

Original scientific paper

Modelling Social and Environmental Determinants of Urban Housing in Developing Countries: A Delphi Approach

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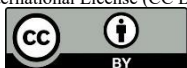
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ABSTRACT

Urban housing development is an outcome of several predictors ranging from finance, governance, land tenure security, and social and environmental factors, among others. However, despite scholars acknowledging their importance, social and environmental dimensions remain inadequately conceptualised within the housing development agenda from a developing country's perspective, as evidenced by socially and environmentally constrained human settlements. Using Zambia as a case study, this research models social and environmental determinants of urban housing development. Methodologically, a Delphi approach was employed, with data collected over two iterative rounds from a panel of ten experts drawn from the Ministry of Local Government, non-governmental organisations, financial institutions, property developers, housing institutions, and academia. Twelve environmental and thirteen social attributes were evaluated, achieving strong second-round consensus (interquartile deviation ≤ 1) on most items. Findings reveal that promoting culturally reflective designs, linking housing to broader urban fabrics, sustainable policies, and local building materials will yield viable housing solutions for communities. The study recommends mandatory, enforceable eco-friendly and socially adaptive housing regulations, guiding policymakers on prioritising environmental and social attributes to advance climate-responsive, socially cohesive, well-linked human settlements that promote economic inclusion.

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Highlights:

- Human settlements are socially constrained, with housing stocks not properly linked to urban fabrics
- Failure to consider social dimensions in the development agenda leads to lack of success in housing development initiatives.
- Context-specific development models aid in creating well-targeted and effective housing solutions
- The study identifies environmental and social determinants in housing development

Contribution to the field statement:

This study provides a guide to policymakers on the need to develop housing solutions which are adaptive to the cultural needs of the communities and regulations which promotes the use of eco-friendly local building materials and technologies.

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1. Introduction

Housing is a complex, multi-dimensional unit comprising a package of goods and services that provide accommodation and satisfaction for inhabitants (Kasim et al., 2024). It is a fundamental human need

and is essential for advancing social wellbeing and sustainable urban human settlements (Elsayed, 2025). Scholars broadly agree that social and environmental dimensions of urban development must be integrated into the overall urban development agenda to guarantee sustainable human settlements (Kalfas et al., 2023; Klopp & Petretta, 2017; Satterthwaite, 2016; Xue, 2022). The social dimension emphasises the importance of preserving community cohesion, local identity, and inclusive participation in housing development. Likewise, the environmental dimension advocates eco-friendly and climate-responsive housing design, construction, operation, and disposal (Deshmukh et al., 2025; Li et al., 2022). Environmental factors, in particular, remain a persistent challenge in housing development, exerting adverse effects on overall outcomes.

Today, most of the world's population resides in urban areas, a trend projected to continue. In developing countries, urban areas face substantial challenges related to land shortages and environmental pressures, partly driven by climate change, among other factors. Rising urban populations, land scarcity, and inadequate land-use control have collectively accelerated the rapid, often unplanned, growth of human settlements. Settlements continue to emerge wherever land becomes available, including disaster-prone areas thereby contributing to inhumane housing conditions (Li et al., 2022; Ruíz & Mack-Vergara, 2023). The climate change crisis is compounding these challenges: damage, migration, and displacement caused by increasingly frequent extreme weather events and prolonged exposure, are contributing to the proliferation of substandard and inhumane housing conditions (Ruíz & Mack-Vergara, 2023).

In many African countries, cities are overcrowded and lack decent housing. Human settlements remain socially constrained, with housing stock poorly linked to essential urban fabrics such as industrial zones (employment opportunities), schools, hospitals, and social amenities (Gollin et al., 2016; Scheba et al., 2021). Infrastructure investment, service delivery, and urban land-use planning consequently remain poorly integrated. Nwafor et al. (2018) contend that much of the existing housing stock in sub-Saharan countries fail to meet social and environmental adequacy standards, a shortfall compounded by housing policies and regulations that inadequately address key determinants such as energy-efficient design and the use of local building materials. While most existing studies have examined how housing development affects the environment (Abidin et al., 2023; Arceo et al., 2024; Lavagna et al., 2018; Preval et al., 2016), others have explored the social and environmental impacts of housing development itself (Bentley et al., 2025; Çelik et al., 2019; Forchuk et al., 2016; Nur et al., 2024; Rana, 2025; Rolfe et al., 2020). Environmental and social determinants have not been adequately addressed. This study addresses this gap by modelling and conceptualising the role of environmental and social factors in housing development through a Delphi approach. It is precisely these social and environmental determinants that shape the success and long-term sustainability of housing initiatives, underscoring the need for context-specific, inclusive, and adaptive housing solutions. Figure 1 summarises the Delphi approach employed in this study.

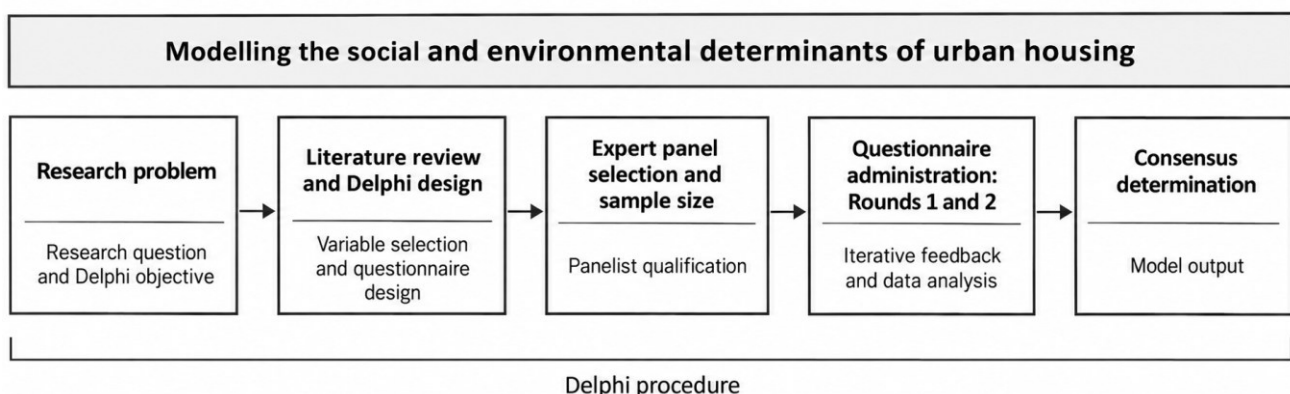


Figure 1. Delphi approach employed.

Instead of looking at the effects, this study models the environmental and social determinants which should be considered in ensuring sustainable human settlements. In developing countries, most housing development initiatives do not succeed due to failure to consider the community in the development agenda.

1.1 Variable Conceptualisation

The conceptualisation of the social and environmental variables as espoused in this paper was informed by similar studies by Altrock (2022); Forchuk et al. (2016), Smets & van Lindert (2016), Oyeibanji et al. (2017), and Nwafor et al. (2018), among others. For each of the variables, measurement items were derived a priori from scholarly evidence, as shown in Table 1.

Table 1: Social and Environmental Factors.

Factors	Attributes	Source
Social	Encouraging socially mixed housing development	Sanei et al., 2022
	Promotion of social cohesion in housing development	Oyeibanji et al., 2017; Formolly & Saraei, 2024
	Housing designs should reflect the community's lifestyle	Moghayedi et al., 2021; Sanei et al., 2022; Formolly & Saraei, 2024
	Social regeneration (improvement of quality of life) and integration	Ji et al., 2023; Altrock, 2022; dos Santos Figueiredo et al., 2022; Hanif & Riza, 2025
	Sustainable mobility	Sanei et al., 2022
	Encouraging mixed residential development	Sanei et al., 2022
	Housing should reflect the local building traditions	Formolly & Saraei, 2024; Asmal, 2025
	Planning reflecting cultural context of local communities	Moghayedi et al., 2021; Naknawaphan & Naknawaphan, 2025
	Ensuring secure housing	Oyeibanji et al., 2017; Moghayedi et al., 2021; Sanei et al., 2022
	Housing linked with other fabrics of human settlements	Forchuk et al. 2016; Oyeibanji et al., 2017
	The use of spatial planning instruments	Getzner & Kadi, 2020; Dühr, 2023
	Promote the participation of women in housing development	Oyeibanji et al., 2017; Chisumbe et al., 2024
	Promote the participation of the youth in housing development	Oyeibanji et al., 2017
	Participation of the disabled in housing development	Oyeibanji et al., 2017
	Provision of social amenities	Forchuk et al. 2016; Oyeibanji et al., 2017; Sanei et al., 2022
Environmental	Promotion of climate change responsive housing development	Sanei et al., 2022
	Use of sustainable materials	Oyeibanji et al., 2017; Formolly & Saraei, 2024
	Promotion of green construction	Moghayedi et al., 2021
	Sustainable urban planning	Nwafor et al. 2018
	Promotion of energy efficient buildings	Oyeibanji et al., 2017; Moghayedi et al., 2021
	Promotes health environment through reduced air pollution	Sanei et al., 2022
	Land conservation and proper planning	Oyeibanji et al., 2017
	Provision of waste management infrastructure	Sanei et al., 2022
	Preserving and creation of green and public spaces	Nwafor et al. 2020
	Creation of sustainable housing policies and programmes	Smets & van Lindert, 2016; Chisumbe et al., 2024
	Water efficiency and water conservation	Moghayedi et al., 2021
	Provision of drainage and sanitation infrastructure	Owojori & Anwana, 2024

2. Materials and Methods

2.1 Study Design

The Delphi approach involves administering iterative surveys to a panel of expert respondents with relevant expertise in the study area. The process begins with problem identification and the formulation of a Delphi objective, followed by a literature review that informs the selection of variables to be examined. Once the Delphi questionnaire (survey instrument) has been designed, the process proceeds to the selection of expert panelists suitable for the study. Following expert recruitment, the survey instrument is administered over successive iterative rounds until group consensus is achieved, a process that, in most studies, extends to a third round. Scholars have recommended adherence to established guidelines to ensure rigorous implementation of the Delphi process (Hallowell & Gambatese, 2010; Kim & Yeo, 2018; Tymvios & Gambatese, 2016). The principal benefit of the Delphi technique lies in the premise that even the most informed and well-researched individual may hold views that are not entirely accurate in isolation; however, when considered collectively alongside the opinions of others, more informed and reliable conclusions typically emerge (Sablatzky, 2022).

2.2 Selection of Delphi Expert panellists

Ensuring the reliability of Delphi research findings depends critically on a clearly defined criterion for what constitutes an "expert," and several recommendations have been advanced in the literature (Alomari et al., 2018; Gunduz & Elsherbeny, 2020; Hallowell & Gambatese, 2010; Ibrahim et al., 2014; Xu et al., 2010; Yeung et al., 2009). Common themes identified across this literature indicate that an expert should satisfy the following criteria: authorship of peer-reviewed scholarly publications, having chaired a nationally recognised relevant committee, possession of extensive professional experience in the field, a minimum of a bachelor's degree qualification, faculty membership at a reputable university, and demonstrated sound knowledge of the subject under investigation. The recommendations of Hallowell and Gambatese (2010) and Alomari et al. (2018) are considered particularly robust in defining and qualifying experts. Hallowell and Gambatese (2010), for instance, proposed a scoring criterion whereby a minimum of 11 points is required for an individual to qualify as an expert. A detailed breakdown of this scoring system is presented in Table 2.

Table 2: Flexible point system for the qualification of expert panellists.

Item no.	Category Description	Points allocation
1.	Affiliation with a professional body	3 points per registration
2.	Professional experience	1 point per year
3.	Made a presentation at a conference	0.5 points per presentation
4.	Member of committee	1 point per committee
5.	Chair of committee	3 points per committee
6.	Author of peer-reviewed journal articles	2 points per article
7.	Member of a faculty at a reputable university	3 points
8.	Book author or editor	4 points per book
9.	Authored a book chapter	2 points per book
10.	Holder of bachelor's degree	4 points per degree
11.	Holder of master degree	2 points per degree
12.	Doctor of Philosophy (PhD)	4 points per degree

Source: (Hallowell and Gambatese, 2010)

Likewise, Alomari et al. (2018) outlined that an expert should have a considerable level of professional experience in the area under inquiry, member of a university faculty, book author on the relevant topic under investigation, done a presentation on the subject matter at a reputable conference, published journal author with at least more than three articles on the topic of interest. Another consideration had to do with having relevant professional registration. Therefore, for this research, a combination of Alomari et al. (2018) and Hallowell and Gambatese's recommendations was adhered to for expert selection, as shown in Table 3.

Table 3: Expert selection criteria.

#	Assigned Identification	Expert Selection Percentage									
		1	2	3	4	5	6	7	8	9	10
1.	Professional body membership	√	√	√	√	√	√	√	√	√	√
2.	Involved in housing development-related activities at organisational to national level.	√	√	√	√	√	√	√	√	√	√
3.	At least 5 years' experience of working in Job related to housing	√	√	√	√	√	√	√	√	√	√
4.	Academic background as a faculty member	√	√	-	-	-	-	-	-	-	-
5.	Higher education background (Bachelor's, Master's degree, PhD)	√	√	√	√	√	√	√	√	√	√
6.	Member or chair of a housing committee	√	√	√	√	√	√	√	√	√	√
7.	Journal publication or conference presentation	√	√	-	-	√	-	-	√	√	-
Total Criteria Percentage (%)		100	100	71.4	71.4	85.7	71.4	71.4	85.7	85.7	71.4
Points		54	56	16	26	35.5	12	15	18	33.5	17

Source: Authors' compilation.

Decision

Percentage $\leq 50\%$ - Reject as Delphi panel of experts.

Percentage $\geq 50\%$ - Include as Delphi panel of experts.

For the purpose of this research, three principal architects, three urban planners, a registered professional quantity surveyor, two experts in property development, and one policy/development economist drawn from a consortium of civil society organisation involved in housing development, made up the expert panel. As aforementioned, all the respondents fulfilled the requirements to be classified as experts (Alomari et al., 2018; Hallowell & Gambatese, 2010).

2.3 Number of expert panellists

There is no universally agreed number of expert panellists that should be considered for Delphi. However, scholars have put forward several recommendations of the panel size for a Delphi study (Delbecq et al. 1975; Rowe & Wright, 2001; Hallowell and Gambatese, 2010; Alomari et al., 2018). Twenty (20) studies were reviewed in arriving at the suitable sample size for this study. Of all the reviewed studies, eleven suggested ten (10) experts to be adequate (Delbecq et al., 1975; Duffield, 1989; Rowe & Wright, 2001; Okoli and Pawlowski, 2004; Hallowell and Gambatese, 2010; Cortés et al., 2012; Sobaih et al., 2012; Tilakasiri, 2013; Ameyaw et al. 2016; Alarabiat & Ramos, 2019; Gunduz and Elsherbeny, 2020). Consequently, this study considered a panel of ten (10) experts. A summary of various recommendations is shown in Table 4.

Table 4: Scholarly views on suitable number of expert panellists for Delphi.

ID	Recommendation	Author
1	5 to 10	Delbecq et al. (1975)
2	5 to 20	Rowe & Wright (2001)
3	≥ 7	Alomari et al. (2018)
4	7 to 14	Sobaih et al. (2012)
5	8 to 12	Hallowell and Gambatese (2010)
6	8 to 20	Ameyaw et al. (2016); Gunduz and Elsherbeny [38]
7	≥ 10	Cortés et al. (2012)
8	≥ 14	Keeley et al. (2016)
9	10 to 15	Duffield (1989); Alarabiat & Ramos (2019)
10	10 to 100	Tilakasiri (2013)

ID	Recommendation	Author
11	10 to 18	Okoli and Pawlowski (2004)
12	12 to 15	Varndell et al. (2021)
13	15 to 18	Day and Bobeva (2005)
14	15 to 20	Ludwig (1997); Hsu & Sandford (2007)
15	15 to 30	Clayton (1997); Loo, (2002)
16	15 to 60	Hasson et al. (2000)

Source: Author's compilation

Having evaluated various suggestions as aforementioned, the survey opted for a minimum of 10 experts; the number 10 satisfies most of the suggestions put forth in other Delphi studies.

2.4 Iterative Rounds

The process of data collection was done over two iterative rounds. For the first round, a questionnaire was sent to expert panellists, who were asked to rate on a scale of 1 to 10 the importance of the identified attributes in explaining social and environmental determinants of urban housing development. Median values of 6 and above were considered to be of significant influence in housing development. At the end of the first round, responses were tabulated with group medians computed and interquartile deviations. Tabulated scores were then sent back to respondents in order for them to confirm whether they agreed with the group median scores, and in situations where their score was not more than one from the group median, they had a choice of not changing their response. In instances where respondents' scores were more than one from the group median, they were presented with an option of either changing their responses or giving reasons why they stood by their response. According to Pfeiffer (1968), an explanation for staying outside of the consensus or the median should be given if an individual's response deviates significantly from the group median.

2.5 Consensus determination

In determining consensus of expert opinions, interquartile deviation (IQD) was relied upon; the interpretation was that IQD values of 1 or less denoted a strong consensus around the group median. Whereas IQD values of more than 1 signified divergence of ideas, thereby requiring further confirmation or explanation from respondents. The absolute group median was calculated using equation 1.0. Similarly, the difference between the 1st and 3rd quartiles of the frequency distribution was used to find the IQD. As in this case, the percentile is frequently used to represent test results that are norm-referenced. The 50th percentile is referred to as the median or second quartile (Q2), the 25th percentile as the first quartile (Q1), and the 75th percentile as the third quartile (Q3).

$$D_i = [x_i - m(X)] \dots \dots \dots \text{Equation 1.0}$$

Where D_i = Absolute deviation

x_i = Panel rating

$m(X)$ = Measure of central tendency

Consensus was reached when IQD values were found equal to one, with 60% of the respondents either agreeing or disagreeing. IQD values of less than one depicted convergence of opinions. This approach has been widely adopted by scholars (Hallowell and Gambatese, 2010; Jordan and Javernick-Will, 2013). IQD values above one suggested a lack of consensus and were sent back to experts for further consideration.

3. Results

3.1 Environmental determinants

A list of twelve (12) environmental attributes was compiled as identified from the literature and subjected to expert panellists. Experts were asked to rate the level of importance of each of the listed

attributes in achieving urban housing development in Zambia. Results after the first round revealed that all the attributes were rated as being fairly important in contributing to housing development, with median scores ranging from 6-7, as shown in Table 5. However, due to not achieving consensus on some attributes, the decision was made to proceed with the second round.

Table 5: Environmental (first round results).

Attributes	Median	Mean ($\bar{x}$)	SD (σX)	IQD
Promotion of climate-responsive housing development	6	5.78	1.92	2.00
Use of sustainable materials	7	6.56	1.33	1.00
Promotion of green construction	7	7.00	1.73	3.00
Sustainable urban planning	7	6.78	1.64	1.00
Promotion of energy efficient buildings	6	6.67	1.66	1.00
Promotes health environment through reduced air pollution	6	7.00	1.94	3.00
Land conservation and proper planning	7	7.11	1.90	3.00
Provision of waste management infrastructure	6	6.11	0.93	0.00
Preserving and creation of green and public spaces	6	5.78	1.39	1.00
Creation of sustainable housing policies and programmes	7	7.00	1.66	1.00
Water efficiency and water conservation	7	7.44	1.33	1.00
Provision of drainage and sanitation infrastructure	7	7.11	1.96	1.00

Legend: **Std**: Standard deviation, **IQD**: Interquartile deviation.

After the second round, most attributes were rated as being of high importance in contributing to housing development, having recorded median scores in the range of 8 to 10, with IQD of 1 or less, except for three items which had values of 1.5. Overall, there was a strong consensus on the attributes defining environmental factors in housing development, as shown in Table 6.

Table 6: Environmental attributes (second round results).

Attributes	Median	Mean ($\bar{x}$)	SD (σX)	IQD
Creation of sustainable housing policies and programmes	10	9.50	1.08	0.00
Provision of drainage and sanitation infrastructure	10	9.40	1.07	0.75
Sustainable urban planning	10	9.30	1.64	0.00
Land conservation and proper planning	9	8.70	1.57	0.75
Preserving and creation of green and public spaces	9	8.70	1.57	0.75
Provision of waste management infrastructure	9	8.60	1.26	0.75
Promotion of energy efficient buildings	9	8.40	1.43	0.75
Use of sustainable materials	8	8.20	1.48	1.00
Promotion of climate responsive housing development	7	7.40	1.43	0.00
Promotes health environment through reduced air pollution	9	8.30	1.49	1.50
Water efficiency and water conservation	9	8.70	1.34	1.50
Promotion of green construction	8	8.20	1.55	1.50

Legend: **Std**: Standard deviation, **IQD**: Interquartile deviation

3.2 Social determinants

With regard to social factors, thirteen attributes were identified from the literature and experts were asked to rate their importance in urban housing development. First round results revealed that all the listed attributes were scored as been fairly important in housing development, with median scores in the range of 6 to 7, as shown in table 7.

Table 7. Social attributes (first round results).

Attributes	Median	Mean ($\bar{x}$)	SD (σX)	IQD
Promotion of social cohesion in housing development	7	6.56	1.33	1.00
Housing designs should reflect the community's lifestyle	7	7.00	1.73	3.00
Social regeneration and integration	7	6.67	1.66	1.00
Sustainable mobility	6	7.00	1.94	3.00
Mixed use development	6	7.11	1.90	3.00
Housing reflecting cultural context of local communities	7	7.22	1.48	0.00
Ensuring secure housing	7	7.00	1.66	1.00
Housing linked with other fabrics of human settlements	7	7.44	1.33	1.00
The use of spatial planning instruments	7	7.33	1.50	1.00
Participation of women in housing development	7	7.11	1.96	1.00
Participation of the youth in housing development	7	6.67	1.50	1.00
Participation of the disabled in housing development	7	7.11	1.90	4.00
Provision of social amenities	6	6.22	1.30	2.00

Legend: **Std**: Standard deviation, **IQD**: Interquartile deviation

After, the second round, most attributes were rated as being of high importance in contributing to housing development, with all attributes having median scores in the range of 7 to 9 and IQD of 1 or less, except for three items which had values of more than 1. Overall, there was a strong consensus on the importance of most attributes defining social factors in housing development, as shown in Table 8.

Table 8: Social attributes (second round results).

Attributes	Median	Mean ($\bar{x}$)	SD (σX)	IQD
Ensuring secure housing	9	9.00	0.94	0.75
Provision of social amenities	9	8.80	1.14	0.00
Housing reflecting cultural context of local communities	9	8.90	1.52	1.00
The use of spatial planning instruments	8	8.20	1.23	0.75
Housing linked with other fabrics of human settlements	8	8.10	1.37	0.75
Sustainable mobility	8	8.00	1.76	1.00
Participation of women in housing development	8	7.8	1.55	0.75
Participation of the disabled in housing development	8	7.70	1.42	0.75
Social regeneration and integration	7	7.30	1.57	1.00
Mixed use development	7	7.20	1.87	0.75
Housing designs should reflect the community's lifestyle	8	8.40	1.51	1.75
Participation of the youth in housing development	8	7.60	1.78	1.50
Promotion of social cohesion in housing development	8	7.50	1.51	1.75

Legend: **Std**: Standard deviation, **IQD**: Interquartile deviation

4. Discussion

4.1 Environmental dimension

The findings confirm the environmental dimension to be an influential factor, defined by twelve (12) attributes. The study advances that particular focus should be placed on promoting sustainable urban planning, a finding consistent with Nwafor et al. (2018), who emphasise the need to integrate spatial planning with density management, arguing that cities can achieve compact, resource-efficient urban forms that reduce environmental footprints while enhancing resilience. Resource-efficient urban forms imply well-connected human settlements that minimise the need for costly, long-distance motorised commuting, a major contributor to carbon emissions. The findings further support the construction of urban housing incorporating reduced energy consumption and water conservation features.

Another attribute identified as important was the creation of sustainable housing policies and programmes, aligning with Jiboye (2011), who notes that policy is crucial to ensuring a sustainable

housing delivery system. This viewpoint is shared by Yakob et al. (2015), who contend that government can play an active role through rule-making, regulation, development planning, and the establishment of planning standards and guidelines that support housing development (Chisumbe et al., 2024; Smets & van Lindert, 2016). This underscores the need for climate-responsive building regulations that promote the use of eco-friendly building materials and construction technologies. In most sub-Saharan African countries, however, building regulations remain archaic and poorly adapted to climate change (Sichali & Mulenga, 2025). The preservation and creation of green public spaces represents a further aspect that building regulations should address, as a means of optimising functionality and minimising carbon footprints (Nwafor et al., 2020). With respect to drainage and sanitation infrastructure, the findings align with Owojori and Anwana (2024) and Sanei et al. (2022) on the importance of ensuring adequate access to infrastructure such as drainage systems and roads.

4.2 Social dimension

The social dimension constitutes another key factor in predicting urban housing development, defined by thirteen (13) attributes, namely: ensuring secure housing; provision of social amenities; planning that reflects the cultural context of local communities; the use of spatial planning instruments; housing linked to other fabrics of human settlements; and sustainable urban mobility. Additional attributes central to this dimension include promoting stakeholder participation encompassing women, youth, and persons with disabilities; ensuring social regeneration and integration; encouraging mixed residential development; ensuring that housing designs reflect community lifestyles; promoting social cohesion in housing development; encouraging socially mixed housing; and promoting housing that reflects local building traditions.

These findings are consistent with the literature on the need to incorporate traditional architectural elements into new developments while adapting to contemporary conditions, in order to achieve culturally sensitive and sustainable housing solutions (Formolly & Saraei, 2024; Moghayedi et al., 2021; Sanei et al., 2022). UN-Habitat (2012) and Ibem and Azuh (2011) similarly maintain that the planning, design, and construction of houses and their surrounding environment should be responsive to occupants' needs, cultural values, and lifestyles. This points to the need for standardising the use of local building materials and incorporating them into building regulations; the current lack of standards constitutes a barrier to both the use of local materials and their broader market acceptance. Regarding the provision of spatial planning instruments, Stead (2021) underscores the need for regulations, standards, legislation, and policy to effectively control urban land use.

With respect to the promotion of social cohesion in housing development, the literature advances social cohesion through mixed housing development that accommodates residents of varying economic, cultural, and social backgrounds, supported by shared social facilities such as sports, markets, transport, health, and education services (Oyebanji et al., 2017; Sanei et al., 2022). Such mixed-use development fosters economic inclusion among urban dwellers, in contrast to the situation prevailing in most African cities, where the majority of low-income earners occupy housing located far from industrial zones and centres of economic activity. Regarding the provision of social amenities, Oyebanji et al. (2017) and Sanei et al. (2022) emphasise the importance of recreational facilities in improving community welfare and quality of life. Concerning stakeholder participation, Oyebanji et al. (2017) further underscore the importance of stakeholder involvement in decision-making processes.

4.3 Implications and Future Directions

This study offers policymakers guidance on the need to develop housing solutions that are adaptive to the cultural needs of communities, supported by regulations that promote the use of eco-friendly local building materials and technologies. The proposed model identifies the social and environmental attributes that determine urban housing development outcomes. Future research may build upon the

variables and sub-attributes identified in this study, employing alternative methodologies such as mixed-methods approaches to further validate and extend these findings.

5. Conclusion

This study developed a context-specific account of the social and environmental determinants of urban housing development in Zambia, addressing the limited integration of these dimensions into housing models for developing countries. A two-round Delphi process involving ten experts evaluated 25 attributes, comprising 12 environmental and 13 social attributes. By the second round, 19 attributes, representing 76% of the total, achieved strong consensus, defined as an interquartile deviation (IQD) of 1.00 or less. Specifically, strong consensus was reached for nine of the 12 environmental attributes (75%) and ten of the 13 social attributes (76.9%). These results confirm that sustainable urban housing depends not only on the physical provision of dwellings but also on environmental performance, cultural responsiveness, social inclusion, and integration with the wider urban system.

Among the environmental determinants, sustainable housing policies and programmes, drainage and sanitation infrastructure, and sustainable urban planning received the highest median score of 10. Sustainable housing policies and programmes also recorded the highest mean score ($M = 9.50$, $IQD = 0.00$), followed by drainage and sanitation infrastructure ($M = 9.40$, $IQD = 0.75$) and sustainable urban planning ($M = 9.30$, $IQD = 0.00$). Among the social determinants, secure housing, social amenities, and housing that reflects the cultural context of local communities each achieved a median score of 9. The provision of social amenities produced complete agreement around the median ($M = 8.80$, $IQD = 0.00$), while secure housing recorded the highest social mean score ($M = 9.00$, $IQD = 0.75$). These findings demonstrate that housing should be understood as an integrated socio-environmental system rather than as an isolated physical product.

From a policy perspective, the results call for the systematic incorporation of social and environmental requirements into housing policies, spatial plans, development-control instruments, and building regulations. Governments should establish enforceable standards that promote climate-responsive design, energy and water efficiency, green and public spaces, effective waste management, adequate drainage and sanitation, and the responsible use of local and environmentally sustainable materials. Housing programmes should also respond to community lifestyles and cultural traditions, facilitate the participation of women, young people, and persons with disabilities, and promote socially mixed, accessible, and well-connected neighbourhoods. Effective implementation will require coordination among planning authorities, housing institutions, developers, financial organisations, civil society, and local communities, supported by clear monitoring and compliance mechanisms.

The findings should nevertheless be interpreted in light of the study's geographical and methodological boundaries. The expert panel was limited to ten participants in Zambia, and Delphi consensus represents informed expert agreement rather than causal evidence or population-level generalisability. Moreover, three environmental attributes, namely reduced air pollution, water efficiency and conservation, and green construction, recorded IQD values of 1.50. Three social attributes, namely community-responsive housing design, youth participation, and social cohesion, recorded IQD values between 1.50 and 1.75, indicating residual divergence that warrants further examination. Future studies should test the proposed framework across multiple developing countries, incorporate residents' perspectives, and use larger samples and methods such as structural equation modelling to validate the relationships among the identified determinants and measurable housing outcomes.

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Conflicts of Interest

The authors report no conflicts of interest.

Data availability statement

The dataset considered in this study remains private to the public for ethical reasons, and can only be made available on special request and consideration by the corresponding author. Requests can be directed to clechisumbe@gmail.com

Institutional Review Board Statement

This study upheld the Declaration of Helsinki principles and was authorized by the University of Johannesburg's Institutional Ethics and Plagiarism Committee (FEPC) (protocol code UJ_FEBC_FEPC_00059).

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