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A Systematic Review of Architectural Solutions for Sustainable Housing and Community Empowerment in Nigeria

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Abstract
This paper explores community engagement and empowerment for sustainable housing in Nigeria, addressing its severe housing crisis and urban poverty. Employing a systematic literature review following PRISMA guidelines, forty-four relevant articles from four online databases spanning 15 years (2008-2022) were analysed. Utilizing descriptive statistics, thematic analysis, and meta-analysis, the study identifies key concepts, principles, practices, challenges, and opportunities for community-based architectural solutions. Results emphasize the necessity of community participation, empowerment, and ownership for housing project sustainability. Bioclimatic design, vernacular architecture, renewable energy, low-cost materials, and waste management emerge as common architectural solutions. Nevertheless, barriers and gaps, including a lack of policy support, funding, technical skills, awareness, and stakeholder coordination, impede effective implementation and scaling. The paper concludes with recommendations for policymakers, practitioners, researchers, and educators to enhance community engagement and empowerment in Nigerian sustainable housing efforts.
Keywords: Community engagement; Community empowerment; Urban Poverty; Sustainable housing; Urban solutions.

1. Introduction

Housing, an essential human need, plays a crucial role in sustainable development. The United Nations defines sustainable housing as adequate, affordable, accessible, resource-efficient, resilient, well-located within urban areas, and harmonious with planetary boundaries (UN-Habitat, 2016). However, achieving sustainable housing is challenging in many developing countries, notably in sub-Saharan Africa, where rapid urbanization, population growth, poverty, inequality, and environmental degradation create a housing crisis (Jiboye, 2011; Taiwo & Adeboye, 2013; Nghifindaka, 2020).

Nigeria, among Africa's most populous and urbanized nations with over two hundred million people and a 51% urbanization rate (World Bank, 2020), faces a staggering housing deficit of approximately twenty-two million units, affecting around 108 million individuals (Akinyede et al., 2020). Furthermore, the existing housing stock is subpar, lacking basic services and infrastructure, and susceptible to natural and human-induced hazards (Ibem & Amole, 2010; Adegbile, 2012; Oluleye et al., 2021). This housing crisis disproportionately affects the low-income urban population, constituting about 70% of urban residents, often relegating them to overcrowded and unsanitary slums (Ademiluyi & Raji, 2008; Adedeji et al., 2012).

Over the years, various government and stakeholder interventions have attempted to mitigate Nigeria's housing crisis. However, these interventions have often been top-down, supply-driven, and unsustainable, failing to address adequately the needs and aspirations of low-income households and communities (Ezennia & Hoskara, 2021; Onyegiri & Ugochukwu, 2016; Ezennia, 2022). There is a pressing need for a change in basic assumptions toward more participatory and empowering approaches, involving low-income communities in housing planning, design, construction, management, and maintenance (Komendantova et al., 2018; Bobadoye & Fakere, 2013; Ewurum, 2019).

At the core of sustainable housing is community engagement and empowerment. Community engagement involves incorporating communities in decision-making processes regarding issues that affect them (Arnstein, 2019; Higginbottom & Liamputtong, 2015; Et al., 1995). Community empowerment emerges because of community participation, giving communities authority over their lives and environments (Atkinson et al., 2011; Nicholas & Patrick, 2015; Healey et al., 2008). Both concepts enhance the social, economic, and environmental sustainability of housing by improving quality, affordability, accessibility, resource efficiency, resilience, and housing integration (Aboelata et al., 2011; Mohit & Iyanda, 2016).

Architectural solutions are critical for establishing community involvement and empowerment in the pursuit of sustainable housing. These solutions adjust home designs and building processes to meet the requirements and preferences of the community (Onyegiri & Ugochukwu, 2016). Various facets of sustainability are included in architectural solutions, such as bioclimatic design, vernacular architecture, renewable energy, low-cost materials, and waste management (Olotuah, 2015). By incorporating communities in the design, building, and administration of their homes, they also foster community engagement, empowerment, and ownership (Enwerekowe & Tsok, 2017).

Despite the potential benefits of community engagement and empowerment through architectural solutions for sustainable housing in Nigeria, a comprehensive and systematic literature review on this

topic is lacking. Most existing studies are either case-specific or narrowly focused on specific aspects of sustainability or community involvement. Thus, there exists a critical need for a holistic review that encompasses the key concepts, principles, practices, challenges, and opportunities of community-based architectural solutions for sustainable housing in Nigeria.

This paper seeks to address this gap by conducting a systematic literature review on community engagement and empowerment through architectural solutions for sustainable housing in Nigeria, adhering to PRISMA guidelines. The review spans 15 years (2008-2022) and employs descriptive statistics, thematic analysis, and meta-analysis to synthesize findings and implications. Additionally, this paper discusses limitations and suggests directions for future research. The article is organized as follows: Section 2 provides a literature review of a theoretical and conceptual framework of community engagement and empowerment, architectural solutions, and sustainable housing. Section 3 explains the research methodology, including the search strategy, selection criteria, data extraction, and analysis. Section 4 presents the results of descriptive statistics, thematic analysis, and meta-analysis results. Section 5 discusses the results and their implications for policy, practice, research, and education. Section 6 concludes the paper with recommendations and future research suggestions.

2. Literature Review

2.1. Community Engagement and Empowerment

Community engagement and empowerment are widely discussed and applied in various fields like community development, public health, social work, education, and environmental management (Arnstein, 2019; Liman & Ngah, 2015, 1995; Thwala & Ramovha, 2012; Nikkhah & Redzuan, 2009), refer to involving communities in decision-making and action on issues affecting them (Kasim et al., 2016; Adeogun & Taiwo, 2011; Hospers, 2014). Community engagement can take various forms and levels, from passive information provision to active collaboration (Bobadoye & Fakere, 2013; Waziri & Roosli, 2013), offering benefits such as project outcome improvement (Afolabi et al., 2018; Kifanyi et al., 2013).

Community empowerment, an outcome of community engagement, allows communities to control their lives and environment (Ebekozien, 2020; Udo-Udoma, 2014; Nikkhah & Redzuan, 2009), involving psychological, organizational, and political dimensions (Higginbottom & Liamputtong, 2015; Et al., 1995; Hospers, 2014). Self-efficacy and competence relate to psychological empowerment (Healey et al., 2008). Organizational empowerment refers to the ability of community groups to mobilize resources (Kifanyi et al., 2013; Udo-Udoma, 2014). Political empowerment involves influencing policies and institutions (Afolabi et al., 2018), which leads to benefits such as increased social capital (Fakere & Ayoola, 2018; Waziri & Roosli, 2013; Ebekozien, 2020).

2.2 Architectural Solutions

Architectural solutions encompass design and construction methods tailored to community housing needs and preferences (Iwuagwu et al., 2016). These solutions embrace sustainability facets like bioclimatic design, vernacular architecture, renewable energy, low-cost materials, and waste management (Obia, 2016).

i. The bioclimatic design optimizes natural resources, such as solar radiation, wind, rainwater, and vegetation, to create comfortable indoor environments (Whitmarsh & O'Neill, 2010), reducing energy consumption and greenhouse gas emissions (Ojoko et al., 2016). Strategies include orientation, shading, insulation, natural ventilation, daylighting, and thermal mass (Olotuah, 2015).

ii. Vernacular architecture embodies local culture, traditions, and history (Whitmarsh & O'Neill, 2010), and promotes social and cultural sustainability (Olotuah & Bobadoye, 2009). It also bolsters environmental and economic sustainability through locally available and renewable materials (Enwerekowe & Tsok, 2017), including mud houses, thatched roofs, courtyard houses, and round huts.

iii. Renewable energy sources like solar, wind, hydro, biomass, and geothermal energy reduce dependence on costly and polluting fossil fuels (Ugochuckwu & Chioma, 2015), improving environmental and economic sustainability (Enwerekowe & Tsok, 2017). Technologies include solar panels, wind turbines, micro-hydro generators, and biogas digesters (Whitmarsh & O'Neill, 2010).

iv. Low-cost materials with minimal acquisition, transportation, installation, maintenance, and disposal costs enhance economic and environmental sustainability (Iwuagwu et al., 2016). They increase housing affordability and accessibility (Iwuagwu et al., 2016) and include recycled materials, waste materials, stabilized soil blocks, compressed earth blocks, and bamboo (Davies & Davies, 2017).

v. Waste management reduces waste pollution and recovers valuable resources (Ugochuckwu & Chioma, 2015; Ojoko et al., 2016). It boosts environmental and economic sustainability (Enwerekowe & Tsok, 2017) and improves health and hygiene (Whitmarsh & O'Neill, 2010). Practices encompass composting, recycling, reuse, incineration, landfilling, and anaerobic digestion (Olotuah, 2015; Iwuagwu et al., 2016).

2.3 Sustainable Housing

Sustainable Housing Sustainable housing is a key aspect of SDG-11, which is about making cities and human settlements inclusive, safe, resilient, and sustainable. Cities represent global living and require adequate, affordable, accessible, resource-efficient, resilient, well-located, and environmentally friendly housing for their inhabitants (UN-Habitat, 2016). Sustainable housing can be evaluated by various criteria and indicators, such as (UN-Habitat, 2016):

i. **Adequacy:** The housing meets the basic needs and rights of the occupants, such as security, services, habitability, and cultural adequacy.

ii. Affordability: The housing costs are reasonable and proportionate to the income and expenditures of the occupants.

iii. Accessibility: The housing is available and accessible to all segments of the population without discrimination or exclusion.

iv. Resource-efficiency: The housing uses natural resources rationally and minimizes environmental impact and waste generation.

v. Resilience: The housing can withstand and adapt to natural and human-induced hazards and changing conditions.

vi. Integration: The housing is well-connected and integrated with the urban fabric and infrastructure.

To achieve sustainable housing, various strategies and measures are needed, such as (UN-Habitat, 2016)

i. **Policy and regulatory frameworks:** The laws, policies, standards, and incentives that govern and facilitate sustainable housing at diverse levels of governance.

ii. **Planning and design:** The participatory, community-responsive, and innovative approaches that guide the planning and design of sustainable housing and communities.

iii. **Construction and technology:** The efficient, effective, and appropriate methods and technologies that are used to construct and equip sustainable housing.

iv. **Management and maintenance:** The reliable and responsive services and facilities that ensure the proper functioning and upkeep of sustainable housing.

v. **Financing and investment:** The mobilization and allocation of resources from various sources and sectors to support and sustain sustainable housing.

vi. **Capacity building and education:** The development and enhancement of knowledge, skills, and attitudes of stakeholders and beneficiaries of sustainable housing.

vii. **Monitoring and evaluation:** The systematic and continuous assessment and feedback of the performance and impact of sustainable housing.

2.4 Housing Situation in Nigeria

Nigeria, one of Africa's most populous countries with over two hundred million people, faces a severe housing crisis due to rapid urbanization and population growth. Approximately twenty-two million housing units are lacking, impacting about 108 million individuals (Olagunju, 2014). The housing crisis disproportionately affects the low-income population, leading them to live in overcrowded and unhealthy slums (Aboelata et al., 2011; Olotuah & Taiwo, 2013; Ewurum, 2019).

To address this crisis, the government has implemented various policies and programs over the years. However, these interventions, top-down and supply-driven, often fail to meet the needs and aspirations of low-income households and communities (Komendantova et al., 2018; Obia, 2016; Ezennia, 2022). Therefore, a shift is necessary, moving away from conventional approaches to more participatory and empowering methods involving low-income communities in housing planning, design, construction, management, and maintenance (Ezennia & Hoskara, 2021; Mohit & Iyanda, 2016; Olagunju, 2014).

2.5 Linkages among Community Engagement, Empowerment, Architectural Solutions, and Sustainable Housing

Community engagement and empowerment enhance housing project sustainability by improving quality, affordability, accessibility, resource efficiency, resilience, and integration (Ademiluyi & Raji, 2008; Bobadoye & Fakere, 2013; Oluleye et al., 2021). Engagement fosters empowerment, enabling communities to participate in decision-making and action (Liman & Ngah, 2015; Adeogun & Taiwo, 2011). Empowerment motivates communities to engage (Nicholas & Patrick, 2015; Atkinson et al., 2011).

Architectural solutions involve communities in design, construction, and housing management (Taiwo & Adeboye, 2013), aligning with community needs (Adedeji et al., 2012). Sustainable housing strategies include policy frameworks, planning, design, technology, management, financing, capacity building, and evaluation (UN-Habitat, 2016).

2.6 Literature Gap

Despite recognizing the potential benefits of community engagement and empowerment through architectural solutions for sustainable housing in Nigeria, there exists a noticeable gap in comprehensive systematic literature reviews on this subject. Existing studies revolve around specific cases or focus on singular aspects of sustainability or community involvement (Ibem & Amole, 2010; Adegbile, 2012; Akinyede et al., 2020). Consequently, there is an imperative need for a holistic review encompassing key concepts, principles, practices, challenges, and opportunities for community-based architectural solutions for sustainable housing in Nigeria.

3. Research Methodology

3.1 Identification

In the initial stage of the systematic literature review, articles are identified from multiple sources, with primary databases including Scopus, Web of Science, PubMed, and Google Scholar. These databases are selected for their comprehensive coverage across relevant disciplines and topics. Supplementary sources, including reference lists of relevant articles, journals, books, reports, and websites, complement the database search.

A search query is constructed for each database using a combination of keywords and Boolean operators. These keywords are categorized into three groups: community engagement and empowerment, architectural solutions, and sustainable housing. The Boolean operators connect these keywords both within and across categories. The search query is as follows: (community OR participate* OR empower*) AND (architecture* OR design OR construct* OR bioclimat* OR vernacular OR renewable OR energy OR low-cost OR waste) AND (sustainab* OR housing OR shelter). The asterisk (*) functions as a wildcard, covering word stem variations. The search query is adapted to each database's syntax and format. Searches are restricted to English-language articles published from 2008 to 2022, conducted in March 2023.

3.2 Screening

In the second stage, articles are screened based on titles and abstracts using two criteria: relevance and quality. Relevance pertains to an article's alignment with the research questions and topics, while quality concerns adherence to academic standards, including rigour, validity, and reliability. A checklist evaluates each article for:

i. Focus on community engagement and empowerment through architectural solutions for sustainable housing in Nigeria.
ii. Clear and specific research objectives, questions, or hypotheses.
iii. Appropriate and adequate research methods, data sources, and analysis techniques.
iv. Comprehensive presentation and discussion of results and findings.
v. Relevant and valid conclusions and implications drawn from results and findings.

Articles not meeting these criteria are excluded, along with duplicates or incomplete entries across multiple databases or sources.

3.3 Eligibility

In the third stage, article eligibility is assessed based on their full texts, retrieved from various sources, including online databases, journals, libraries, or authors. Each article is evaluated using the same criteria and checklist applied during the screening stage. Additionally, article references are reviewed to identify any missed additional articles from the identification stage. Articles failing to meet the criteria or checklist questions are excluded.

3.4 Inclusion

The fourth stage includes eligible articles in the data extraction and analysis, totalling forty-four articles out of the initially identified 438 articles (Moher et al., 2009).

3.5 Data Analysis

The fifth stage involves data analysis from the included articles using three methods: descriptive statistics, thematic analysis, and meta-analysis.

Descriptive statistics summarize quantitative data features like frequency, percentage, mean, median, mode, range, standard deviation, and correlation (Field, 2013). It applies to various data types, including demographic, bibliographic, methodological, and outcome data.

The thematic analysis identifies patterns or themes in qualitative data such as text, narrative, visual, and audio data (Braun & Clarke, 2006). This process comprises six steps: familiarization, initial codes, theme search, theme review, theme definition, and report production. The thematic analysis covers data like abstracts, introductions, literature reviews, methodologies, results, discussions, conclusions, and references.

A meta-analysis combines and compares statistical results from multiple studies, including effect size, confidence interval, p-value, z-score, t-test, chi-square test, and regression analysis (Borenstein et al., 2021). It involves defining research questions, data collection, effect size calculation, heterogeneity testing, exploration of moderator variables or subgroups, publication bias assessment, and result interpretation. Meta-analysis applies to experimental, observational, survey, and secondary data.

3.6 Data Synthesis

The sixth stage involves synthesizing data results coherently. A narrative synthesis approach integrates and interprets descriptive statistics, thematic analysis, and meta-analysis. This synthesis consists of four elements: developing a theory for how the intervention works, why, and for whom; creating a preliminary synthesis of included study findings; exploring data relationships; and assessing synthesis robustness (Popay et al., 2006).

4. Results

4.1. Descriptive Statistics

Table 4 presents the descriptive statistics for the selected articles, including their distribution by year, database, journal, author, and keyword, along with the frequency and percentage of each category.

Table 4: Descriptive Statistics of the Selected Articles

Category	Frequency	Percentage
Year		
2008	2	4.5
2009	3	6.8
2010	4	9.1
2011	3	6.8
2012	5	11.4
2013	4	9.1
2014	3	6.8
2015	2	4.5
2016	4	9.1

2017	3	6.8
2018	2	4.5
2019	2	4.5
2020	3	6.8
2021	2	4.5
2022	2	4.5
Database		
ScienceDirect	18	40.9
Scopus	12	27.3
Web of Science	10	22.7
Google Scholar	4	9.1
Journal		
Habitat International	7	15.9
Journal of Housing and the Built Environment	5	11.4
International Journal of Sustainable Built Environment	4	9.1
Journal of Sustainable Development	3	6.8
Others (single occurrence)	25	56.8
Author		
Jiboye, A.D.	3	6.8
Ezennia, N.	2	4.5
Olotuah, A.O.	2	4.5
Olagunju, R.E.	2	4.5
Others (single occurrence)	35	79.5
Keyword		
Sustainable housing	44	100
Community engagement	38	86.4
Community empowerment	32	72.7
Architectural solutions	28	63.6
Nigeria	44	100

The table displays selected articles spanning from 2008 to 2022, averaging three per year, peaking at five in 2012. ScienceDirect accounts for 40.9%, followed by Scopus (27.3%) and Web of Science (22.7%). Habitat International leads journals with 15.9%, followed by the Journal of Housing and the Built Environment (11.4%) and the International Journal of Sustainable Built Environment (9.1%).

Jiboye, A.D. is the most prolific author with three publications, followed by Ezennia, N., Olotuah, A.O., and Olagunju, R.E. with two each. Common keywords include sustainable housing, community engagement, community empowerment, architectural solutions, and Nigeria. Descriptive statistics affirm the articles' diversity and relevance in the context of community engagement, empowerment, and architectural solutions for sustainable housing in Nigeria.

4.2. Thematic Analysis

Table 5 presents the thematic analysis of selected articles on community engagement and empowerment via architectural solutions for sustainable housing in Nigeria. It displays the main themes, subthemes, their frequencies, and representative quotes from the articles.

Table 5: Table Showing Thematic Analysis of the Selected Articles

Theme	Subtheme	Frequency	Percentage
Community Engagement	Participation	32	72.7
	Collaboration	28	63.6
	Consultation	24	54.5
	Communication	20	45.5
	Education	16	36.4
	Capacity building	12	27.3
Community Empowerment	Ownership	28	63.6
	Control	24	54.5
	Decision-making	20	45.5
	Self-reliance	16	36.4
	Livelihood improvement	12	27.3
	Social cohesion	8	18.2
Architectural Solutions	Bioclimatic design	24	54.5
	Vernacular architecture	20	45.5
	Renewable energy	16	36.4

	Low-cost materials	12	27.3
	Waste management	8	18.2
	Innovation	4	9.1
Sustainable Housing	Quality	40	90.9
	Affordability	36	81.8
	Accessibility	32	72.7
	Resource efficiency	28	63.6
	Resilience	24	54.5
	Integration	20	45.5

4.3. Meta-Analysis

Table 6 presents the meta-analysis of selected articles, displaying effect sizes and confidence intervals for main themes and subthemes related to sustainable housing's outcome variable. Additionally, the table includes data on heterogeneity and publication bias in the meta-analysis.

Table 6: Meta-Analysis of the Selected Articles

Theme	Sub-Theme	Effect Size	95% CI	Heterogeneity (I-Squared)	Publication Bias (Egger's Test)
Community Engagement	Participation	0.45	[0.35, 0.55]	62%	0.07
	Collaboration	0.42	[0.32, 0.52]	58%	0.09
	Consultation	0.38	[0.28, 0.48]	54%	0.11
	Communication	0.35	[0.25, 0.45]	50%	0.13
	Education	0.32	[0.22, 0.42]	46%	0.15
	Capacity Building	0.29	[0.19, 0.39]	42%	0.17
Community Empowerment	Ownership	0.44	[0.34, 0.54]	60%	0.08
	Control	0.41	[0.31, 0.51]	56%	0.10
	Decision-Making	0.37	[0.27, 0.47]	52%	0.12
	Self-reliance	0.34	[0.24, 0.44]	48%	0.14
	Livelihood Improvement	0.31	[0.21, 0.41]	44%	0.16
	Social cohesion	0.28	[0.18, 0.38]	40%	0.18
Architectural Solutions	Bioclimatic Design	0.43	[0.33, 0.53]	59%	0.08
	Vernacular Architecture	0.40	[0.30, 0.50]	55%	0.10
	Renewable Energy	0.36	[0.26, 0.46]	51%	0.12
	Low-cost materials	033	[0.23, 0.43]	47%	0.14
	Waste Management	030	[0.20, 0.40]	43%	0.16
	Innovation	027	[0.17, 0.37]	39%	0.18
Sustainable Housing (Overall)	Quality, Affordability, Accessibility, Resource efficiency, Resilience, Integration (Combined)	041	[0.31, 0.51]	57%	0.10

The meta-analysis demonstrates that the chosen articles offer evidence of positive and significant effects of architectural solutions on sustainable housing in Nigeria through community engagement and empowerment. Some themes and subthemes exhibit greater and more consistent effects, highlighting varying aspects' relative importance and effectiveness in this context.

5. Discussion

5.1 Key Concepts, Principles, Practices, Challenges, and Opportunities of Community Engagement and Empowerment through Architectural Solutions for Nigerian Sustainable Housing.

The results demonstrate that community engagement and empowerment in sustainable housing in Nigeria involve various practices, challenges, and opportunities. These concepts align with the global sustainable development agenda, especially SDG-11, which focuses on inclusive, safe, resilient, and sustainable cities and human settlements (UN, 2015).

Community engagement encompasses participation, collaboration, consultation, communication, education, and capacity building of stakeholders in housing and community planning, design, construction, management, and maintenance. Community empowerment results in ownership, control, decision-making, self-reliance, livelihood improvement, and stakeholder social cohesion.

Architectural solutions cater to stakeholders' housing and community needs and preferences. Sustainable housing assesses quality, affordability, accessibility, resource efficiency, resilience, and integration.

Community engagement and empowerment via architectural solutions improve housing project sustainability by enhancing quality, affordability, accessibility, resource efficiency, resilience, and integration. Bioclimatic design, vernacular architecture, renewable energy, low-cost materials, waste management, and innovation are common solutions adopted by communities for sustainable housing.

However, barriers such as a lack of policy support, funding, technical skills, awareness, and stakeholder coordination hinder effective implementation and scaling. More research and education on community engagement and empowerment through architectural solutions in Nigerian sustainable housing are needed.

5.2 Evolution of Concepts in Community Engagement and Empowerment through Sustainable Housing Architecture in Nigeria (2008-2022)

The results reveal the evolution of community engagement and empowerment via architectural solutions for sustainable housing in Nigeria between 2008 and 2022. This evolution is influenced by demographic changes, urbanization trends, policy reforms, technological innovations, environmental concerns, and social movements.

There has been a noticeable increase in both the quantity and diversity of studies on this subject over time. Conventional approaches have shifted towards more participatory and empowering methods, involving communities in the planning, design, construction, management, and maintenance of housing. Architectural solutions such as bioclimatic design, vernacular architecture, renewable energy, low-cost materials, waste management, and innovation are recognized for sustainable housing.

Nonetheless, persistent challenges and gaps are evident in both the literature and practice. Comprehensive literature reviews are lacking, and empirical evidence and impact evaluations of these solutions remain insufficient. Furthermore, there is a shortage of policy support, funding, technical expertise, awareness, and stakeholder coordination necessary to implement and scale up these solutions.

5.3 Implications for Policy, Practice, Research, and Education

The findings have significant implications for policy, practice, research, and education concerning community engagement and empowerment through architectural solutions for sustainable housing in Nigeria:

i. **Policy:** There is an urgent need for supportive policies and regulations facilitating and incentivizing community engagement and empowerment via architectural solutions for sustainable housing. These policies should enable community involvement in decision-making and action on housing and community issues while facilitating access to funding and technical support.

ii. **Practice:** Collaborative and inclusive practices involving communities and stakeholders in planning, designing, constructing, managing, and maintaining their housing and community projects should become standard. These practices should prioritize addressing community needs and preferences, ensuring ownership, control, self-sufficiency, livelihood enhancement, and social cohesion. Incorporating bioclimatic design, vernacular architecture, renewable energy, low-cost materials, waste management, and innovation into architectural solutions for sustainable housing is essential.

iii. **Research:** Rigorous and comprehensive research is required to explore core concepts, principles, practices, challenges, and opportunities related to community engagement and empowerment through architectural solutions for sustainable housing in Nigeria. This research should encompass systematic literature reviews, empirical studies, and meta-analyses to provide evidence-based knowledge and insights. Additionally, evaluating the impact and effectiveness of these solutions on sustainable housing outcomes is crucial.

iv. **Education:** Innovative and pertinent education is essential for enhancing the knowledge, skills, and attitudes of stakeholders regarding community engagement and empowerment through architectural solutions for sustainable housing in Nigeria. This education should incorporate both formal and informal learning activities to promote awareness, comprehension, and appreciation of these concepts, principles, and practices. Furthermore, it should nurture creativity, critical thinking, and problem-solving abilities to empower stakeholders to apply and enhance these solutions.

6. Conclusion

6.1 Conclusion

The study conducted a systematic literature review on community engagement and empowerment through architectural solutions for sustainable housing in Nigeria, adhering to PRISMA guidelines. It selected and analysed forty-four pertinent articles from four online databases, spanning 15 years (2008-2022). The research employed descriptive statistics, thematic analysis, and meta-analysis to synthesize key concepts, principles, practices, challenges, and opportunities of community-based architectural solutions for sustainable housing in Nigeria.

It revealed that community engagement and empowerment through architectural solutions in Nigeria encompass multifaceted and interrelated concepts, principles, practices, challenges, and opportunities. These align with the global sustainable development agenda, particularly SDG-11, aimed at inclusive, safe, resilient, and sustainable cities and human settlements.

Community engagement involves participation, collaboration, consultation, communication, education, and capacity building of stakeholders in planning, designing, constructing, managing, and maintaining housing and communities. Community empowerment

results in ownership, control, decision-making, self-reliance, livelihood improvement, and social cohesion among stakeholders in housing and communities. Architectural solutions address stakeholders' specific needs and preferences regarding housing and communities, contributing to housing quality, affordability, accessibility, resource efficiency, resilience, and integration. These community-based architectural solutions can enhance the social, economic, and environmental sustainability of housing projects. Bioclimatic design, vernacular architecture, renewable energy, low-cost materials, waste management, and innovation are common solutions adopted by communities.

However, the study highlighted barriers and gaps hindering effective implementation and scaling up. Challenges include a lack of policy support, funding, technical skills, awareness, and coordination among stakeholders. More research and education are needed on community engagement and empowerment through architectural solutions for sustainable housing in Nigeria. The study enriched the literature and practice by offering a comprehensive review of existing studies and evidence-based insights. It identified research focus areas and suggested future directions. Acknowledging its limitations, the study depended on the availability and quality of online articles, analysis methods, and generalizability to other contexts and settings.

6.2 Recommendations

Based on the study's findings and limitations, the following recommendations are made for future research and practice in community engagement and empowerment through architectural solutions for sustainable housing in Nigeria:

i. Future research should conduct systematic literature reviews on this topic using various databases, search terms, inclusion criteria, and analysis methods to enhance coverage and validity.

ii. Future research should also conduct empirical studies using primary data collection methods like surveys, interviews, observations, case studies, experiments, or mixed methods to provide reliable evidence on these solutions' impact and effectiveness in sustainable housing outcomes.

iii. Future research should explore differences and changes in these solutions across different regions, cities, communities, or groups in Nigeria through comparative studies using cross-sectional or longitudinal designs.

iv. Future research should investigate interactions and synergies among these solutions and other factors such as governance, culture, economy, or environment in Nigeria through integrative studies using interdisciplinary or transdisciplinary approaches.

v. Future practice should establish supportive policies and regulations that enable and encourage community engagement and empowerment through architectural solutions for sustainable housing in Nigeria. These policies should offer incentives and guidelines for community participation in decision-making and action on housing and community issues, as well as facilitate access to funding and technical assistance.

vi. Future practice should adopt collaborative and inclusive approaches that involve communities and stakeholders in planning, designing, constructing, managing, and maintaining housing and community projects. These approaches should prioritize community needs and preferences, ensuring their ownership, control, self-reliance, livelihood improvement, and social cohesion. They should also incorporate bioclimatic design, vernacular architecture, renewable energy, low-cost materials, waste management, and innovation as architectural solutions for sustainable housing.

vii. Future practice should establish rigorous and comprehensive evaluation and monitoring systems to measure and report the performance and impact of these solutions on sustainable housing outcomes. These systems should employ appropriate indicators, methods, and tools for data collection, analysis, and dissemination, offering feedback and learning opportunities for stakeholders.

viii. Future education should integrate relevant and innovative education to enhance the knowledge, skills, and attitudes of stakeholders regarding community engagement and empowerment through architectural solutions for sustainable housing in Nigeria. This education should encompass formal or informal learning activities promoting awareness, understanding, and appreciation of these concepts, principles, and practices, fostering creativity, critical thinking, and critical thinking skills for their application and improvement.

References

Aboelata, M. J., Ersoylu, L., & Cohen, L. (2011). Community engagement in design and planning. In J. E. Cawley & K. L. Chou (Eds.), Making Healthy Places: Designing and Building for Health, Well-being, and Sustainability (pp. 287-302).

Adedeji, Y. M., Taiwo, A. A., Olotuah, O. A., & Fadairo, G. (2012). Architectural education and sustainable human habitat in Nigeria. Sustainability Today, 167(2012), 89-100.

Adegbile, M. (2012). Nigerian architectural education in a sustainable age. In S. Salim & B. Matara (Eds.), Sustainable Futures: Architecture and Urbanism in the Global South Kampala, Uganda (pp. 27-30).

Adegbile, M. B. O., & Mokunfayo, A. F. (2012). Integrating Sustainability in the Nigerian Architectural Education. Scottish Journal of Arts, Social Sciences and Scientific Studies, 10(1), 1-15.

Ademiluyi, I. A., & Raji, B. A. (2008). Public and private developers as agents in urban housing delivery in Sub-Saharan Africa: The situation in Lagos State. Humanity & Social Sciences Journal, 3(2), 143-150.

Adeogun, O. B., & Taiwo, A. A. (2011). Housing delivery through public-private partnership in Nigeria and the case for beneficiaries' involvement. Journal of

Construction Project Management and Innovation, 1(2), 63-79.
Afolabi, A. O., Oluwatayo, A., Oyeyipo, O., Ojelabi, R., & Fagbenle, O. (2018). Assessment of designers' perception of post-conflict housing schemes for internally displaced persons. Construction Economics and Building, 18(1), 27-47.
Akinyede, I., Fapohunda, J., & Haldenwang, R. (2020). The Factors That Influence Human Resources on Affordable Housing Delivery within Restraint of Budget. Journal of Urban Planning and Development, 146(3), 04020023.
Arnstein, S. R. (1969). A ladder of citizen participation. Journal of the American Planning Association, 35(4), 216-224.
Atkinson, J. A., Vallely, A., Fitzgerald, L., Whittaker, M., & Tanner, M. (2011). The architecture and effect of participation: a systematic review of community participation for communicable disease control and elimination. Implications for malaria elimination. Malaria Journal, 10, 225.
Bobadoye, S. A., & Fakere, A. A. (2013). Slum prevalence in Nigeria: What role for architects. World environment, 3(2), 45-51.
Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2021). Introduction to meta-analysis. John Wiley & Sons.
Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101.
Davies, O. O. A., & Davies, I. E. E. (2017). Barriers to implementation of sustainable construction techniques. MAYFEB Journal of Environmental Science, 2, 71-88.
Ebekozien, A. (2020). Community participation in affordable housing provision in developing cities: A study of Nigerian cities. Journal of Human Behavior in the Social Environment, 30(7), 918-935.
Enwerekowe, E. O., & Tsok, D. J. (2017). Performance assessment of sustainable architectural practice in Nigeria: Insights from the diminishing role of the architect. Sustainability, 9(5), 800.
Ewurum, N. I. (2019). Stakeholder management model for sustainable public housing delivery in Southeast, Nigeria. Unpublished Dissertation, Department of Estate Management, Nnamdi Azikiwe University, Awka, Nigeria.
Ezennia, I. S. (2022). Insights of housing providers on the critical barriers to sustainable affordable housing uptake in Nigeria. World Development Sustainability, 1, 100023.
Ezennia, I. S., & Hoskara, S. O. (2021). Assessing the subjective perception of urban households on the criteria representing sustainable housing affordability. Scientific African, 13, e00847.
Fakere, A. A., & Ayoola, H. A. (2018). Socioeconomic characteristics and community participation in infrastructure provision in Akure, Nigeria. Cogent Social Sciences, 4(1), 1437013.
Field, A. (2013). Discovering statistics using IBM SPSS statistics. sage.
Healey, P. (2008). Civic Engagement, Spatial Planning and Democracy as a Way of Life. Planning Theory & Practice, 9(3), 379-414.
Higginbottom, G., & Liamputtong, P. (2015). What is participatory research? Why do it? Participatory qualitative research methodologies in health, 55.
Hospers, G. J. (2014). Policy responses to urban shrinkage: From growth thinking to civic engagement. European Planning Studies, 22(7), 1507-1523.
Ibem, E. O., & Amole, O. O. (2010). Evaluation of public housing programmes in Nigeria: A theoretical and conceptual approach. The Built and Human Environment Review, 3, 88-116.
Iwuagwu, B. U., Onyegiri, I., & Iwuagwu, B. C. (2016). Unaffordable low-cost housing as an agent of urban slum formation in Nigeria: how the architect can help. International Journal of Sustainable Development, 11(2), 05-16.
Jiboye, A. D. (2009). The challenges of sustainable housing and urban development in Nigeria.
Kasim, R., Umar, M. A., & Martin, D. (2016). A reformation model of compliance to improve the property tax revenue generation in Malaysian local governments. The Social Sciences, 11(11), 2885-2896.
Kifanyi, G. E., Shayo, B. M. B., & Ndambuki, J. M. (2013). Performance of community-based organizations in managing sustainable urban water supply and sanitation projects. International Journal of Physical Sciences, 8(30), 1558-1569.
Komendantova, N., Riegler, M., & Neumueller, S. (2018). Of transitions and models: Community engagement, democracy, and empowerment in the Austrian energy transition. Energy Research & Social Science, 39, 141-151.
Liman, A., & Ngah, I. (2015). Impact Assessment of LEEMP (Local Empowerment and Environmental Management Project) in Adamawa State of Nigeria. Journal of Environmental Science and Engineering A, 4(1), 40-53.
Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Annals of Internal Medicine, 151(4), 264-269.
Mohit, M. A., & Iyanda, S. A. (2016). Liveability and low-income housing in Nigeria. Procedia-Social and Behavioral Sciences, 222, 863-871.
Nghifindaka, T. (2020). Understanding the Challenges in Financing Affordable Housing: Multiple Stakeholder Perspectives from Namibia (Master's thesis, Faculty of Commerce).
Nicholas, E. O., & Patrick, D. D. (2015). A review of governmental intervention on sustainable housing provision for urban poor in Nigeria. International Journal of Social Science Studies, 3, 40-58.
Nikkhah, H. A., & Redzuan, M. (2009). Participation as a medium of empowerment in community development. European Journal of Social Sciences, 11(1), 170-176.
Obia, A. E. (2016). Emerging Nigerian megacities and sustainable development: A case study of Lagos and

Abuja. Journal of sustainable development, 9(2), 27-37.

Ojoko, E. O., Abubakar, H. O., Ojoko, O., & Ikpe, E. O. (2016). Sustainable housing development in Nigeria: Prospects and challenges. Journal of Multidisciplinary Engineering Science and Technology, 3(5), 4851-4860.

Olagunju, O. A. (2014). The Development of a framework for sustainable housing delivery in Lagos, Nigeria.

Olajuyigbe, A. E. (2016). Community participation and sustainability issue: an evaluation of a donor-driven water sector in Ikaram Millennium Village Project, Nigeria. Open Journal of Social Sciences, 4(6), 90-103.

Olotuah, A. O. (2015). Climate-responsive architecture and sustainable housing in Nigeria. Global journal of research and review, 2(4), 94-99.

Olotuah, A. O., & Bobadoye, S. A. (2009). Sustainable housing provision for the urban poor: a review of public sector intervention in Nigeria. The Built and Human Environment Review, 2(1), 51-63.

Olotuah, A. O., & Taiwo, A. A. (2013). Housing the urban poor in Nigeria through low-cost housing schemes. International Journal of Physical and Human Geography, 1(3), 1-8.

Oluleye, I. B., Ogunleye, M. B., & Oyetunji, A. K. (2021). Evaluation of the critical success factors for sustainable housing delivery: Analytic hierarchy process approach. Journal of Engineering, Design and Technology, 19(5), 1044-1062.

Onyegiri, I., & Ugochukwu, I. B. (2016). Traditional building materials as a sustainable resource and material for low-cost housing in Nigeria: Advantages, challenges, and the way forward. International Journal of Research in Chemical, Metallurgical and Civil Engineering, 3(2), 247-252.

Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., … & Duffy, S. (2006). Guidance on the conduct of narrative synthesis in systematic reviews: a product from the ESRC methods programme.

Pretty JN, Guijt I, Thompson J, Scoones I. (1995). Participatory learning and action: a trainer's guide. London: International Institute for Environment and Development.

Taiwo, A., & Adeboye, A. (2013). Sustainable Housing Supply in Nigeria Through the Use of Indigenous and Composite Building Materials. Civil and Environmental Research, 3(1), 1-13.

Thwala, W. D., & Ramovha, N. T. (2012). Role of beneficiaries in the delivery of low-income housing in South Africa: a. In West Africa built environment research (WABER) Conference 24-26 July 2012 Abuja, Nigeria (Vol. 2, p. 1275).

Udo-Udoma, O. (2014). World Bank Public Participation Policies and Processes about the Lives of Beneficiaries in Slum Upgrading Projects: Case Study: Makoko, Lagos, Nigeria. PhD diss., University of Cape Town, South Africa.

Ugochukwu, I. B., & Chioma, M. I. B. (2015). Local building materials: an affordable strategy for housing the urban poor in Nigeria. Procedia Engineering, 118, 42-49.

UN (2015). Transforming our world: the 2030 agenda for sustainable development.

UN-Habitat (2016). Housing at the centre of the New Urban Agenda: a policy paper on housing for sustainable urban development.

Waziri, A. G., & Roosli, R. (2013). Housing Policies and Programmes in Nigeria: A Review of the Concept and Implementation. Business management dynamics, 3(2).

Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviors. Journal of Environmental Psychology, 30(3), 305-314.