



Residents' Perceptions of Neighborhood Physical Environment on Self-Rated Health Status in Maiduguri Metropolis-Borno State, Nigeria

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Abstract: *This study has examined the influence of neighborhood physical environmental attributes on the self-rated health status of households in Maiduguri metropolis. The study adopted a survey research strategy using multi-stage sampling technique on households. Five (5) residential neighborhood were selected from Yerwa; Bolori; Shehuri north; Gwange and Maisandari districts in Maiduguri metropolis as sampling clusters for the study. Three hundred and seventy five questionnaires were administered to households' head to obtained data for the study. Data obtained was analyzed using inferential statistics to describe the physical environmental quality attributes on the self-rated health status in the study area. Descriptive analyses was conducted to determine the means and standard deviations. The results revealed that, traffic congestion, gardens/open spaces, and condition of buildings constitute the highest mean value respectively, while the self-rated health status findings revealed the occurrences of diseases such as, Headache, Heart and Cancer diseases with the highest mean value while Kidney diseases constituted the least mean value. Body pains, Burns and Electrical shock constitute the highest self-reported mean value for Injury health status accordingly. The study recommends that; the state government should embark on programmes to improve physical environmental quality through improving ventilation, ensuring that buildings are properly kept, and installing clean water and sanitation systems among others. In order to improve the residents health status in residential neighborhood of Maiduguri metropolis.*

Keywords: *Disease, Public Health, Sanitation System*

Introduction

Majority of the world's population lives in urban environments. In the current society, people prefer to live in urban than in rural areas, in order to use urban facilities. This makes population densities in urban areas much greater than in rural areas. Urbanization has long been associated with human development and progress, but recent studies have shown urbanization leads to significant inequalities and health problems (Steve *et al*, 2020). Oluwaseyi, (2019), observed that urbanization derives both opportunities and risks, with enormous challenges for maintaining and improving human health and wellbeing

The neighborhood physical environment can either enhance or constrain an individual's choices benefiting health and well-being (Steve *et al*, 2020). The neighborhood physical environment includes the built environment such as the human built physical features and structures like streets, sidewalks, and buildings and the natural features such as air, water, and soil quality. Human health and wellbeing in the urban

environment depends on the sum total of the interactions between and among determinants and outcomes (Tendai *et al.*, 2018). The study of health in an urban environment requires consideration of a wide range of factors and conditions, acting and interacting at various scales. Victor, (2020), posit that, there is a correlation between adequate neighborhood environmental quality and residents' health.

The impacts of neighborhood physical environment on human health have long been recognised (Owolabi, 2019). Many neighborhood features have influence the physical, social, economic and the mental well-being of occupants (Collins and Elekwachi, 2019). Self-rated health (SRH) is one of the most widely used personal health measurements (Erik & Ragnar, 2017). Many researchers have justified the use of self-rated health (SRH) as a measure of quality of life and a predictor of morbidity and mortality (Godwin, 2019).

According to World Health Organization and World Bank estimates, poor water quality, sanitation and hygiene is responsible for about 88% of incidences of diarrhoea across the world (Oluwaseyi, 2019). Additionally, poor water quality, sanitation, and hygiene is responsible for 100% of helminthiasis, 50% of hepatitis, typhoid and paratyphoid fever respectively. According to Tanzilla and Faisal (2021), about 2.6 billion or 39% of the world population, have no access to proper waste disposal methods. Another, 1.1 billion people dispose their waste in neighbourhood open spaces. These wastes are often uncollected which degrades the environmental quality and also constitutes disasters to human health (Nwachukwu, 2018). Despite the abundance of evidence in existing literature that showed the links between neighborhood physical environment and residents health status, limited studies have been done to investigate how health could relate to the neighbourhood physical environment attributes.

Limited work has been done on the scale that connects the neighbourhood environment and household health status especially, on key public health issues related to physical, social, and mental well-being (Tendai *et al.*, 2018, Owoeye & Ogundiran, 2015). More so, there are paucity of literature on the interplay of multiple factors affecting self-rated health outcomes in developing countries (Masood, 2021).

Maiduguri being a capital city has attracted large numbers of people within and outside Borno State. This unprecedented urbanization, particularly in Africa is accounted by natural growth, rural urban drift and reclassification of rural settlements (Murtala and Nafiu, 2021). States capital in particular attracts and provides avenue for migrants from rural areas. The insurgency of Boko haram worsened the situation. In Nigeria, for example the increasing pace of urbanization and the high tempo of rural –urban migration makes housing environment problems in cities and towns very acute (Oluwaseyi, 2019). The growth has brought with it many problems, perhaps the prominent of all the problems is that of providing adequate, safe, decent and sanitary neighborhood environment for the growing population. It is in this regard that, this study is designed to investigate the neighborhood physical environment attributes and perceived resident's self-rated health status in Maiduguri metropolis.

Statement of Problem

In recent times, there has been a growing concern in the deteriorating state of neighborhood physical environment in most urban areas of the developing nations (Oluwaseyi, 2019). Urban physical environment problems have been generally accepted as being diverse and complex. The most visible and obvious consequences of urbanization in developing countries, such as Nigeria, is often rapid deterioration of urban physical environment and living conditions. The consequences of these is the major challenges of providing adequate and safe housing and infrastructural facilities such as roads, drainage, water, electricity supply etc. (Oluwaseyi, 2019).

Poor neighborhood environment has been associated with numerous physical and mental health conditions (Mario *et al.*, 2020). These range from psychological and physiological effects to specific diseases varying in

the degree of associated morbidity (Kimberly *et al.*, 2017). The characteristics of the neighborhood physical environment where one lives or works can have a number of potential effects on human health. Determinants of health include several social and environmental factors, and one aspect is the built environment in which people live and work (Yingying *et al.*, 2021). The immediate environment where people live and work can greatly affect their health. As pressure on cities intensifies, many urban inhabitants live in very poor conditions that are characterized by the presence of pathogenic micro-organisms and cramped physical environment.

Another problem of the Nigerian urban built environment is noncompliance with building bye-laws and regulations (Oluwaseyi, 2019). Housing structures are built without any regard to the existing building and health codes or zoning and sub-division regulations. The major areas of default are in the area of zoning, setbacks, building along utility lines and non-adherence to provision of adequate ventilation which results to environmental degeneration. This could result to lack of safety, pollution of air, soil and water, crowding in residential neighborhoods, as well as lack of physical facilities amongst other problems of the built environment. Owolabi (2019), analyzed the characteristics of neighborhood environmental degeneration to include: Inadequate basic infrastructural amenities, substandard housing, over-crowding, poor ventilation in homes and work places, and non-compliance with building bye-laws and regulations.

In Nigeria, several studies were conducted to ascertain the physical environment attributes in urban centres. However, little or no attention has been directed towards the relationships that exist between the physical environment attributes and residents self-rated health. Rufa'l *et al.* (2018), studied physical activity and quality of life among adults in Maiduguri, and found that, engaging in sufficient physical activity improves health and quality of life across all the ages' groups. Iyawa *et al.* (2020), examined the impact of urban growth on green space in Maiduguri metropolis while Nkwocha *et al.* (2020), examined the housing challenges in Maiduguri urban, Borno State, while, Danjuma *et al.* (2023), studied the effects of poverty on household's welfare in Maiduguri. Ali and Gabasa (2013), studied the effects of solid waste dumpsite on the surrounding human settlement in the fifteen wards of Maiduguri metropolitan council. Knowledge regarding the relationship between the physical environments attributes and health status of resident is limited in Nigeria, especially with regard to urban communities. Therefore, this study is an attempt to fill this gap, by investigating the relationship between physical environment quality attributes and residents self-rated health status in Maiduguri Metropolis.

Theoretical Framework

The term "neighborhood" is defined by Victor (2020), as a designates part of the city that can be identified in terms of physical geography, history, housing and architectural aspect or by its residential, industrial, commercial and administrative functions. The notion of neighborhood means the place where people live. The neighborhood represents an intermediate space between the housing and the city, a practical device that allows the link between what is the most intimate (the private space of the housing) and what is the most unknown (the whole city) (Oluwaseyi, 2019). Steve *et al.* (2020), refers to neighborhood as an entity that is spatially and socially more limited than a city, which shows a collective unity of life; a place of relationships and specific social practices, connected by proximity; or a space of life defined by the behavior of the inhabitants.

Similar to the definition of "neighborhood", neighborhood environment is also defined based on geographic boundaries and hierarchy of ecological groupings in the literature. According to Steve *et al.* (2020), the neighborhood environment refers to a person's immediate residential environment, which is hypothesized to have material and social characteristics that could influence people's health outcomes. Murtala and Nafiu (2021), opined that, neighborhoods should be thought of not only as the distinct areas of a city, but also a hierarchy of ecological groupings at four levels: the local network (usually formed by a group of residents

who share the same local facilities and residential condition because of their proximity to each other), the defending neighborhood (referred as the smallest area that has a corporate identity recognized by both its insiders and outsiders), the community of limited liability (imposed by external commercial or governmental interests), and the expanded community of limited liability (large-scale neighborhoods which arise from government policies or programs).

The concept of “neighbourhood” is well recognized in the social sciences and is usually linked to the ecology of human existence or otherwise linked to the environment (Kyung-Young, 2021). Extensive research shows that low-income and minority neighbourhoods are more likely to experience harmful conditions and lack health-promoting conditions (Tendai *et al.*, 2018). Neighbourhoods with high levels of antisocial behaviour can increase social isolation and community fears (Owoeye and Ogundiran, 2015). Feeling unsafe within a neighbourhood is associated with a series of negative health outcomes (Murtala & Nafiu, 2021). Noisy neighbours, poor quality green space, overcrowding and limited access to facilities are associated with poor mental health outcomes (Zhang *et al.*, 2017). Erik and Ragnar (2017) developed a housing niche model that focuses on;

- (a) Housing markets and other societal processes that constrain residential choice,
- (b) Effects of residential environments on health and access to human and social capital, and
- (c) Family dynamic effects on health and the intergenerational consequences of particular housing niches for future health and housing choices.

A large body of literature has linked different kinds of conditions in neighborhoods with health; these include physical conditions, the services available, and social conditions. Healthy and unhealthy neighborhood conditions are not distributed randomly. Extensive research shows that low-income and minority neighborhoods are more likely to experience harmful conditions and to lack health-promoting conditions (Collins and Elekwachi, 2019). In order to achieve a quality environment within the neighbourhood, Steve (2020), stress the need for a quality housing which satisfies minimum health standards and good living standard. Such an immediate housing environment and the neighbourhood represent an everyday-landscape, which can either support or limit the physical, mental, and social well-being of the residents.

During the past few decades, there has been an increasing interest in the effects of neighbourhood environments on public health (Erik & Ragnar, 2017). To a great extent, this interest in the social determinants of health was inspired by many empirical contributions in the past 15 years (Zan & Yuqi, 2019). These studies showed that the impacts of neighbourhood characteristics, independent of individual factors, exist across a wide range of public health outcomes, such as cardiovascular mortality, infant and youth health, chronic diseases, and mental health. Whether the neighbourhoods have better and more access to hospitals and clinics and whether neighbours have mutual trust also influence the physical and mental health of adults and children. The effects of neighbourhood environments on health can also be found in Zhang *et al.* (2017) work. In this study, the authors aimed to examine whether a neighbourhood’s access to amenities, neighbourhood quality, neighbourhood disorder, and neighbourhood cohesion are with people’s self-rated health. Using data from the cross-sectional Health and Social Needs Survey, this study found that poor access to amenities, poor neighbourhood quality, neighbourhood disorder, and lack of social cohesion are positively associated with poor self-rated health. This study further proves that the neighbourhood environment is associated with self-rated health.

The importance of neighborhood physical environment to health is driven by the prolonged exposure people have to the residential environment (Victor, 2020). In realisation of this interrelationship, the challenge in the developing nations is to improve conditions in low-income residential neighbourhoods, where poor access to water, bad sanitation, contaminated food, uncollected waste, smoky kitchens and a range of insect vectors combine to form a complex of health threatening conditions (Owolabi, 2019). The problems that aid the decay of neighbourhood have been attributed to inadequate basic infrastructural

amenities, substandard housing, overcrowding, poor ventilation in homes and work places, sanitation and non-compliance with building bye-laws and regulations and these impose serious adverse effects on environment and the health of city residents.

Study Area

Maiduguri, the Borno State capital, is a fast-growing urban area. Over the years, rapid changes have been noted in its physical extent, population size and land use (Jimme *et al.*, 2019). It has long been one of the dominant cities in North Eastern Nigeria. Its location close to the republic of Chad, Niger and Cameroun gives it an increasing significance as a centre of commerce, transport, education, religion and administration. Maiduguri comprises two local government areas (LGAs): Maiduguri metropolitan council (MMC) and Jere LGA, with some parts including Konduga and Mafa LGAs into 'greater Maiduguri'. It covers a total area of 543sq km, making it the largest city in the North Eastern region of Nigeria. These areas combine to cover a total land area of 543 km².3 (Marissa & Katja, 2021). The 2015 projected population was estimated to be over 1,112,449 as a result of the influx of Internally Displaced Persons (IDPs) (Jimme *et al.*, 2019).

The city lies between Latitudes 11°00' to 11°05' North and Longitudes 13°00' to 13°05' East, and it stands some 350 meters above sea level. Although Maiduguri is predominantly a Kanuri town, it has always been the host to other parts of Nigeria and Africa. Almost all languages and cultural groups from across Nigeria and neighbouring countries can be found in Maiduguri (Marissa & Katja, 2021). The nearest major towns in Nigeria are Damaturu (about 135km), the capital of Yobe state, Bauchi, the capital of Bauchi state and Kano, the capital of Kano state, which are almost 450 and 600km to the southwest of the state capital.

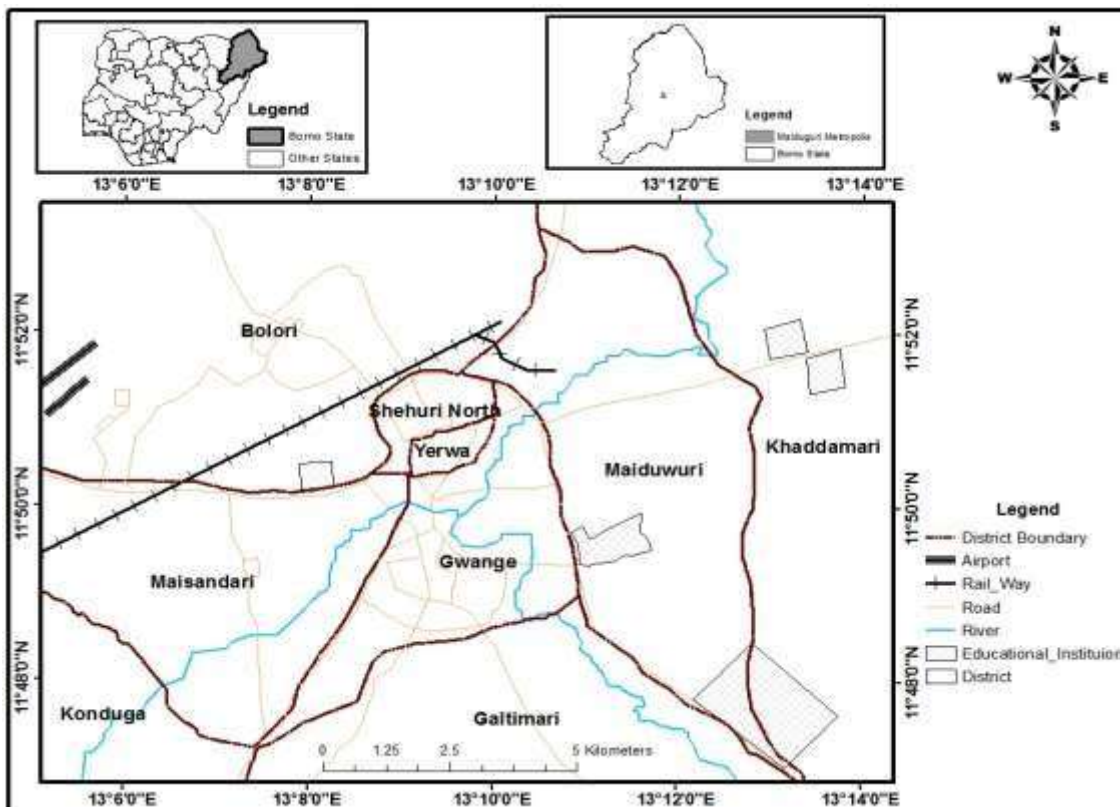


Figure 1. Maiduguri Metropolis showing the Administrative District

Source: Mukhtar et al, 2021

Materials and Methods

The quantitative survey's study population comprised of heads of households living in a housing unit in any of the administrative districts in Maiduguri Metropolis. The sample size for the quantitative survey is a number of heads of households to receive the study instrument. For the purpose of this study, Krejcie and Morgan (1970) table of determining sample size was used. A multi-stage sampling technique was employed to establish the number of household heads surveyed across the study area. Multi-stage sampling is moving from a broad to a narrow sample using a step-by-step process. It is a sampling technique where two or more probability techniques are combined. It is used when the population elements are spread over a wide geographical region, and it is impossible to obtain a representative sample with only one technique (Alvi, 2016).

In order to get a representative sample for the study, neighbourhoods in the Maiduguri metropolis were identified into five (5) administrative districts. These are Bolori, Gwange, Maisandari, Shehuri North, and Yerwa. Yerwa; Gwange and Shehuri North districts which are considered as high-density residential areas; Bolori is a medium density while Maisandari district is a mixture of medium and low-density neighborhoods. Secondly, the residential neighborhoods that formed the sampled population that cut across the five residential districts were surveyed. The snowball sampling method was followed with the stratified random sampling method. This was done by assigning serial numbers to each of the samples. Samples selections were in accordance with the proportion of each stratum. After the pilot testing and all necessary modifications, the questionnaires were administered directly to the chosen sample of the study. The questionnaires were used and solicited information on the physical environment quality attributes; and the (reported) self-rated health from respondents. Altogether, 375 households' heads were selected and surveyed in the five residential districts using field assistants.

The data obtained was entered into an electronic database and analysed using Statistical Package for Social Sciences (SPSS) version 17. Descriptive statistics for categorical and continuous variables was summarized using frequency distributions and percentages group for categorical variables; and the mean, standard deviation, mode, maximum and minimum values for continuous variables.

Results and Discussion

Residents' Demographic Characteristics

The demographic information of the respondents was collected. The frequency and percentage analysis were carried out to explore the respondents' profiles. Data on the gender of the household heads revealed that, males are predominant with the highest percentage of 53.9% while the females have 46.1% in the study area. Regarding the age of household heads, revealed, that the agegroup between between 30yr to 60yr constitute the highest percentage of 46.4%, followed by age group above 60 years which constitutes the percentage of 31.1%. The least age was under 30 years, constituting 22.5% in the study area. Regarding the educational qualification of household heads, the results indicated NDiploma/NCE holders constitutes the majority about 36.6%, of the respondents. HND/Degree comes second with a rate of 27.8%, and Primary/Secondary has a rate of 21.5%. The least were postgraduate qualification and Qur'an education, which constitute 14.1% each. In the employment status of household head, Artisan/ Craftsman constitute the highest percentage of 34.4%. Business/Trader constitute the percentage of 28.1%. Farming/fishing and Civil servants constitute 19.6% and 13.1%, respectively. The least was Unemployed, which constituted a percentage of 4.1%.

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Regarding how long they have stayed in the neighbourhood, 6-10 years constitute the highest percentage of 30.4%, 16 years and above constitute the percentage of 25.3%, 11- 15 years constitute the percentage of 25.0%, and the least was less than 5 years which constitute the percentage of 19.3%. Lastly, the table provides the type of residential house occupied by households, where multiple-family houses constitute the highest percentage of 32.8%. Traditional compounds constitute 26.6%, while single-family flats and others have the least percentage of 23.0% and 17.6%, respectively.

Neighbourhood Physical Environment Attributes

Descriptive statistics based on the mean ranking was carried out to explore the level of neighborhood physical environmental attributes in Maiduguri Metropolis. The results showed each item's ranking, mean, standard deviation and remark. The quality of physical attributes results is presented in Table 1.

Table 1: Physical Environment Attributes

Physical attributes	Mean	Std. Deviation	Ranking	Remark
Traffic congestion	3.23	1.217	1	Fair
Gardens/open spaces	3.22	1.195	2	Fair
Condition of buildings	3.18	1.209	3	Fair
Pollution	3.15	1.185	4	Fair
Smoke from traffic	3.13	1.178	5	Fair
Drainage System	2.93	1.121	6	Fair
Roads/Street maintenance	2.84	1.133	7	Fair
Trees and shrubs	2.79	1.273	8	Fair
Nature of street	2.75	1.163	9	Fair
Trees along the streets	2.73	1.227	10	Fair
Evidence of vandalism	2.64	1.197	11	Fair
Parking spaces	2.58	1.261	12	Bad
Attractive natural sights	2.56	1.263	13	Bad
Physical attributes	2.90	1.2048		Fair

Source: Field Survey, 2023

Table 1 presents the physical environment attributes indicator of the residential environment where traffic congestion (M=3.23, SD=1.22), gardens/open spaces (M=3.22, SD=1.195), and condition of buildings constitute the highest mean of (M=3.23, SD=3.22 and 3.18), respectively. The least was the attractive natural sights which constituted the mean of (M=2.56, SD=1.263). The overall result for physical residential environmental attributes indicated fair results. Physical attributes of traffic congestion is fair (M=3.23, SD=1.22), gardens/open spaces (M=3.22, SD=1.195), and condition of buildings has the highest quality (M=3.18, SD=1.209), while overall result for physical environmental attributes indicated fair quality (M=2.90, SD=1.2048).

Respondents Self-Rated Health Status

Descriptive statistics based on mean ranking was carried out to explore the self-rated health status of the residents in Maiduguri Metropolis. The results showed the ranking, mean standard deviation and remark for each item. The results on the respondents self-rated health status in the study area were presented in Table 2.

Table 2: Self-Rated Health Status

Disease	Mean	Std. Deviation	Ranking	Remark
Headache	3.65	1.174	1	High
Malaria/Typhoid fever	3.46	1.265	2	High
Respiratory infection	3.46	1.296	3	High
Cancer diseases	2.93	1.366	4	Moderate
Heart diseases	2.91	1.329	5	Moderate
Itchy Skin	2.89	1.313	6	Moderate
Cough	2.89	1.341	7	Moderate
Difficulty Hearing	2.88	1.285	8	Moderate
Chest Pain or Tightness	2.87	1.326	9	Moderate
Watery Eyes	2.85	1.326	10	Moderate
Watery Stools	2.85	1.354	11	Moderate
Liver diseases	2.85	1.335	12	Moderate
Skin infections	2.82	1.341	13	Moderate
Lung diseases	2.79	1.334	14	Moderate
Kidney	2.74	1.301	15	Moderate
Diseases occurrences	2.99	1.312		Moderate

Source: Field Survey, 2023

Table 2 presents the respondents self-rated health status in the study area. Headache, Malaria/Typhoid fever and Respiratory infection have the highest mean of 3.65, 3.46, and 3.46, respectively. The least was Kidney diseases which constituted the mean of 2.74. The overall results for self-rated health (diseases occurrences) indicated moderate occurrence in the study area. Headache, Malaria/Typhoid fever and Respiratory infections/diseases are the major reported diseases, while Kidney diseases are the least in the study area.

Discussion

Data on gender status of the respondents agrees with the Nigerian Demographic and Health Surveys Data, that, households’ composition in Nigeria are predominantly headed by male and less than one in five are headed by female(NBS,2021). Also educational attainment and household income level were positively associated with most neighborhood conditions (Udofia, et al, 2016). Educational attainment of a person is also many a times linked with one’s health (Erik & Ragnar, 2017). With low income distribution, to afford good quality housing environment and or proper maintenance of existing situations might be difficult, if not impossible. According to Baqutayan (2015), neighborhoods with high unemployment, low income, and low transport wealth (low value/ prestige cars) were also found to predict fair to very bad self-rated health. Past studies have established that neighborhood, poverty and economic deprivation are associated with poor health outcomes (Udofia, & Alfred, 2016).

The physical housing environment quality attribute was determined by examining various factors such as the physical attributes of the neighborhood, the amount of traffic congestion, access to green spaces and gardens, and the condition of the buildings among other variables. Overall, the physical housing environment quality was remarked fair. However, some areas could be improved. Specifically, the amount of

traffic congestion in some of the neighbourhoods are high which could be time consuming for residents and visitors. Living closer to the workplace or having ease access to public transports are very important; it helps dwellers feel less stress and achieve peace of mind. Significant increased odds of reporting fair to very bad self-rated health were seen for people in neighbourhoods with a poor quality physical environment (Moses, *et al*, 2017). The physical characteristics of household dwellings are important indicators of the socioeconomic and health status of households (NBS,2021).

Self-rated health status measures how an individual perceives their overall health. It is often used as an indicator of overall well-being and can be used to assess the success of health interventions. Health is a dynamic equilibrium between man and his environment (Jack, 2016).

Findings of relations between poor quality physical environment and health have been found in the US. Using the “broken windows” index a study in New Orleans collected data on homes with structural damage, street litter, prevalence of abandoned cars, graffiti, and physical problems with public high schools. According to a study done by Steamers, (2019). in New Zealand residents of the greenest urban neighbourhoods had significantly lower risks of having poor mental health than those in the least green areas, and the results suggested a dose- response relationship. It is determined by several factors including genetic inheritance, personal behaviors, access to quality health care, and the general external environment such as water, air and living conditions of the people (Teshome-Bahiru, 2004).

Recommendations

The government, businesses, community-based organizations, and Non-Governmental Organizations each have roles to play

- The Borno state government, private enterprises, and the local authorities should ensure the provision of sustainable public transportation, pedestrian safety, parking spaces and reduce traffic density as well as improving street/roads maintenance
- The government and community-based organizations should improve sustainable public transportation, pedestrian safety, parking spaces, open-space infrastructure and reducing traffic density as well as improving street/roads maintenance.
- The Primary Health Care and awareness programmes should target specific self-reported health diseases, than generic health and interventions that will improve access to healthcare facilities tailored to the resident's specific needs.

References

- Abubakar M., Habu M. B., Sadiq T., Abdul Azeez A. M., \$ Umar A. (2020), Measuring Residents Satisfaction Levels of Public Housing in Maiduguri Metropolis of Borno State, Nigeria. *Path of Science*. 6 (3)
- Adedoyin O Ogunyemi, Foluke A O., Kofoworola A., and Odeyemi (2018). Assessment of factors affecting self-rated health among elderly people in Southwest Nigeria. *Postgraduate Medical Journal*. 25(2)
- Alvi A, (2016). A Manual for Selecting Sampling Techniques in Research, Mohsin University of Karachi, Iqra University 23 March 2016
- Babatunde F. A., and Emilia O. M. (2017), Effects of Poverty on Urban Residents’ Living and Housing Conditions in Nigeria *Journal of Arts & Humanities* 6(3).
- Baqutayan S. M (2015), The Impact of Housing Issue on the Well-being of Middle-Income Group. *Mediterranean Journal of Social Sciences*. Vol 6 No 6

- Collins H. W. and Elekwachi W. (2019), Peri-Urban Housing and Environmental Quality Problems in Choba Town, Rivers State, Nigeria. *International Journal of Geography and Environmental Management (IJGEM)*. 5(2).
- Danjuma A. N., 2 Musa T. J., Bukar Y. M. (2023), Effects of Poverty on Household's Welfare in Maiduguri, Nigeria. *International Journal of Advanced Multidisciplinary Research and Studies*; 3(2):
- Erik B. and Ragnar W. L. (2017), Housing Type and Neighbourhood Safety Behaviour Predicts Self-rated Health, Psychological Well-being and Frequency of Recent Unhealthy Days: A Comparative Cross-sectional Study of the General Population in Sweden. *Journal of Planning Practice and Research*. 32(3).
- Godwin O. I. (2019), Self-Rated Mental Health Status among Households in Ibadan Region, Nigeria. *African Journal for the Psychological Study of Social Issues* 22 (2).
- Hameda J., and Shibu R., Gabriela Z., (2015), Understanding the impact of the residential built environment design on inhabitants' wellbeing. Cardiff University, Cardiff, United Kingdom.
- Iyawa, A; Waziri, M; Jimme M. A. & Sambo, G.H(2020), Impact of Urban Growth on Green Space in Maiduguri Metropolis, Borno State (1975 – 2015). *ATBU Journal of Environmental Technology* 13, 2,
- Ingrid G. E. and Sherry G. (2015), The Future of Children. Housing, Neighbourhoods, and Children's Health. *Spring* 25(1).
- Jimme, M. A, Musa, A.A. and Sambo, G.H. (2019), Urbanization and its Effects on the Environment in Maiduguri Metropolis, Borno State, North East, Nigeria *Jalingo Journal of Social and Management Sciences*.1(3)
- Jack, E., J. (2016), *Mental Health: The Health of Population*. Pharmacy Law and Practice (5th Edition)
- Kyung-Young L. G. (2021), Relationship between Physical Environment Satisfaction, Neighbourhood Satisfaction, and Quality of Life in Gyeonggi, Korea. <https://www.mdpi.com/journal/land>
- Kimberly A R.; Nancy M W.; and Gary E. (2017), Housing and neighborhood physical quality: Children's mental health and motivation. *Journal of Environmental Psychology* 501016/j.jenvp.2017.01.004
- Mario S., Kiarri N. Kershaw L; Khadijah B., Elizabeth A. J., and Lisa M. L., *et al.* (2020), Importance of Housing and Cardiovascular Health and Well-Being: A Scientific Statement from the American Heart Association. <https://doi.org/10.1161/HCQ.000000000000089>
- Murtala, U. M and Nafiu, Z. (2021). Housing and Neighbourhood Quality Deprivation in Fagoji Area of Dutse, Jigawa State, Nigeria. *Journal of Pure and Applied Sciences (DUJOPAS)*, 7(1).
- Mukhtar A., Abdulkarim B,Z & Ladan T.A. (2021), Cost and Economic Benefits of Livestock Rearing in Maiduguri Metropolis, Borno State, Nigeria. *Journal of Geography* Vol. 8 | No. 1
- Masood A. B., Guang Y., Mugheer A., Muna A, Asma Al R. and Layla A.(2021), Hierarchical Regression of Wellbeing and Self-Rated Health among Older Adults in Abu Dhabi. *Int. J. Environ. Res. Public Health*, 18(8006). <https://doi.org/10.3390/ijerph181580>

- Moses, W. Ruby, Y. & Jean, W. (2017). Effects of Perceived Neighbourhood Environments on Self-Rated Health among Community-Dwelling Older Chinese *International Journal of Environmental Research and Public Health*.4(2)
- National Bureau of Statistics (2021), General Household Surveys (2018-2019)
- Nkwocha K. F, Iheukwumere S., Shettima M.K. & Audu A. (2020), An Autopsy of Housing Challenges in Urban Maiduguri *Journal of Waste Manage Xenobio*, 3(4):
- Nwachukwu D.O., Nwelue K.N.K., Ibekwe C.C., Anyanwu U.G., Obilor F., Ekwe, E. Okereke-Ejiogu, N, Ellah G.O, Ohajianya D.O. (2018), Effects of Household Waste Generation, Disposal and Management on Farmers' Health in Owerri Metropolis of IMO State, Nigeria. *International Journal of Environment, Agriculture and Biotechnology (IJEAB)*. Vol-3, Issue-5.
- Odunola, O. O., Jelili, M. O., Adejumobi, D. O., and Asani, M. A. (2015), Housing and Residents' Health in Ogbomoso, Oyo State, Nigeria. *Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*. 9(9).
- Oluwaseyi, O.B. (2019). Assessment of Housing Quality in Osun State, Nigeria. *European International Journal of Science and Technology* 8 (5)
- Owoeye, J.O and Ogundiran, A.O (2015), A Study on Housing and Environmental Quality of Moniya Community in Ibadan, Nigeria *International Journal of Physical and Human Geography* 3(1).
- Owolabi, B. O. (2019), Assessment of Housing Quality in Osun State, Nigeria. *European International Journal of Science and Technology* 8(5).
- Rufa'i A. A, Oyeyemi A, Salamatu U. , Saidu A, Aishatu A. , (2018), Physical activity and quality of life among adults in Maiduguri, Nigeria *Borno Medical Journal* Vol. 15 Issue 1
- Steve R., Lisa G.; Jon G.; Isobel A.; Pete S.; & Cam D. (2020), Housing as a Social Determinant of Health and Wellbeing: Developing an Empirically-Informed Realist Theoretical Framework. *BMC Public Health* 20, Article number: 1138 (2020)
- Stemmers, K., (2019). Public Health Frameworks: Social Determinants of Health and Socio-Ecological Model. Architecture for Wellbeing and Health. <https://www.youtube.com/watch?v=6CdiA5tLk-M>
- Teshome-Bahiru, W. (2004), Concept of Health, Disease, Illness and Therapy among the People of Addis Ababa. *Annals of African Medicine*. 3 (1): 28 - 31
- Tanzila A. and Faisal J. (2021), Assessing Health Damages from Improper Disposal of Solid Waste in Metropolitan Islamabad–Rawalpindi, Pakistan. *Sustainability* 2021, 13, 2717. <https://doi.org/10.3390/su13052717> <https://www.mdpi.com/journal/sustainability>
- Tendai C.; Janet K. S.; and Irene H. Y.(2018), How Neighborhoods Influence Health: Lessons to be learned from the application of political ecology. *Health Place Journal*. 10(1016).
- Victor A. O. (2020), Covid-19 Pandemic Outbreak and the Housing Environment in Lagos, Nigeria. Unilag Centre for Housing and Sustainable Development. Accessed on 10/06/2021).

Yingying L., Ann F., and Steven W. (2021), Built Environment and Self-Rated Health: Comparing Young, Middle-Aged, and Older People in Chengdu, China. *Health Environments Research & Design Journal*, 14(3).

Zan Y. and Yuqi F. (2019), Physical Attributes of Housing and Elderly Health: A New Dynamic Perspective. *International Journal of Environmental Research and Public Health*

Zhang, K. H.; Wong H and Lee J. Y; (2017), Living environment and quality of life in Hong Kong. *Hong Kong Geographical Association*