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AN EXPLORATION OF CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) PRINCIPLES FOR ENHANCING SAFETY AND SECURITY IN THE DESIGN OF ADAMAWA STATE UNIVERSITY STUDENTS' HOSTEL, MUBI

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AN EXPLORATION OF CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) PRINCIPLES FOR ENHANCING SAFETY AND SECURITY IN THE DESIGN OF ADAMAWA STATE UNIVERSITY STUDENTS' HOSTEL, MUBI

Abstract

People across the world face growing insecurity, violent conflict spreading and intensifying and the natural systems on which human life depends on, is in jeopardy. Also, today the security condition of student hostel has become one of the major challenges facing Nigerian institutions, with continual media coverage of the state of insecurity of the students' hostel, level of theft, burglary, abductions, and kidnappings. This research set out to proffer solutions to the rising insecurity challenges in the students' hostel. This was achieved through the development of a framework from CPTED, on architectural strategies used to deter crime from thriving in the students' hostel environment. A user perception survey was carried out using questionnaire issued to occupants of the various hostels. A case study was also carried out using visual survey and checklist to identify safety and security inadequacies in the buildings. Findings from questionnaire and case study revealed that the perceived level of safety was higher in Abubakar Tafawa Balewa University, Bauchi, then University of Maiduguri and least perception of students' safety and security seen in Adamawa State University, Mubi. Hence, confirming the need to improve the impediment of variables like perimeter control, building configuration, external wall design, window design and site planning and layout, in respect to CPTED principles in the design of student hostel buildings in Nigeria.

Keywords

CPTED, Safety and Security, Students' Hostel Design

1. INTRODUCTION

The political, economic and social systems of a country create the conditions for security and insecurity. Security is a first necessary precondition for the development of human beings and society. Therefore, security is the most basic need of human beings and societies. For every country, housing policy represents an important and constituent part of its social policy and its strategy of maintaining personal security and suitable living standards for its citizens, which form part of the basic needs for a secure environment (Zavora and Chepurny, 2014; Korsakienė, Tvaronavičienė, 2014), and this is not a case that is left out for housing that relates to the student hostels in some countries. Security has been found to be of considerable impact on the lifestyle and the living standards of general population of people who reside in student hostels (Włodarczyk, 2015).

The importance of student housing covers the entire aspects of student human life. Primarily, it involves physical protection from exposure to certain risks and hazards and for conducive learning environment, which ordinarily may be regarded as shelter. In all, students' hostel as a unit of the academic environment of man, has a profound influence on the health, social behaviour, satisfaction, general welfare of the academic community and sustenance of same community for the future generations. Hostel has been a major area of government concern with increasing student population as a result of increasing interest in the higher institution of learning over the years. The rise in population which has led to various problematic conditions of student housing which range from inadequate infrastructure facilities to overcrowding, has brought about increased crime rates in student hostels, violence and all centred on the security of lives and properties.

Tertiary education is pictured as one of the catalysts to economic growth and development. In view of this, countries around the globe are putting in place effective measures to promote security of the tertiary education. However, as an attempt to boost tertiary education, students' hostel and welfare become important bedrock which needs considerable attention by all stakeholders. Additionally, universities, through their competition to increase enrolment, inadvertently become contributors to the upward spiral criminal activity due to their lax acceptance policy (Chekwa, Thomas and James, 2013). This has led to a great challenge in the provision of students' hostel (accommodation) and promoting students' welfare (security) for many tertiary institutions today, thus the need for extensive research. There has also been the need for measures to provide and improve students' hostel security in tertiary institutions as research in the past has shown the relationship it has with a vital and noticeable impact in improving overall students' academic performance (Ekaette, in Anonkye & Mohammed, 2016).

Nigerian universities frequently record incidences of crime, conflict and violence. Some of the consequences of such have become a major concern to a lot of stakeholders in the education sector and the United Nations. Lawal (2018) reports that, of the 10.5 million children in Nigeria who are out of school, 60 per cent are in the north, and most of them are girls; and has been the primary target of the deadly Boko Haram sect and brutal campaign against Western education. Violence and criminal activities usually in the forms of petty theft, rape and prostitution, murder, grievous wounding, burglary, armed robbery and kidnapping are assuming dangerous tendencies as they threaten lives, properties, the sense of wellbeing, peace and security in students' hostels eventually reducing the quality of life of students (Ujene and Akpanamasi, 2014). Therefore, exploring ways and strategies for a more secure students' hostel environment is a priority for sustainable development of any nation, and Nigeria is no exception.

In recent time, the attention of researchers is on environmental criminology which is focused on the physical design and layout of urban living environments (Yermus, 2013). These are the principal factors that determine why some places are more vulnerable to crime than others and this emphasizes the fact that the built environment is more easily manipulated, making it potentially more influential to security challenges. In fact, Yermus (2013), stated that the role environmental design plays, in creating opportunities for crime prevention as in Oscar Newman's defensible space theory through 'Secured by Design' scheme.

Crime prevention through environmental design (CPTED) is one of the most popular strategies for improving safety and security of buildings. The major purpose of CPTED is to deter potential criminals by changing and modifying environments. It is based on the design and environmental psychology belief that human behaviour can be influenced by the surrounding environment (Cozen, 2005). Interventions based on the principles of CPTED attempt to reduce the occurrence of crime and violence and promote positive interactions with design and judicious use of the built environment (Jeffery, 1977). CPTED principles rely on 3 basic overlapping strategies: controlling access,

increasing opportunities for casual surveillance, and promoting a sense of ownership. The effects of these strategies can extend beyond reducing opportunities for crime to enhance positive social interactions and create a sense that people care and are involved in what happens within their environment. Environmental strategies designed to reduce crime and improve quality of life have been applied in diverse settings, including communities, industrial areas, public transportation, and businesses. In addition, few studies have been conducted to test the association between CPTED constructs and violent behaviours, particularly in schools. Moreover, most previous studies have evaluated CPTED application at the neighbourhood level, and this research aims at establishing CPTED as a strategy for improving safety and security of students' hostels.

This security is not just restricted to attack from external forces, but also the level of security within the school environment to avoid crises and riots, theft, ethno-religious violence; violence against staff and students; proliferation of religious sects spreading religious intolerance and violent widespread of insecurity in the hostels (Alemika, 2015).

The aim of this research is to explore the CPTED principles as a strategy for enhancing safety and security in students' hostels with a view to finding a sustainable solution to the security challenges in tertiary institutions.

2. RESEARCH OBJECTIVES

- i. To understand CPTED and its principles to see what has changed from literature.
- ii. To evaluate the user perception of safety and security in student hostel facilities.
- iii. To propose a CPTED student hostel-security theoretical framework to assess the level of security in students' hostels in selected cases.
- iv. To demonstrate the findings in the design of a secure student hostel facility for Adamawa state university, Mubi.

3. RESEARCH QUESTIONS

- i. What is CPTED, what are the CPTED principles and what has changed from literature?
- ii. What is the user perception of safety and security in students' hostel?
- iii. How can safety and security and security be assessed in students' hostel in the selected cases?
- iv. What architectural design can be made for a safe and secure students' hostel?

4. METHOD

4.1 Research Design

Research which can be to investigate an idea systematically and methodologically aims at proffering solution to problems and contributing to knowledge. The research procedure is peculiar to the research activities which clearly itemize the key issue in the research (Clarke, 2005). This study will consist of both approaches, The quantitative and qualitative methods. The instruments of data collection used include the following: in-depth interview, visual survey, questionnaire survey with the aid of secondary data. Case study approach will equally be used during the field work.

4.2 Source of Data

The sources of data for this research are undergraduate students and the administrative staff in residence halls in the case studies.

4.4 Mode of Data Collection

In the context of this research, there are two modes of data collection. They are survey method using the questionnaire and case study using checklist, interview and observation.

4.5 Instruments for Data Collection

Data in this research will be collected in two parts. The first part will be collected during the observation of the undergraduate student hostel in the selected schools, using a checklist containing the variables that affects student safety and security. While the second part will be obtained from the respondents with the use of a structured questionnaire. The questionnaire will be structured to collect information from undergraduate students who are the users in the context of this study.

5. CASE STUDY

Kazdin in Jacob (2017) opined that case studies present naturalistic and uncontrolled methods which places them as a unique and valuable source of information that complements and informs theory, research and practice. For the purpose of this research an explorative study will be applied to comparatively, explore CPTED security strategies tending towards design in selected cases: Abubakar Tafawa Balewa University, Bauchi, University of Maiduguri, Borno and Adamaawa state university, Mubi.

5.1 Qualitative Approach

Veal as cited by Jacob (2017), postulates that case study selections are comparative to sampling in a quantitative research and that such cases were usually purposively selected. Oluigbo (2010), observed that it must possess some intrinsic features or qualities which are in relation with the phenomenon under investigation.

The Northeast has been faced with rising issues of insecurity and the universities also has decried issues of insecurity, threats to lives, property leading to instability of students and disrupted academic activities and also a lack of accommodation for students of the institution, (Daily Times, 2018).

Hence the adopted sampling technique carried out on this research will be based on purposive sampling which have related peculiarities. Therefore, three public universities were selected: (Adamawa State University, Mubi, being the first State Government owned University in the North East sub-region of Nigeria, University of Maiduguri, Borno and Abubakar Tafawa Balewa University, Bauchi, which are the most prominent Universities in the Northeast region.

The selection criteria for the case studies on this research were based on undergraduate hostels in purposely selected universities that satisfy the following criteria.

1. Location of university: Based on this, undergraduate hostels in universities located in the North East sub-region of Nigeria were selected.
2. Selected cases must be government owned universities.

5.2 Quantitative Approach

The instruments used to collect data are questionnaires, interviews, physical survey and checklist. The CPTED requirements for students' hostels were gotten from literature review, while effectiveness level present in the case study facilities was gotten from the visual checklist. The visual checklist was structured to check the rate at which the design conformed with the CPTED Principles as gotten from literature from have been met in the existing hostels in the selected university. The results gotten from the questionnaires will answer research question two.

Each item on the checklist has been rated as 0%, 25%, 50%, 75% and 100%. 0% indicates the facility/requirement is not available/has not been provided; 25% indicates it was provided in the initial design, but it is no more available, no more in use or it is deteriorated; 50% means it has been provided and still in use but inefficient and inadequate; 75% means it has been provided, still in use and close to being efficient and adequate and 100% means it has been provided, it is in use and it is efficient and adequate.

A structured questionnaire was used as instrument for data collection which was developed from the five (5) major CPTED principles from literature, to get the satisfaction level that will be derived by the students when these CPTED principles are fully implemented in the hostel design and also establish the extent to which these universities' hostels are compliant with the CPTED principles for enhanced security. The questionnaire used in this study is open ended, divided into two major sections. The first section contains the respondent's demographics which are gender, age range, name of hostel, number of students per room, and the second section divided into five major categories, further explaining the principles of CPTED. The second section sought to answer research question two. It seeks their perception as to what level the CPTED principles which were obtained from literature will affect the level of security and crime control in the hostel. Each statement has been rated on a Likert scale from 1 to 5.

1 means that the responded strongly disagrees with the statement; 2 means that the respondent disagrees with the statement made; 3 means that the respondent has no idea about the statement, meaning the respondent is neutral about that statement as perceived; 4 means the

respondent agrees with the statement; and 5 means the respondent strongly agrees with the statement.

5.3 Population/Sample Size Selection Criteria

The population size of this study is the undergraduate students hostel of three public universities in North-East Nigeria, Adamawa State University, Mubi (ADSU), University of Maiduguri (Uni-Maid), Borno and Abubakar Tafawa Balewa University (ATBU), Bauchi. Targeting a true representation of the sample population, 525 questionnaires were distributed to the three universities' students' hostels; 374 (71.2%) were retrieved from Adamawa state university, 388 (73.9%) and 370 (70.47%) from University of Maiduguri and Abubakar Tafawa Balewa University, Bauchi respectively, and employed for analysis.

5.4 Framework and Variables

The framework for this research will be adapted from the SBD Physical Security Requirements and Security strategies evaluation framework (Ujene and Akpanamasi, 2014). Also, in the design to solve the security challenges, the defensible space model (Steventon, 1996) will be adopted. As shown in table 3.1 and figure 3.1, a student security

Table 1: Student Hostel Security Framework

S/N	Territoriality	Natural Surveillance	Access Control	Maintenance	Geographical Juxtaposition
1.	Perimeter and External Areas	Telecommunications and utility access control	Burglary Gate	Burglary Proof	Safe and strong adjoining areas
2.	Tall/ Short fence	Availability of windows	Doors/ Security doors	Lighting	Activities of adjoining communities
3.	Electrified wire fence	Doors and windows enhance natural surveillance	Window	Doors	Location of hostels
4.	Hostel activities	Hostel room design	Pedestrian Walkways	Windows	Threat by adjacent buildings
5.	Zoning of spaces	Obstruction by landscape elements	Access for persons with disabilities	Fire safety and emergency routes	Influence of surrounding buildings
6.	Hostel boundaries	Hostel design	Intruder systems	alarm Roof Construction	Nearby land users and activities
7.	Landscaping		Access control and security staff	for and Building Envelope	
8.	Use of spaces		CCTV/Security camera		

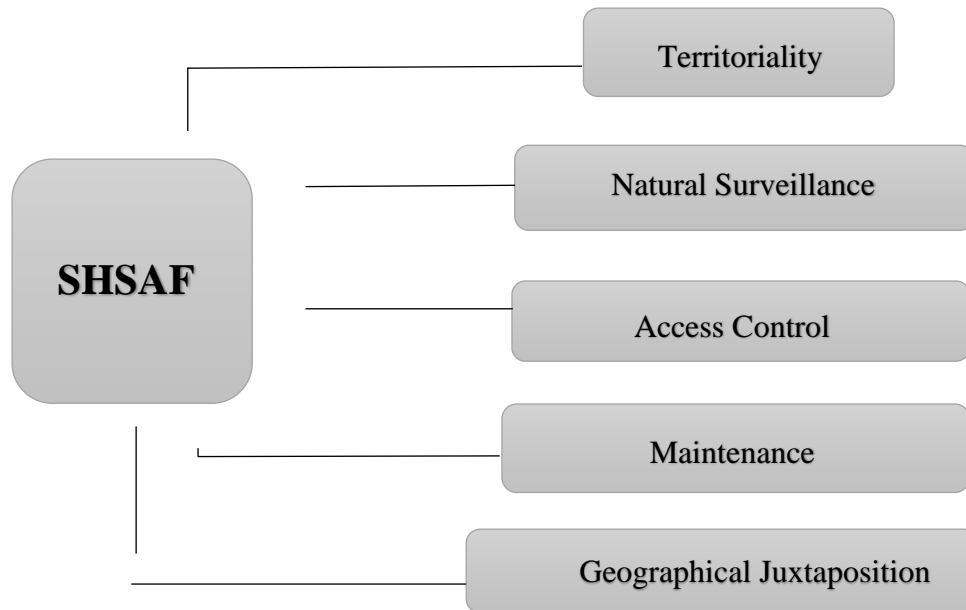


Fig.1: Students' Hostel Security Assessment Framework
Adapted from (SBD, 2014 and Ujene and Akpanamasi, 2014)



Fig.2: Image showing courtyard design with enhanced courtyard visibility for
Natural Surveillance in hostel area
Source: Author, 2019



Fig.3: Showing surrounding areas of Hostels with overgrown shrubs in Adamawa State University
Source: Author, 2019.



Fig.4: Showing a view to the hostel entrances with doors and windows in place for ATBU
Source: Author, 2021



Fig.5: Showing Courtyard design with minimal trees that do not obstruct natural surveillance in University of Maiduguri
Source: Author, 2021

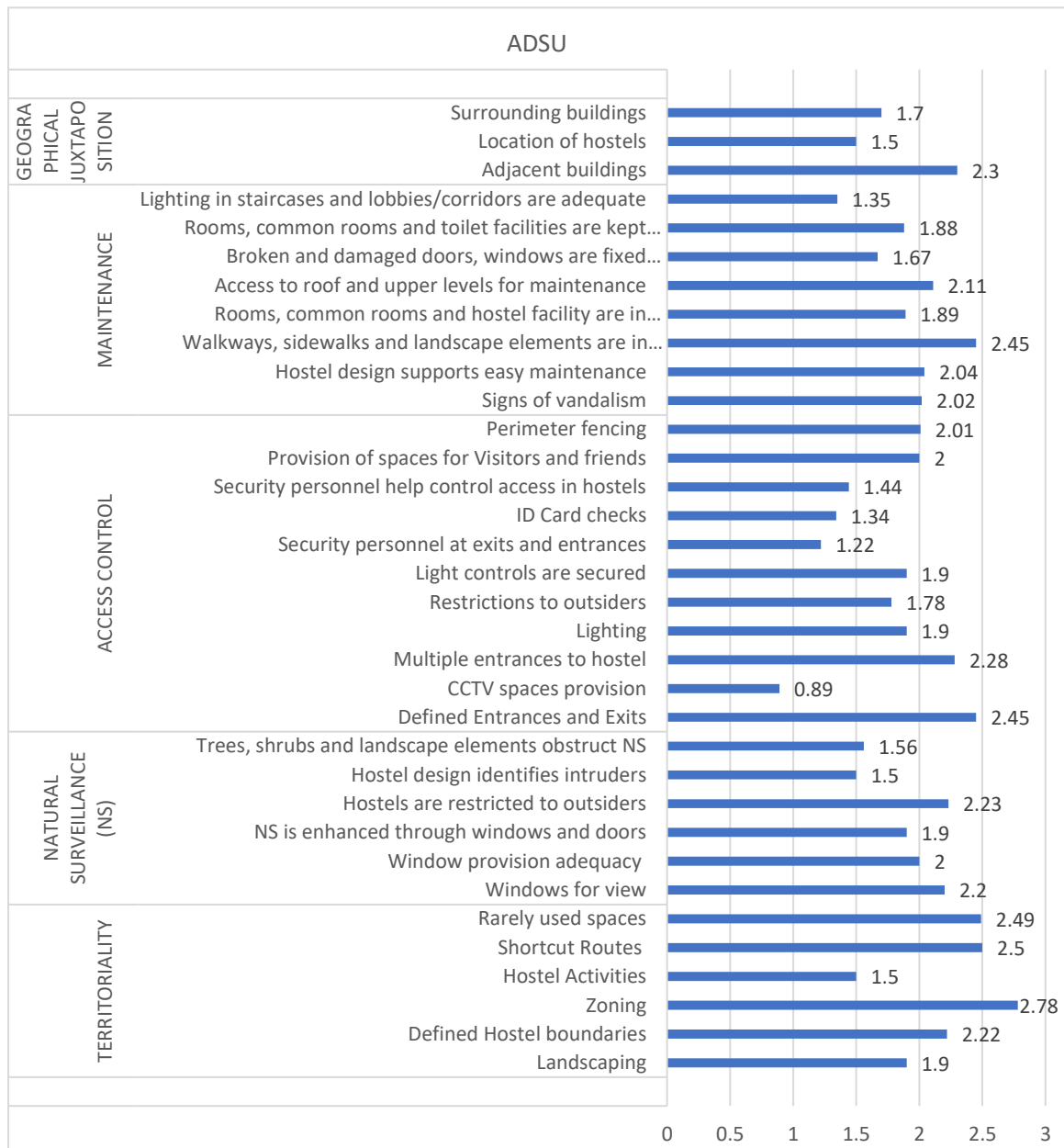
6. RESULTS

Table 2: Summary of the Respondent's perception on CPTED in the Hostel, in the three Universities.

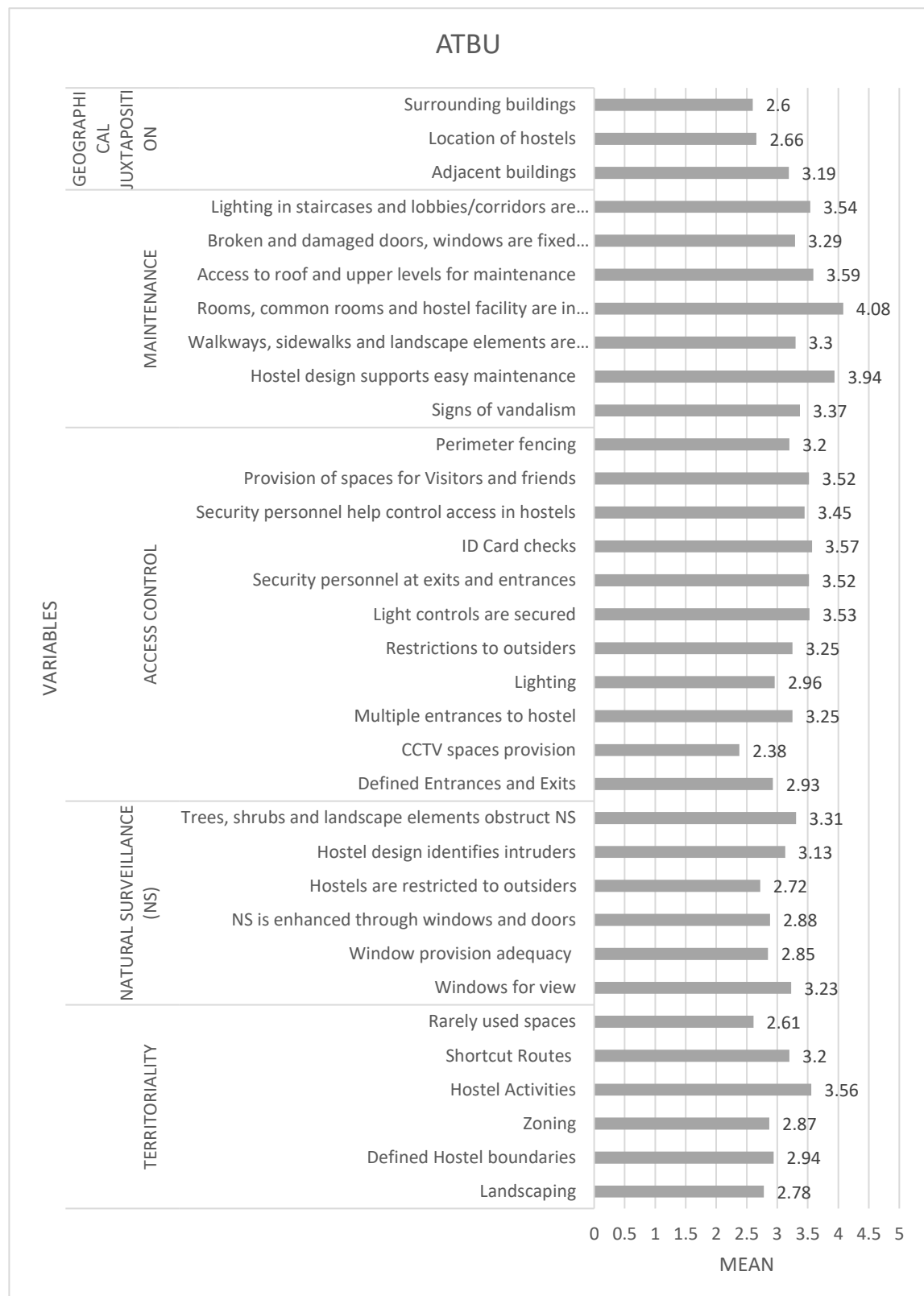
S/N	Variables	Items/factors	Mean Scores			Average Mean Score
			ADSU	Uni Maid	ATBU	
A.	TERRITORIALITY	Landscaping	1.90	3.38	2.78	2.68
		Defined Hostel boundaries	2.22	3.45	2.94	2.87
		Zoning	2.78	3.22	2.87	2.95
		Hostel Activities	1.50	3.11	3.56	2.72
		Shortcut Routes	2.50	3.21	3.20	2.97
		Rarely used spaces	2.49	2.83	2.61	2.64
B.	NATURAL SURVEILLANCE (NS)	Windows for view	2.20	3.01	3.23	2.81
		Window provision adequacy	2.00	3.15	2.85	2.66
		NS is enhanced through windows and doors	1.90	2.82	2.88	2.53
		Hostels are restricted to outsiders	2.23	2.74	2.72	2.56
		Hostel design identifies intruders	1.50	2.69	3.13	2.44
		Trees, shrubs and landscape elements obstruct NS	1.56	2.76	3.31	2.54
C.	ACCESS CONTROL	Defined Entrances and Exits	2.45	2.50	2.93	2.62
		CCTV spaces provision	0.89	2.89	2.38	2.05
		Multiple entrances to hostel	2.28	2.72	3.25	2.75
		Lighting	1.90	2.58	2.96	2.48
		Restrictions to outsiders	1.78	3.31	3.25	2.78
		Light controls are secured	1.90	3.00	3.53	2.51
		Security personnel at exits and entrances	1.22	2.82	3.52	2.52
		ID Card checks	1.34	2.91	3.57	2.60
		Security personnel help control access in hostels	1.44	2.90	3.45	2.59
		Provision of spaces for Visitors and friends	2.00	3.25	3.52	2.92
D.	MAINTENANCE	Perimeter fencing	2.01	3.30	3.20	2.83
		Signs of vandalism	2.02	3.12	3.37	2.83
		Hostel design supports easy maintenance	2.04	2.81	3.94	2.93

	Walkways, sidewalks and landscape elements are in excellent condition	2.45	3.15	3.30	2.96
	Rooms, common rooms and hostel facility are in excellent condition	1.89	3.25	4.08	3.07
	Access to roof and upper levels for maintenance	2.11	3.01	3.59	2.90
	Broken and damaged doors, windows are fixed immediately	1.67	3.19	3.29	2.71
	Rooms, common rooms and toilet facilities are kept clean always	1.88	2.95	3.72	2.85
	Lighting in staircases and lobbies/corridors are adequate	1.35	3.35	3.54	2.74
E.	ADJACENT BUILDINGS	2.30	2.89	3.19	2.79
	Location of hostels	1.50	3.31	2.66	2.49
	Surrounding buildings	1.70	3.10	2.60	2.44

Source: Author's field work (2019)



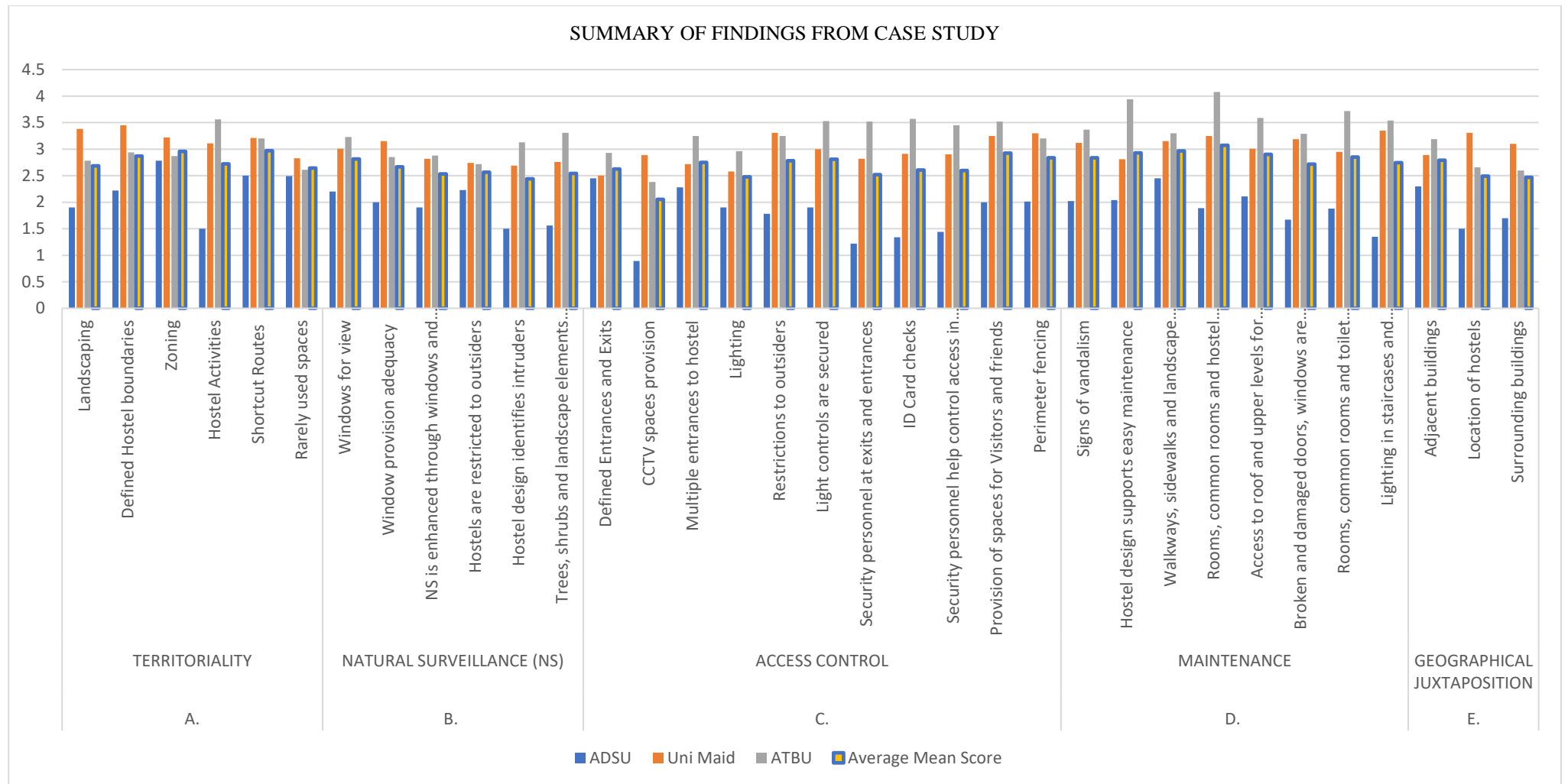
Case Study 1
Source: Author, 2021



Case Study 2
Source: Author, 2021



Case Study 3
Source: Author, 2019



Summary of Findings from Case Study

Source: Author, 2019

The result from the mean score in table above shows that 34 items have mean value below 2.5 for ADSU. This means that respondents in this particular school hostel, have highlighted key issues that border around safety and security of the students' hostel, which need to be worked on and improved upon by designers and allied construction practitioners.

In response to the second research question concerning the user perception of safety and security in North East Nigeria, results from this summary indicates that the user perception of safety and security is in the provision of *spaces that are defined for different purposes; well-defined entrances and exits, CCTV spaces, improved lighting design conditions, well designed security units or spaces within the hostels (to monitor entrances and exits); hostel design that supports easy maintenance, and adequate lighting in places prone to more crime such as staircases and corridor, perimeter fencing*. All these requirements will be considered and provided in the proposed design of ADSU students' hostel.

Notably, during the field work, most of the respondents showed their concern with the absence of CCTV spaces provided to help check crime in the hostels seeing the advent of technology. As a result, should be well factored in the proposed design.

7. SUMMARY AND DISCUSSIONS

From the responses gathered from the students, it can be deduced that both soft and hard landscape design elements, have not been well thought, designed and applied to varied extents in all the hostels in ways that should help in curtailing crime.

It can be deduced that the lack of well-defined and controlled access, as well as the absence of CCTV surveillance spaces or control rooms and the lack of sufficient lighting of passages and corridors, can only provide an environment for criminal activities to thrive. This implies that in all the hostels under consideration, there are one or two groups that carry out activities under the cover of the dark. It can also be deduced that the absence of perimeter fences can freely allow for easy access to students' hostels by intruders.

Research findings have found out that the lack of maintenance as gathered from the responses of the students clearly supports the "Broken Window Theory". The use of CCTV, well designed spaces that can create a sense of Natural Surveillance, would help in the monitoring of criminal activities, and can as well help in providing surveillance for proper accountability of the activities of the workers who are supposed to keep the facility clean, which could also further prevent deterioration of the hostels.

The data concerning geographical juxtaposition, 29.1% of the respondents across the seven hostels say adjacent buildings pose a threat to the students. The perception of the respondents can be a further confirmation that there is a need for perimeter fencing to at least provide a safe environment for the students, specifically during lecture hours when they must have gone out of their hostels.

Other users having to use the same spaces with visitors can be a major cause of criminal activities in the hostel environment. 28.6% of respondents indicated that there is no clear-cut separation of spaces provided for private and public use. 31.5%, however, portray that uncommunicative building appearances and poorly applied signage are the major reasons while criminal activities thrive. From that, the research also reveals that a well organised secure design, is a very effective and necessary tool in the coordination of activities in the hostel environment in order to be able to identify positions for parking as well as for other activities. The respondents expressed that no path have been defined to coordinate circulation at their hostels.

In conclusion, the need for effective crime control in public places is of paramount importance. It has been noticed that the hostels attract a lot of unknown intruding crowd, which in some cases is so intense that there is serious danger within the students' vicinities. With these in sight, there is a need for architectural designs to take into cognizance some of the loopholes spotted by this research in order to make amends in the future when constructing facilities. It is also important that future design briefs should contain a proposal of a students' building with enhanced capacity that still has all it takes to serve as a public and private facility, but has lower risk in terms of providing a shield for criminal activities to thrive, while at the same time satisfying the spatial need of a safe dwelling centre, which would in turn provide a peaceful haven for academic activities; with special consideration to the management of pedestrian and vehicular traffic in the landscape with proper access control design mechanism.

To a reasonable extent, it can be deduced that the required considerations for a Crime-free architectural space, were present but not adequately seen to be applied in a way that is both aesthetically pleasing and also, help control crime. Paths for pedestrian and vehicular circulation need to be well-defined with pavements and lined with plantings, which were observed to be done in a manner that obstructed views for natural surveillance. Buildings on the site have to be linked with these paths and there is a need for adequate signage, indicating the facilities for various functions on the site, aiding definition of spaces. There also should be adequate and well controlled entrances and exits into the facilities, with presence of more detailed and well-designed security room spaces and CCTV rooms which helps with the modernization and use of technology, and also is supported by designing spaces to help create and communicate a proper sense of ownership, territoriality for improved security.

8. CONTRIBUTION TO KNOWLEDGE

The research has shown the following contributions to knowledge;

- i. The research has shown that most students' hostel designers have not put security considerations in the design of students' hostels, further stressing the need for more designs of students hostels to take into consideration security and safety of students in the hostels.
- ii. The development of a conceptual research and design framework that can be used in the assessment of perception of security in students' hostel which include: access control; natural surveillance; territorial reinforcement; maintenance; window design, architectural configuration; functional and well-defined space design; and planned layout and landscape design.
- iii. Design of parking areas must be separate from the main building structure to reduce intrusion of the building and to curtail movement within the core spaces of the building.
- iv. Circular architectural configuration of building aids in providing a more secure building form for the core and with a window design of minimum 1800mm x 1800mm to enhance views for natural surveillance for the building exterior.
- v. A more secure hostel design that factors safety, security and functionality, which is a durable option to reduce perceived crime in students' hostels. Due to this dynamic nature of the design, it can be reused for paramount demands in other institutions and building typology.

9. RECOMMENDATIONS

The following are recommendations can be implemented with respect to security of students' hostel:

- i. The use of the CPTED principles in the design of students' hostel should come at the initial stage of preliminary designs to help understand and improve the inadequacies of the proposed site and building design, with respect to safety and security.
- ii. Trees, whether growing singly or in clusters provide a wide range of benefits, however, there should be careful selection of landscape elements on site plan and layout to avoid indiscriminate planting and use of landscape elements that obstruct views for natural surveillance and access control. Evergreen trees with that grow beyond 2.5 meters must be avoided in designs, shrubs with spiky edges can be used to demarcate spaces that should not be transitioned into.

10. AREA FOR FURTHER RESEARCH

This research has been able to effectively highlight key CPTED Principles and to integrate them in mitigating threats and security challenges of students' hostel designs to create a safe space for study and learning to continue, thus this can give room for further building typologies to be explored as safety is important to not just students but all human species. Other security issues that tend to arise from different building typologies such as supermarkets, train stations, airport terminals and official complexes.

CONCLUSION AND RECOMMENDATION

This study set out to establish students' perception on the level of safety and security with architectural relevance that CPTED plays a role in enhancing the students' safety and security. From the responses gathered from the students, it can be deduced that both soft and hard landscape design elements, seem to not have been well thought, designed and applied to varied extents in all the hostels in ways that should help in the curtailing crime, also designers. Security architecture may seem to be a multi-dimensional issue, but the demand for hostels due to rising population of students, therefor will foster integrative approach of the CPTED design approach for a secure students' hostel design.

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