

**GREEN BUILDING MATERIALS AND THEIR HEALTH BENEFITS IN
THE DESIGN OF INTERNALLY DISPLACED PERSONS (IDP) CAMP,
LAGOS, NIGERIA**

**AKINDOYIN, PRAISE OJUOLUWA
(16CA021130)
B.Sc Architecture, Covenant University, Ota**

JULY, 2023

**GREEN BUILDING MATERIALS AND THEIR HEALTH BENEFITS IN
THE DESIGN OF INTERNALLY DISPLACED PERSONS (IDP) CAMP,
LAGOS, NIGERIA**

BY

**AKINDOYIN, PRAISE OJUOLUWA
(16CA021130)
B.Sc Architecture, Covenant University, Ota**

**A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE
STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENT
FOR THE AWARD OF MASTER OF SCIENCE (MSc.) DEGREE IN
ARCHITECTURE IN THE DEPARTMENT OF ARCHITECTURE,
COLLEGE OF SCIENCE AND TECHNOLOGY, COVENANT
UNIVERSITY, OTA, OGUN STATE**

JULY, 2023

DECLARATION

I, AKINDOYIN, PRAISE OJUOLUWA (16CA021130) declare that this research was carried out by me under the supervision of Dr. Eghosa N. Ekhaese of the Department of Architecture, College of Science and Technology, Covenant University, Ota, Nigeria. I attest that the dissertation has not been presented either wholly or partially for the award of any degree elsewhere. all sources of data and scholarly information used in this dissertation are duly acknowledged.

AKINDOYIN, PRAISE OJUOLUWA

Signature and Date

ACCEPTANCE

This is to attest that this dissertation is accepted in partial fulfilment of the requirements for the award of the degree of Master of Science in Architecture in the Department of Architecture, College of Science and Technology, Covenant University, Ota, Nigeria.

Ms Adefunke F. Oyinloye
(Secretary, School of Postgraduate Studies)

Signature and Date

Prof. Akan B. Williams
(Dean, School of Postgraduate Studies)

Signature and Date

CERTIFICATION

We certify that this dissertation titled " **GREEN BUILDING MATERIALS AND THEIR HEALTH BENEFITS IN THE DESIGN OF INTERNALLY DISPLACED PERSONS (IDP) CAMP, LAGOS, NIGERIA**" is an original research work carried out by **AKINDOYIN, PRAISE OJUOLUWA (16CA021130)** in the Department of Architecture, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria under the supervision of Dr Eghosa N. Ekhaese. We have examined and found this work acceptable as part of the requirements for the award of Master of Science in Architecture.

Dr. Eghosa N. Ekhaese
(Supervisor)

Signature and Date

Prof. Adedapo A. Oluwatayo
(Head of Department)

Signature and Date

Dr. Clement O. Folorunso
(External Examiner)

Signature and Date

Prof. Akan B. Williams
(Dean, School of Postgraduate Studies)

Signature and Date

DEDICATION

This dissertation is dedicated to God, who is my source of strength, wisdom, inspiration and knowledge. My heartfelt gratitude goes to my parents, Pastor and Pastor (Mrs.) R.A Akindoyin and sisters; Success, Life, Peace and Breakthrough for their unending support and encouragement in diverse ways possible. To my colleagues (Adeolu, Israel, Yamah, Lois, Joy, Seye and Charles) and loved ones who have been instrumental in their way towards fulfilling this quest, I appreciate you all and may God bless you all abundantly.

ACKNOWLEDGEMENTS

This dissertation couldn't have been accomplished without God's undeniable help and my ever-supportive parents' assistance. I appreciate my family for their financial support and continuous motivational words throughout my Master's Program. I am eternally grateful to my supervisor, Dr. Eghosa N. Ekhaese for his constant affirmative words that encouraged me whenever I was on the right path and for his guidance and insightful contributions to this work. His passion for excellent completion of my postgraduate studies made an undeniable mark on me and this project. I'm always glad to know his office is ever open to welcome me just as his heart is open to pour out words of wisdom and knowledge to me to achieve successful research work. I also appreciate Arc. Ore, Arc. Jonathan and Arc. Emmanuel who have designed an IDP camp for sharing their experience and ideas to guide my architectural design.

Last, but not least, I also acknowledge the additional contributions to this research made by Prof. A.A. Oluwatayo, Dr. O.J. Ediae, Dr. B.A. Adewale, Dr. A.B. Sholanke, Arc. Akintaro, Arc. David Audu, Arc. Tofarati Gbadamosi, Arc. Odeyele and Arc. Olajumoke Adenowo. May God reward you all for your labour of love.

TABLE OF CONTENTS

CONTENTS	PAGES
COVER PAGE	
TITLE PAGE	
DECLARATION	iii
ACCEPTANCE	iv
CERTIFICATION	v
DEDICATION	vi
ACKNOWLEDGEMENTS	vii
LIST OF FIGURES	xi
LIST OF PLATES	xiii
LIST OF TABLES	xvi
LIST OF ABBREVIATIONS	xviii
ABSTRACT	xix
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background to the Study	1
1.2 Problem Statement	5
1.3 Research Questions	6
1.4 Aim and Objectives	6
1.5 Rationale and Justification for the Study	6
1.6 The Client	7
1.7 Scope of Study	7
1.8 Definition of Terms	7
CHAPTER TWO	9
LITERATURE REVIEW	9
2.0. CHAPTER OVERVIEW	9
2.1. IDP CAMP	9
2.1.1. Residential Facility- IDP Camp	9
2.1.2. Historical Background of IDP Camp	10
2.1.3. Development over the years on IDP Camp	11
2.1.4. Homeless Shelter Types	12

2.1.5. Internally Displaced Persons	12
2.1.6. IDP Camp	13
2.2. GREEN BUILDING MATERIALS AND IDP CAMP	14
2.2.1. Green Building Materials for Construction	14
2.2.2. Reasons for the Use of Green Building Materials for Construction	15
2.2.3. Green building Materials specifications for construction	16
2.2.4. Green Building Materials for construction and their Health Benefits	17
2.2.5. Benefits of Green Building Materials in the design and construction of IDP Camp	18
2.3. IDP CAMP AND HEALTH ISSUES IN NIGERIA	19
2.3.1. Causes of Displacement of Persons	19
2.3.2. Features of IDP Camp	19
2.3.3. Problem in designing IDP Camp	20
2.4. GAPS IN LITERATURE	21
CHAPTER THREE	22
RESEARCH METHODOLOGY	22
3.1. PREAMBLE	22
3.2. RESEARCH PHILOSOPHY	22
3.3. RESEARCH APPROACH AND METHODOLOGY	22
3.4. RESEARCH DESIGN AND STRATEGY	23
3.5. DATA SOURCES	24
3.5.1. Primary Data Sources	24
3.5.2. Secondary Data Sources	24
3.6. STUDY POPULATION	25
3.7. SAMPLING METHOD	25
3.8. SAMPLE SIZE	26
3.9. UNIT OF DATA COLLECTION	26
3.10. DATA COLLECTION INSTRUMENTS	26
3.11. DATA COLLECTION, ANALYSIS AND TREATMENT BY OBJECTIVES	26
3.14. RESEARCH VALIDITY AND RELIABILITY	32
3.15. ETHICAL CONSIDERATIONS	32
CHAPTER FOUR	33
DATA PRESENTATION AND ANALYSIS	33
4.1. INTRODUCTION	33

4.2. QUESTIONNAIRE STRUCTURE	33
4.3. DATA ANALYSIS	33
4.4 SITE	82
CHAPTER FIVE	92
DESIGN CRITERIA AND APPROACH	92
5.1 CHAPTER OVERVIEW	92
5.1.1 Project Goals	92
5.1.2 Design Objectives	92
5.2 PERFORMANCE REQUIREMENT	92
5.3 TECHNOLOGY AND ENVIRONMENTAL CRITERIA	94
5.4 FUNCTIONAL SPACES AND REQUIREMENTS	95
CHAPTER SIX	103
DESIGN PHILOSOPHY, CONCEPTUALISATION, AND PROPOSAL	103
6.1. DESIGN PHILOSOPHY	103
6.2. MASTER PLAN DESIGN CONCEPT	103
6.2.1. Functional Zoning	103
6.2.2. Privacy Zoning	104
6.2.3. Noise Zoning	105
6.2.4. Circulation Pattern	106
6.3. DESIGN CONCEPT	107
6.4 ACCOMMODATIONS	108
6.4.1 Bubble Diagram of a studio apartment in a family accommodation	109
6.4.2 Flowchart Diagram of Gender-based Accommodation	110
REFERENCES	111
APPENDIX A	123
APPENDIX B	125
APPENDIX C	127
APPENDIX D	128
APPENDIX E	129
APPENDIX F	130

LIST OF FIGURES

FIGURES	LIST	PAGES
Figure 2.2. 1:	Showing the Level of occupant satisfaction with indoor air quality. Conventional buildings VS. Green buildings	17
Figure 4.3 1:	Image showing an aerial view of the African Mission Global Community Nursery and Primary School	51
Figure 4.3. 2:	Image showing the Camp Infrastructure Map	66
Figure 4.3. 3:	Image showing the tents in Roj Camp	69
Figure 4.3. 4:	Image showing household latrine and shower in Roj Camp	70
Figure 4.3. 5:	Image showing the market in Roj Camp	70
Figure 4.3. 6:	Image showing the interior of the NGO's clinic in Roj Camp	71
Figure 4.3. 7:	Image showing Khazir Transit Camp Infrastructure Map	71
Figure 4.3. 8:	Image showing the planned tents within Khazir Transit Camp	74
Figure 4.3. 9:	Image showing the Sanitary facilities in Khazir Transit Camp	75
Figure 4.3. 10:	Image showing the Mobile Clinic in Khazir Transit Camp	75
Figure 4.3. 11:	Image showing Khazir Transit Camp boundary for safety and security	76
Figure 4.3. 12:	Image showing the Site Plan of 300-Unit Social Residence	76
Figure 4.3. 13:	Image showing a perspective view of 300-Unit Social Residence	79
Figure 4.3. 14:	Image showing perspective view 2 of 300-Unit Social Residence	79
Figure 4.3. 15:	Image showing perspective view 3 of 300-Unit Social Residence	80
Figure 4.3. 16:	Image showing an interior view of a room in 300-Unit Social Residence	80
Figure 4.3. 17:	Image showing the letters boxes room in 300-Unit Social Residence	81
Figure 4.4. 1:	Image showing SITE A	82
Figure 4.4. 2:	Image showing SITE B	83
Figure 4.4. 3:	Image showing SITE C	83
Figure 4.4. 4:	Image showing the Location of Epe LGA in the Map of Lagos State	84
Figure 4.4. 5:	Image showing Proposed Site	84
Figure 4.4. 6:	Image showing Proposed Site Analysis	85
Figure 4.4. 7:	Image showing climate in Lagos State	86
Figure 6.2. 1:	Image showing bubble diagram of the proposed facilities on site	104

Figure 6.2. 2: Image showing Public, Private and Semi-private Zones of the proposed facilities on site 105

Figure 6.2. 3: Image showing Semi-noisy, Quiet and Noisy Zones of the proposed facilities on site 106

Figure 6.2. 4: Image showing the circulation pattern of horizontal movement within the site via walkways and vehicular road 107

LIST OF PLATES

PLATES	LIST	PAGES
Plate 4.3. 2:	Showing the Health Benefits of Green Building Materials used in the selected IDP camps	38
Plate 4.3. 2:	Image showing the Aerial view of New Kuchingoro Camp	40
Plate 4.3. 3:	Image showing the exterior view of the School in New Kuchingoro Camp	44
Plate 4.3. 4:	Image showing the exterior view of the Tents in New Kuchingoro Camp	44
Plate 4.3. 5:	Image showing the interior view of a kitchen in New Kuchingoro Camp	45
Plate 4.3. 6:	Image showing the exterior view of the Clinic in New Kuchingoro Camp	45
Plate 4.3. 7:	Image showing Water Sanitation and Hygiene (WASH) facilities in New Kuchingoro Camp	46
Plate 4.3. 8:	Image showing the woman leader standing in front of the toilets in New Kuchingoro Camp	46
Plate 4.3. 9:	Image showing the Tailoring Vocational training centre made of plywood and corrugated zinc sheets in New Kuchingoro Camp	47
Plate 4.3. 10:	Image showing the Communal Hall in New Kuchingoro Camp	47
Plate 4.3. 11:	Image showing the entrance gate of the African Mission Global IDP Camp	48
Plate 4.3. 12:	Image showing the African Mission Global Community Nursery and Primary School	52
Plate 4.3. 13:	Image showing Tents in the African Mission Global IDP Camp covered with thatched roof	52
Plate 4.3. 14:	Image showing Toilets in the African Mission Global IDP Camp	53
Plate 4.3. 15:	Image showing Tents in the African Mission Global IDP Camp	53
Plate 4.3. 16:	Image showing the Universally designed Clinic in the African Mission Global IDP Camp	54

Plate 4.3. 17: Image showing the Vocational training hall in the African Mission Global IDP Camp	54
Plate 4.3. 18: Image showing the interior of the Vocational training hall in the African Mission Global IDP Camp	55
Plate 4.3. 19: Image showing the Staff's Office building in the African Mission Global IDP Camp	55
Plate 4.3. 20: Image showing Igando Emergency Relief/Resettlement Camp's main entrance and exit gates	57
Plate 4.3. 21: Image showing Igando Emergency Relief/Resettlement Camp Master Plan	61
Plate 4.3. 22: Image showing the Administrative Section of Igando Emergency Relief/Resettlement Camp	62
Plate 4.3. 23: Image showing the Shops in Igando Emergency Relief/Resettlement Camp	62
Plate 4.3. 24: Image showing the Multipurpose Hall in Igando Emergency Camp	63
Plate 4.3. 25: Image showing the Kitchen in Igando Emergency Relief/Resettlement Camp	63
Plate 4.3. 26: Image showing the Staff Quarters in Igando Emergency Relief/Resettlement Camp	64
Plate 4.3. 27: Image showing the exterior view of one of the Male Hostel blocks in Igando Emergency Relief/Resettlement Camp	64
Plate 4.3. 28: Image showing the exterior view of the Clinic in Igando Emergency Relief/Resettlement Camp	65
Plate 4.3. 29: Image showing the exterior view of one of the Male Toilets in Igando Emergency Relief/Resettlement Camp	65
Plate 4.4. 1: Image showing the T-junction of Lekki-Epe Expressway and Ikorodu-Epe road	87
Plate 4.4. 2: Image showing the existing shops around the proposed site	87
Plate 4.4. 3: Image showing a statuette at the centre of Epe roundabout	88

Plate 4.4. 4: Image showing a land bounding the proposed site at South	88
Plate 4.4. 5: Image showing a restaurant opposite the proposed site at North	89
Plate 4.4. 6: Image showing existing gate and concrete fence bounding the proposed site	89
Plate 4.4. 7: Image showing makeshift structures within the proposed site	90
Plate 4.4. 8: Image showing a land bounding the proposed site at West	90
Plate 4.4. 9: Image showing Residential buildings bounding the proposed site at East	91
Plate 4.4. 10: Image showing a mechanic workshop and vehicles parked in front of the proposed site	91
Plate 6.4. 1: Image showing the conceptual model for family accommodation	108
Plate 6.4.1.1: Image showing the Bubble diagram of a studio apartment for a family of 2	109
Plate 6.4.1.2: Image showing the Bubble diagram of a studio apartment for a family of 4 and 6	109
Plate 6.4.2: Image showing space and circulation diagram of Gender-based accommodation	110

LIST OF TABLES

TABLES	LISTS	PAGES
	Table 3.1: Table showing research objectives and their detailed methods of data collection, analysis, presentation and treatment	28
	Table 3.2: Table showing operationalization of variables	29
	Table 4.3.1 shows the schedule of finishes for some of the camp facilities	36
	Table 4.3. 2: Showing the population structure in New Kuchingoro IDP Camp	41
	Table 4.3.3: Showing New Kuchingoro IDP Camp facilities and their frequency	41
	Table 4.3. 4: Showing the various sectors of New Kuchingoro IDP Camp Infrastructure	42
	Table 4.3. 5: Showing the population structure in African Mission Global IDP Camp	48
	Table 4.3.6: Showing AMG IDP Camp facilities and their frequency	49
	Table 4.3. 7: Showing the sectors of African Mission Global IDP Camp Infrastructure	49
	Table 4.3. 8: Showing the population structure in Igando Emergency Camp	56
	Table 4.3.9: Showing Igando Emergency Camp facilities and their frequency	57
	Table 4.3. 10: Showing the various sectors of Igando Emergency Camp Infrastructure	59
	Table 4.3. 11: Showing the population structure in Roj IDP Camp	66
	Table 4.3.12: Showing Roj IDP Camp facilities and their frequency	67
	Table 4.3. 13: Showing the various sectors of Roj Camp Infrastructure	67
	Table 4.3.14: Showing Khazir Transit Camp facilities and their frequency	72
	Table 4.3. 15: Showing the various sectors of Khazir Transit Camp	72
	Table 4.3.16: Showing 300-Unit Social Residence facilities and their frequency	77
	Table 4.3. 17: Showing the various sectors of 300-Unit Social Residence	77
	Table 4.3. 18: Showing the colour preferences of IDPs in the three selected IDP camps	81
	Table 5.1 Spatial Program for Accommodations	96
	Table 5.2 Spatial Program for the Social Spaces	96
	Table 5.3 Spatial program for the Health centre	97
	Table 5.4 Spatial program for the Administrative Unit	97
	Table 5.5 Spatial Program for the School	98
	Table 5.6 Spatial program for the Vocational training Centre	98
	Table 5.7 Spatial Program for the Conveniences	98
	Table 5.8 Spatial Program for the Outdoor Circulation	99
	Table 5.9 Spatial program for the Kitchen	99
	Table 5.10 Spatial program for the Waste disposal point	100

Table 5.11 Spatial program for the Storage Area	100
Table 5.12 Spatial program for the Shops	100
Table 5.13 Spatial program for the Dining Hall	101
Table 5.14 Spatial program for the Gate House	101
Table 5.15 Spatial program for the Maintenance Support Unit	101
Table 5.16 Spatial program for the Farm Area	102
Table 5.17 Spatial program for the Multipurpose Hall	102

LIST OF ABBREVIATIONS

AMG- African Mission Global

GBMs- Green Building Materials

IDMC- Internal Displacement Monitoring Centre

IOM- International Organization for Migration

LAWMA- Lagos State Waste Management Authority

OCHA- Office of the Coordination of Humanitarian Affairs

OHCHR- Office of the United Nations High Commissioner for Human Rights

UNHCR- United Nations High Commissioner for Refugees

NCFRMI- National Commission for Refugees, Migrants and Internally Displaced Persons

MSU- Maintenance Support Unit

ABSTRACT

Internally Displaced Persons (IDP) Camp is a secured shelter for the protection and provision of displaced persons' needs before moving back home. These people abandoned or left their homes due to conflict, war or violence within their locality. This traumatic experience of losing their abode makes them vulnerable to health challenges and diseases. This study aims to investigate Green Building Materials for the design and construction of camps to improve the quality of health of the displaced persons. The objectives are to; ascertain the extent to which green building materials specifications are used in an IDP camp, examine the health benefits of green building materials used in the IDP camp, analyse the physical architectural characteristics of the IDP camp and design a healthy, cost-effective and sustainable IDP camp in Lagos, Nigeria. A review of relevant literature identified Green Building Materials; their purposes and health benefits, IDP camps; their health issues and the benefits of applying green building materials for the design. The research methodology employed for this research work was focused on the indicated research objectives. A mixed research approach which is qualitative and quantitative was adopted, and case studies were executed on selected IDP Camps in Nigeria with emphasis on the physical architectural characteristics of their facilities. Questionnaires were administered to 400 IDPs in the selected camps to examine the application of green building materials in the design of the camps and their health benefits on the occupants. An observation guide was used to analyse the physical architectural characteristics of the selected IDP camps. An interview was conducted with the camp manager and a volunteer teacher at African Mission Global IDP camp and New Kuchingoro IDP camp respectively to identify the common health challenges at the camp while the architect that designed Igando Emergency Relief/Resettlement camp was interviewed to identify the considerations for the design of an IDP camp to achieve a sustainable design. The findings revealed that tarpaulin, plywood, aluminium nails, corrugated zinc sheets and cement bags were used for construction by the IDPs in the New Kuchingoro IDP camp. Thatch, Timber, tent flex, screed, and corrugated zinc roofing sheets were primarily used for construction by the IDPs in AMG IDP camp and Stretcher bond block laying was used for the conventional construction of some facilities. Generally, the conventional construction method was applied in Iganthe do Emergency Relief/Resettlement camp with the use of concrete, emulsion paint, ceramic tiles, gypsum board, wood panels and corrugated zinc roofing sheets. The IDPs in AMG IDP and Igando Emergency Relief/Resettlement camp enjoy comfort and improved health whereas those in the New Kuchingoro IDP camp experience poor living conditions due to low-quality building materials. The IDPs in the three IDP camps chose blue, cream, ash and pink colours for the proposed design facilities. This study concludes that green building materials such as wood, zinc sheets, emulsion paint and ceramic tiles have positive impacts on human health which makes them suitable for a sustainable IDP camp design.

Keywords: Green Building Materials, Health benefits, Design, Internally Displaced Persons (IDP) Camp, Lagos