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Assessing the Effectiveness of Ventilation on Students' Wellbeing in Lokoja, Nigeria

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ABSTRACT

This study examined the effectiveness of ventilation on the well being of students in Lokoja. Stratified random sampling technique was adopted to select the target population of 240 students living in various lodges. Data acquired through the use of questionnaires that were distributed among the selected respondents. Relevant literatures and journals were also reviewed. The results revealed that some of the effects of poor ventilation in student lodges are respiratory problems, poor academic performance, discomfort, poor sleep quality, etc. Consequently, it is obvious that ventilation has an effect on the wellbeing of students. Recommendations made include compliance with proper building standards in order to have rooms that are well ventilated, maintaining proper hygiene in and outside the rooms, encouraging urban green belts, etc.

Keywords: Discomfort, effects, lodges, students, ventilation.

INTRODUCTION

Ventilation helps to remove or dilute indoor airborne pollutants coming from indoor sources. This reduces the level of contaminants and improves indoor air quality (IAQ). Poor ventilation in buildings has been identified as a major environmental risk factor for respiratory diseases, poor academic performance, and discomfort (Sasan et al, 2022). Student lodges in Lokoja are often characterized by poor ventilation, which may have negative effects on the health and academic performance of students. According to Rylance et al (2015), wellbeing effects linked with poor natural ventilation include: irritation of the eyes, runny nose and dry throat, headaches, dizziness, fatigue, respiratory diseases, etc. Hence, this research is conducted to investigate the effectiveness of ventilation on the wellbeing of students staying in lodges in Lokoja, Nigeria.

Literature Review

Ventilation plays a major role in creating a healthy and pleasant indoor environment, especially in modern space/airtight buildings. Hybrid ventilation systems are developed to combine the benefits of natural and mechanical ventilation, in order to increase the use of sustainable technologies, reduce energy consumption and to create healthy, comfortable indoor environment (Heiselberg, 2000 and Chenari et al, 2016). Natural ventilation is often well adopted by the occupants but may be inadequate in some climates and buildings. In the case of hybrid ventilation, mechanical components compensate the shortcomings of natural ventilation.

According to Batiment and Luxembourg, (2000), there are two things that the air in a location must provide for its people. First, there should not be much of a health risk from breathing the air. Second, rather than being stale, stuffy, and unpleasant, the air should be viewed as being fresh and pleasant. Human needs vary significantly from person to person. While some people do, others do not spend a significant portion of their time in the same indoor setting. Some people are extremely sensitive and have high standards for the air they breathe. People in other groups tend to be less sensitive and need less air. The degree to which human needs are addressed can be used to describe the indoor air's quality. If there are not many complaints about the air and the risk to health is minimal, the air quality is high. The quality of the air inside a building changes over time. It is affected by modifications in building operation, tenant activity, and exterior climate (Abdou and Budaiwi, 2009).

Aim and Objectives

The aim of this study is to assess the effectiveness of ventilation on the wellbeing of students in some selected student lodges in Lokoja. Bearing this in mind, the study will investigate causes of poor ventilation in the study area, analyze the effects on the wellbeing of the students, and make proper recommendations to mitigate the negative effects.

Research Methods

The research design is descriptive and relies on data collection from respondents through the use of close-ended questionnaires. Stratified random sampling technique was adopted to reach the target population who were students in the various lodges. A sample size was derived by means of a demographic formula that is used for determination of sample sizes (Otte, 2006). The formula is as follows: $\mathbf{N= P (100 - P) x Z^2/D^2}$

Where: N = required sample size
P = anticipated prevalence
D = allowable error estimate (desired precision)
Z = appropriate value from the normal distribution for the desired confidence level.

The research anticipated a minimum response rate of 80% and an allowable error estimate of within 5% of the true prevalence: 80 (100 - 80) x ($1.96^2/5^2$) = 240.

Therefore, a total of 240 students were taken as the sample size for the study. All the questionnaires were retrieved which form 100% of the distributed questionnaires.

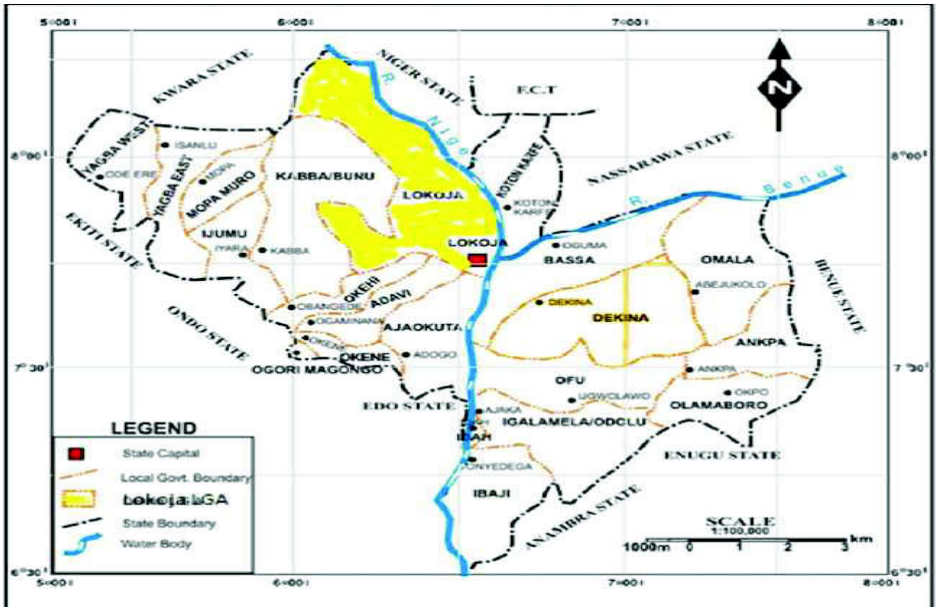
Analysis of findings was done using tables, charts and percentages were necessary.

Study Area

Lokoja is the capital city of Kogi State in Nigeria which lies at the confluence of the Rivers Niger and Benue. Lokoja lies about 7.8023° North of the equator and 6.7333° East of the Meridian. Residential districts are of varying densities, and the city has various suburbs such as Felele, Adankolo, Otokiti, Ganaja, etc. The town is situated in the Tropical Wet and Dry Savanna Climate Zone of Nigeria, and temperatures remain hot year-round.

Lokoja is also a Local Government Area of Kogi State with an area of 3,180 km^2 and a population of 195,261 at the 2006 census.

Fig. 1: Kogi State Showing Lokoja the Study Area



Source: Geography and Planning Department, Kogi State University (2019).

Result of Findings

This study investigated some aspects of the bio-data of the respondents. These include their present academic level, number of lodges they have stayed, as well as the type of apartments they have occupied. Other aspects investigated were the number of occupants in each room, causes and effects of poor ventilation in their lodges, in line with the objectives of the study. Simple tables, percentages and charts were used for analysis.

Response on Academic Level, Number of Lodges Stayed, Types of Apartment Occupied

240 students were selected as respondents. Findings were made to know the academic levels of the respondents, the number of lodges each of them has stayed as at the period of this study, and also the type of apartments they occupied.

From the survey, 72 students (33%) are in 100 Level, while 60 students (27%), 56 students (25%) and 31 students (12.5%) are in 200, 300 and 400 Levels respectively. Only 21 students (7.5%) are in academic levels above 400 Level. The highest number of students who turned out for the survey is an indication that the new comers are the ones who are more eager to participate in research works.

The survey also revealed that 79 students (33%) that have stayed in two different lodges recorded the highest frequency while the lowest was only 22 students who have stayed in five different lodges as at the time of this study. This is an indication of the financial capacity of the students to change their lodges as they advance in their academic pursuit.

Also, Table 1 shows that only two types of apartments are being occupied by the students in focus which are single and self-contain apartments. Single apartments are rooms built without toilets and kitchens inside the rooms while self-contain apartments are built with toilets and kitchens in each room. A total of 126 students (63%) rented single rooms while 74 students (37%) rented self-contain apartments. Again, financial capacity is a big factor responsible for the high number of respondents that rented single rooms, because of the higher rents paid for self-contain apartments.

Table 1: Response on Academic Level, Number of Lodges Stayed, Types of Apartment Occupied

Academic level/ Frequency					Number of Lodges Stayed					Types of Apartment Occupied/Frequency	
100	200	300	400	Above 400	1	2	3	4	5	Single room	Self-contain
72 (30%)	60 (25%)	56 (23%)	31 (13%)	21 (9%)	51 (21%)	79 (33%)	55 (23%)	33 (14%)	22 (9%)	146 students (61%)	94 students (39%)
Total = 240 students											

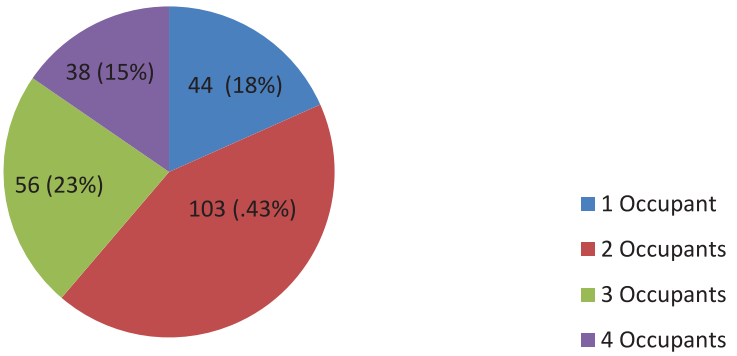
Source: Field Survey, 2023.

Number of Occupants Per Room

A survey was carried out to ascertain the number of occupants that stay in each of their apartments (both single and self-contain rooms). This is displayed in Fig.1.

34 (17%) respondents stay as single occupants, while 93 (46.5%) respondents stay as two occupants in a room. Also, 46 (23%) respondents stay as 3 occupants, while 27 (13.5%) stay as 4 occupants in a room. This obviously will affect the ventilation in each room as the more the occupants, the lesser the ventilation available.

Fig. 2: Number of Occupants Per Room



Source: Field Survey, 2023.

Factors Affecting Ventilation Identified by Respondents

Further studies were carried out to know the factors affecting ventilation in the students' lodges. The following causes were identified:

●Non Conformity With Standard Building Plans And Construction Methods: 31 (13%) respondents are of the opinion that building plans deficient construction methods that do not conform with standards is a major factor affecting ventilation. These include inadequate number of windows, small room sizes, overcrowded number of rooms within a lodge (inappropriate occupancy ratio), improper structural arrangement of buildings, use of poor/inferior or substandard building materials, etc. Many students' lodges are not built in compliance with proper planning and building construction standards because most landlords execute building plans themselves and end up erecting poor quality structures.

●Overcrowding: 76 (32%) respondents made it known that overcrowding by occupants in the rooms is the cause of poor ventilation. This was more emphatic on the respondents that fall into the category of 3 or 4 occupants in a room. Many students co-habit because they pay their rents jointly. This is a great pointer to the fact that many of them cannot afford to stay alone due to high rent charges by landlords.

●Inadequate Electricity Supply: 85 respondents (35%) opined that undoubtedly, inadequate electricity supply affects ventilation. They argued that if there is constant electricity supply, the effects of heat and the resultant discomfort will be minimal. Undoubtedly, some of the students are able to provide gadgets or appliances that may help ameliorate the quality of ventilation.

●Insufficient/lack of HVAC devices: 19 respondents (8%) opined that their inability to acquire Heating, Ventilation and Air Conditioning (HVAC) devices like ceiling or standing/table fans that causes poor ventilation. Infact, some of the respondents in this category argued that some students cannot even afford any of such devices in their rooms at

all. In their opinion, this will definitely obstruct the effectiveness of ventilation as supply of fresh air will be limited, especially in rooms that are overcrowded.

●Unhygienic environment: 14 (6%) respondents were of the opinion that the surrounding unhygienic environment causes poor ventilation. They cited the presence of improper waste dump sites created by students, different spots littered with household dirt, stagnant pools of dirty water, etc as factors that impede quality of fresh air and creates the condition that can impede proper ventilation and quality hygiene.

●Sparse vegetation: 15 (6%) respondents pointed out the fact that sparse and unkempt vegetation around students' lodges is also responsible for poor ventilation. They are of the opinion that total absence or sparse availability of trees, unkempt flower lawns and green belts, etc is a big factor responsible for the flow of air in the study area.

Effects of Poor Ventilation on Students

Table 2 shows the response of respondents on the effects of poor ventilation. Some of the effects identified include increase in respiratory problems, allergies, poor academic performance, and discomfort, among others. It is observed from Table 2 that general discomfort ranked as the most prevalent effect of poor ventilation with 74 respondents citing cases of headaches, neck pains, itchy eyes, faces and bodies etc. On the other hand, poor academic performance was regarded as the least prevalent effect with 14 respondents citing a case of inconvenient reading environment.

Table 2: Effects of Poor Ventilation on Students

S/N	Effects	Number of Respondents	Cited Cases
1	Respiratory problems	21	Nasal infections, shortness of breath.
2.	Allergies	37	Heat rash, dry throats,
3	Poor academic performance	14	Inconvenient indoor reading environment
4	General Discomfort	74	Headaches, neck pains, fatigue, drowsiness, dizziness.
5	Damp, musty odors	16	Smelly rooms, body odours
6.	Poor sleep quality	53	Sleeping outside, insecure act of leaving doors open.
7	Unstable frame of mind	25	Unhappiness, brooding, concentration disorders.

Source: Field Survey, 2023.

CONCLUSION AND RECOMMENDATIONS

In conclusion, this study has been able to assess the effectiveness of ventilation on the wellbeing of students in Lokoja, Nigeria. It is clear that improper ventilation can lead to severe outcomes like respiratory problems, general discomfort, poor academic performance, etc. Therefore, it is essential for ventilation to be effective and adequate to enhance the wellbeing of the students. Hence, proper ventilation should be provided in student lodges to avoid the negative effects of poor ventilation.

Therefore, the study recommends educating students on the importance of proper ventilation, with emphasis on the need to avoid overcrowded habitation, and by installing proper and adequate ventilation systems like ceiling/standing/table fans in their rooms. It is also important that proper hygiene and environmental cleanliness should be encouraged among students.

Regulatory agencies in charge of monitoring building projects should also ensure that buildings are well designed and constructed to comply with minimum standard, as well as building with proper ventilation in mind. Emphasis should be laid on fixing standard window sizes in rooms to allow proper air flow. In addition, building engineers/architects should ensure that buildings are erected in such a manner that the windward and the leeward directions of wind are optimally utilized. It is also very important that each room should have adequate number of windows that are well positioned across but not directly opposite each other.

There should also be an increased awareness on the importance of preserving urban green belts or vegetation spots in areas where students' lodges are sited. This will surely improve the flow of indoor air quality.

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