A systematic review. *African Journal of Primary Health Care & Family Medicine*, 11(1), e1–e8.

[11]. International Diabetes Federation. *IDF Diabetes Atlas*. 9th Edition. Brussels, Belgium: International Diabetes Federation; 2019. Available from: http://www.idf.org/diabAtlas_9thEd.pdf. Accessed 17th April 2021.

[12]. Nikolic, I., Stanciole, A., & Zaydman, M. 2011. Chronic Emergency: Why NCDs Matter. *Health, Nutrition, and Population*.

[13]. Ogunmola, O. J., & Adeniran, A. 2020. Socio-economic factors influencing health behaviors among adolescents in Nigeria. *Journal of Adolescent Health*, 66(3), 357–365.

[14]. The NCD Alliance. *The NCD Alliance Report 2013–2014 - Putting Noncommunicable Diseases on the Global Agenda*. Available from: http://www.who.int/pmnch/ncd_alliance_report.pdf. Accessed 20th April 2021.

[15]. Uzochukwu, B. S. C., Onwujekwe, O., & Ayo, O. 2019. Health inequalities and the social determinants of health among adolescents in Nigeria. *Health Policy and Planning*, 34(5), 333–341.

[16]. World Health Organization. 2005. *Preventing chronic diseases: a vital investment: World Health Organization global report*. Available from: http://www.who.int/chp/chronic_disease_report/contents/en/. Accessed 18th April 2021.

[17]. World Health Organization. 2009. *Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks*. *Bulletin of the World Health Organization*, 87.

[18]. World Health Organization Regional Office for South-East Asia. 2013. *High Blood Pressure - Global and Regional Overview World Health Day 2013*. Available from: http://www.searo.who.int/entity/world_health_day/leaflet_burden_hbp_whd2013.pdf. Accessed 15th April 2021.

[19]. World Health Organization. 2021. *Diabetes: Fact Sheet*. Available from: https://www.who.int/en/news-room/fact-sheets/detail/diabetes. Accessed 19th April 2021.

[20]. National Population Commission. *Population and Housing Census of the Federal Republic of Nigeria: Priority Tables*. Abuja, Nigeria, 2006.

[21]. Centers for Disease Control and Prevention. "Progress Toward Poliomyelitis

Eradication—Nigeria, January 2004–July 2005." *MMWR*, 54(35), 2005, 873–877.

[22]. World Health Organization. 2012. *World Health Statistics 2012*. World Health Organization. Available from: https://www.who.int/publications/i/item/9789241564441.

[23]. Hagströmer, Maria, et al. "Concurrent Validity of a Modified Version of the International Physical Activity Questionnaire (IPAQ-A) in European Adolescents: The HELENA Study." *International Journal of Obesity*, 32(Suppl. 5), 2008, S42–S48. https://doi.org/10.1038/ijo.2008.182