

**ESTABLISHING A UNIVERSAL MODEL TO EVALUATE THE  
ADEQUACY OF SHELTER FOR HOUSING**

by

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submitted in fulfilment of a part of the requirements for the degree

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## ABSTRACT

**Title of treatise:** Establishing a universal model to evaluate the adequacy of shelter for housing

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The right to adequate housing is recognised as a basic human right, but the concept of adequate housing is ill-defined. This research aimed to establish a universal model that can be used to evaluate the adequacy of shelter for housing globally. In a qualitative study using a grounded theory approach, the official housing regulations/legislation/policy/code/standards of 42 countries were analysed. As per grounded theory, the data was open coded, axially coded and selectively coded. It was established that 27 consistent universal elements occur across the sample. These can be divided into five categories. Allocation of a percentage to each of the elements facilitates the quantitative comparison of housing internationally. The data is validated by the data itself as per grounded theory, and application of the model is illustrated by a case study. The model provides a framework to assess the adequacy of shelter for housing universally.

## DEDICATION

“If not for the Grace of God, there goes I.” This thesis is dedicated to all those who do not have access to adequate housing, while I am constantly reminded of my own privilege in the process. Hopefully it can bring about change, even if only through better understanding.

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# 1 CHAPTER 1: INTRODUCTION

## 1.1 Background

The idea for the research came from intrigue at Singaporean Housing and Developing Board (HDB) housing being generally lauded, while South African housing was often discussed in media as lacking. It seemed there was no evaluation basis as to what made one superior to the other, where it was lacking and how different organisations could learn from others internationally.

The basic human right to adequate housing is agreed upon by all member states of the United Nations (UN HABITAT, 2009). The details of what adequacy entails are vague and ill-defined according to existing literature, and it is therefore difficult to determine whether any shelter used for housing is adequate, how adequate it is, or where it lacks in adequacy.

Instead of focusing on the provision of housing by government entities, or the extent of support offered, this study aims to establish a model to evaluate the adequacy of any shelter used for housing. This means it should be applicable to evaluate any structure used as a shelter for housing—this includes, but is not limited to social housing, emergency housing, informal housing, private developments, temporary housing, student housing, employee housing, etc.

## 1.2 Outline of the document

Following on this introductory Chapter 1, the document will discuss, detail and critique the theoretical overview and literature background on the topic in Chapter 2. Chapter 3 considers grounded theory as approach including the methodology through the different stages of data collection, analysis, presentation and validation. Chapter 4 considers data collection in the different phases of the project and details the sampling and source documents. Chapter 5 analyses the data through open coding, axial coding and core categories as per the grounded theory approach. The data obtained from these codes are then formulated into the elements and model presented in Chapter 6 and validated through theoretical saturation and confirmation as per grounded theory as well as a case study example in Chapter 7. Chapter 8 is a discussion chapter that includes the answering of research questions and comparison of the results to existing theories in terms of universality, definitions and elements. The document

concludes with Chapter 9 with the potential contribution of this research and further research possible.

### **1.3 Main findings**

The research found 27 elements of housing adequacy and the evaluation criteria in each element. These 27 elements are divided into five categories: Accessibility; Protection from the elements; Internal habitability; Service Provision and Sustainability. The model is displayed in a visual form with percentages for each element to assist the user in interpreting the results themselves. The model is considered universal in nature due to the geographic and socio-economic representation of the sample. The theories from existing literature are also incorporated and built upon by the proposed model, and data is validated according to grounded theory by the data itself. The proposed model is capable of evaluating the adequacy of housing, and a case study example is provided to illustrate its application.

### **1.4 Contributions and implications**

The need for housing is a global problem and the right to adequate housing is a universal human right. Development of a universal model to evaluate the adequacy of shelter for housing will contribute to establishing a standard against which housing, not only in South Africa, but also internationally, can be measured. Housing provision can be evaluated and compared. The contributions are discussed in more detail in Chapter 9.

### **1.5 Research gap**

Access to adequate housing is internationally recognised as a basic human right, yet there is no universal system to consider and compare the adequacy of the housing being provided.

Different national standards, frameworks and codes exist but these are aimed at adequacy in specific circumstances and settings or of specific elements (Ibem et al., 2013), not adequacy of the housing as a whole. An adequacy model should not seek to replace or universally overrule local standards, but supplement existing standards in determination of adequacy. A minimum standard is not necessarily a minimum adequacy. "Standards" is the physical term in which a minimum situation can be expressed (Ratcliff, 1952). In a housing context, standards refer to the housing quality and expression of value at different levels of housing

(Ratcliff, 1952). The use of measurable criteria alone, in addition to having such criteria enforced by the governments or similar, will result in stereotypical houses without variations that respond to specific human requirements (Marshall, 1969). This study will rather attempt to consider volitional standards—standards of acceptability where choice determines the standards to ensure that it results in satisfaction, not only to function, but to add value (Ratcliff, 1952). Because housing comprises probabilities for desirable results (comfort, satisfaction, contentedness, etc.) as well as unfavourable (dissatisfaction, safety risks, health and wellbeing risks, etc.), the decisions made during standard-setting remains a human choice based on considerations of which attributes matter the most, and is not a scientific absolute (Ratcliff, 1952). It is already known that humans have the capacity to adapt to surroundings and accept new standards, as most habitats are man-made. This suggests that our ideas of “normal” are based on personal and received ideas. One should attempt to find a balance by taking mental and physiological aspects into account (Marshall, 1969). In conclusion, standards form part of adequacy determination, but are not the only component of adequacy.

While current international theories on adequacy – to be discussed in detail in 2.5 (Aroni, 1975; Barber, 2008; Behr, 2021; McClean, 2018; Onibokun, 1985; Russell, 2021; Smit, 2008; South African Cities Network, 2011; UN HABITAT, 2009; Whitehead and Scanlon, 2007; Wimalasena, 2022; Yang, 2008) – state some elements of adequacy, it is a limited framework of information with limited evaluation and comparison application. This is an issue that has applications in the provision of all housing including public provision, emergency housing, housing for workers, housing for different classes etc. While it is applicable in various provision situations the focus of adequate housing should not be concerned with the system, situation or process used to provide housing but rather attempt to guarantee that the housing of all citizens can be considered adequate (Hardman, 1993; Ratcliff, 1952; UN HABITAT, 2009).

It is arrogant and flawed to believe that we know and have researched and developed to date all the essentials and requirements possible in the spheres of real estate and housing (Marshall, 1969). This study will attempt to bridge some gaps in existing research on the adequacy of shelter for housing.

## **1.6 Research aim**

To identify the universal elements comprising the concept of adequate housing, and develop a model that enables the evaluation and comparison of housing in different settings and contexts.

## **1.7 Research objectives**

Developing a rating system to objectively and realistically evaluate housing provisions will allow comparisons of strengths and weaknesses and facilitate international learning from the experience of others. The aim is to start from the fundamental and international human right to adequate housing. This statement is normally not amplified by further explanation or specifications of what adequacy should entail (UN HABITAT, 2009). An adequacy valuation will not seek to replace rigid and often unchanging regulations and standards, but rather to supplement these. It will also take into consideration that there will be individual and collective differences between different countries and regions; the aim would be for the model itself to be universally applicable, in order to allow evaluation within individual contexts as well. The elements should not depend on a geographical, financial and/or developmental context, even though the evaluation of such elements might depend on such. The model should provide details on what would constitute adequate in the case of any elements discussed in order to provide a measurement of degree of adequacy. Such a system can then be used for any shelter for housing: including social; public and even temporary or refugee shelter for housing.

## **1.8 Research question**

As per grounded theory approach discussed in the methodology in 3.1, the research question is expected to be a process question (Creswell et al., 2007) that can be used for theory building (Gligor et al., 2016). The result is often presented as a visual model to help illustrate the results (Creswell et al., 2007). In this case, to achieve the research aims and objectives, the results would need to be universal in nature; compiled into a model with a possible visual element, and it importantly needs to evaluate the adequacy that can be applied to any form of shelter used for housing. Can a universal model be established to evaluate the adequacy of shelter for housing?

## **1.9 Research sub-questions**

In order to answer the research question, the following research sub-questions are posed:

### **1.9.1 Can the model be considered universally applicable?**

As the model aims to be universally applicable, the first sub-question should determine whether the scope of the results can be considered as universal – is it applicable to different geographic, economic and social regions?

### **1.9.2 Are there minimum elements to adequacy of housing?**

The model depends on the presence of certain elements that comprise the definition of adequacy of housing. Are these present, and if so, what are they?

### **1.9.3 Can these adequacy elements be categorized and compiled into a model?**

As per grounded theory, the axial codes need to be analysed up to the point where core concepts or categories emerge. This will also ease the presentation of findings into a more comprehensible format, i.e. the model.

### **1.9.4 Can the housing adequacy elements be evaluated?**

The model aims to be able to compare and evaluate, so this research sub-question considers whether there are criteria for each element that can be used to determine the level of adequacy for each element in order to enable evaluation and comparison of adequacy.

### **1.9.5 Does the model of housing adequacy build upon existing theories?**

As per grounded theory, existing theories are not ignored but can be expanded upon (Sarker et al., 2000). Is this the case? Does this model contribute through its expansion on existing theories?

## **1.10 Delineations and limitations**

### **1.10.1 Scope limitations**

The following delineations and limitations were noted prior to conducting the study, and are also noted in 3.2.2 when discussing the exclusion of data based on scope during data collection:



- This study excludes aspects related to the provision system. While it is understood that the system is paramount to the success of any housing provision programme, the present study is not focussed on programmes, and does not wish to shift the focus from the adequacy of housing to the mechanisms providing the housing. Doing so would also unnecessarily narrow the focus of the study to applicability to, for example, only state or government provided housing. The present study therefore also excludes details pertaining to the scope and set-up of housing committees and departments and involvement of public sector or state in provision.
- There will be no critique of policies, legislation, legal processes, or other official documentation and governance processes and legislation. The study makes use of official published housing documents and analyses the contents thereof as the backbone of literature of housing (Mikeszová, 2007; Sirmans and Macpherson, 2003), not the efficiency or comprehensiveness thereof.
- The study does not consider the manner of usage such as subsidy, sale or rental of said housing, only the adequacy thereof. Examples of manner of usage data that will be excluded are (Haffner, 1999; Hardman, 1993):
  - Selection of beneficiaries,
  - Loan assistance,
  - Rental management schemes etc
  - Rent control
  - House-price appreciation
  - Cost of maintenance
  - Housing subsidies
- Feedback or summary about historical progress or provision measurement are not included. The study will not be examining the statistics of provision, but rather the adequacy of a housing unit. Historical indicators of housing have also been found to be focused on housing by income category or development status (Hardman, 1993), and this study does not wish to be limited to specific classes, income levels or provision modes.
- Construction standards and specifications that are not focussed on housing or residential buildings are not considered to be applicable to housing.
- The study will not task itself with design processes, as design is highly variable. While it can analyse general factors such as housing type, rooms and material usage, it

attempts to focus on moving away from specialised aspects like layouts and set designs. As Marshall (1969) suggests one can achieve further universality through customisability, and universal application is the aim.

- The study acknowledges the limitation of differences in principles, cultures, and thought-processes in different regions, times and classes (Marshall, 1969). To this end, the model attempts to ensure universal applicability by leaving results open to allow for interpretation and comparison in different cultural, physical and social circumstances.
- This study is focussed on the basic human right to adequate housing, but acknowledges that it may be a concern for other species and could have application in ecological studies as well such as Baumans and Van Loo (2013) that determined simple factors like cost, space, hygiene etc. do not really take the welfare of animals into account, and that physical and physiological needs are both very important when determining the minimal needs for acceptable housing.

#### **1.10.2 Methodology limitations**

The following limitations pertain to the data collection. The methodology of Phase 1 of the study will be discussed in detail in 3.2.1, the following methodology limitations are anticipated:

- The study was limited to online communication only – not only because of the charges for international telephone calls, but also due to restrictions as this study was undertaken in the midst of the Covid pandemic in 2020.
- The study was predominantly limited to the English language. Although English is only the primary, de facto or de jure language in 55 countries, it is the most spoken second language (Papadopoulos, 2019). The EF English Proficiency Index (EPI) is only rated as low to very low for a select few countries (Breene, 2019). Where possible, website interpreting and text translation was used to comprehend aspects that were not in the English language. It was also attempted to have the salutations of communication in the local language, but the language of communication still remained in English.

The methodology and data collection technique of Phase 2 of the study is detailed in 3.2.2, the following limitations to data collection are expected:

- Time restrictions—The study's time-horizon is cross-sectional, and data was collected between June and August 2021. The date of latest available revision or amendments were used, although the initial document might have been published prior to that.

- English language—only documents available in the English language or with translated versions of the document were used in the study. Self- or automatic translations were not used, as the context might be changed with incorrectly translated words.
- Online availability—the methodology followed made use of the internet for data collection; therefore, documents or revisions not available online were by default excluded. Documents behind a paywall, login or geographical access block were also deemed to be unavailable.
- Type of document—only official government publications were used in the study to ensure that data sources can be considered as primary data.

### **1.11 Application and future studies**

The results of this study are aimed to be for the use of evaluating and possibly comparing the adequacy of housing by the potential provider or potential user of such housing. The application can include:

- Adequacy of housing in specific provision systems such as state-provided or public housing systems
- Adequacy of shelter for housing in emergency situations
- Adequacy of shelter for housing in informal settlements
- Adequacy of housing in private developments
- Adequacy and comparison of specifics of design or layout
- Case studies and comparisons in different contexts such as different geographic, social or economic settings.

Aspects excluded from this study could provide scope for future studies on adequacy of:

- Provision system such as
  - Scope and set-up of housing committees and departments
  - Involvement of public sector or state in provision
- Critique on policies, legislation, legal processes, or other official documentation and governance processes and legislation.
- Manner of usage and related aspects such as:
  - Selection of beneficiaries,
  - Loan assistance,

- Rental management schemes etc
- Rent control
- House-price appreciation
- Cost of maintenance
- Housing subsidies
- Statistics and feedback on historical progress or provision.
- Construction standards and specifications that are not focussed on housing or residential buildings.
- Design processes
- Housing of non-human species

### **1.12 Summary**

This chapter summarises what can be expected from the rest of the document by firstly providing background and structure, and then summarising the main findings of the research. It then considers the technicalities of the research such as the gap in existing research and how the aims and objectives aim to address this. The limitations of the study – both based on both scope and methodology – are considered. Lastly, the research question and sub-questions are posed, and potential contributions and further research are anticipated.

## **2 CHAPTER 2: THEORETICAL OVERVIEW**

### **2.1 Introduction**

The right to adequate housing, and universal acknowledgement of the need for adequate housing is confirmed at the hand of existing literature and theories. The universality of housing concerns can be expanded upon by touching on applicability in different contexts. While ‘adequacy’ is the main focus, related concepts like housing standards and residential satisfaction should also be considered. Existing definitions of adequacy should be considered, and in summarising the elements that comprise such definitions – these should be investigated further.

### **2.2 Right to adequate housing**

According to international human rights law, adequate housing is included in the adequate standard of life every person is entitled to; it is included as such in the 1948 Universal Declaration of Human Rights, as well as the 1966 International Covenant on Economic, Social and Cultural Rights (UN HABITAT, 2009). It is considered a basic human right (South African Human Rights Commission, 2018; UN HABITAT, 2009), that is interdependent on and indivisible of other human rights, such as access to health, education, and services including water and sanitation (South African Human Rights Commission, 2018). This is reiterated in Article 25 of the Universal Declaration of Human Rights (UDR) as well as Article 11 of the International Covenant on Economic, Social and Cultural Rights (ICESCR) (South African Human Rights Commission, 2018).

All member states of the United Nations (UN) have ratified one or more treaties that mention adequate housing, and/or international declarations, plans of action or conference outcome documents that commit the protection of the right to adequate housing (UN HABITAT, 2009); therefore all member states of the UN agree that access to adequate housing is a basic human right.

Other international treaties that mention the right to adequate housing as part of human rights include (UN HABITAT, 2009):

- The 1951 Convention Relating to Status of Refugees (Art. 21)

- International Labour Organization's 1962 Convention No.117 concerning Basic Aims and Standards of Social Policy (Art. 5 (2))
- The 1965 International Convention on the Elimination of All Forms of Racial Discrimination (Art. 5 (e)(iii))
- The 1966 International Covenant on Civil and Political Rights (Art. 17)
- The 1979 Convention on the Elimination of All Forms of Discrimination against Women (Arts. 14 (2) and 15 (2))
- The 1989 Convention on the Rights of the Child (Arts. 16 (1) and 27 (3))
- The International Labour Organization's 1989 Convention No.169 concerning Indigenous and Tribal Peoples in Independent Countries (Arts. 14, 16 and 17)
- The 1990 International Convention of the Protection of the Rights of All Migrant Workers and Members of Their Families (Art. 43 (1)(d))
- The 2006 Convention on the Rights of Persons with Disabilities (Arts. 9 and 28).

Regional aspects that recognise the right to adequate housing include (UN HABITAT, 2009):

- European Convention on the Legal Status of Migrant Workers (1977)
- African Charter on the Rights and Welfare of the Child (1990)
- Revised European Social Charter (1996).

It is also implied in (UN HABITAT, 2009):

- European Convention for the Promotion of Human Rights and Fundamental Freedoms (1950)
- European Social Charter (1961)
- The American Convention on Human Rights (1969)
- The African Charter on Human and Peoples' Rights (1981).

On a national level, several constitutions specifically state the protection of the right to adequate housing. Legal court systems have also had to deal with cases regarding the enjoyment of housing—including aspects like protection of tenancy, forced evictions or even sociological aspects like discrimination (UN HABITAT, 2009). A sample of the mention of adequate housing in specific national constitutions also include (UN HABITAT, 2009):

- Constitution of Mexico 1917 (as amended in 1983), Article 4

“...the right to enjoy decent and proper housing.”

- Constitution of Portugal 1976 (fourth revision based on Constitutional Law No. 1/97 of 20 September 1997)

“All have the right ... to a dwelling of adequate size that meets satisfactory standards of hygiene and comfort and preserves personal and family privacy.”

- Constitution of the Russian Federation 1993, Article 40

“...the right to a home.”

- Constitution of South Africa 1996, Article 26, Housing

“... the right to have access to adequate housing.”

Article 28, Children

“... the right to ... shelter...”

Within South Africa in particular, the legislation and regulatory documents regarding housing can be fairly extensive, and include the following (McLean, 2018; Tissington, 2011):  
Policies (McLean, 2018; Tissington, 2011):

- White Paper: A New Housing Policy and Strategy for South Africa (1994) (White Paper on Housing)
- People’s Housing Process (1998) (PHP)
- Breaking New Ground: A Comprehensive Plan for the Development of Sustainable Human Settlement (September 2004) (BNG)
- Social Housing Policy for South Africa (June 2005) (Social Housing Policy)
- Framework for an Inclusionary Housing Policy (IHP) in South Africa (2007) (Inclusionary Housing Policy)
- National Housing Code (2000, revised in 2009)

Primary legislation (McLean, 2018; Tissington, 2011):

- Constitution of the Republic of South Africa 1996 (Constitution)
- Prevention of Illegal Eviction from and Unlawful Occupation of Land Act 19 of 1998 (PIE Act)
- Housing Act 107 of 1997 (Housing Act)
- Housing Consumers Protection Measures Act 95 of 1998
- Housing Amendment Act 28 of 1999
- Rental Housing Act 50 of 1999 (Rental Housing Act)
- Housing Second Amendment Act 60 of 1999

- Local Government: Municipal Systems Act 32 of 2000 (Municipal Systems Act)
- Housing Amendment Act 4 of 2001
- Rental Housing Amendment Act 43 of 2007
- National Norms and Standards for the Construction of Stand Alone Residential Dwellings Finance through National Housing Programmes (2007) (National Norms and Standards)
- Social Housing Act 16 of 2008 (Social Housing Act)
- Housing Development Agency Act 23 of 2008

Secondary legislation (McLean, 2018; Tissington, 2011):

- Expropriation Act 63 of 1975
- National Building Regulations and Building Standards Act 103 of 1977 (NBRA)
- Sectional Titles Act 95 of 1986 (amended by Acts 24 and 29 of 2003)
- Environment Conservation Act 73 of 1989 (amended by Act 79 of 1992)
- Land Titles Adjustment Act 111 of 1993 (LTA)
- Development Facilitation Act 67 of 1995 (DFA)
- Land Reform (Labour Tenants) Act 3 of 1996
- Interim Protection of Informal Land Rights Act 31 of 1996
- Extension of Security of Tenure Act 62 of 1997
- Water Services Act 108 of 1997
- National Environmental Management Act 107 of 1998 (NEMA)
- Public Finance Management Act 1 of 1999 (PFMA)
- Home Loan and Mortgage Disclosure Act 63 of 2000

Other documents (McLean, 2018; Tissington, 2011):

- National Housing Accord (Botshabelo Agreement)
- Reconstruction and Development Programme (RDP)
- Growth, Employment and Redistribution Strategy (GEAR)
- ‘*Grootboom*’ Constitutional Court Case—Government of the RSA & Others v Grootboom & Others 2001 (1) SA 46 (CC), 2000 (11) BCLR 1169 (CC) (‘Grootboom’)
- Urban and Rural Development Frameworks.

The right to adequate housing should not discriminate; it should include children and prisoners as well (McLean, 2018) and remains relevant in times of conflict or after a natural disaster



incident (Barber, 2008). It also includes reimbursements if the displacement was caused by a government forced eviction (Barber, 2008). Additionally, despite not being contained as such in international law, it has been granted in some specific instances that the right to adequate housing even extends to the compensation of property lost during displacement of such disasters (Barber, 2008). However, these rights extend further than state responsibility or provision of housing by government (McLean, 2018), so one should not lose focus on what adequate housing entails by focusing on related concepts like housing provision—the right to adequate housing should not be distorted to include misconceptions such as (UN HABITAT, 2009):

- Adequate housing does not necessitate a country or government to provide housing for all its citizens despite overlap of aims that include prevention of homelessness and attempts to eliminate evictions and discrimination.
- The right to adequate housing should not only be a goal that can be postponed or completed.
- It should not prohibit development based on the assumption that it could displace other people
- The right to adequate housing is not the same as the right to property or the right to land.

### **2.3 Universality**

The international applicability of housing adequacy as a concern is undisputed. The details of what this entails are to be investigated further. Barber (2008) specifically considers the applications of this right according to legal cases in different countries and how this affects the international applicability of the law.

There are multiple housing problems, and such problems are in all likelihood connected (Baker and Lester, 2017). Housing problems and housing concerns should not be considered in isolation, as they usually have direct impact on and are impacted by other attributes (Baker and Lester, 2017). For example, it is highly likely that someone with affordability problems will have issues with the quality of the housing as well (Baker and Lester, 2017).

It is expected that housing considered as ‘adequate’ will differ in geographical regions, environmental and physical environment, as well as based on social, cultural and economic

factors (Ibem et al., 2015). This needs to be taken into account when discussing universality of concerns or applications. In Brazil, a standardised model was attempted to cope with housing deficit, but the lack of the standardised model's ability to take climate or material differences into account at regional levels resulted in low quality buildings, and unsatisfied users (Dalbem et al., 2019). When comparing countries, one should be cognisant of the differences in built environment to be expected due to differences in urban frameworks and densities etc. (South African Cities Network, 2011).

The UN Committee on Economic, Social and Cultural Rights (CESCR) places an obligation on each member state to satisfy the fundamental minimum of the basic rights that had been agreed upon (McLean, 2018). The debate is whether such a fundamental core is universal in nature, or open to interpretation according to local definitions (McLean, 2018).

### **2.3.1 Housing in the developed world**

It has been found that the percentage provision of social housing in European countries has fallen over the past decade with possible reasons including privatisation, demolition and/or slower pace of development in comparison to total construction (Whitehead and Scanlon, 2007). Similarly, Australia found a strong decline since the early 2000's in the relative housing satisfaction, high rates of home ownership, low levels of homelessness and high housing standards that had been experienced up to that point (Baker and Lester, 2017).

### **2.3.2 Housing in the developing world**

In developing countries there are a number of factors that influence the necessity of increased number and quality of housing, especially low cost (Mehta and Bridwell, 2005). These factors often include the history and political legacy of colonisation, and rapid rural-urban migration (Mehta and Bridwell, 2005). Mention is also made of factors such as poverty levels, access to financing, servicing in rural areas and municipal urban planning (Mehta and Bridwell, 2005). In developing countries there are often areas of uncontrolled settlements housing large amounts of the population, yet these areas often also have the worst physical characteristics, materials and service-provision (Aroni, 1975).

## 2.4 Related concepts

Housing adequacy is more than simply four walls and a roof. Additional conditions need to be taken into account for housing to be considered adequate (Ibem et al., 2015; UN HABITAT, 2009). Housing is a concept taking into account multiple dimensions—including security and economic, but also physiological and psychological (Ibem et al., 2015). Housing is likewise a concept of a process or assortment of processes. This includes financial processes (investments), production and manufacturing processes (building materials, the construction itself, etc.), market processes (selling and buying, renting and letting), and even the process of utilisation of the end-product (Ratcliff, 1952). However, housing is also a situation; it is a complicated collection of relationships between a person (people) and the physical environment (including land, use of the land, and the community itself) (Ratcliff, 1952).

Related concepts for physical factors such as minimum standards, as well as perceived and community factors such as residential building performance and residential satisfaction indicators (Ratcliff, 1952) are all investigated as forming part of adequacy. In order to determine what is 'best' on an adequacy scale, such a scale should be based on more than standards (Ratcliff, 1952). Houses are for people to live in; thus the best quality test is the effect on people (Ratcliff, 1952). A study on the perception of housing in Nigeria found that while there are some overlapping factors, residents still viewed the concepts of adequacy and residential satisfaction as separate (Ibem et al., 2015). The study concluded that factors important in the determination of adequacy included (Ibem et al., 2015):

- Residential satisfaction
- Personal factors (including sex/gender, employment status and education)
- Level of contentment.

Although these concepts on their own do not seem to satisfy the full scope of adequacy, they do give deeper understanding about it.

### 2.4.1 Standards

Housing standards are based on what is socially tolerated, and incorporated as minimum requirements by legal systems (Ratcliff, 1952). The purpose of a standard should be to clarify specific concepts and interactions in order to be used as an analytical tool (Haffner, 1999).

While standards can be used as an indicator and guiding source of housing adequacy, they cannot be used in isolation (Haffner, 1999). Shelter adequacy is not the same as a minimum requirement or standard for shelter. Adequacy includes what a shelter means within the specific community, whilst minimum requirements are determined by the environment (Suchar and Rotenberg, 1994), as well as the interpretation of professionals in the process (Ratcliff, 1952). For example, how builders interpret the design, how the bank or lending institution views the financial risk or how the professional team and architect understand and relate to the actual human requirements (Ratcliff, 1952). Some standard programmes are aimed at being applicable to a broader variety of situations, for example multiple housing typologies (Scheba, 2018).

Some concerns with standards as adequacy measures are:

- Standards are limited by building codes, zoning ordinances and other legislation in addition to requirements from credit institutions (Ratcliff, 1952). However, it is clear that the standards are still based on human value determination (Ratcliff, 1952).
- The majority of housing is provided for profit—building attributes are then mostly based on what will provide quick sales, or typical patterns of acceptable features within the specific financial range, not necessarily what is best (Ratcliff, 1952).
- A standard also cannot be defined without a norm, as the extent of improvement should be measured against such a baseline or norm (Haffner, 1999); also how we perceive and what we expect of standards are based on what is upheld as “normal”, instead of being focused on physiological and psychological needs (Marshall, 1969).
- The limitations and control of standards of housing design had been getting increasingly rigid, to the point where it is questionable whether current house types will be acceptable or even applicable to new generations (Marshall, 1969).
- Standards are judicial, legislative, administrative or business decisions, while judgement of housing should still be related to people (Ratcliff, 1952).

Standards and housing codes are an attempt to maintain a certain level of quality (Aroni, 1975). Minimum housing standards are the bottom line of what is socially acceptable (Ratcliff, 1952). Local legislation might determine this, but these standards are expressed as physical requirements, not levels of living (Ratcliff, 1952). The limitation lies therein that the product is protected at the cost of the user, due to the focus only on physical concerns (Aroni, 1975).

Volitional standards, on the other hand, take into account not only function, but also value where standards are set according to the choice of what yields satisfaction (Ratcliff, 1952); therefore, closer to the definition of adequacy. Integral to understanding the applicability of a volitional standard is grasping the fact that sale or rental of residences does not provide any proof that needs in terms of adequacy are being met, only that housing can be sold or rented (Ratcliff, 1952). The market is therefore a poor indicator of standard or adequacy, and could be driven simply by a shortage of options, or advantages in other aspects such as location (Ratcliff, 1952).

A minimum core or universal type of standard will most likely offer meaningful evaluation, but governments cannot be held accountable, as the standard would not be justiciable (McLean, 2018).

In contrast with the rigidity of standards, some degree of flexibility is needed to allow for some trade-off between psychological and physical factors for which standards and legislation do not provide (Aroni, 1975). A standard that is flexible in nature is more likely to be universally applicable (McLean, 2018).

#### **2.4.2 Residential satisfaction**

While standards and specifications are necessary, there is concern that these don't change with user needs (Meir et al., 2009). Whilst most features with a design component spend time and resources to evaluate and adapt to user feedback and satisfaction, this is unfortunately not the case in the built environment (Meir et al., 2009). A building's main purpose should be a safe, comfortable and secure indoor area where activities and interactions can be carried out (Ibem et al., 2013). But what care do those tasked with the development and construction of residences take to ensure that needs can and will be met?

Residential satisfaction is by definition supposed to comprise three dimensions: the dwelling, neighbourhood and social interactions (Abass and Tucker, 2018). Studies or surveys taking all three into account are expected to be more comprehensive than those that focus on one of these in isolation (Abass and Tucker, 2018). The performance of a residential building as a dwelling unit should be measured on users' satisfaction and how well the building meets the

expectations of the user (Ibem et al., 2013). Expectedly, residential satisfaction varies according to location. Ideally, new residents in an area should have choice of their needs with regards to location, services and affordability of accommodation (South African Cities Network, 2011).

Based on Kim et al. (2005), building performance should be improved by considering the needs and concerns of residents in the form of a regular evaluation. Building Performance Evaluation (BPE) can be used to determine how well a building performs and meets the needs of users (Kim et al., 2005). BPE should assess a building in terms of architecture, functionality, economic value, technical product value or the building process (Van der Voordt and Maarleveld, 2006).

In an attempt to determine the adequacy of housing, Suchar and Rotenberg (1994) focused on the social satisfaction element. The study's photo-elicitation interviews with households determined their shared meanings and perceptions of housing and what is valued—which established the importance of the following categories (Suchar and Rotenberg, 1994):

- A stage for social performance
- A dwelling as a setting for individuality
- A sustaining atmosphere for domesticity and family life.

It was also found that length of residency had a qualitatively significant relationship to how they defined the adequacy of shelter—those who had been there the shortest time were more likely to view it as a social performance setting, while those who had been there the longest viewed it as an atmosphere of domesticity (Suchar and Rotenberg, 1994). This study was limited in scope based on time-period, single neighbourhood and single class. A South African study on environmental problems in housing listed the following as problem factors (South African Cities Network, 2011):

- Littering and waste removal
- Land erosion
- Air pollution
- Water pollution.

Housing satisfaction can be used for various purposes including (Djebarni and Al-Abed, 2000 as cited in ; Mohit and Nazyddah, 2011):

- Prediction of quality of life
- Indications of mobility and changing neighbourhoods with housing demands
- Evaluation and measurement of public and private construction developments
- Assessment of residents' perceptions of improvements that can be done to current housing.

This correlates with the reasons for determining adequacy.

Some government provision programmes like the BNG approach in South Africa specifically attempted to get 'closer to the people' with their response to housing delivery (Tissington, 2011). A comparison of housing satisfaction between different housing programmes was done at the hand of satisfaction components considered to be objective (Mohit and Nazyddah, 2011). Individual dissatisfaction is about a deviation between needs and aspirations of individuals, and how they experience what is provided (Mohit and Nazyddah, 2011). The list of satisfaction components included:

- Features
- Support services
- Social environment
- Public facilities
- Neighbourhood facilities.

Subsequently it is suggested that housing satisfaction should be measured at the hand of six sections (Mohit and Nazyddah, 2011):

- House unit information
- Housing features
- Housing support features
- Public facilities
- Social environment
- Neighbourhood facilities.

These are all important factors to be considered further in determining adequacy.

It can be inferred that adequacy does have an element of perception of satisfaction. Satisfaction with a building depends on the user—for client satisfaction is mostly based on return on their investment; professional team satisfaction is in the realisation of their creativity; end user and community satisfaction is in meeting their needs and supporting their activities (Ibem et al., 2013). The physical characteristics with the greatest influence on user satisfaction relate to physical, spatial attributes, building location, aesthetic and cost (Ibem et al., 2013). Building satisfaction subjectively evaluates the difference between the needs and expectations of the user and how well these are met by the building (Ibem et al., 2013).

## **2.5 Existing theories**

Adequacy changes depending on different contexts and circumstances, as well the needs of a collective and individuals (Tissington, 2011). This sentiment is echoed throughout other research: Housing should be more than something that can be owned or a place where household activities can actually and potentially take place (Suchar and Rotenberg, 1994); Adequacy is linked to standards where standards are used to clarify interactions and are used as an analytical tool (Haffner, 1999), but where minimum standards or requirements are determined by professionals and the environment (Ratcliff, 1952), adequacy is determined by communities and their interpretation (Suchar and Rotenberg, 1994). In contrast with the rigidity of standards, some degree of flexibility is needed to allow for the balance between psychological and physical factors and user needs for which standards and legislation do not provide (Aroni, 1975; Meir et al., 2009); a standard that is more flexible in application, it is more likely to be universally applicable (McLean, 2018); Assessment of the performance of a residential building as a dwelling unit should consider the satisfaction of users and how well the building meets the expectations of the user (Abass and Tucker, 2018; Ibem et al., 2013; Kim et al., 2005).

Examples of definitions of adequacy are:

- A place where someone can exist and express freely, with personal and collective meaning (Suchar and Rotenberg, 1994).
- The ability to support the least acceptable standard of living through all elements that make up the housing (McCray and Weber, 1991).



- Mainly pertaining to the interior and exterior—such as structure, heating, cooling, sanitation and unit size, while assuming that there are no abnormalities in the unit and environment in terms of service, space and physical characteristics (Ibem et al., 2015).
- An indicator aimed at collecting data to assist with both the enabling and provision of housing, specifically related to affordability and standards. Additional indicators considering the rate of housing production, how to deal with unauthorised housing and a land development multiplier. This is based on the United Nations General Assembly in 1988 adoption of the “Global Strategy for Shelter to the Year 2000” as discussed in Hardman (1993). This strategy was based on the government in an enabling role, and the private sectors as providers of housing.
- Communities integrated on a social and economic level with access to a variety of amenities (Ngxubaza, 2010).

Theories on adequacy that were analysed and included in the theoretical framework were chosen for specifically defining adequacy in regards to housing and detailing elements that would comprise adequacy. The United Nations Committee on Economic, Social and Cultural Rights (CESCR) (Barber, 2008; UN HABITAT, 2009) specifies a minimum criteria for housing adequacy. Other sources include the World Bank Group’s index as per Behr (2021); McLean (2018)’s discussion on what the courts in South Africa expect adequate housing to entail; Onibokun (1985)’s view on housing adequacy; Smit (2008)’s matrix for assessing adequacy as discussed in Tissington (2011); The South African Cities Network (2011)’s list of additional aspects over and above physical factors to be taken into account in an adequacy measure; factors influencing the adequacy of social or government provided housing as by Whitehead and Scanlon (2007); housing attributes as adequacy measure as classified by Yang (2008); and indicators used in monitoring housing adequacy in Ireland (Russell, 2021)

While not explicitly detailing adequacy, some other sources that seemed to agree in principle, even if not terms, were used to further detail adequacy. These sources were not seen to prescribe the elements that comprise adequacy, but rather further indicators of adequacy within these elements. The South African White Paper on Housing as adopted by the African National Congress (ANC) (Tissington, 2011) is included as it agrees in principle even if not in the terms used; as does Aroni (1975) although they used the term ‘quality of housing’ instead of ‘adequacy’. Similarly, the Housing Quality Indicators of Wimalasena (2022) which are

determined by using a Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) was similar enough to be considered, and offer a more comprehensive set of indicators than other lists of elements. A summary of the results is shown in Table 1.

**Table 1: Elements of Adequacy summary (Aroni, 1975; Barber, 2008; Behr, 2021; McClean, 2018; Onibokun, 1985; Russell, 2021; Smit, 2008; South African Cities Network, 2011; UN HABITAT, 2009; Whitehead and Scanlon, 2007; Wimalasena, 2022; Yang, 2008).**

	Element	Theory												
		CESCR UN HABITAT - tenure security	UN HABITAT	Behr (World Bank Index)	CESCR Barber	McClean	Onibokun	Smit	South African Cities Network	Whitehead and Scanlon	Yang	Russell	South African White Paper	Aroni
1	Physical security / physical safety													
2	Tenure security													
3	Access to infrastructure /service provision													
3.1	Waste removal													
3.2	Drinking water supply													
3.3	Sanitation													
3.4	Energy for electricity including gas													
3.5	Stormwaster system													
3.6	Fire system													
4	Affordable													
5	Habitable													
5.1	Purpose of structure / type of housing													
5.2	Layout / internal / design details													
5.3	Floor area / size / spatial													
5.4	Crowding / household size													
5.5	Specific rooms (kitchen, bedrooms, bathrooms)													
5.6	Protection from the elements													
5.7	Structurally sound													
5.8	Construction quality													
5.9	Building materials													
5.10	Heating and cooling / thermal performance													
5.11	Ventilation													
5.12	Lighting													
5.13	Air quality													
5.14	Acoustic performance													
5.15	Pest control													
6	Accessible to all / availability													
7	Location													
7.1	Neighbourhood													
7.2	Access to childcare													
7.3	Access to social													
7.4	Access to education													
7.5	Access to health and hospitals													
7.6	Access to jobs and opportunities													
7.7	Access to amenities													
7.8	Access to parks, green and open spaces													
7.9	Access to public transport													
7.10	Access to religious places													
7.11	Access to exercise space													
7.12	Privacy and safety													
8	Socio-cultural and political considerations													
9	Other													
9.1	Longevity													
9.2	Durability													
9.3	Sustainability													
9.4	Age													
9.5	Building technologies													
9.6	Maintenance													
9.7	Energy-saving and renewable energy													

## **2.6 Existing theory details of adequacy**

At the hand of the summary in Table 1, the elements of housing adequacy were used to delineate the aspects that are required to be adequate. Other literature was then consulted to better detail the adequacy of these different elements.

### **2.6.1 Physical Safety**

Physical safety and security in conjunction with tenure security is the apex of adequacy and accessibility (Tissington, 2011).

Security also refers to safety and security from crime and fear of crime (Izadifar et al., 2014). Crime is listed as a social environment factor that should be taken into account when considering resident satisfaction (Mohit and Nazyddah, 2011). Nigerian resident satisfaction surveys have determined that security concerns need to be addressed in order to allow for a building to be better received by residents (Ibem et al., 2013). Safety and security are, therefore, factors of residential satisfaction and adequacy of residence. The majority of residences included in a resident satisfaction survey in Nigeria had steel exterior doors as well as burglar proofing on the windows. However, residents were still dissatisfied with the safety and security (Ibem et al., 2013). Safety and security of parking and pedestrian routes have been found to play a role in neighbourhood selection and satisfaction (Abass and Tucker, 2018).

Safety and security and the perception thereof have been shown to depend on various factors listed according to the theory followed. Based on Crime Prevention through Environmental Design (CPED), the main components of safety and security are (Izadifar et al., 2014):

- Territoriality—sense of ownership by those entitled to legitimate use of the property
- Surveillance—being visible to others (through windows, cameras or street lighting) has been found to reduce crime
- Access control
- Maintenance and target hardening—well-kept and maintained properties have been proven to reduce crime rates
- Support activity—local and community involvement in securing the space.

Based on the “territoriality” aspect of this, it is theoretically implied that tenure security also improves physical security in turn (Izadifar et al., 2014).

### **2.6.2 Tenure Security**

A permanent structure with tenure security is the baseline of adequacy (Tissington, 2011). Widely recognised, but not always available—forced evictions and ownership uncertainty are raised as concerns universally, in South Africa (Tissington, 2011), and in Sao Paulo (Ngxubaza, 2010).

Evictions should be legally ordered, and legislation should not allow for arbitrary evictions (South African Human Rights Commission, 2018). It should be noted that security of tenure does not necessarily equate to or include ownership, but more the protection of use (McLean, 2018).

Based on an extensive literature review conducted by Arnot et al. (2011) previous literature defined tenure security as iterations or combinations of some of the following aspects:

- Probability of expropriation, eviction or losing rights to the land
- Risk of expropriation or losing rights to the land
- Perception of these probabilities and rights
- Time of residence before, probability and conditions of eviction
- Uncertainty (about rights, policies, ability to sell land, duration of possession)
- Perception of probability of losing ownership
- Legal title to the land
- Assurance of rights
- Renewability, comprehensiveness and obligations towards government.

Some of the measures used in existing literature in the analysis of tenure security include the following (Arnot et al., 2011):

- Tenure (type, perception of tenure security, renewal probability)
- Ownership details (transfer deeds, methods of acquisition, land use and transfer rights, legal title to the land)
- Duration of ownership
- Political factors (stability, expropriation risk)

- Conflict with abutters
- Eviction probability.

In monitoring adequacy, security can be measured in (Russell, 2021):

- Tenure (in years)
- Subjective housing security with regards to affordability.

Tenure security has been found to improve investment. In one study, the titling of land in Peru indicated a 68% increase in renovations within four years of becoming land title owners (Field, 2005). Security of tenure is also hypothesised to assist in investment in land through higher likelihood to reap benefits of such investments, as well as better access to funds for such investment (Arnot et al., 2011). Within a developing context the influence of security of tenure was found to have a benefit on agricultural and environmental related aspects such as soil, water and agricultural yield improvements on the land (Arnot et al., 2011). Similarly (Field, 2005) discussed how empirical literature often considers the relationship between agricultural investment and tenure; the study found that investment was also increased in urban slums in relation to an increase in land titling. This correlation is significant to increasing portions of society being housed in urban slums as urbanisation increases, as such slums have notorious low tenure security (Field, 2005).

Tenure security of the land as well as the physical structure are discussed. Where land is treated as a separate asset from the housing unit(s) on top of it, it is often practice in developed countries to have residential land lease instead of freehold; i.e. in a leasehold, tenants lease the land on which the home is situated, but own the home; they lose claim to such premises upon the expiry date (Iwata and Yamaga, 2009). In the Japanese context of the study, upon expiration of the lease the contract could be renewed on market-based rental, or the units could be bought back from the tenants at market related rates. The study was based on the concern that the valuation of such buy-back amounts did not necessarily reflect the housing expenditures on maintenance (Iwata and Yamaga, 2009). The theoretical model found that leaseholders do not reap future benefits from maintenance, and therefore often under maintain, even if the tenure is kept secure through options at the expiration date (Iwata and Yamaga, 2009). In a study in Ghana, (Ubink, 2007) it was found that leasing of land by chiefs led to a plethora of concerns. This started with lack of tenure security, which escalated to the

inability to grow one's own food, surplus selling at markets, loss of income, rising food prices and cost of living (Ubink, 2007). Additionally, the lease of land is skewed to benefit those with higher income rather than those from the community itself, and compensation for land loss or any benefit towards the community itself seemed to be inadequate (Ubink, 2007).

There is evidence to indicate that tenure security has a benefit through the credit access channel—through the ability to use a titled property as loan collateral, as well as through tenure security channel—where higher investment in the land and agricultural output are a result of tenure security (Schweigert, 2006). While acknowledging the benefits of tenure security, less developed countries suffer from deficient systems and high costs of acquiring title deeds to land (Schweigert, 2006).

### **2.6.3 Infrastructure / Service provision**

Service provision should be sustainable and without discrimination (UN HABITAT, 2009). The United Nations recommends that it should ideally extend to health, safety and even comfort services. Service provision is required for housing to be considered adequate (Tissington, 2011). Occupants should be entitled to (UN HABITAT, 2009):

- Drinking water
- Proper sanitation
- Energy (for lighting, food preparation and storage, and heating or cooling)
- Refuse removal.

Similarly, housing satisfaction measures relating to services to support the unit are recommended to include the following (Mohit and Nazyddah, 2011):

- Corridors
- Staircases and lifts
- Drainage
- Garbage removal or collection
- Firefighting systems.

The services in the building formed part of the categories in a study into residential satisfaction (Ibem et al., 2013). This included the supply of power and water. As the satisfaction levels with

both of these were ranked fairly low, it can be assumed that the buildings did not perform satisfactorily in these areas. On the other hand, a study in Kuala Lumpur, Malaysia found that low-cost housing residents were satisfied with service provision (Husna and Nurizan, 1987 as cited in ; Mohit and Nazyddah, 2011). Based on user satisfaction opinion, service provision should be improved in public residential buildings in Nigeria. From this feedback, it is suggested that architects need to consider designs that utilise alternative service provision such as solar power (Ibem et al., 2013). In other words, adequacy or acceptability of service provision form part of how residents evaluate their satisfaction. Again, these location-specific examples indicate the universality of the need for adequacy, but also the uniqueness of concerns based on time and space.

### **2.6.3.1 Waste removal**

Waste collection is specifically mentioned as a necessary service (McLean, 2018; South African Cities Network, 2011; Tissington, 2011). In a literature review considering solid waste removal in Sweden, it was found that there were very few academic articles on its collection and transport. Additionally, it was found that most of these studies were more generic and descriptive as opposed to problem-solving in nature (Lagerkvist, 2006). A disjoint between industry and academic research was proposed, since the few articles in this regard also focused more on corporate waste management and suppliers than waste removal geared towards individual households (Lagerkvist, 2006).

Asase et al. (2009) did a comparison between London, Ontario (ON), Canada and Kumasi in Ghana. It was found that the Canadian city showed an average of 1,2 kg of solid household waste per capita per day. While this is more than the 0,6 kg per capita waste for the Ghanaian city, the population of Kumasi was much larger than London, so it ended up with a larger volume of waste per day.

The city of London, ON, provided waste management to all residents. Curb side garbage collection accounted for 80% of the population, while the remaining 20% were served by multi-residential and public space garbage collections. Apart from this, there was a separate recycling collection initiative for recyclables, as well as separate curb side collection for yard waste. Of all the waste generated in Kumasi, Ghana, 85% is handled by the municipality—

either through curb side collection or at transfer stations throughout the community where metal skips were provided (Asase et al., 2009).

Proper waste management in developing countries such as Kumasi was limited by adequacy of (Asase et al., 2009):

- Capital funding
- Equipment
- Infrastructure to facilitate waste removal
- Laws and law enforcement
- Revenue and running cost
- Resident attitudes and education.

### **2.6.3.2 Drinking water**

Drinking water provision is specifically mentioned as a necessary service (McLean, 2018; South African Cities Network, 2011; Tissington, 2011). Global statistics showed that in the year 2000, 18% of the world's population (1.1 billion people) did not have adequate water (Mara, 2003).

By using data from a clustered survey in developing regions, access to water can be discerned in various aspects and subsections (Sorenson et al., 2011). Most developing countries do have access to an improved water source; however, there are countries with access rates lower than 70% of the population: Tajikistan (69.5%); Cameroon (69.3%); Burundi (64.3%); Central African Republic (64%); Guinea-Bissau (59.9%); Yemen (59%); Laos (51.5%); Mauritania (50.5%); Nigeria (49.1%); Sierra Leone (47%); Somalia (29%) (Sorenson et al., 2011).

Water on the premises is available to as many as 90+% of the population in cases like Macedonia (96%); Montenegro (95.7%); Serbia (95.5%); Trinidad and Tobago (92.9%); and Thailand (91.5%) (Sorenson et al., 2011). Yet, in other instances, less than 20% of the country's populations have access to water on the premises such as Cameroon (20.2%); Togo (18.1%); Nigeria (17.1%); Ghana (16.2%); Burkina Faso (10.9%); Sierra Leone (8.8%); Central African Republic (5.4%); Malawi (6.0%); and Burundi (3.6%) (Sorenson et al., 2011).



The mean time to a water source in developing countries is lowest in Belarus (7.7 minutes); Ukraine and Belize (both 10.2 minutes); Laos (11.7 minutes); Bosnia and Herzegovina (12.1 minutes); Bangladesh (12.2 minutes) (Sorenson et al., 2011). The longest time to water source is in Somalia (70 minutes); Mauritania (67 minutes); Yemen (63.7 minutes); Malawi (37.1 minutes); Burundi (36.6 minutes); Burkina Faso (35.7 minutes); Djibouti (34.6 minutes); and Mongolia (30.7 minutes) (Sorenson et al., 2011). Time is preferred over distance as indicator, as the source of water could be as close as one kilometre, with waiting times exceeding an hour. Caloric expenditure is another suggested measurement because this takes into account the health risks of such journeys, the amount of trips required, the effect of malnutrition or mineral deficiency, and influence of food or water scarcity; thus considering the actual energy expended by fetching water (Sorenson et al., 2011).

Additional concerns that result from inadequate water supply or water collection include road casualties and assault or crime risks for those collecting the water, health concerns from actual water carrying or the sanitary and terrain condition, and even whether water will be used for drinking or sanitation (Sorenson et al., 2011).

Of the countries investigated in (Sorenson et al., 2011), there were ten where men were most likely to be the water-fetchers, compared to 34 countries where women carried the water. The highest percentage of male carriers was Palestinians in Lebanon at 75.4%, while the highest percentage of female carriers was in Guinea-Bissau at 93.1%; Laos, Malawi, Burkina Faso, Cote d'Ivoire and Gambia also have figures higher than 80%. The highest percentage of children as water carriers was in Burundi at 39.4%, while the amount of children carriers also exceeded male carriers in Yemen, Cameroon, Central African Republic, Cote d'Ivoire, Ghana, Sierra Leone and Togo (Sorenson et al., 2011).

Water consumption is as low as one gallon per capita per day in Mozambique, yet as high as 150 gallons per capita per day in the United States of America (Sorenson et al., 2011).

Water supply improvement in rural areas is aimed at improving the amount of available water, the reliability thereof, and if possible, even quality for health reasons (Mara, 2003).

Current interventions are mainly focused on reducing the duration of water collection journeys to 30 minutes—above 30 minutes, the volume of water that can be carried falls sharply (Mara, 2003). Examples of improvements can be basic such as a hand pump or gravity piped systems, standpipes, or even more innovative like water collection vehicles (Mara, 2003). In illegal or temporary settlements, the most common solution is a communal water-point (Mara, 2003).

### **2.6.3.3 Sanitation**

Sanitation is a service required for adequacy (McLean, 2018; South African Cities Network, 2011; Tissington, 2011). In 2000, statistics indicated that approximately 2,4 billion people, accounting for 40% of the population did not have adequate access to sanitation (Mara, 2003).

Sanitation provision in industrialised countries would, however, be inappropriate for developing countries due to the high cost and requirement for running water; even the socio-cultural opinions of the end-users—such as whether sitting or squatting is preferred, and whether water needs to be used for cleansing (Mara, 2003).

Sanitation systems that are currently in use to improve rural sanitation provision include ventilated improved pit latrines and pour-flush toilets, and communal sanitation blocks for informal or temporary settlements (Mara, 2003).

### **2.6.3.4 Electricity**

Electricity or energy provision is included in the services required for adequacy (McLean, 2018; South African Cities Network, 2011; Tissington, 2011). Electricity usage depended on the type of unit, but in 2002 average usage ranged from 15 MWH (Mega Watt Hour) for apartments to just below 35 MWH for single detached family homes in the United States of America (Kaza, 2010). This calculated to between seven and 13 MWH per person (Kaza, 2010). In 2005 analysis of usage per  $m^2$  ranged from just over 10 kWh per year for single-family detached house, up to 24 kWh per year for multi-family units (Kaza, 2010).

Electrification is a large problem in countries with rural areas, as it is often quite a distance from existing grid points leading to low load factors and high costs to install and maintain infrastructure (Mahapatra and Dasappa, 2012). If decentralised energy generation is therefore

a better economic option, one should consider the possibility of utilising renewable energy resources to this end. A study found exactly this—a biomass gasification system close to low demand rural villages is more cost effective than grid-extension or photovoltaic systems (Mahapatra and Dasappa, 2012).

#### **2.6.4 Affordability**

Affordability should be considered when considering the right to adequate housing (Tissington, 2011), including a choice of options to suit the affordability of each individual/household (South African Cities Network, 2011; Tissington, 2011). According to the UN HABITAT (2009), adequate affordability means that the cost of the housing should not compromise the enjoyment of any other human right (McLean, 2018). It is mentioned as one of the most pressing challenges for development (Scheba, 2018). Upon investigating residential satisfaction, the cost attributes of the building is one of the suggested categories (Ibem et al., 2013). Affordability in cost of construction is not universal, and depends on the location (Aroni, 1975). For example, in a developing country, using more modern materials would make up a very high percentage of cost in comparison to the situation in developed countries. Developed countries, on the other hand, might try to mechanise to lower the high labour costs (Aroni, 1975). Affordability is complex to define because of its subjectivity depending on expectations and values of the setting, as well as problems encountered by housing quality and income disparities (Yang, 2008). Affordability should include the initial cost as well as cost of maintenance (Mohit and Nazyddah, 2011; Nurizan, 1993). A study into resident satisfaction in Malaysia found that residents in low-cost housing in Johor Bahru were dissatisfied with such total cost of rent (Mohit and Nazyddah, 2011; Nurizan, 1993).

Affordability is a necessary component of adequacy, and should ideally include up-front and ongoing costs (Tissington, 2011). The Housing Indicator Programme focuses on economic characteristics. The key indicators that deal with economic or affordability related concerns include (Hardman, 1993):

- House-price-to-income ratio
- Rent-to-income ratio
- Housing investment
- Housing credit portfolio
- Infrastructure expenditures per capita.

Traditional measure for affordability is the ratio of family income to house price, while Yang (2008) proposed a 'residual income' concept. This centres on a minimum standard unit and calculates a minimum budget to afford such a standard and then compares family income to such a budget. The appropriate measure for affordability should be based on the residual income after non-housing costs have already been deducted from household aggregate income, and the ability of such residual income to cover a minimum standard unit (Yang, 2008).

Affordability is dependent on three factors (Russell, 2021)—the proportion of households who:

- Spend more than 30% of income on housing—especially when in the bottom 40% of income
- Are below the poverty line after deduction of housing cost
- Have been in arrears on their rent or mortgage in the past year.

Affordability is not a housing characteristic, but a housing service characteristic, a function of ability and desire of consumers to pay for the characteristic (Yang, 2008). Affordable housing should be applicable to moderate to low income households without lowering the building's standards (Ngxubaza, 2010). Therefore, housing affordability decisions are not based on the housing itself, but also the trade-off with other expenditures (Yang, 2008). Additionally, aspects like accessibility as well as diversity in household preferences and market conditions influence affordability (Ho, 2002). Competition between accessibility values impact rental affordability. For example, dwellings closer to public transport are more expensive than others further away (Ho, 2002). Similarly, housing that is more affordable often has been found to have serious inadequacies with regards to the unit, services, tenure and/or location (Tissington, 2011).

Generally adopted affordability rent-to-income ratio is 30%, although research has proven this is an arbitrary amount, and in many cases would inaccurately indicate housing problems in higher income categories (Ho, 2002). This further proves that universality in affordability is difficult across income groups and different locations, although the technique of determination makes a difference—for example using the residual income approach has a lower chance of incorrect affordability calculation conclusions (Ho, 2002). The 30% threshold for housing affordability seems to be echoed in other literature as well—for example, this threshold is used by the U.S. Department of Agriculture and the U.S. Department of Housing and Urban

Development (HUD) for payment standard (Williams Foster, 2007). In a Comprehensive Housing Affordability Strategy (CHAS) analysis, it was determined that across various area median family income levels there are many households that not only exceed the 30% threshold, but some are even above 80% (Williams Foster, 2007). For example, using the same study's data for 0–1 bedroom units earning less than 30% of the HUD area median family income (HAMFI), less than 40% of the almost 200 000 households in the survey pay below the affordability threshold for their housing, with similar or worse results at higher HAMFI levels or a higher number of bedrooms in a unit. The gauge of affordability is, therefore, usually to measure the cost of housing in comparison with and in proportion to their income (Sirmans and Macpherson, 2003). Affordability and income do not always grow proportionately. For example in Malaysia, house prices increased by 18,6% in contrast with income only growing by 10,8% (Aljarallah, 2020).

Sirmans and Macpherson (2003) discuss a variety of methods that can be used to measure affordability. Bogdon and Can (1997) assert that the main indicators are:

- The proportion of rental cost to income, especially where rent exceeds 30% and 50% of income
- The availability of units for values lower than the fair market values
- The availability of housing units available to an income class in comparison to the number of households in such an income class.

For their housing cost burdens prediction model, Sirmans and Macpherson (2003) use house prices, household income, and demographics as inputs to part of housing affordability. Rex (2000) also argued that the median income cannot be used to measure affordability as this does not accurately account for those in the lower end of the spectrum.

Tsenkova (2014) focused on the affordability of social housing in central Europe—specifically Poland and the Czech Republic. The affordability of such units was valued in terms of rental rates and state subsidies, while also taking note of cost of services and household sizes. If housing burden exceeds 30–35% of household expenditure, such households are considered eligible for support (Tsenkova, 2014). Within a South African context, affordable housing was valued to be units costing less than R500 000 (Tissington, 2011), with this segment of the market very poorly researched and understood (Tissington, 2011).

Affordability is sometimes used in conjunction with subsidies, and while subsidies do not account for affordability, they could influence whether the housing is affordable or not. (Haffner, 1999) investigated which financial instruments for subsidisation existed—whether fiscal or non-fiscal—in different north-western European countries in the early 90's. While some countries had specifications for renovation of existing dwellings, or applied the subsidisation only to new buildings, each country also had their own terms and conditions. These could include when or if property can be resold, if inflation is corrected, if benchmark is applied to full sum or only limited amounts, etc. However, the list of types of subsidies found in the study included (Haffner, 1999):

- Non-fiscal
  - Savings facilities (present in Denmark, France and West Germany)
  - Non-recurrent contribution (Belgium, England, Netherlands)
  - Recurrent contribution (France, Netherlands)
  - Recurrent low-interest loan (Belgium, France, Netherlands and West Germany)
  - Non-profit rent control (Belgium, Denmark, France, England, Netherlands, West Germany)
  - Non-profit housing allowance (Denmark, France, England, Netherlands, West Germany)
  - Commercial rent control (Denmark and Netherlands)
  - Commercial housing allowance (Denmark, France, England, Netherlands, West Germany)
- Fiscal
  - Taxation benchmark on rental values (Belgium, Denmark, Netherlands)
  - Taxation benchmark on capital gains (none)
  - Mortgage interest deductions (Belgium, Denmark, France, England and Netherlands)
  - Management deductions (Netherlands)
  - Maintenance deductions (Belgium, Denmark, France, Netherlands)
  - Depreciation deductions (Belgium, Netherlands, West Germany)
  - Property tax deductions (Netherlands).

This is reiterated by some examples of assistance that include fixed or variable financial assistance, lowered VAT rates, assisted loans, housing allowances, etc. and that these differ

according to different municipalities and countries. Even programmes have differing policies on how to assist affordability in terms of social initiatives (Tsenkova, 2014).

There are broad and narrow definitions for the term 'subsidy' with lack of consensus on a single definition; yet all concur that it involves redistribution of resources from one group to another in an effort to modify market forces (Haffner, 1999). This is applicable to resources from taxpayers to consumers, or from producers to consumers (price regulation), cross-subsidisation between products, public expenditure in the form of grants or loans—a loan can only be viewed as a subsidy if it is done more favourably than market equivalent (Haffner, 1999). Therefore, not all public housing expenditure is subsidy, nor are all subsidies public expenditure. For example, tax deductions are not subsidies, but price regulation and cross-subsidisations are (Haffner, 1999). (Haffner, 1999) has concluded that housing subsidy has no universally accepted definition, and suggested a broad definition that can be applied and benchmarked by governments. Public expenditure and tax concessions cannot be used to determine the value of housing and their subsidies; detailed modelling is required and should take into account housing production, consumption and costs (Haffner, 1999). Most countries have a strong focus on affordability in their housing policies (Yang, 2008). Affordability is a very important factor because the continuous inequity in adequate housing provision results in wider economic gaps (Yang, 2008).

To determine the extent of subsidies, a benchmark, norm or standard is required (Haffner, 1999). Within a country, comparisons of subsidies may be useful, but cross-national comparison is dangerous and difficult, because the departure points of different countries vary (Haffner, 1999). In terms of subsidies this could be because of different tax-systems, benchmarks and/or which sectors are viewed as favourable (Haffner, 1999). Even if systems are similar between countries, the parties implementing the system could still behave differently (Haffner, 1999). Depending on the location, social housing serves different levels of affordability—in some cases it is for the very poor, while other instances cater for lower income or even middle class (Whitehead and Scanlon, 2007). The European Union (EU) encourages subsidisation of the deserving, i.e. the poor rather than those with reasonable incomes (Whitehead and Scanlon, 2007). The City of Warsaw has a list of low income households that are prioritised in their social housing assistance programmes. Low income, or households that cannot afford housing, are described as those within the city who are unable to afford a

residence at current market prices (Tsenkova, 2014). With social rental schemes, there are concerns about the determination of limits. Tenant incomes do not allow for provider costs or the physical aspects of the dwelling itself; on the other side of the spectrum, actual expenditure on the investment does not account for affordability and demographic diversity (Whitehead and Scanlon, 2007).

Some international examples of affordability include:

- In a study considering low-income housing in Tanzania, the following were considered factors in determining affordability of construction (Mehta and Bridwell, 2005):
  - Government or Non-Government Organisations (NGO) involvement or assistance
  - Physical characteristics of the land (for example soil)
  - Financing access and legislation
  - Material availability
  - Local labour skills.
- In Norway, historically affordability of housing used to be part of the housing planning and supply. Therefore, it is even more prominent that rising housing prices are seen as one of the most serious challenges, with no official intent to increase the numbers of affordable housing (Nordahl, 2014).
- In English planning regulations, the aim is to allow for a stipulated number of houses below market place to form part of a development in order to be available to suitable households (Nordahl, 2014).
- (Nordahl, 2014) highlights various Norwegian concerns with the difficulties in managing stock of affordable housing by authorities. Some examples include immediate resale of such units, bankrupt authorities, private developer driven developments, growing demand, etc.
- A study on the housing expenditures of Czech families found that those with the highest housing affordability burden were singles and retirees; further investigation revealed that this was often a consequence of living in housing too large for their needs and requirements (Mikeszová, 2007). Tenants, sub-tenants or those living in shared lodging facilities indicated a high level of negativity towards the burden of housing costs (Mikeszová, 2007).



- A comparison of housing in the United States of America between the years 1980 and 2000 indicated that housing has become increasingly unaffordable. At the time, reports indicated that households with low incomes—around 50% below the median—paid more than half of such income for their housing (Sirmans and Macpherson, 2003).

Limited affordable housing is considered one of the main problems, (if not the main), with housing (Sirmans and Macpherson, 2003).

### **2.6.5 Habitability (size, structure, thermal, acoustic, weather, wind, maintenance)**

Habitability means that housing should be of adequate size, physically and structurally safe and offer protection against the elements—wind, damp, rain, heat, vectors of disease and cold (McLean, 2018; Tissington, 2011; UN HABITAT, 2009). Housing satisfaction is an evaluation approach for quality of houses and service provision that is non-economic in nature. A housing satisfaction survey is supposed to measure the minimum standard, or the lowest point at which an intervention would need to be done (Mohit and Nazyddah, 2011). This is an extensive and broad category, and as these aspects are not expanded on as separate elements, this literature review mainly considers studies aimed at multiple factors, not those in isolation.

Various other study terms are used for investigation of similar groups of aspects. For example, features that are suggested to be included in an evaluation of building performance indicators include (Kim et al., 2005):

- Functional comfort (space)
- Acoustic comfort
- Indoor air quality
- Visual comfort
- Thermal comfort
- Building (structural and material) integrity.

Meir et al. (2009) also suggested evaluation of:

- Thermal comfort (heating, ventilation and air conditioning)
- Illumination and visual comfort
- Occupant satisfaction (physiological and psychological comfort).

Habitability and quality can be measured in (Russell, 2021):

- Over-crowding
- Housing Quality Index
- Ability to keep the home adequately warm.

To ensure satisfaction, the design and construction of a residence should at least take into account the type, aesthetics, size, illumination, thermal and visual comfort; also consideration of family size should form part of the design and construction of housing (Ibem et al., 2013). The questionnaire instrument developed by Ibem et al. (2013) included 27 items, of which the physical, spatial, aesthetic and air quality aspects relate to the habitability of the building.

These building attributes include:

- Privacy
- Room sizes
- Natural light
- Air quality
- Building type
- Noise protection
- Aesthetic appearance
- Bathroom design
- Thermal comfort
- Fire safety
- Damp protection
- Insect and animal protection
- Building material
- Number of rooms
- Security.

The specific physical characteristics investigated included (Ibem et al., 2013):

- Building type (single; semi-detached; duplex)
- Number of bedrooms
- State of repairs
- Walling material (compressed bricks, sandcrete cement)

- Window types (glazed louvres, glazed aluminium)
- External doors (panelled timber, steel)
- Nets on windows
- Burglary proofing on windows
- Floor finish (Cement screed, ceramic tiles)
- Ceiling materials (asbestos, acoustic, PVC strips).

While not part of the list investigated, additional aspects were also reported—for example, cross ventilation and natural illumination in the building design (Ibem et al., 2013). Additional space (for guest rooms, shops, a laundry, guest toilet, and outdoor cooking space) was mentioned (Ibem et al., 2013). Satisfaction of residents in public housing appeared to be higher based on privacy and the size of property, rather than availability of service provision. Additional aspects that determined satisfaction included the type, location and appearance of the shelter (Ibem et al., 2013).

Housing unit features that are suggested to form part of housing satisfaction surveys include (Mohit and Nazyddah, 2011):

- Living area
- Dining area
- Bedroom
- Kitchen
- Bathroom
- Toilet
- Drying areas
- Power sockets
- Ventilation.

Abass and Tucker (2018) investigated whether dwelling design characteristics could predict residential satisfaction within a controlled socio-demographic situation. Their study considered aspects such as the distance between the street and the dwelling and associated social interaction or isolation and feeling of safety, the presence of a fence that can assist in privacy and security or cut off visual connection between residents.

### **2.6.5.1 Size**

With the Housing Indicators Programme, the floor area per person and number of permanent structures are two of the key indicators dealt with (Hardman, 1993); in residential satisfaction surveys such as the one in Johor Bahru, Malaysia, the size of units and crowding in their houses was one of the main areas of concern or dissatisfaction (Mohit and Nazyddah, 2011; Nurizan, 1993).

### **2.6.5.2 Design elements (including features)**

In searching for a universal Brazilian passive house design, (Dalbem et al., 2019) did an in-depth analysis of materials used, and the thermal performance of such materials combined with the prevalent bioclimatic zones in the area. They made use of EnergyPlus® software to simulate the thermal and energy performance of the model. Such modelling software is able to consider the expected climate (including temperatures, humidity, etc.) as well as detailed information of the design and construction materials (such as window shutter reflectance levels, etc.). The passive design in this study was done to comply with the Brazilian minimum standards for thermal transmittance, capacity, and absorbance.

The Brazilian minimum thermal performance of building materials is dependent on the bioclimatic zones, but those detailed in (Dalbem et al., 2019) have indicated that:

- External walls should have a thermal transmittance (U) of equal to or lower than  $2,5 \text{ W/m}^2 \cdot \text{K}$ . In some bioclimatic zones this comes with the caveat that the thermal absorptance (a) should be greater than 0,6; if it is equal to or below, 0,6, the U-value should instead be equal to or below  $3,7 \text{ W/m}^2 \cdot \text{K}$ . The thermal capacity (TC) should be greater than or equal to  $130 \text{ kJ/m}^2 \cdot \text{K}$ .
- The internal walls should have a thermal capacity (TC) of greater than or equal to  $130 \text{ kJ/m}^2 \cdot \text{K}$ .
- The roof should have a thermal transmittance (U) of equal to or lower than  $2,3 \text{ W/m}^2 \cdot \text{K}$ . In some bioclimatic zones this comes with the caveat that the thermal absorptance (a) should be equal to or below 0,6; if it is greater than 0,6, the U-value should instead be equal to or below  $1,5 \text{ W/m}^2 \cdot \text{K}$ .

From (Dalbem et al., 2019) the thermal performance of materials is tested in different bioclimatic zones. In some, the performance is acceptable, but not in others. The study goes on to determine a universal Brazilian adequacy based on the expected bioclimatic zones in the country. However, even as such, their solutions had to consider not only thermal insulation and expected energy demand, but also the cost of such a solution. From this it is clear that materials and requirements are very difficult to universally stipulate for adequacy due to differences in climate, and also energy costs and material costs. However, the study also proved that a universal model for a Brazilian climate could be theoretically established. Also, notwithstanding specific standards for different countries, the expected performance of materials—such as thermal performance is a concept universally accepted.

### **2.6.5.3 Protection against elements (including materials)**

A study considering the construction of affordable housing with structural integrity was undertaken in Tanzania (Mehta and Bridwell, 2005). In this study, they considered households by the construction materials used for different elements in a house. Although the study does not specify which materials are considered inadequate and what the reasons are, it is inferred that it is preferable to get low-income population to move from homes made of wood, sheet metal and cardboard to more modern materials, such as specifically mentioned concrete or bricks (Mehta and Bridwell, 2005):

- Foundations:
  - None
  - Stones in mud mortar
  - Loosely laid stones
  - Concrete
  - Other
- House floor
  - Earth
  - Cement, tiles, etc.
  - Other
- House walls
  - Poles, branches and grass
  - Mud and poles and/or stones
  - Mud only

- Mud bricks
- Baked bricks
- Concrete, cement, stone
- House roof
  - Grass, leaves, bamboo
  - Mud and grass
  - Concrete, cement
  - Galvanised metal sheets
  - Asbestos sheets
  - Tiles
  - Other.

While it is not discussed further, the study mentioned that rural areas are responsible for the majority of inferior materials (Mehta and Bridwell, 2005). From this statement, one can conclude from the data that the following are considered inferior materials:

- No foundation
- Earth flooring
- Poles, wood, grass and mud in some combination for walls
- Grass, leaves, bamboo and even galvanised steel for roofing.

On the other hand, the study in Tanzania determined that heavy dependence on materials which are not easily available locally increase cost and duration of construction (Mehta and Bridwell, 2005). The other concern with recommending the use of local materials and techniques is the vulnerability of these to natural disasters. This again highlights the need for better material quality assurance and control (Aroni, 1975). Similarly, dependence on local manufacturing of supposed superior building materials—in this case local concrete block manufacturing—could result in less stringent quality control measures and a possibly inferior product (Mehta and Bridwell, 2005).

#### **2.6.5.4 Design elements (including features)**

While aspects and elements are investigated, one should keep in mind that the problem with detailed design concerns is that there are too many variables. For example, deciding what

effect a vestibule has on the building requires determining how many times the front door opens, what temperature change this brings about, what the prevailing weather is in the area, and whether any of these aspects can be measured to some extent. These are too variable to calculate (Ratcliff, 1952). So even though this category is acknowledged to be broad, a universal adequacy model should not seek to fall into a loop of variables focused on individual design aspects and fail to determine adequacy.

A study into the satisfaction of public low-cost housing residents in Kuala Lumpur found that they were most dissatisfied with features of the housing provided (Husna and Nurizan, 1987 as cited in ; Mohit and Nazyddah, 2011). Some layout components form part of considering dwelling form and its impact on residential satisfaction, such as the location of a garage in relation to the dwelling and the street (Abass and Tucker, 2018).

### **2.6.6 Accessibility**

Housing should be accessible to all groups equally, including disadvantaged or marginalised people (McLean, 2018; UN HABITAT, 2009). It should also be physically accessible to services, amenities, employment, health-care, education and social facilities, without being located in dangerous areas or polluted circumstances (Tissington, 2011; UN HABITAT, 2009).

Neighbourhood facilities as a component in housing satisfaction should include distance and accessibility to (Mohit and Nazyddah, 2011):

- Town centre
- Schools
- Police station
- Hospital
- Market
- Shopping centre
- Public library
- Religious institutions (for example mosques and churches)
- Public transport (train, bus and taxi).

Housing satisfaction measures with regards to public facilities should also include factors like (Mohit and Nazyddah, 2011):

- Open space
- Play area
- Parking
- Public halls
- Road
- Pedestrian walkways
- Public phones
- Local shops.

Dissatisfaction can be expressed by adjusting residential situations through migration (Mohit and Nazyddah, 2011). However, where supply is limited in the location or in the price range, migration is not always an option.

Access to housing also includes access to amenities, services etc. (Tissington, 2011). Neighbourhood satisfaction was found to be positively associated with open green space and green views, as well as the upkeep of any such shared outdoor space (Abass and Tucker, 2018). In addition, other accessibility factors such as pedestrian access and safety of transport and traffic systems were also noticeable in neighbourhood satisfaction (Abass and Tucker, 2018).

Walkability considers the accessibility and linkages within the built environment in a neighbourhood specifically to aspects like attraction facilities, shops, living environment and other people (Abass and Tucker, 2018). There are three main variables to enabling a pedestrian environment—provision of a footpath, tree cover for such footpath, and a strip of grass between the footpath and the adjacent road to provide for benches, streetlights, etc. These were found to predict contentment significantly with the neighbourhood if socio-economic factors like age, income, number of household and tenure were controlled (Abass and Tucker, 2018).



Neighbourhoods are considered connected if facilities and services are reachable within 5–10 minutes, therefore 400–800m in distance (Abass and Tucker, 2018).

Adequacy of location and access can be measured by two factors (Russell, 2021):

- Access to services
- Safety of walking home at night.

Public space provision is not only aesthetic, but also functional and part of residents' wellbeing. The proximity of such public and/or community spaces is also measured by whether it is within 400–800m in distance (Abass and Tucker, 2018). Provision of public space was the best predictor for contentment with the neighbourhood (Abass and Tucker, 2018).

### **2.6.7 Location**

Location and accessibility are listed as elements determining the adequacy of housing (Smit, 2008; Tissington, 2011). They are also integral to the liveability and therefore adequacy of a building (Aroni, 1975). Ideally, individuals and households should have a choice of housing locations that fit their preferences (South African Cities Network, 2011; Tissington, 2011).

Urban location can, for example, be the differentiating factor in access to employment opportunities (Aroni, 1975). Location is also linked to accessibility and access to amenities (McLean, 2018; Tissington, 2011). Dispersed development or urban sprawl also lead to further repercussions like difficulty with expanding bulk infrastructure, lack of accessibility, high spending on commuting and subsequently higher carbon emissions (South African Cities Network, 2011). A study in Tshwane, South Africa found commuting times to be two to three times as long as Moscow, London, Tokyo and Singapore (South African Cities Network, 2011). Location of housing should also not be in any hazardous area (McLean, 2018).

Furthermore, location is one of the primary factors in the development of 'slums' and 'squatter' settlements in order to be closer to the urban areas (Aroni, 1975; South African Cities Network, 2011). In South Africa it was also found that lower income households often had to compromise on location, or had limited choice of such (Tissington, 2011). Similarly, it is a challenge to find affordable, yet well located land for social housing (Scheba, 2018). Location or spatial legacies also have an influence, as separation, division or segregation practices of past regimes or past

spatial planning still influence the present—such as the apartheid spatial legacy in a South African context (South African Cities Network, 2011; South African Human Rights Commission, 2018). There is often a compromise between the location and the quality of housing. For example, urban slums have better location and access to opportunities, while a rural setting might have better physical units at a lower cost (Aroni, 1975).

Satisfaction with location is also linked to residential satisfaction and was found to be one of the main aspects that determined overall performance in the view of residents in public housing estates. Of the items investigated in the study, location forms one of the main categories (Ibem et al., 2013). In conducting a subsequent Nigerian household satisfaction survey, convenience and location of residential buildings were suggested to form a part of considerations for satisfaction with residences (Ibem et al., 2013). A study into resident satisfaction in Johor Bahru, Malaysia found that they were most satisfied with the distance of the housing from the city and access to public transport (Mohit and Nazyddah, 2011; Nurizan, 1993 as cited in). Abass and Tucker (2018) investigated whether the neighbourhood and location of a property could predict residential satisfaction. Respondents to an affordable housing survey indicated that cleaned-up brownfield developments are deemed an acceptable housing location (Sirmans and Macpherson, 2003).

### **2.6.8 Socio-cultural acceptability**

Housing should consider and respect an individual's and collective's cultural identity (Russell, 2021; Tissington, 2011; UN HABITAT, 2009); such housing should be culturally adequate (Tissington, 2011) so that inhabitants are free to express their own cultural identity and diversity (McLean, 2018). Because perception is developed from past experiences, it often seems as if different cultures live in different worlds. Only the features that are significant to the individual and/or culture will be noticed in observation (Marshall, 1969). Housing conditions are judged according to either personal or cultural norms. These may or may not coincide. A variation between what is expected to be satisfied and what is provided will lead to satisfaction and the need for housing adjustment (Mohit and Nazyddah, 2011).

For example, social environment and cultural factors that are suggested to be taken into account as components of resident satisfaction include (Mohit and Nazyddah, 2011):

- Noise

- Crime
- Accidents
- Community relations.

Buildings can be perceived differently when either the criteria for selection of users and/or community or the time period differs (Ibem et al., 2013). Nigerian public housing satisfaction surveys have determined that design and planning should take into account resident convenience and way of life (Ibem et al., 2013).

Cultural acceptability and choice are very difficult to measure and/or rank because there is not necessarily a direct link or reasoning behind the decisions (Ratcliff, 1952). However, such cultural acceptability remains integral, because the community's understanding of shelter determines what is considered to be adequate (Suchar and Rotenberg, 1994).

Cultural acceptability can also depend on customary and local laws, and even colonial or similar history. (Ubink, 2007) mentions that within an African context there is immense pressure on land, security tenure seems to be decreasing, adding that the roles of chiefs, elders and heads of families are important in this context. It might be difficult to find a solution where traditional and customary laws can keep up with and adhere to pressures of an economic, administrative nature and/or other laws and policies (Ubink, 2007). It is also highlighted that the ideals and written aspects of customary laws in the instance of this Ghanaian study were not in parallel to the actual applied versions of such laws (Ubink, 2007).

With the acknowledged inequality in the distribution of wealth and resources, Guatemala was the location for a study into land ownership and the benefits thereof. An NGO purchased private land, subdivided it and sold the parcels of land to landless families willing to participate in commercial farming with these tracts of land. All participants received the same credit, but due to administrative difficulties, some tracts of land were given titles earlier in the process, while others only received these later. This inadvertently led to a study where other factors are similar, and the only difference was land title. It was found that those with secure tenure through titles had higher output and yield (Schweigert, 2006).

## **2.7 Existing theories critique**

Existing theories do list elements that comprise adequacy, but are fairly silent on what would be considered adequate within these elements or even which aspects should be considered. To this end, the entire section of 0 detailing the adequacy of such elements have been compiled mainly from other sources of literature, as the existing theories seem to list but not describe. It is notable that as per Table 1, a large amount of detail in terms of specification is provided by the sources that do not use the term 'adequacy', but rather 'quality of housing'. Are these housing quality aspects then supposed to be considered over and above adequacy? Lastly, taking note of the existing theories, there is still no way to evaluate or compare adequacy in different circumstances, therefore being exactly that, theoretical, and not practically applicable.

## **2.8 Summary**

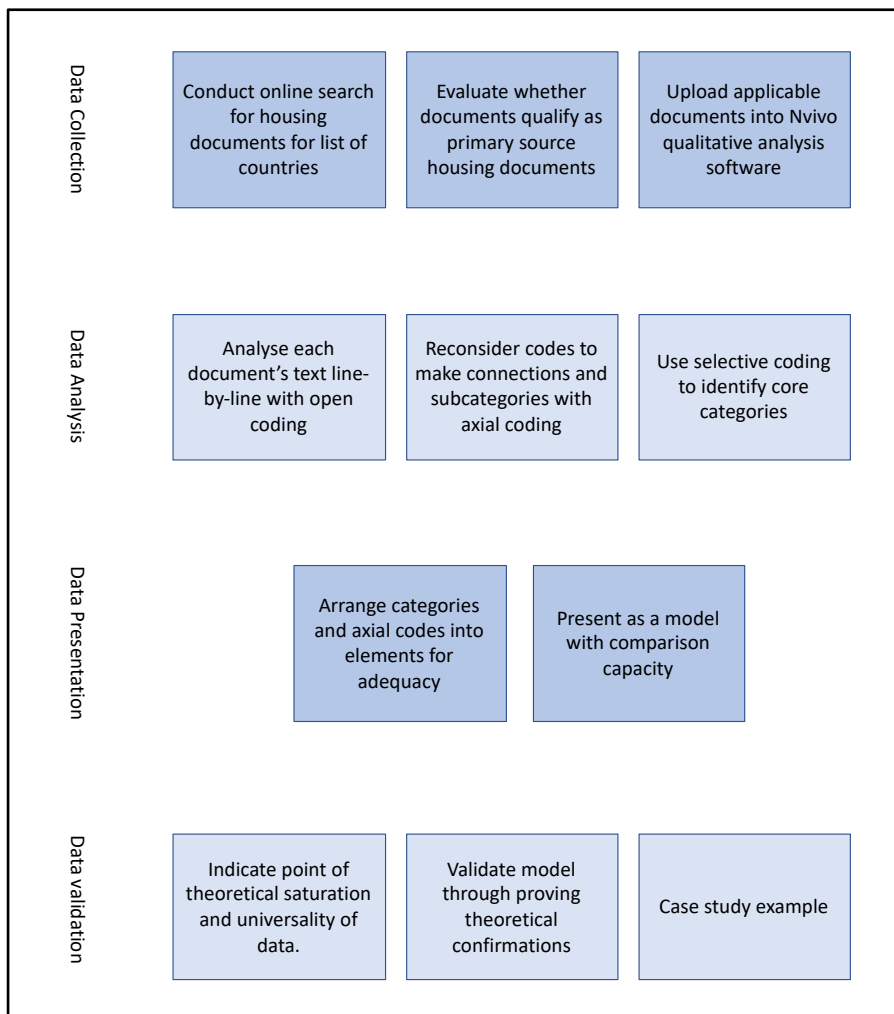
The universal need for and right to adequate housing is supported by existing literature. Definitions of adequacy in existing literature are investigated, and the details of such definitions are expanded upon further. Adequacy is tied to related concepts including standards and residential satisfaction through literature as well, and are expected to form part of the full scope of adequacy. The existing literature is found to be theoretical in nature with limited application in evaluation of adequacy.

## 3 CHAPTER 3: METHODOLOGY

### 3.1 Introduction

This study is qualitative in nature, and rooted in grounded theory. Grounded theory originated in the field of sociology, but has been used in a broad range of other applications including business, management and action plans (Douglas, 2003). It is an approach that does not start with a theory, but instead starts with an area of study from which theoretical concepts emerge (Douglas, 2003). The research is therefore not hypothesis-driven, but the model for housing adequacy will be derived from the data. It is an applicable strategy where existing theories are limited or insufficient (Creswell et al., 2007) where existing housing adequacy theories are discussed in 2.7. This approach also has the benefit that existing theories do not need to be discarded, but can be used as knowledge to build upon (Sarker et al., 2000).

The methodology of the project is visually represented as per Figure 1, and this will be used as a guideline for the structure of this chapter, and further throughout the document.



**Figure 1: Visual representation of methodology for Phase 2**

### 3.2 Data collection

This study has two phases of data collection, with some differences in methodologies. Both are discussed and reported on, but because phase 2 was the approach that was used in the analysis and results of this study, it will be the main focus of the document.

Grounded theory is often found in instances where the research question aims to discover a process, and entails the analysis of many individuals or entities (Creswell et al., 2007) the study is expected to start with the gathering of data (Heath and Cowley, 2004), thereby immersing in a large amount of data (Sarker et al., 2000) until a point of theoretical saturation is reached (Sarker et al., 2000). The sampling strategy aimed to generate a large amount of data, and non-probability sampling was used to ensure a maximum sample size. Limitations

in data collection methodology for both phase 1 and phase 2 are noted in the methodology limitations section in 1.10.2. Data collection and sample results are explained in full in Chapter 4.

### 3.2.1 Phase 1

A list was compiled containing all 195 UN member states, plus four non-members (Vatican City, Palestine, Kosovo, and Taiwan) housing authorities (United Nations, 2022). The names of these countries were then entered into an online search, combined with terms that relate to:

- “housing”—including “housing”, “residential” and a translation of the word “housing” into the local language for the particular country
- “authority”—including “authority”, “department”, “regulation”, “body” and “national”.

Thereby, a database was constructed of all the specified authorities in charge of housing in that specified country. The internet was scoured for an official website or online presence for these authorities for each country, and this was used to collect official contact information or contact methods for each authority. The authorities in the various countries were contacted during the time period June 2020 to August 2020. In some of the 199 countries, multiple authorities are involved in housing often based on geographical area delineation such as: individual authorities for Australian states and territories; individual authorities for Canadian provinces; and separate authorities for Belgian regions and languages. Sometimes the authorities referred the request for information to other branches or authorities. A total of 210 organisations in 199 countries were attempted to be approached, and asked if they would participate in providing information on what would be considered “adequate” housing in their area/region.

The letters of consent obtained from housing authorities of countries that were interested in participating were included in the Ethical Clearance application, together with a question-list of eight main questions that would be put to respondents following ethical approval:

1. What determines whether housing is adequate?
2. What is considered adequate safety and security regarding housing?
3. What is considered adequate service provision?
  - (You may choose to delineate your response according to subsections)
    - Drinking water provision

- Sanitation provision
  - Energy provision
  - Heating, ventilation or air conditioning provision
  - Refuse removal
4. What is considered adequate affordability for shelter/housing?
  5. What constitutes an adequate physical structure?
    - (You may choose to delineate your response according to subsections)
      - Size
      - Structural adequacy
      - Thermal properties
      - Acoustic properties
      - Weatherproofing properties (including wind and water)
      - Maintenance
  6. What would be adequate accessibility regarding shelter/housing?
    - (You may choose to delineate your response according to subsections)
      - Access to transport
      - Access to non-motorised mobility (including walkability and cycling)
      - Access to amenities
  7. What would determine whether the location of the shelter/housing is adequate?
    - (You may choose to delineate your response according to subsections)
      - Proximity to CBD (urban areas) or nearest city (rural)
      - Proximity to healthcare
      - Proximity to education
  8. What is considered adequately meeting cultural requirements regarding housing?

### 3.2.2 Phase 2

A list was compiled of all 195 UN member states, plus four non-members (Vatican City, Palestine, Kosovo, and Taiwan) (United Nations, 2022). A systematic internet search was made of the following combination of terms:

- The name of the country
- “housing”
- Iterations of: “standards” / “regulations” / “minimum” / “code” / “policy” / “adequacy” / “requirements”



- If required, any of the following terms: “official” / “pdf” / “national” or “English” were added depending on the results achieved initially. This resulted in a sample size of one hundred (100) documents.

In order to ensure work with primary data, only official published documents were acceptable. If such an applicable official published housing document was found during sampling, it was downloaded and added as a source document. Documents were excluded if they were not an official published document by a government entity, because anything other than official documents could not be classified as a primary source.

Documents were also excluded if they were deemed to fall outside of the scope of the study as discussed in 1.10.1. This included documents that focused mainly on:

- Provision system such as
  - Scope and set-up of housing committees and departments
  - Involvement of public sector or state in provision
- Critique on policies, legislation, legal processes, or other official documentation and governance processes and legislation.
- Manner of usage such as:
  - Selection of beneficiaries,
  - Loan assistance,
  - Rental management schemes etc
  - Rent control
  - House-price appreciation
  - Cost of maintenance
  - Housing subsidies
- Statistics and feedback on historical progress or provision.
- Construction standards and specifications that are not focussed on housing or residential buildings.
- Design processes
- Housing of non-human species

### **3.3 Data analysis**

With a grounded theory approach, the study commences with an area of study, rather than a theory (Douglas, 2003). As with most qualitative studies, there is a role of interpretation assigned to the researcher (Heath and Cowley, 2004), and while the process shares a lot of elements with reflexive thematic analysis (Braun and Clarke, 2021), to dissuade a mix of methodologies the data continually be discussed at the hand of grounded theory (Sousa, 2014). Grounded theory can be a combination of positivism – where purely data and facts are considered; and interpretivism – where differences in context is also taken into account (Alharahsheh, 2020). As with all qualitative studies there is a role of interpretation (Heath and Cowley, 2004), but it remains important that the emphasis of the data analysis should be on the source data in order to minimise the researcher’s own opinions (Douglas, 2003). Relevant theoretical concepts can then emerge from the data in the data analysis process. By following the grounded theory coding steps, the emergent theory is detailed and dense in nature (Heath and Cowley, 2004). To this end qualitative analysis software was used to assist in the form of the computer programme/app NVivo. This specifically allowed for coding of a large body of information into different themes, and managing and correlating such coding to discuss similarities and differences.

#### **3.3.1 Open coding**

The source data is approached in a line-by-line basis (Sarker et al., 2000) and systematically sorted into codes (Heath and Cowley, 2004) aligned with the theme of study. A single line of data might be assigned to any and all codes that seem applicable. Prior understandings of the topic and existing literature can be acknowledged, but the aim is not to test existing theories, so coding should remain open in nature (Heath and Cowley, 2004).

#### **3.3.2 Axial coding**

Once all data has been through the open-coding process, axial coding commences. Axial coding is the process of reworking through all the data, but this time with a code-by-code basis making connections and reassembling data (Sarker et al., 2000). The axial coding phase is aimed at reducing and clustering the data (Heath and Cowley, 2004).

### **3.3.3 Selective coding**

Selective coding is the process of considering the axial codes, and categorising to enable identification of core categories (Creswell et al., 2007; Douglas, 2003; Heath and Cowley, 2004; Sarker et al., 2000). Categories are linked through context, condition, strategy and consequence (Sarker et al., 2000).

### **3.4 Data presentation**

For data generated in grounded theory to be presented for theory building, it should be presented in a manner that is (Gligor et al., 2016):

- Is clear and logical
- Has utility and relevance
- Enables describing, explaining, predicting and possibly controlling the phenomenon.

To this end, the housing codes and core phenomenon of this study should be presented in a way that is useful in clarifying what housing adequacy entails, that can be universally relevant, and that can be used to explain and predict the adequacy of housing to the point where it can possibly assist in implementing change towards addressing inadequacies.

The data presentation stage should answer the grounded theory 'what', 'how', 'why', 'who', 'when' and 'where' as indicated by Gligor et al. (2016) and Dubin (1978). The phenomenon description should entail 'what' aspects determine adequacy of housing, and 'how' they relate to one another as well as 'how' they answer the research question. The 'why' is an explanation of underlying dynamics that lead to adequacy or inadequacy. The 'who', 'when' and 'where' are limitations to the applicability, and the study should describe how it deals with differences in social and temporo-spatial settings in order to achieve universality.

### **3.5 Data validation**

Data validation in qualitative research should preferably be intrinsic, and based on the research context itself rather than additional criteria (Sousa, 2014). This aligns with grounded theory where ideas should be verified by the data: The comparative analysis subsumes and assumes the verification process (Glaser and Strauss, 1967; Heath and Cowley, 2004). Validation is done at each stage using constant comparison until theoretical saturation is achieved (Sarker et al., 2000). The theory-building approach taken is seen as exploratory instead of

confirmatory, and descriptive as opposed to explorative (Sousa, 2014). However, proving the quality of research should include assumptions that are both ontological and epistemological in nature, thereby addressing reality and theory. While the theory is confirmed by the data in this approach, proving ontological quality is better done at the hand of a case study. The application of results in a case study example is another possible way to validate results (Sousa, 2014), but also a way to show the application of the model which ties in to the grounded theory statement that the results should ideally be illustrated visually (Creswell et al., 2007).

### **3.6 Summary**

The study makes use of grounded approach which entails collection of a large body of data in the collection stage of the project. This was done in two phases, while Phase 2 provided the ultimate data for the project. Grounded theory analysis data through open coding, axial coding and selective coding. These codes are then presented as elements in a visual model with comparison capacity. Epistemological data validation is proven through indicating that the point of theoretical saturation is achieved, and proving theoretical confirmations and universality of the data. Ontological data validation is done through a case study example.

## 4 CHAPTER 4: DATA COLLECTION

### 4.1 Introduction

Data collection took place between June and August 2020 for Phase 1, and during June to August 2021 for Phase 2. As per the grounded theory approach of the study, the aim was to gather as much data as possible in order to fully immerse in data. To this end non-probability sampling was used, and all countries were attempted to be included – in instances where countries wished to be represented by region, this was also complied with. Data collection methods and strategies are described in detail in 3.2, and sample details and results are further discussed for each phase separately.

### 4.2 Phase 1

A total of 210 organisations in 199 countries were attempted to be approached, and asked if they would participate in providing information on what would be considered “adequate” housing in their area/region. In countries with multiple organisations, the country might therefore be represented in multiple categories of responses.

Table 2: Contact status results for phase 1 sampling

Contact status		No. of countries (No. of authorities where different from no. of countries)	% of total countries (% of organisations)
<b>No contact initiated</b>	<b>No information on authority</b>	13	6,2 %
	<b>No website or online presence</b>	4	1,9 %
	<b>No English translation</b>	2	1,0 %
	<b>Website error</b>	12	5,7 %
	<b>No contact information or contact form</b>	23 (25 authorities)	11,0 % (11,2 %)
<b>Contact initiated</b>	<b>Undeliverable</b>	17	8,1 %
	<b>No response</b>	115 (123 authorities)	55,0 % (54,9 %)
	<b>Acknowledged, no correspondence</b>	10 (12 authorities)	4,78 % (5,36 %)
	<b>Some correspondence</b>	9 (12 authorities)	4,31 % (5,36 %)

	<b>Agreement to participate in research</b>	4	1,91 %
	<b>Total</b>	209 (224 authorities)	100 %

A total of 25% of potential contacts had no or inaccessible online presence, no contact information available, or no way to contact them online. This somewhat relates to the internet penetration rate that indicates 37.5% of the world has no access to the internet (Statista, 2022) even if it can be expected that this percentage applies more to general public than the internet penetration rates of official or government entities. No contact could be established with any countries from Africa, the Caribbean and Atlantic Isles, Middle East, Central America or from Great Britain.

Of the 155 countries contacted, no response or further contact was received from 115 of the countries. Seventeen were indicated as undeliverable, with automated correspondence stating that the mail had bounced, is undeliverable, that the mailbox is full or the mail had been blocked. Ten of the responses received were an automated response, acknowledging receipt of the mail with no further correspondence subsequently; 13 actively engaged to some extent.

Of the 13 countries with whom contact was established, six expressed interest in the study and formal permission was received from four of them:

- Canada (Saskatchewan)
- Estonia
- Hungary
- Latvia.

Interestingly, while the study expected limitation through communication in the English language, of the four countries that continued correspondence, only one is a primary English-speaking country.

Upon ethical approval as obtained on 4 June 2021, the four interested countries were contacted again. None answered the questions or elected to arrange an interview. This lack of response may possibly be ascribed to the effect of Covid-19 on the efficient functioning of relevant departments.

### 4.3 Phase 2

Phase 2 entailed the usage of official published documents available online in English as source documents. The methodology is discussed further in 3.2.2. The exclusion of certain documents deemed irrelevant are described further in the limitation section of 1.10.2. This resulted in acceptable documents from 42 countries:

- Australia (Australia, 2010)
- Azerbaijan (Azerbaijan, 2009)
- Bahrain (Kingdom of Bahrain, 2010)
- Bangladesh (Bangladesh, 2016)
- Belarus (Belarus, 2012)
- Bhutan (Bhutan, 2020)
- Canada (Alberta - Canada, 2012)
- Croatia (Croatia, 2001)
- Czechia (Czech, 2016)
- Ethiopia (Ethiopia, 2016)
- Finland (Finland, 2005)
- Ghana (Ghana, 2015)
- Guyana (Guyana, 1998)
- Iceland (Iceland, 1998)
- Iraq (Iraq, 2010)
- Ireland (Ireland, 2019)
- Jamaica (Jamaica, 1973)
- Kazakhstan (Kazakhstan, 1997)
- Kuwait (Kuwait, 1993)
- Lesotho (Kingdom of Lesotho, 2018)
- Malaysia (Malaysia, 2021)
- Maldives (Maldives, 2008)
- Malta (Malta, 1949)
- Marshall Islands (Republic of the Marshall Islands, 2016)
- Moldova (Moldova, 2021)
- Nepal (Nepal, 2018)

- New Zealand (New Zealand, 2013; New Zealand, 2021)
- Poland (Poland, 2016)
- Russia (Russia, 2021)
- Samoa (Samoa, 2006)
- South Africa (Republic of South Africa, 2009)
- St Lucia (St Lucia, 2006; St Lucia, 2008)
- Taiwan (Taiwan, 2017)
- Tajikistan (Tajikistan, 1997)
- Trinidad and Tobago (Trinidad and Tobago, 2016)
- Uganda (The Republic of Uganda, 2016)
- United Kingdom (United Kingdom, 2015)
- United States of America (United States of America, 1994)
- Ukraine (Ukraine, 1983)
- Vietnam (Vietnam, 2014)
- Zambia (Zambia, 2020)
- Zimbabwe. (Zimbabwe, 1972)

The demographics of this sample is discussed in more detail below, and will again be mentioned in 7.2, where the validity of claiming universality of results will refer back to the universal representation of the sample. The dates of the published documents ranged from 1973 to 2021 as shown in Figure 2. The date of latest available revision or amendments were used, although the initial document might have been published prior to that.



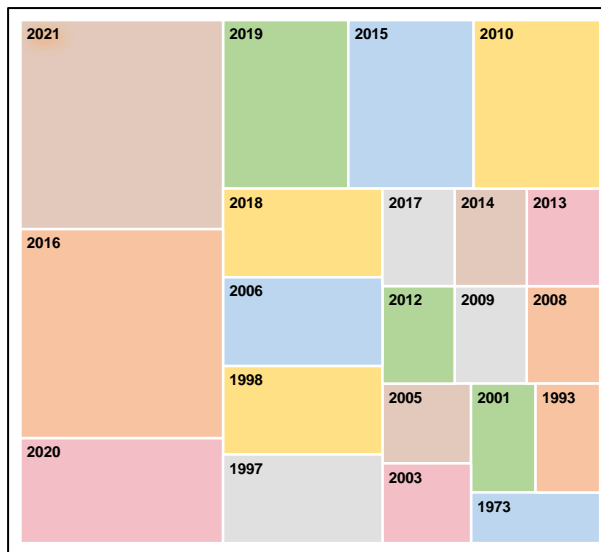


Figure 2: Year of publication distribution of documents used

Of the documents used, sixteen (16) were housing regulation/legislation documents, nine (9) were housing policy documents, six (6) were housing codes, four (4) were housing standards, two (2) were housing guidelines and one (1) was a housing specification. Four (4) were other types of documents as visually represented in Figure 3.

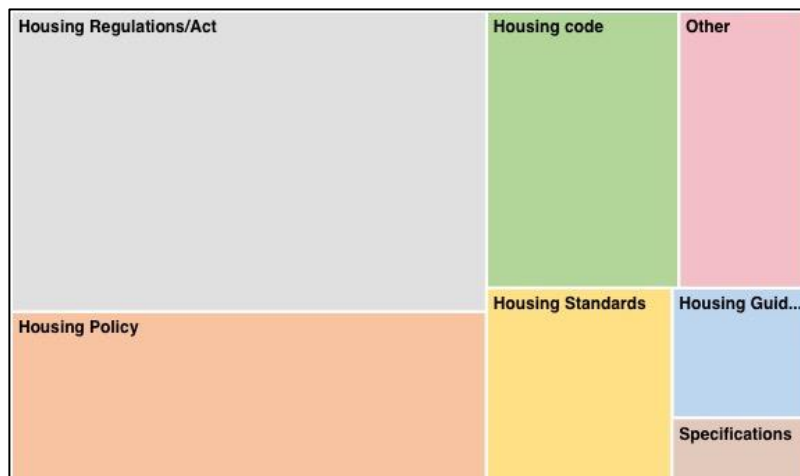


Figure 3: Types of documents in analysis

This also resulted in a wide geographical representation of information (with the number of countries in this category in brackets) as well as broad range of GNI income classifications in each of the continents (World Economic Situation and Prospects, 2014). Data represented the following continents as shown in Figure 4: Asia (14), Europe (11), Africa (7), North America

(5), Australia/Oceania (4). Unassigned (“Un” in Figure 4) is Azerbaijan which is an upper middle-income transcontinental country both in Asia and Europe.

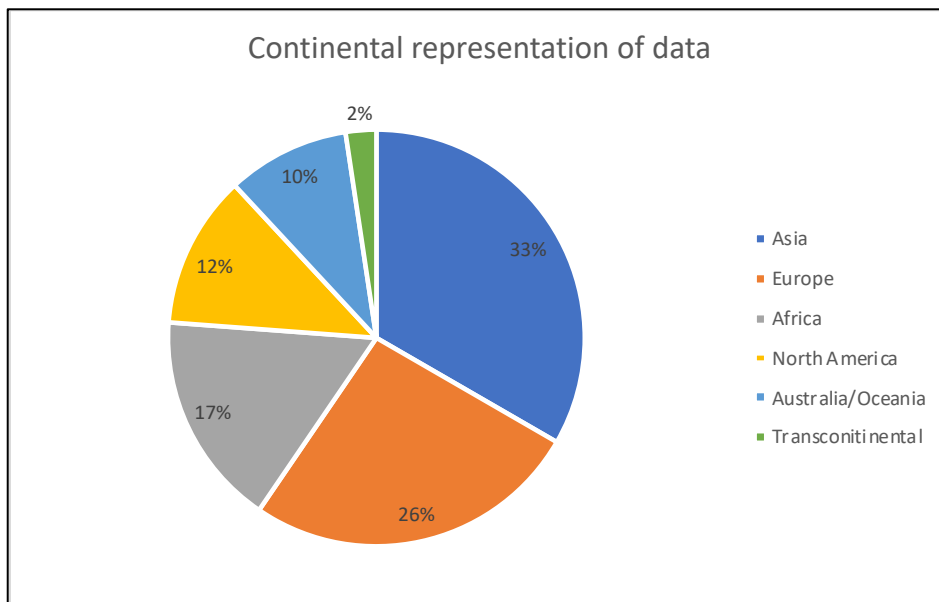


Figure 4: Continents represented by sample (own compilation)

Without being displayed by continent, the sample representation of per capita GNI countries was balanced as indicated in Figure 5: High income (15), Upper middle income (11), Lower middle income (8), Low income (5), Not applicable (3) (World Economic Situation and Prospects, 2014).

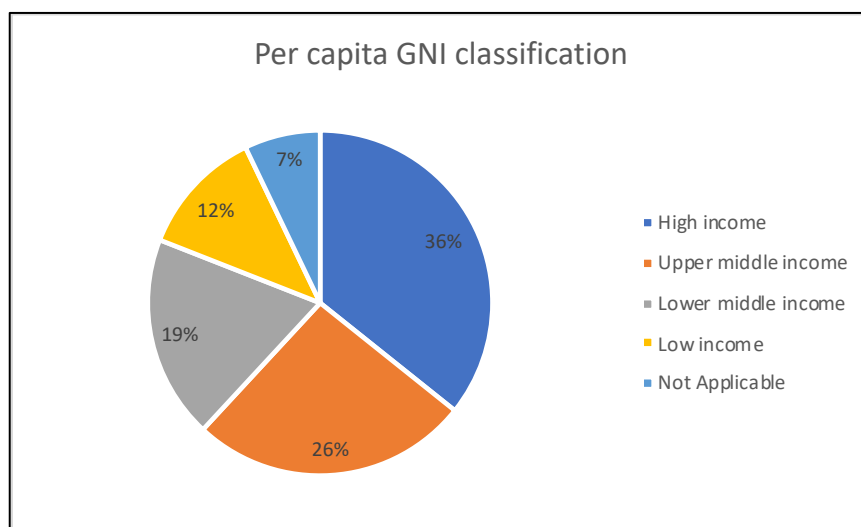


Figure 5: Per capita GNI classification of sample (own compilation)

The data also represents a variety of country developmental classifications—specifically World Economic Situation and Prospects (WESP) classification as per Figure 6:

Developing (23), Developed (11), Transition (6), Not applicable (2) (World Economic Situation and Prospects, 2014).

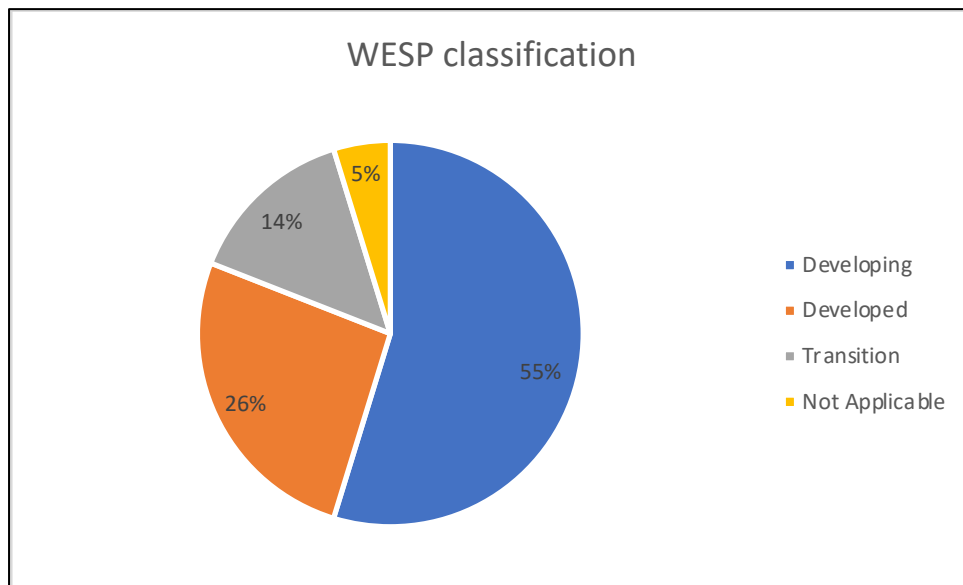


Figure 6: WESP classification distribution of sample (Developed vs Developing countries) (own compilation)

#### 4.4 Summary

Data collection from Phase 1 attempted to contact a total of 224 authorities. Approximately 25% of these could not be contacted due to limited information, limited online presence, limited contact methods or limited English language. Of the total sample, 55% did not respond to the communication at all, and only about 5% actually took part in some correspondence. Data collection for Phase 2 resulted in a viable sample of 42 countries. The documents used were official housing regulation/legislation documents; housing policy documents; housing codes; housing standards; housing guidelines; and housing specifications. The sample represented five continents, all categories of WESP classification, and all categories of per capita GNI classification.

## 5 CHAPTER 5: DATA ANALYSIS

### 5.1 Introduction

Data analysis followed the grounded theory approach of coding the large body of data firstly on a line-by-line basis called open coding, followed by axial coding and selective coding or core categorisation. The grounded theory approach is further explained in 3.3. The data analysis of the study is discussed at the hand of each of the coding steps.

### 5.2 Open coding

Prior to commencing open coding, a word cloud of the words indicating the words that most frequently occur in the source documents in their entirety is shown in Figure 7. Larger and lighter coloured words represent words that occur more frequently. This is different from the word-cloud generated from all coded content shown in Figure 8, as the open coding is done by focusing on the area of study.



Figure 7: Word-cloud of most common words in source documents (own compilation)



Name	Files	References
Occupants	14	42
Other	19	59
Physical properties	16	180
Building materials and structure	28	162
Maintenance	12	21
Other	20	63
Protection from elements	18	59
Size and layout	30	117
Type of building	31	80
Resettlement	10	32
Rural vs urban	13	39
Security	4	6
Physical safety	18	27
Tenure security	14	28
Service provision infrastructure	20	155
Electricity	16	44
Fire or smoke	8	11
Gas supply	3	4
Heating or cooling	12	27
Pest control	4	5
Sanitation	21	50
Storm water	2	4
Waste	11	14
Water	21	53
Sustainability	16	131
Technology and innovation	10	97

### 5.3 Axial coding

Subsequent to the open coding phase, axial coding commenced – each open code was revisited and data was reorganised and recoded. Firstly, the need for housing across the sample was analysed and discussed.

### 5.3.1 Need for housing

It was found that across the sample, the need for housing and/or right to adequate housing is acknowledged and discussed with some slight differences.

Bangladesh (2016) recognises the fact that housing is a basic need. Iceland (1998) mentions that the need for housing differs between regions and that the attempt should be in assisting individual needs. Kingdom of Lesotho (2018) has formally adopted a Human Rights-Based Approach to Development (HRBAD), making the right to housing a fundamental right and freedom for the country's citizens. The need for housing is a basic social need. If and how it is satisfied determines the quality of life for individuals and within a society—especially with regards to family and safety (Poland, 2016).

There is a critical and growing housing crisis which expands to urban and rural areas, and this impacts a country's ability to provide planned housing for all (Bangladesh, 2016). The shortage in housing has continued to grow, even after it was already considered large at the end of the 1900's (Iraq, 2010). Poland (2016) refers to the multi-year housing deficit that has prevailed.

The need for housing is rising due to growing population, also within specific locations due to rapid urbanisation (Bangladesh, 2016; Bhutan, 2020; Kingdom of Lesotho, 2018; Maldives, 2008; Zambia, 2020). Growing population and existing supply chain issues have left the demand for housing unmet (Iraq, 2010). Deterioration of existing housing stock or poor quality housing is also a big issue in urban and rural areas (Kingdom of Lesotho, 2018; Zambia, 2020). Availability of land for housing is another significant concern (Maldives, 2008).

Furthermore, the need for housing has led to an acknowledged right to housing (Ethiopia, 2016; Tajikistan, 1997) and a basic right at that (Moldova, 2021; The Republic of Uganda, 2016). This is discussed in Article 25 of the Universal Declaration of Human Rights (Czech, 2016). The right of any individual to find and secure their own housing is recognised and protected, but it is not seen as a universal right (Czech, 2016). The Republic of Uganda (2016) guarantees citizens the fulfilment of their fundamental rights with regards to social and economic aspects, including access to clean water, health and acceptable shelter. The right to housing in Nepal (2018) equates to the right to appropriate housing that is protected and respected. The right to a standard of living is essential to facilitate enjoyment of rights of an

economic, social and cultural nature (Ghana, 2015). In (Taiwan - Republic of China, June 2020) citizens' right to housing is protected in order to provide a dignified living environment. Equal rights and access to assistance with regard to housing is required (Iceland, 1998). The right to ownership of a residential place in Kazakhstan (1997) is subject to an individual falling into one of the following categories:

- Constructing the dwelling
- Conclusion of sale or being gifted
- Inheritance
- Being a tenant in state housing that is privatised
- Contractual commitment to transfer
- No-charge sale or transfer through legal entities of private property
- No-charge sale or transfer through legal entities or state of state property
- Compensation for when a dwelling is lost through demolition, requisition or disaster and emergency consequences.

Vietnam (2014) has a similarly detailed list of what are acceptable methods to become entitled to a property including: investment, construction, purchase, lease, lease purchase, gifted, inherited, exchanged, borrowed, stay, authorised or received through capital contribution. These options are even more limited for overseas Vietnamese, and foreign entities (Vietnam, 2014).

Bangladesh (2016) government has adopted the motto that "None should be homeless". Ethiopia (2016) believes that poverty is expressed as homelessness.

If the provision of formal housing does not meet the need of the population, an increase in illegal settlements and slums has been shown (Bangladesh, 2016). Similarly the Kingdom of Bhutan attempts to provide "every citizen with a roof over their head" in their attempt to improve Gross National Happiness (Bhutan, 2020). Therefore, as the need for housing cannot wait for the provision of formal buildings, adequacy should also be applicable to informal settlements, illegal settlements and slums.



There is a disparity within the population regarding the distribution in the need for housing, with the government attempting to prioritise assistance to distressed women, working women, unmarried women, widows and other iterations of women-headed families (Bangladesh, 2016). Physically and mentally challenged people should also be specifically assisted, particularly those below the poverty line (Bangladesh, 2016). Maldives (2008) says the rights and needs of socio-economically disadvantaged groups—such as the poor, women and single-headed households, and those affected by disasters and displacement—are more vulnerable.

Ghana (2015) believes that the right to housing is applicable to all. This is regardless of gender and other differences, although vulnerable groups are prioritised in state-provided resources, funds, knowledge and policies on the subject, as well as any interventions with regards to housing. In Kuwait (1993) priority is given in welfare housing for families of martyrs, prisoners of war, minor orphans and the handicapped. Nepal (2018) discusses that housing cannot be discriminated on grounds of origin, ideology, religion, language, ethnicity, gender, pregnancy, caste, marital status, physical and health condition, disability, class, economic stance, etc.

Some data exists regarding the actual amounts of housing required to meet the need. In Iraq (2010) the estimate was approximately 200 000 dwellings per annum or one every 45 seconds per working day. This was calculated to be in excess of two million by 2016 (Iraq, 2010). In the Kingdom of Lesotho (2018), numerical need is for 98 711 dwellings or 169 709 rooms by 2025; therefore, translating to 5 195 dwellings or 8 932 rooms per annum. This is only for urban housing, but does include reducing overcrowding in existing buildings (Kingdom of Lesotho, 2018). Maldives (2008) reclaimed a new island to assist with housing shortage—this concluded with 280 residential units including infrastructure. Statistically in Poland (2016) they overcame their housing deficit so that in 2015 there were 120 000 more flats than households, i.e. a 0,8% surplus. However, there is still cause for concern as multiple households often occupy the same flats so much so that the municipal rental waiting list was 165 200 households. Poland (2016) targets for 2030 are to reach the EU average for number of flats per 1 000 residents, thereby increasing from 363 to 435 flats per 1 000.

The St Lucia (2008) waiting list of 1 000 people indicated that the demand for owning and renting property is higher than the supply at the time.

The Republic of Uganda (2016) aims to produce 200 000 units of housing per annum (more than three times the preceding 60 000 units per annum) in order to meet their country's housing needs by 2022.

Zambia (2020) had a housing deficit of 1 500 000 in the 2010 census, with expectations that this will increase to 3 300 000 by 2030. Yet their supply was approximately 73 000 units per annum, of which only about 30 000 met health and sanitation requirements; the rest are considered unsuitable for habitation. The need for housing is greatest amongst low income groups as this is the vast majority (80%) of the population (Zambia, 2020).

In order to meet the need for housing, an entire population would require improvement of the standard of houses, and updating of construction and urban planning regulations (Bangladesh, 2016). Bhutan (2020) suggests that it should ensure adequate housing constantly, although it mentions that the opposite of adequate is substandard living conditions, and this will happen if housing and infrastructure supply is inadequate (Bhutan, 2020).

Alberta - Canada (2012) suggests that the term 'building' cannot be used to replace 'housing', as housing should also be safe, sanitary and habitable. Similarly, Ethiopia (2016) believes that housing is much more than a physical building (Ethiopia, 2016). Jamaica (1973) suggests that a building includes any house, out-house, wall or fence on or part of premises that contain such items, while a 'house' or 'dwelling' is any separate building or part of a building (such as a flat) that is suitable for residential use. Kazakhstan (1997) expands this further to say it is any separate residential unit for permanent residence; this includes house, apartment, or separate room in a dormitory (Kazakhstan, 1997). The need for housing is diverse, with requirements ranging from high-density housing to low-rise family units (Iraq, 2010).

### **5.3.2 Definitions of adequacy**

Upon establishing the universality of the need for adequate housing, the next code to be revisited was the "Adequacy" code, as this contained any definitions and detailed explanations for "adequate housing".

The details of these definitions were then axially coded into the proposed framework for adequacy as per Table 4. Aspects of the definition are listed on the left. The columns indicate countries with a definition for ‘adequacy’ or ‘housing’ in their official documentation. A dark green block indicates that this aspect (as per the row header on the left) is mentioned in this country’s definition. Light green means the aspects are alluded to, but not explicitly mentioned.

All aspects in this definition framework are mentioned at least once in a country’s definition—except for gas, and roads and transport. These two items are only alluded to when ‘service provision’ or ‘basic infrastructure’ is mentioned, but were, however, found in more detail in the content of the documents and will therefore be discussed further.

**Table 4: Aspects and categories of adequacy as defined by different countries**

Axial code	United Nations	Taiwan - Republic of China	New Zealand	Czech	Ethiopia	Finland	Guyana	Kazakhstan	Lesotho	Malaysia	Maldives	Moldova	Poland	South Africa	St Lucia	Trinidad and Tobago	Uganda	Zambia	Zimbabwe
1	Access to housing / availability																		
2	Location / Access to amenities																		
3	Physically accessibility – including limited capacity																		
4	Affordable																		
5	Tenure security / structure permanence																		
6	Protection from crime																		
7	Physically safe - including structural																		
8	Quality building materials																		
9	Protection from damp, cold, precipitation and wind																		
10	Protection from fire																		
11	Protection from pests																		
12	Acceptable internal layout																		
13	Proficient size																		
14	Intended for residential use / habitation																		
15	Lighting																		
16	Ventilation																		
17	Indoor temperature																		
18	Energy - including gas and electricity																		
19	Sanitation																		
20	Surface drainage																		
21	Water supply																		
22	Waste removal																		
23	Environmental considerations																		
24	Social / family considerations																		
25	Lifecycle Maintenance																		
26	Future considerations /technology and innovation																		
27	Cultural / community considerations																		

The data was then reworked into these axial codes with the following results:

### 5.3.3 Elements of adequacy

#### 1. Access to housing/availability

All should universally have access to housing (Bangladesh, 2016; Ghana, 2015) as also believed by countries where it is seen as a human right (Zambia, 2020), basic human right (Moldova, 2021; St Lucia, 2008), and fundamental human right (Taiwan, 2017).

Some countries specifically state that this right is applicable to citizens of the country (Bhutan, 2020; Croatia, 2001; Nepal, 2018; Russia, 2021; Tajikistan, 1997; Ukraine, 1983), while others at least broaden it to include other lawful residents in addition to citizens (Republic of South

Africa, 2009; Vietnam, 2014). Poland (2016) mentions that housing is a social issue and that groups like refugees need to be provided for specifically, while Nepal (2018) and Bangladesh (2016) state there should be no discrimination based on origin, ethnicity, religion and language in access to housing. Housing should be a basis for the enjoyment of all economic, social and cultural rights (Ghana, 2015).

Access to housing is applicable to all, not only housing provided by government. As such provided housing is often for a very specific subgroup of people (Maldives, 2008; Moldova, 2021; Nepal, 2018; Poland, 2016), government employees (Ethiopia, 2016) or guided by a separate document to the one used in this study. So while governments or authorities are often the drivers for realisation of adequate housing (Ghana, 2015; Iceland, 1998; Poland, 2016; Ukraine, 1983; Zambia, 2020), discussions regarding access to housing should not be tied to the government provision.

Housing access is about assisting individuals (Iceland, 1998), best addressed at a local level on a case-by-case basis (Croatia, 2001). How access to housing can be obtained legally is discussed in detail by Vietnam (2014) and is listed as through:

- Construction
- Purchase
- Lease
- Lease purchase
- Receipt of a gift
- Receipt of inheritance
- Receipt of capital contribution
- Exchange
- Borrowing
- Stay or authorisation for housing management
- Other transaction.

Aspects that are specifically mentioned with regards to access to housing include:

*1a Gender or sexual orientation*

Housing should be equitably available to all genders (Australia, 2010; Nepal, 2018; Zambia, 2020) and sexual orientations (Australia, 2010). Women can be prioritised in housing provision (Bangladesh, 2016; Ethiopia, 2016; Maldives, 2008).

*1b Health*

People should not be deprived of access to housing or discriminated against based on disability, health and pregnancy (Australia, 2010; Nepal, 2018; St Lucia, 2008). Provision should also be made to cater for unique needs of the disabled (Poland, 2016; Taiwan, 2017). The ill (Bangladesh, 2016) and disabled can be prioritised for housing provision (Poland, 2016).

*1c Household composition*

Multi-family housing needs to be considered as part of the housing framework (Iraq, 2010). There should be no discrimination based on household composition (Australia, 2010), marital (Nepal, 2018) or socio-economic status (St Lucia, 2008) in terms of access to housing. Woman-headed households (Bangladesh, 2016; The Republic of Uganda, 2016) and single-headed households (Maldives, 2008) and the disadvantaged/vulnerable (Kuwait, 1993; Maldives, 2008; Taiwan, 2017; The Republic of Uganda, 2016; Zambia, 2020) can be prioritised in housing provision.

*1d Age*

There should be equality and fairness in access to housing for all ages (Australia, 2010)—the aged and youth (Ghana, 2015; St Lucia, 2008; Taiwan, 2017) specifically, because not all elderly require care units and young people often have difficulties with long-term loans and mortgage credit for housing (Poland, 2016). In provision of housing, children (Bangladesh, 2016), and students at higher education institutions or boarding schools (Vietnam, 2014) can be prioritised in housing provision.

*1e Income*

Low and middle income housing have more limited access due to a shortage of supply (Bhutan, 2020), and people should not be deprived of housing or discriminated against based on economic condition (Ghana, 2015; Nepal, 2018). Low income, poverty and near poverty

households and individuals can be prioritised in provision (Bangladesh, 2016; Ghana, 2015; Maldives, 2008; Vietnam, 2014). Affordability is discussed as a separate category, but it does have a direct impact on access to housing, which should be available to different income levels (Poland, 2016), as it can be expected to spend 30% plus of income on housing (St Lucia, 2008) and the right to housing should equate to a right to affordable housing (Zambia, 2020).

#### *1f Existing homes*

Definitions of 'homeless' might exclude a vast number of people (Poland, 2016). The homeless can be prioritised in provision of housing (Bangladesh, 2016; Nepal, 2018; Poland, 2016).

#### *1g Disasters and displacements*

In disaster, climate change and displacement instances, housing should be provided, prescribed and people in such a situation should be prioritised (Maldives, 2008; Nepal, 2018; Vietnam, 2014).

#### *1h Type of housing*

All forms of housing should be available (Czech, 2016), and while the ideal is to facilitate possession of the housing (Moldova, 2021), 65% of housing available is rental housing (Bhutan, 2020); there is also focus on non-traditional forms of housing such as movable housing, shelters and hostels (Moldova, 2021).

With regards to details about the physical housing when discussing access to housing, the following are mentioned:

- Land—part of access to housing does entail access to land for such (Maldives, 2008), as well as surrounding open and public space (Nepal, 2018; Taiwan, 2017).
- Quality—the right to housing should entail access to decent housing (Czech, 2016; Zambia, 2020) and the scope of housing provision should include improving the quality of housing (Czech, 2016).

## *2. Location/amenities*

Everyone has the right to choose the place of housing, and suitable migration towards such a choice (Nepal, 2018). Physical accessibility and location of housing form part of the human

right to housing and related services (Kingdom of Lesotho, 2018; St Lucia, 2008; Zambia, 2020).

Location of housing should be determined based on factors like cost, available finance and market demand (Croatia, 2001), and is noted as a supply-side concern (Ghana, 2015).

Land is a basic requirement for housing, but it is subject to availability, ownership, value, control, planning and management (The Republic of Uganda, 2016). Jamaica (1973) agrees that it is necessary to plan and define the housing for land in an area, while Vietnam (2014) also mentions that the land should satisfy requirements for housing area standards. Sometimes the government is involved in providing equitable access to land for housing (Zambia, 2020), such as where unutilised tracts of government land are to be prioritised (Bangladesh, 2016).

#### *2a Resettlement or displacement*

Ideally there should be no resettlement or relocation. Migration to new housing should ideally be by choice (Nepal, 2018). However, there are instances where it should be planned for—for the aftermath of disasters (St Lucia, 2006; St Lucia, 2008), war (Bangladesh, 2016), or in the interest of public welfare (Bangladesh, 2016; St Lucia, 2008; Vietnam, 2014) such as formalising informal settlements, or replacing with higher densities or higher yield developments (Iraq, 2010). If it does need to happen, it should be accompanied by:

- Preceding and concurrent consultations and rehabilitation (Bangladesh, 2016; Ethiopia, 2016)
- On-site provision of new housing where possible (Iraq, 2010; Vietnam, 2014)
- Relocation and rehabilitation, including timeous arrangements, transport, service arrangement etc. (Bangladesh, 2016; Ethiopia, 2016; Guyana, 1998; Iraq, 2010; Maldives, 2008; Nepal, 2018; Vietnam, 2014)
- Compensation or financial assistance (Maldives, 2008; Nepal, 2018; St Lucia, 2008; Vietnam, 2014)
- A court decision allowing the deprivation of dwelling (Kazakhstan, 1997).



## *2b Job and commercial proximity*

The most desirable characteristic of a neighbourhood is proximity to work (Guyana, 1998; Iraq, 2010; Malaysia, 2021; Samoa, 2006; The Republic of Uganda, 2016). The location of housing should support economic development (Maldives, 2008). Residential areas should be located close to areas with income generating activities, and ideally mixed use (Ethiopia, 2016); yet, limited land that can be utilised for residential purposes is a great concern—specifically in urban areas (Iraq, 2010). Low income housing should be close to commercial areas to further promote accessibility (Ethiopia, 2016).

Neighbourhood development should aim at linking urban centres and attempt to limit horizontal expansion (Ethiopia, 2016). Standardised houses and services should be focused on urban centres (Ethiopia, 2016). In Iraq (2010) priority is given to developments located centrally. The majority of the population in Ghana (2015) is based around the capital region, and unavoidable irreversible urbanisation should be considered in decision of location.

Urban areas tend to have land scarcity (Zambia, 2020). New housing should rather be located on rural land close to urban areas (Bangladesh, 2016). Neighbourhood development plans should also link slum areas (Ethiopia, 2016). In Ghana (2015), a notable portion of the urban population lives in informal housing. Rural housing has different concerns to urban housing; these include household compositions, the type of homes and access to and impact of availability of credit, subsidies and different tenure options (Asase et al., 2009), along with the fact that the type of housing is deteriorating or sub-par in comparison with urban counterparts (Kingdom of Lesotho, 2018). In Zambia (2020), rural ground provides the majority of land required for housing.

Availability of services is also a factor in adequacy of the location (St Lucia, 2008), and rural housing tends to have inadequate infrastructure supply (Kingdom of Lesotho, 2018). Iraq (2010) warns that expansion of supply beyond urban areas—such as to informal or newly developed areas—is bottlenecked by the need to maintain and keep up with services in existing urban areas.

Often resettlement has been shown to be unsuccessful, as it moves people too far from urban centres, job markets, transport and amenities (Iraq, 2010).

### *2c Open space and the environment*

Environmental quality is a factor in housing adequacy (Tajikistan, 1997). Green cities and open spaces should be taken into account and protected (Ethiopia, 2016; Jamaica, 1973). Sensitive areas or areas of natural and environmental significance should be conserved (Finland, 2005; Maldives, 2008; Nepal, 2018); also, agricultural, flood and fertile areas or parks and reservoirs should be avoided (Bangladesh, 2016).

Access to both green and public spaces should be barrier-free (Taiwan, 2017) and available to all income levels (Bhutan, 2020; Ethiopia, 2016), and such common lands should be well maintained (Kazakhstan, 1997). The open and environmental spaces available should include:

- Green spaces—including natural landscape (Bhutan, 2020; Ethiopia, 2016; Jamaica, 1973; Taiwan, 2017; The Republic of Uganda, 2016)
- Parks or public areas—specifically in urban areas (Croatia, 2001; Kazakhstan, 1997; Republic of the Marshall Islands, 2016; Taiwan, 2017; The Republic of Uganda, 2016)
- Community linkages (Ethiopia, 2016; Taiwan, 2017).

Factors of physical and environmental consideration (Samoa, 2006) and the quality of such an environment (The Republic of Uganda, 2016) should be taken into account. The actual location or siting of the building itself should take into account aspects like the terrain, topography, and existing landforms (Republic of South Africa, 2009); development on steep terrain also has additional environmental factors like soil erosion, runoff and high sediment loads (Samoa, 2006). Climatic conditions and landscaping like tree plantation have an influence on passive design sunlight, energy and water efficiency and even privacy through design and placement of the building—specifically the distance between different buildings or buildings and large elements (Finland, 2005; Republic of South Africa, 2009; Samoa, 2006) and the distance between the building and the street (Samoa, 2006).

### *2d Transport*

Access to transportation is noted as an important factor in housing location (Iraq, 2010; Samoa, 2006).

Aspects mentioned include access to and planning for:

- Roads (Croatia, 2001; Jamaica, 1973; Kingdom of Lesotho, 2018; Maldives, 2008; Republic of South Africa, 2009; Samoa, 2006; The Republic of Uganda, 2016; United States of America, 1994)
- Public transport (Bhutan, 2020; Iraq, 2010)
- Parking spaces and driveways (Bhutan, 2020; Ethiopia, 2016; Finland, 2005; Samoa, 2006; United States of America, 1994)
- Pedestrian footpaths (Samoa, 2006).

## 2e *Infrastructure*

Access to infrastructure is noted as another significant element mentioned in housing location (Iraq, 2010; United States of America, 1994; Zambia, 2020). Details of adequate service provision can be found in Section **Error! Reference source not found.**, while this section discusses which infrastructure aspects should be accessible to the housing:

- Public lighting (Croatia, 2001; Republic of South Africa, 2009; Samoa, 2006)
- Solid waste management (Bhutan, 2020; Ethiopia, 2016; Finland, 2005; Kingdom of Lesotho, 2018; The Republic of Uganda, 2016)
- Water (Kingdom of Lesotho, 2018; Maldives, 2008; Republic of South Africa, 2009; The Republic of Uganda, 2016)
- Sanitation (Kingdom of Lesotho, 2018; Maldives, 2008; Republic of South Africa, 2009; The Republic of Uganda, 2016)
- Electricity (Maldives, 2008; The Republic of Uganda, 2016)
- Telecommunications (Maldives, 2008; The Republic of Uganda, 2016)
- Storm water management (Republic of South Africa, 2009; The Republic of Uganda, 2016).

## 2f *Education*

Schools are discussed as amenities that should be in close proximity to housing (Bhutan, 2020; Ethiopia, 2016; Iraq, 2010; Maldives, 2008; The Republic of Uganda, 2016). Some differentiate based on the levels of education:

- Nurseries (Malaysia, 2021)
- Primary (Bangladesh, 2016)
- Secondary (Bangladesh, 2016)

- Further education.

### *2g Health*

Housing requires access to a healthy environment (Tajikistan, 1997)—including health services and disease prevention (Ethiopia, 2016). The following aspects are mentioned specifically:

- Health care (Bhutan, 2020; Ethiopia, 2016; Malaysia, 2021; The Republic of Uganda, 2016)
- Hospitals (Iraq, 2010; Malaysia, 2021; Maldives, 2008)
- On the opposite side of the spectrum, care should also be taken where housing should not be located; for example in proximity to landfills, offensive trades, noxious industries or other areas with possible adverse health risks (Republic of South Africa, 2009).

### *2h Social, community and religious*

The second most important housing characteristic of a neighbourhood is said to be social aspects like proximity to family and kinship (Iraq, 2010; The Republic of Uganda, 2016), as well as familiarity with the neighbourhood (Iraq, 2010) and access to recreation (Samoa, 2006).

The following aspects are specifically listed:

- Playground (Bangladesh, 2016; Bhutan, 2020; Ethiopia, 2016; Finland, 2005)
- Religious building (Bangladesh, 2016; Maldives, 2008; Nepal, 2018)
- Recreation facilities (Bangladesh, 2016; Ethiopia, 2016; Finland, 2005; Iraq, 2010; Malaysia, 2021; Maldives, 2008; Republic of the Marshall Islands, 2016; Samoa, 2006; The Republic of Uganda, 2016)
- Social facilities (Malaysia, 2021; Maldives, 2008; Nepal, 2018)
- Sport facilities (Bangladesh, 2016; Malaysia, 2021; Republic of the Marshall Islands, 2016).

### *3. Physical accessibility*

Access to housing should not discriminate based on any disabilities (Australia, 2010; The Republic of Uganda, 2016; Zambia, 2020). Structures of buildings should be accommodating

to people with physical or mental challenges and disabilities or limited capacity to function (Bhutan, 2020; Finland, 2005; Samoa, 2006). Specifics mentioned include:

- Vertical accessibility—provision of lifts/elevators and/or chair lifts (Finland, 2005; Kingdom of Bahrain, 2010; United States of America, 1994)
- Horizontal accessibility—continuous path of travel with minimal slope (Samoa, 2006)
- Horizontal accessibility—circulation wide enough for wheelchairs, walking frames, strollers or prams and other mobility aids (Finland, 2005; Samoa, 2006; United States of America, 1994)
- Handrails (Alberta - Canada, 2012; Finland, 2005; New Zealand, 2013; United States of America, 1994)
- Designated spaces—parking (Finland, 2005)
- Guide dog-friendly (Taiwan, 2017).

#### 4. *Affordable*

Affordability means that the costs should not threaten or compromise the ability of a household to enjoy other human rights (Zambia, 2020) or cause hardship (Australia, 2010). They should not threaten basic needs and amount to a reasonable proportion of expected income for the household. (The Republic of Uganda, 2016). They should also permit a family to have sufficient income to rent at current rental market (Trinidad and Tobago, 2016).

Threats to affordability are noted as:

- Increases in land price, rent and cost of materials (Bangladesh, 2016; Bhutan, 2020; Poland, 2016)
- Shortage of land (Iraq, 2010; Maldives, 2008)
- Limitations of financing available (Bangladesh, 2016; Bhutan, 2020; Iraq, 2010; Kingdom of Lesotho, 2018; Maldives, 2008).

Access to housing should be increased especially to the poor, low income and low-middle income side of society (Australia, 2010; The Republic of Uganda, 2016), slums and informal settlements (The Republic of Uganda, 2016) as well as vulnerable households threatened by social exclusion (Poland, 2016), as they cannot purchase or rent based on usual commercial terms (Poland, 2016).

Some ways in which the government or authorities in the area get involved by assisting certain portions of the population are through:

- Education (Bangladesh, 2016; Ghana, 2015)
- Subsidies and similar, including loans (Bangladesh, 2016; Belarus, 2012; Ethiopia, 2016; Iceland, 1998; Iraq, 2010; Kazakhstan, 1997; Maldives, 2008; Taiwan, 2017)
- Lowered transfer costs (Bangladesh, 2016)
- Lowered tax-rates (Ethiopia, 2016)
- Provision of land (Croatia, 2001; Iraq, 2010)
- Provision of state/social/welfare housing (Bhutan, 2020)
- Savings accounts (Ethiopia, 2016)
- Cost-reducing construction methods and alternative developments (Kuwait, 1993; Zambia, 2020).

Discussions regarding absolute values for affordability include:

- KWD 100 = approximately USD 500 is the amount provided until welfare is obtained (Kuwait, 1993)
- In Lesotho it had been estimated to cost upwards of 27 000 USD to construct a house, yet 70% of households earn less than M1000 per month, equating to an affordability of only 4 400 USD per dwelling (Kingdom of Lesotho, 2018)
- Rental amounts differ from 0.3 USD/m<sup>2</sup> in welfare housing to 3.4–4.5 USD/m<sup>2</sup> for commercial rental in large towns (Poland, 2016)
- Purchase price is between 670 USD/m<sup>2</sup> and 900 USD/m<sup>2</sup> (Poland, 2016)
- Construction cost is between 850 USD/m<sup>2</sup> and 940 USD/m<sup>2</sup> (Poland, 2016)
- Build or purchase price should not exceed 36 800 USD (Trinidad and Tobago, 2016).

A relative value for affordability is counted as:

- Less than 20–25% of household income (Australia, 2010)
- Less than 30% of household income (Bhutan, 2020; Ghana, 2015; St Lucia, 2008; Zambia, 2020)
- Income to be two-and-a-half to three times monthly rent, thus 33–40% of household income (Kingdom of Lesotho, 2018)

### 5. *Tenure security / Structure permanence*

Tenants should be secure in their housing (Australia, 2010; Iceland, 1998; Republic of South Africa, 2009; St Lucia, 2008; The Republic of Uganda, 2016). This is subject to:

- Nothing—inviolable; nobody can be evicted or limited in their right of use (Azerbaijan, 2009; Maldives, 2008; Russia, 2021; Tajikistan, 1997; Ukraine, 1983)
- Mostly nothing—cannot be evicted arbitrarily or without legal recourse (Ghana, 2015; The Republic of Uganda, 2016)
- Tenancy agreement specifications—timeline, and cancelling stipulations (Australia, 2010)
- Evictions in necessity of national defence, socio-economic development, public interest, emergency or disaster response with compensation and relocation (Vietnam, 2014)
- Anyone can be evicted—subsequent to consultations, accompanied by resettlement or compensation (Nepal, 2018)
- Exceptions to the rule—the housing being deemed unfit for human habitation can lead to valid evictions (Guyana, 1998; Vietnam, 2014).

### 6. *Protection from crime*

Physical safety for persons and households should be provided from criminal endangerment (Ghana, 2015; Russia, 2021). Crime prevention or suppression and detention of criminals are some of the exceptions to Russia (2021) rule of inviolability. Window and door—especially external—should be capable of locking (Alberta - Canada, 2012; United States of America, 1994).

### 7. *Physical safety*

Given that it is a safety hazard to the condition of life to be without housing (Nepal, 2018), safety should be a priority in the house's design and construction (Bhutan, 2020; Kazakhstan, 1997; Nepal, 2018; Poland, 2016; Samoa, 2006; St Lucia, 2008; The Republic of Uganda, 2016). Safety regulations and standards should be enforced (Bhutan, 2020; Maldives, 2008; Vietnam, 2014).

Specifics mentioned include:

- Safety at heights: windows or openings higher than 1 400 mm from the external ground level should have restrictors to prevent falling (Ireland, 2019); however, these safety mechanisms should not compromise safety of emergency egress (Alberta - Canada, 2012).
- The structure should be sound and acceptable for the type of soil and weather (Alberta - Canada, 2012; Belarus, 2012; Ireland, 2019; Kazakhstan, 1997; Kuwait, 1993; Republic of South Africa, 2009; Taiwan, 2017; Zimbabwe, 1972). This would include:
  - Foundations (Republic of South Africa, 2009)
  - Roofs (Republic of South Africa, 2009).

#### 8. *Quality building materials*

Building materials and workmanship should ideally adhere to the relevant standards or codes of practice (Kingdom of Bahrain, 2010)—for example the British or American Society for Testing and Materials (ASTM) Standards or Codes of Practices (Kingdom of Bahrain, 2010), International Organisation of Standardisation (ISO) (Ethiopia, 2016), South African Bureau of Standards (SABS) (Republic of South Africa, 2009), or local standards (Kingdom of Lesotho, 2018). The following aspects are specifically mentioned with regards to the quality of materials:

- Building materials should be weatherproof—able to withstand adverse weather events like floods, cyclones etc. (Bangladesh, 2016; New Zealand, 2013; Republic of South Africa, 2009; United States of America, 1994)
- Building materials should be durable (Bangladesh, 2016; New Zealand, 2013; United States of America, 1994)
- Building materials should be cost-saving where possible (Bangladesh, 2016; Bhutan, 2020; Kingdom of Lesotho, 2018; St Lucia, 2008; The Republic of Uganda, 2016; United States of America, 1994)
- Building materials should be locally available and/or produced if and where possible (Bangladesh, 2016; Bhutan, 2020; Ethiopia, 2016; Iraq, 2010; Kingdom of Lesotho, 2018; St Lucia, 2008; The Republic of Uganda, 2016)
- Building materials should be environmentally friendly and not degrading to local environment—for example uncontrolled tree cutting (Bangladesh, 2016; Iraq, 2010; Kingdom of Lesotho, 2018)



- Building materials should aid passive design through (New Zealand, 2021; Republic of South Africa, 2009; The Republic of Uganda, 2016):
  - Heat reflective properties (Republic of South Africa, 2009)
  - Thermal mass storage properties (Republic of South Africa, 2009)
  - Heat conduction properties (Republic of South Africa, 2009)
- Damaged building materials, or dated materials that may have adverse effects, like asbestos or pumice or Volatile Organic Compound (VOC)-emitting, should be replaced (Alberta - Canada, 2012; Republic of South Africa, 2009; St Lucia, 2008).

#### 9. *Weatherproof / Protection from the damp*

The building should be weatherproof, i.e. able to resist penetration of water into any part of the building (Bangladesh, 2016; Kingdom of Bahrain, 2010; New Zealand, 2013; Republic of South Africa, 2009; United States of America, 1994; Zimbabwe, 1972), as well as able to withstand local wind loads (Republic of South Africa, 2009)—specifically the:

- Roof (Alberta - Canada, 2012; Ireland, 2019; Kingdom of Lesotho, 2018; Republic of South Africa, 2009)
- External cladding or walls (Alberta - Canada, 2012; Ireland, 2019; Kingdom of Lesotho, 2018; Republic of South Africa, 2009; St Lucia, 2008)
- Internal walls—especially areas of high moisture such as bathrooms, showers, etc. (Alberta - Canada, 2012; Ireland, 2019; New Zealand, 2013; Republic of South Africa, 2009)
- Floor—subfloor free of damp (Alberta - Canada, 2012; Ireland, 2019; New Zealand, 2013; Republic of South Africa, 2009)
- Windows and external doors—in cold regions this includes the applicable double glazing or inclusion of storm sashes (Alberta - Canada, 2012; Ireland, 2019; Republic of South Africa, 2009)
- Joints between horizontal and vertical elements—these should be watertight, and fascia and skirtings to be provided (Alberta - Canada, 2012; Ireland, 2019; Republic of the Marshall Islands, 2016)
- Appropriate insulation—minimum 120 mm undamaged ceiling insulation, or R-value of 2.9–3.3; wall insulation—particularly through cavity walls (Ireland, 2019; New Zealand, 2021; Poland, 2016; Republic of South Africa, 2009).

#### 10. *Protection from fire / Fireproof*

Housing should be appropriately fire-resistant (Bangladesh, 2016; Republic of South Africa, 2009; Tajikistan, 1997; United States of America, 1994) and have correct fire-prevention and emergency measures in place (Kazakhstan, 1997; Malaysia, 2021; Vietnam, 2014) the details of which specifies the following:

- The following elements should have fire-resistant properties:
  - Walls (Republic of South Africa, 2009)
  - Roof (Republic of South Africa, 2009)
  - External doors (Republic of South Africa, 2009)
- A smoke detector with audible alarm device should be in each house, particularly in sleeping areas and hallways serving such sleeping areas (Alberta - Canada, 2012; Ireland, 2019)
- Fire extinguishers or extinguishing blankets should be available in the house (Bangladesh, 2016; Ireland, 2019)
- Emergency egress from all bedrooms or emergency evacuation plan should be provided for (Alberta - Canada, 2012; Ireland, 2019; Zimbabwe, 1972).

#### 11. *Protection from pests*

Living premises should be kept hygienic (Belarus, 2012). This includes being free from pests such as:

- Termite and other insect infestations (Alberta - Canada, 2012; Zimbabwe, 1972)
- Flying insects—including mosquitos and flies (Alberta - Canada, 2012; Republic of the Marshall Islands, 2016; Zimbabwe, 1972)
- Vermin infestations, including rats (Alberta - Canada, 2012; Ireland, 2019).

It also includes being free from:

- Bacteria, or easy cleaning through proper interior finishes in kitchens and bathrooms (Alberta - Canada, 2012; Republic of South Africa, 2009)
- Noise or vibration (Republic of the Marshall Islands, 2016).

## 12. *Acceptable layout*

Recommendations are one bed for every two members of a family (St Lucia, 2006). Rooms required are:

- Living room (Belarus, 2012; Moldova, 2021; New Zealand, 2013; Republic of South Africa, 2009)
- Sleeping space (Alberta - Canada, 2012; Finland, 2005; Moldova, 2021; New Zealand, 2013; United Kingdom, 2015)—this might be bedrooms, or a designated space such as in a studio type of layout (Ethiopia, 2016), minimum 2 bedrooms (Republic of South Africa, 2009)
- Kitchen or cooking area inside the premises, including storage, food preparation and refrigeration (Alberta - Canada, 2012; Belarus, 2012; Ethiopia, 2016; Finland, 2005; New Zealand, 2013; Republic of South Africa, 2009)
- Bathroom and sanitary facilities (Alberta - Canada, 2012; Belarus, 2012; Ethiopia, 2016; Finland, 2005; Moldova, 2021; New Zealand, 2013; Republic of South Africa, 2009)
- Utility rooms (including corridors, storage rooms, wardrobes, washing rooms etc.) (Belarus, 2012; New Zealand, 2013)
- Storage facilities for bicycles and prams (Finland, 2005).

## 13. *Size*

Overcrowding is a problem adding extra pressure to housing amenities and facilities (Bangladesh, 2016; Jamaica, 1973), and should, therefore, be avoided as far as possible. Anyone above the age of 10 years old counts as one (1) adult, and those below 10 but older than one year count as one half ( $\frac{1}{2}$ ) of an adult (Alberta - Canada, 2012).

Overcrowding is seen as:

- Two unmarried persons of the opposite sex, ten (10) years or older in one bedroom (New Zealand, 2013; Zimbabwe, 1972)
- Too many people to allow for minimum size provisions (Alberta - Canada, 2012; New Zealand, 2013; Zambia, 2020; Zimbabwe, 1972)
- Less than one room per household (Poland, 2016)
- Less than one room per couple (Poland, 2016)

- Less than one room per adult 18 years and older (Poland, 2016)
- Less than one room per two (2) people of the same sex aged 12–17; if different sexes, one room per person aged 12–17 years old (Poland, 2016)
- Less than one room per two (2) people aged less than 12 (Poland, 2016)
- More than two (2) people per room (St Lucia, 2008; The Republic of Uganda, 2016).

A large family is seen as a family with four (4) or more minor children, or children younger than 23 years old studying at higher education (Kazakhstan, 1997).

Minimum requirements are listed as:

- Land size
  - Minimum 400  $m^2$  of land or plot size
  - 500  $m^2$ –1 000  $m^2$  minimum depending on land type, and urban area—most likely multi-level housing buildings (Taiwan, 2017)
- House size:
  - Minimum of 20  $m^2$  net floor area (Finland, 2005)
  - Minimum 35  $m^2$  for one person, and 10  $m^2$  for each additional person (Croatia, 2001)
  - Existing dwelling sizes of 140  $m^2$ –215  $m^2$  noted to not be sustainable in terms of costs (Iraq, 2010)
  - Average surface area of 26.7  $m^2$  per flat per person (Poland, 2016)
  - Minimum 40  $m^2$  per house (Republic of South Africa, 2009)
  - Minimum 40  $m^2$  per one bedroom, single storey dwelling if intended for one (1) person, or 50  $m^2$  if shared by 2 (two) people (United Kingdom, 2015) as shown in detail in Table 5.
  - Average area is not necessarily a standard of adequacy, but can be used to test the validity of a benchmark (Poland, 2016).

**Table 5: UK space requirement calculation table**

Number of bedrooms	Number of bed spaces (persons)	1 storey dwellings $m^2$	2 storey dwellings $m^2$	3 storey dwellings $m^2$
1b	1p	39		
	2p	50	58	
2b	3p	61	70	
	4p	70	79	
3b	4p	74	84	90
	5p	86	93	99
	6p	95	102	108
4b	5p	90	97	103
	6p	99	106	112
	7p	108	115	121
	8p	117	124	130
5b	6p	103	110	116
	7p	112	119	125
	8p	121	128	134
6b	7p	116	123	129
	8p	125	132	138

- Habitable space:
  - Minimum of  $9.5 m^2$  of floor space in a habitable room that is not a bedroom for each adult in a house and  $21.4 m^3$  air space (Alberta - Canada, 2012)
  - Minimum room size of  $7 m^2$  (Finland, 2005)
  - Minimum habitable room size of  $6.5 m^2$  (Ireland, 2019)
  - Minimum  $11 m^2$  for one (1) person, and  $14 m^2$  for two (2) people (New Zealand, 2013)
  - Average habitable room size or  $7.5 m^2$  (The Republic of Uganda, 2016)
- Sleeping space:
  - Own sleeping area of minimum 198 cm x 80 cm (Republic of the Marshall Islands, 2016)

- Minimum of  $3 m^2$  of total floor area in a bedroom for each adult in a house or  $4.6 m^2$  per adult in a dormitory setting (Alberta - Canada, 2012)
- Room floor area of minimum  $7 m^2$ – $7.5 m^2$  for a room shared by two (2) people,  $11.5 m^2$  if shared by three (3) and  $14.5 m^2$  if shared by four (4) (Republic of the Marshall Islands, 2016)
- Minimum of  $3 m^2$  of total floor area in a bedroom for each adult in a house or  $4.6 m^2$  per adult in a dormitory setting (Alberta - Canada, 2012)
- Minimum width of 1.8 m, and minimum  $6 m^2$  per person,  $10 m^2$  for a room shared by two (2) people,  $14 m^2$  if shared by three (3),  $20 m^2$  if shared by four (4) people or  $4.5 m^2$  per intended child for a person of less than ten (10) years old (New Zealand, 2013)
- Minimum floor area of minimum  $7.5 m^2$  per person, and  $11.5 m^2$  for a room shared by two (2) people (United Kingdom, 2015)
- Minimum width of 2.15 m for a single bedroom, 2.75 m for a double bedroom, and 2.55 m for subsequent double bedrooms (United Kingdom, 2015)
- Minimum  $3.6 m^2$  per person, or  $1.8 m^2$  per person of less than twelve (12) years old (Zimbabwe, 1972)
- Air space:
  - Minimum of  $5.6 m^3$  of air space in a bedroom for each adult in a house or  $8.5 m^3$  per adult in a dormitory setting (Alberta - Canada, 2012)
  - Minimum height of 2 400 mm–2 500 mm, but no less than 2 200 mm even at a slope (Finland, 2005) for single storey dwellings, and 3 000 mm for multi-storey dwellings (Finland, 2005)
  - Minimum headroom of 2 030 mm (Republic of the Marshall Islands, 2016)
  - Minimum height of 2 100 mm for an existing house, 2 400 mm for a new house and minimum of 1 500 mm even if sloped (New Zealand, 2013)
  - Minimum height of 2 300 mm for 75% of the internal area of the house (United Kingdom, 2015). Height lower than 1 500 mm, but exceeding 900 mm can only be used for storage (United Kingdom, 2015).
  - Minimum of  $8.5 m^3$  air space per person, or  $4.5 m^3$  per person younger than twelve (12) years old (Zimbabwe, 1972)
- Food preparation facilities/kitchen:

- One space for up to eight (8) people (Alberta - Canada, 2012)
- Minimum width of 1.5 m, and minimum area of 4 m<sup>2</sup>, reduced to 3 m<sup>2</sup> if intended for two (2) people or less (New Zealand, 2013).

#### 14. *Intended for residential use/habitation*

Only buildings suitable for occupation should be used as housing (Bangladesh, 2016; Guyana, 1998), whether permanent or temporary and whether partially or fully intended for residential use (Nepal, 2018). If a building was originally built for another purpose, officially it needs to be converted or approved for residential use (Malaysia, 2021). Different buildings intended for residential use or habitation are:

- Apartment/flat—full units on top of one another in multi-storey or high rise buildings (Azerbaijan, 2009; Belarus, 2012; Ethiopia, 2016; Finland, 2005; Iraq, 2010; Jamaica, 1973; Kazakhstan, 1997; Moldova, 2021; Russia, 2021; Tajikistan, 1997; Trinidad and Tobago, 2016; Ukraine, 1983; Vietnam, 2014)
- Barracks (Jamaica, 1973)
- Boarding house (New Zealand, 2013)
- Domestic auxiliary room (Azerbaijan, 2009; Belarus, 2012)
- Hostels/hall of residence/dormitory room/boarding house (Belarus, 2012; Kazakhstan, 1997; Moldova, 2021; Ukraine, 1983)
- Hotels (Azerbaijan, 2009; Moldova, 2021)
- House—for a single family, whether detached, semi-detached or terraced (Azerbaijan, 2009; Ethiopia, 2016; Finland, 2005; Iraq, 2010; Jamaica, 1973; Malta, 1949; Moldova, 2021; Russia, 2021; The Republic of Uganda, 2016; Trinidad and Tobago, 2016; Vietnam, 2014)
- Multi-unit building—two (2) or more units that share common access (Ireland, 2019)
- Outhouse or outbuilding (Jamaica, 1973; Zimbabwe, 1972)
- Room (Azerbaijan, 2009; Russia, 2021)
- Shelter (Moldova, 2021)
- Tent (Zimbabwe, 1972).

If any of the above units are not explicitly intended for residential purposes/sleeping, they will not be deemed as a dwelling unit (Zimbabwe, 1972).

### 15. *Lighting*

Proper lighting should be supplied (Finland, 2005; Republic of South Africa, 2009; Republic of the Marshall Islands, 2016; Zimbabwe, 1972)—minimum 30 lux at floor or stair level (Alberta - Canada, 2012). In habitable rooms, adequate natural lighting is required (Ireland, 2019; Republic of the Marshall Islands, 2016). In areas with insufficient natural light (including halls, stairways, landings etc.), adequate artificial lighting is required (Ireland, 2019; New Zealand, 2013; Republic of the Marshall Islands, 2016).

### 16. *Ventilation*

Proper and acceptable ventilation should be provided (Ireland, 2019; Republic of South Africa, 2009; Zimbabwe, 1972):

- Fumes or other combustion products should be removed from a heat-producing appliance to the external air—for example, by flue pipe, chimney or extractor fan that ventilates to the outdoors (Ireland, 2019; New Zealand, 2021)
- Where necessary, carbon monoxide alarms should be installed (Ireland, 2019; Republic of South Africa, 2009)
- Living rooms, dining rooms and kitchens should have windows to the exterior:
  - Minimum one openable window per room that can be fixed to remain open (New Zealand, 2021)
  - Minimum 5% of floor area openable (New Zealand, 2021)
- Sleeping rooms or habitable rooms should have windows to the exterior:
  - Minimum of  $0.1 \text{ m}^2$  (Republic of South Africa, 2009) or  $0.28 \text{ m}^2$  (Alberta - Canada, 2012)
  - Minimum  $1/10^{\text{th}}$  of net room area (Finland, 2005; New Zealand, 2013; Zimbabwe, 1972) or 5% of floor area (Republic of South Africa, 2009) to comprise windows or similar elements that allow penetration of natural light
  - Minimum  $1/20^{\text{th}}$  (New Zealand, 2021; Zimbabwe, 1972) or 5% of room area to have windows that are openable
  - Mechanical forms of ventilation (Alberta - Canada, 2012)
- Draught closers should be installed for unintentional gaps and holes greater than 3 mm to prevent heat loss (New Zealand, 2021)



- Artificial or mechanical ventilation for rooms with a flush toilet and/or bathtub or shower (Alberta - Canada, 2012; New Zealand, 2013; Republic of South Africa, 2009).

### 17. *Indoor temperature*

Depending on the environment, proper heating or cooling is required to keep a home at an acceptable temperature (Alberta - Canada, 2012; Ireland, 2019; New Zealand, 2021; Republic of the Marshall Islands, 2016) which is further defined as below:

- Homes should have capacity to heat and maintain the main living areas to 18 °C (New Zealand, 2021) or 22 °C—although anything above 16 °C may be permitted depending on the region (Alberta - Canada, 2012)
- All habitable rooms, including bathroom or shower room to also adhere to the acceptable temperature requirements (Ireland, 2019)
- The achievement of temperature requirements in the home should not rely on cooking or portable appliances (Alberta - Canada, 2012; Ireland, 2019), and can be achieved by using:
  - An electric heater, with a thermostat and heating capacity of more than 1.5 kW and less than 2.4 kW (Ireland, 2019; New Zealand, 2021)
  - Heat pumps (Ireland, 2019; New Zealand, 2021)
  - Wood and pellet burners (New Zealand, 2021)
  - Flued gas heating (Ireland, 2019; New Zealand, 2021)
  - Adequate passive design (New Zealand, 2021). For example: orientation of the windows should be appropriate to maximise heating and sunlight in winter, with possible use of shading or deciduous trees for protection in summer (Republic of South Africa, 2009).

### 18. *Energy (for electricity)*

Households should have access to domestic energy supply (Alberta - Canada, 2012; Croatia, 2001; Iraq, 2010; Kazakhstan, 1997; Kingdom of Lesotho, 2018; Malaysia, 2021; Maldives, 2008; Nepal, 2018; Republic of South Africa, 2009; The Republic of Uganda, 2016; Vietnam, 2014). Such electricity provision should be continuous and uninterrupted in nature (Alberta - Canada, 2012; Iraq, 2010). Electrical installations to consist of:

- Electrical boxes including (Ireland, 2019; Republic of South Africa, 2009):
  - Means of isolation (Kingdom of Bahrain, 2010)

- Earth leakage protection (Kingdom of Bahrain, 2010)
- Circuit breakers (Kingdom of Bahrain, 2010)
- Fuses (Kingdom of Bahrain, 2010)
- Distribution including:
  - Pipework (Ireland, 2019)
  - Cables and wires (Kingdom of Bahrain, 2010; Malaysia, 2021)
- Outlets:
  - Plugs and sockets (Alberta - Canada, 2012; Kingdom of Bahrain, 2010)
  - Wall switches (Alberta - Canada, 2012; Kingdom of Bahrain, 2010)
- Fixtures:
  - Lighting (Alberta - Canada, 2012; Kingdom of Bahrain, 2010)
  - Fans (Kingdom of Bahrain, 2010)
- Electrical storage facilities (Ireland, 2019)
- Lightning protection (Kingdom of Bahrain, 2010).

Services to be provided to the consumer include gas supply (Kazakhstan, 1997; Poland, 2016; Vietnam, 2014), as well as the safety operation thereof (Kazakhstan, 1997).

## 19. Sanitation

Access to adequate sanitation (Iraq, 2010; Kazakhstan, 1997; Kingdom of Lesotho, 2018; Republic of South Africa, 2009; The Republic of Uganda, 2016) should include:

- Sewage removal (Alberta - Canada, 2012; Bangladesh, 2016; Croatia, 2001; Kazakhstan, 1997; Kingdom of Bahrain, 2010; Maldives, 2008)—whether by waste disposal facilities, pump-out sewage holding tanks, septic tanks (Alberta - Canada, 2012; Samoa, 2006; St Lucia, 2006) or acceptable non-sewered sanitation systems (Iraq, 2010; New Zealand, 2013; Republic of South Africa, 2009; Samoa, 2006; St Lucia, 2008).

The following sanitary fittings are mentioned:

- Access to a toilet (Alberta - Canada, 2012; Finland, 2005; New Zealand, 2013; Republic of South Africa, 2009; Republic of the Marshall Islands, 2016; United States of America, 1994). Most instances require this to be a flush toilet (Alberta - Canada, 2012; Finland,

2005) with proper ventilation system (Kingdom of Bahrain, 2010; New Zealand, 2013; Republic of South Africa, 2009)

- Wash basin (Alberta - Canada, 2012; Republic of South Africa, 2009; Republic of the Marshall Islands, 2016; United States of America, 1994)
- Bath tub (Alberta - Canada, 2012; New Zealand, 2013; Republic of the Marshall Islands, 2016; United States of America, 1994) or shower (Alberta - Canada, 2012; New Zealand, 2013; Republic of South Africa, 2009; Republic of the Marshall Islands, 2016; United States of America, 1994) with cold and hot water (Alberta - Canada, 2012; Ireland, 2019; Marshall, 1969; New Zealand, 2013; Republic of the Marshall Islands, 2016)
- Kitchen unit (Kingdom of Bahrain, 2010; Republic of South Africa, 2009)
- Water pumps if required (Kingdom of Bahrain, 2010).

The minimum number of water closets or toilets are calculated as per Table 6 (New Zealand, 2013)

**Table 6: New Zealand toilets or water closet calculation**

Number of persons	Number of toilets or water closets
<6	1
<14	2
<24	3
<36	4
<48	5
<60	6
>60	1/10 persons

The recommendation is one set of sanitary fittings per six (6) persons (Republic of the Marshall Islands, 2016) to eight (8) persons (Alberta - Canada, 2012; Zimbabwe, 1972) to twelve (12) occupants where there is a water closet system (Zimbabwe, 1972).

## 20. *Surface drainage / storm water*

Sufficient drainage should be provided (Republic of South Africa, 2009; Republic of the Marshall Islands, 2016) to remove storm, surface and ground water (New Zealand, 2013; Republic of South Africa, 2009).

- This includes provision of gutters, downpipes and drains (Ireland, 2019; New Zealand, 2013). Gutters should be:
  - Sufficiently sized to deal with usual rainfall (New Zealand, 2021)
  - Intact, unbroken and properly fixed (New Zealand, 2021)
  - Unobstructed and unblocked (New Zealand, 2021)
- Surface drainage system to:
  - Be easily maintained with no hidden path such as open and lined (Republic of South Africa, 2009; Samoa, 2006)
  - Have removable silt traps to minimise debris accumulation (Samoa, 2006)
  - Overflow to a major drainage system (Samoa, 2006)
  - Be far from sanitation system (Samoa, 2006).

## 21. *Water supply*

The house is required to ensure supply of water (Alberta - Canada, 2012; Croatia, 2001; Iraq, 2010; Kazakhstan, 1997; Kingdom of Lesotho, 2018; Malaysia, 2021; Maldives, 2008; Nepal, 2018; New Zealand, 2013; Poland, 2016; Republic of South Africa, 2009; St Lucia, 2008; The Republic of Uganda, 2016; United States of America, 1994; Vietnam, 2014; Zimbabwe, 1972) including pipes, valves and fittings (Kingdom of Bahrain, 2010) to provide:

- Adequate volume—uninterrupted or continuous supply (Alberta - Canada, 2012; Ghana, 2015; Iraq, 2010; Ireland, 2019; New Zealand, 2013)
- Adequate water pressure—use of pumps if required (Alberta - Canada, 2012; Kingdom of Bahrain, 2010; Republic of South Africa, 2009)
- Adequate temperature—hot and cold water (Alberta - Canada, 2012; Ireland, 2019; New Zealand, 2013; Republic of South Africa, 2009)
  - Hot water should be maintained between 46 °C and 60 °C
- Adequate quality—drinking/potable water (Alberta - Canada, 2012; Bangladesh, 2016; Ghana, 2015; Malaysia, 2021; Maldives, 2008; New Zealand, 2013; Republic of South Africa, 2009; Republic of the Marshall Islands, 2016)

- Water-saving (Iraq, 2010; Republic of South Africa, 2009).

Personal washing facilities should also be included (Alberta - Canada, 2012; Finland, 2005; Republic of the Marshall Islands, 2016; Zimbabwe, 1972).

## 22. *Waste removal*

Handling of solid (Ethiopia, 2016; Iraq, 2010) and liquid waste (Iraq, 2010) should include:

- Waste management (Ethiopia, 2016; Iraq, 2010; The Republic of Uganda, 2016)
  - Adequate waste collection (Malaysia, 2021; Vietnam, 2014)
  - Adequate storage (Alberta - Canada, 2012; Ireland, 2019)
  - Sustainable and environmentally friendly (Iraq, 2010)
- Waste final disposal (Alberta - Canada, 2012; Ethiopia, 2016; Kazakhstan, 1997; Kingdom of Lesotho, 2018; Samoa, 2006)
  - Engineered and designed landfill (Ghana, 2015)
  - Proper final disposal location (Samoa, 2006)
  - Proper chemical and hazardous substance disposal (Samoa, 2006).

## 23. *Environmental considerations*

Environmental and natural circumstances should be taken into account (Finland, 2005).

Sustainable housing through environmental considerations (Iraq, 2010; Maldives, 2008; Samoa, 2006; The Republic of Uganda, 2016; Vietnam, 2014; Zambia, 2020) include:

- Energy efficiency (Bangladesh, 2016; Bhutan, 2020; Iraq, 2010; Kazakhstan, 1997; Maldives, 2008; Poland, 2016; Republic of South Africa, 2009; The Republic of Uganda, 2016; Vietnam, 2014). Energy products comprise such a large expenditure (12% of household expenses) that improvements in energy parameters should be considered.
  - Energy-saving construction materials (Bangladesh, 2016; Republic of South Africa, 2009; The Republic of Uganda, 2016)
- Passive design for enhanced environmental performance including lower energy requirements (Republic of South Africa, 2009; The Republic of Uganda, 2016)

- Alternative energy from renewable sources for lighting, heating, cooling and cooking (Bangladesh, 2016; Kingdom of Lesotho, 2018; The Republic of Uganda, 2016) such as:
  - Installation of solar panels (Bangladesh, 2016)
- Water saving technologies—like:
  - Low flow rate sanitary fittings and dual flush cisterns (Republic of South Africa, 2009)
  - Methods of rain water conservation or reuse where possible (Bangladesh, 2016; Ghana, 2015)
  - Secondary water or greywater harvesting—reuse of household wastewater (Ghana, 2015; Republic of South Africa, 2009; The Republic of Uganda, 2016)
  - Fittings or by design—i.e. no dead legs or short dead legs in the pipework (Republic of South Africa, 2009)
- Environmental preservation and area conservation (Bangladesh, 2016; Bhutan, 2020; Ethiopia, 2016; Ghana, 2015; The Republic of Uganda, 2016; Vietnam, 2014), including avoidance of critical areas, local ecosystems, flood zones, wetlands, etc. (Bangladesh, 2016; Bhutan, 2020; Ghana, 2015)
- Environmentally friendly products (Bangladesh, 2016; Bhutan, 2020; Ethiopia, 2016; Iraq, 2010; Kingdom of Lesotho, 2018; Republic of South Africa, 2009; The Republic of Uganda, 2016) such as:
  - Those that cause no environmental harm (Ethiopia, 2016)
  - Green certified products (Poland, 2016)
  - Ones upcycled from waste materials (Bangladesh, 2016)
  - Local natural products (Ghana, 2015; Iraq, 2010; Kingdom of Lesotho, 2018; The Republic of Uganda, 2016; Zambia, 2020).

#### 24. *Social / family considerations*

Socially sustainable communities can be achieved by being supportive of wider social needs (Australia, 2010; Maldives, 2008; Samoa, 2006):

- Social development (Bangladesh, 2016; St Lucia, 2008)
- Cultural (Bangladesh, 2016; St Lucia, 2008; The Republic of Uganda, 2016)
- Economic prosperity and opportunities (Ghana, 2015)

- Gender (Ghana, 2015; Zambia, 2020)
- Youth and aged (Ghana, 2015)
- Unemployed (Ghana, 2015)
- Historic or heritage preservation (Iraq, 2010; St Lucia, 2008).

## 25. *Lifecycle maintenance*

The lifecycle of a house includes maintenance (Ghana, 2015), repairs, enhancement etc. during and after use for a period of time (Bangladesh, 2016). Poor condition is a safety risk. The minimum service life on housing construction should be 25 years (Kingdom of Bahrain, 2010). Reconstruction and repairs to existing buildings play a big role in providing sufficient housing stock as required (Bangladesh, 2016; Iraq, 2010; Maldives, 2008; The Republic of Uganda, 2016).

Housing should be:

- Fully completed/finished buildings (Belarus, 2012; Croatia, 2001)
- Free of defects (Belarus, 2012):
  - Properly maintained and kept (Alberta - Canada, 2012; Bangladesh, 2016; Ghana, 2015; Ireland, 2019; Kazakhstan, 1997; Kingdom of Lesotho, 2018; Malaysia, 2021; Nepal, 2018; New Zealand, 2013; New Zealand, 2021; The Republic of Uganda, 2016; Vietnam, 2014)
  - Repaired or items replaced where necessary (Alberta - Canada, 2012; Bangladesh, 2016; Guyana, 1998; Ireland, 2019; Kuwait, 1993; Malaysia, 2021; Nepal, 2018; New Zealand, 2013; New Zealand, 2021; The Republic of Uganda, 2016; Vietnam, 2014)
  - Rehabilitated, renovated or reorganised where required (Bangladesh, 2016; Belarus, 2012; Iraq, 2010; The Republic of Uganda, 2016; Vietnam, 2014)
- Reconstructed or redeveloped where applicable (Bangladesh, 2016; Guyana, 1998; Kuwait, 1993; The Republic of Uganda, 2016)
- Enhanced or renovated, if possible (Bangladesh, 2016; Kuwait, 1993).

It should include remaining safe (Alberta - Canada, 2012; Guyana, 1998; Iceland, 1998) in terms of:

- Elements, components, finishes and fittings (Alberta - Canada, 2012; Ireland, 2019; Kazakhstan, 1997; New Zealand, 2013; New Zealand, 2021)
- Structure (Alberta - Canada, 2012; Ireland, 2019; Malaysia, 2021)
- Technical requirements (Belarus, 2012; New Zealand, 2021)
- Health and sanitation (Belarus, 2012; Malaysia, 2021; Maldives, 2008; New Zealand, 2013; New Zealand, 2021; Vietnam, 2014)
- Historic preservation (Iraq, 2010; Vietnam, 2014).

## 26. *Future considerations / technology and innovation*

Information technology should be used efficiently (Bangladesh, 2016) with better methods of construction (Ethiopia, 2016) and building technologies that can:

- Improve housing quality (Ethiopia, 2016; Iraq, 2010; The Republic of Uganda, 2016)
  - Better structural designs (Kuwait, 1993; Republic of South Africa, 2009; The Republic of Uganda, 2016)
  - Better technical practices and safety (Kuwait, 1993; Poland, 2016; Republic of South Africa, 2009)
  - High quality building materials (Ethiopia, 2016; Iraq, 2010; Republic of South Africa, 2009; The Republic of Uganda, 2016)
- Reduce costs (Bangladesh, 2016; Kingdom of Lesotho, 2018; Republic of South Africa, 2009; The Republic of Uganda, 2016; Zambia, 2020)
  - Non-sewered sanitation (Iraq, 2010)
- Reduce environmental impacts (Bangladesh, 2016; Iraq, 2010; Kingdom of Lesotho, 2018; The Republic of Uganda, 2016; Zambia, 2020)
  - Building materials that can be proven to be efficient and sustainable (Iraq, 2010; The Republic of Uganda, 2016)
  - Improve energy efficiency (Iraq, 2010; Poland, 2016; Republic of South Africa, 2009; The Republic of Uganda, 2016)
  - Water-saving technologies (Iraq, 2010; Republic of South Africa, 2009; The Republic of Uganda, 2016)
  - Better waste disposal (Iraq, 2010)
  - Renewable energy sources (Kingdom of Lesotho, 2018)
- Provide better administration (Bangladesh, 2016)



- Housing planning to provide social cohesion and reduce risk of disasters (Bangladesh, 2016)
- Electronic databases for physical, legal, technological and financial housing aspects (Bangladesh, 2016; Iraq, 2010; The Republic of Uganda, 2016; Zambia, 2020)
- Online information distribution to end-users (Bangladesh, 2016)
- Solve local problems or use local resources (Ethiopia, 2016; Iraq, 2010; The Republic of Uganda, 2016; Zambia, 2020)
  - Certification for unconventional building methods or materials (Republic of South Africa, 2009)
- Reduce gap between supply and demand of housing (Iraq, 2010; The Republic of Uganda, 2016).

#### 27. *Cultural / community considerations*

Housing satisfaction greatly determines not only the individual's development and quality of life, but also that of the entire social community and context (Poland, 2016; St Lucia, 2008).

Housing should:

- Be acceptable for a person's cultural identity and norms (Australia, 2010; Iraq, 2010; Nepal, 2018; Republic of South Africa, 2009; Samoa, 2006; St Lucia, 2008; The Republic of Uganda, 2016; Vietnam, 2014)
- Conserve archaeological or architectural aspects of historic or cultural significance (Bangladesh, 2016; Iraq, 2010; Vietnam, 2014)
- Be in line with religious values (Bangladesh, 2016; Iraq, 2010; Nepal, 2018)
- Support local solutions, technologies, businesses and materials (Bangladesh, 2016; Maldives, 2008; Poland, 2016; St Lucia, 2008; The Republic of Uganda, 2016; Zambia, 2020)
- Incorporate the local community (Bangladesh, 2016; Ethiopia, 2016; Ghana, 2015; Iraq, 2010; Maldives, 2008; Poland, 2016; Republic of South Africa, 2009; Samoa, 2006; St Lucia, 2008; Zambia, 2020)
- Be equitably available to all with no discrimination (Australia, 2010; Bangladesh, 2016; Finland, 2005; Ghana, 2015; Nepal, 2018; St Lucia, 2008; Zambia, 2020).

## 5.4 Selective coding / Core categories

For selective coding, the axial codes were reorganised and categorised to the following core categories through aligning them by condition, context, strategy and/or consequence:

### 1. *Accessibility*

All should universally have access to housing (Bangladesh, 2016; Ghana, 2015) as also believed by countries where it is seen as a human right (Zambia, 2020), basic human right (Moldova, 2021; St Lucia, 2008), and fundamental human right (Taiwan, 2017). Accessibility is not only access to housing, but also physical access, accessibility in terms of location to amenities and access through affordability, and access continuity through tenure security.

### 2. *Protection from the elements*

Houses should be for people to be resilient to vulnerabilities or the elements in different forms (Bhutan, 2020; Iraq, 2010; Republic of South Africa, 2009; The Republic of Uganda, 2016), and the condition should be maintained as hygienic (Alberta - Canada, 2012; Belarus, 2012), water-, wind- and weatherproof (Alberta - Canada, 2012; New Zealand, 2013). The elements detailed include crime, physical danger, damp, fire, and pests as well as mentioning the quality of building materials.

### 3. *Internal habitability*

The building should be internally habitable – this includes that the building is intended for habitation, of proficient size, with acceptable internal layout and room composition, and adequacy of lighting, ventilation and internal temperature.

### 4. *Service provision*

Service provision includes access to, continuity of, and details of acceptable provision of energy, sanitation, surface drainage or stormwater, water supply and physical waste removal.

### 5. *Sustainability*

The aim is to have sustainable communities and human settlements (Australia, 2010; Bangladesh, 2016; Iraq, 2010; St Lucia, 2008) including education of end-users, NGO's, and participating organisations (Bangladesh, 2016; Ethiopia, 2016; Ghana, 2015; The Republic of

Uganda, 2016). This includes environmental, social and cultural sustainability as well as lifecycle maintenance, future considerations and technology.

## **5.5 Summary**

The data was analysed through open coding initially. Subsequent axial coding started with establishing universality in the need for adequate housing, then focussed on the definitions of “housing” and “adequacy” which formed the basis for the 27 axial codes – some with further sub-sections of axial coding – of housing adequacy. These 27 codes can also be seen as the elements of adequacy, and were reorganised into five core categories during the selective coding process.

## **6 CHAPTER 6: DATA PRESENTATION**

### **6.1 Introduction**

As per grounded theory, the emerging patterns from the data should be presented (Glaser and Strauss, 1967) in a clear and preferable visual manner (Creswell et al., 2007). The theory should be detailed and dense in nature, rather than concise (Heath and Cowley, 2004). This chapter presents the data in a model format, including the model's capacity for evaluation.

### **6.2 Model presentation**

Based on the axial and selective codes, a visual representation of the model for housing adequacy is presented in Figure 9. Results are compartmentalised in different levels, with Level 1 being housing adequacy, Level 2 being the core categories, and Level 3 and 4 being referred to as elements and sub-elements of housing adequacy.

The aim of the model is to provide an overview and representation of the adequacy of housing; therefore, adequacy cannot be given as a single absolute value, but rather a comparison between different categories, elements and sub-elements in a layered system. The percentage per element enables the reader/interpreter of results to determine their own weighting as they look at a completed evaluation. For example, Physical accessibility (Element 3) could be of higher importance for the physically impaired than for a non-impaired reader, while Physical safety (Element 7) might be of higher importance to a reader in an area with a high crime rate rather than a low crime one.

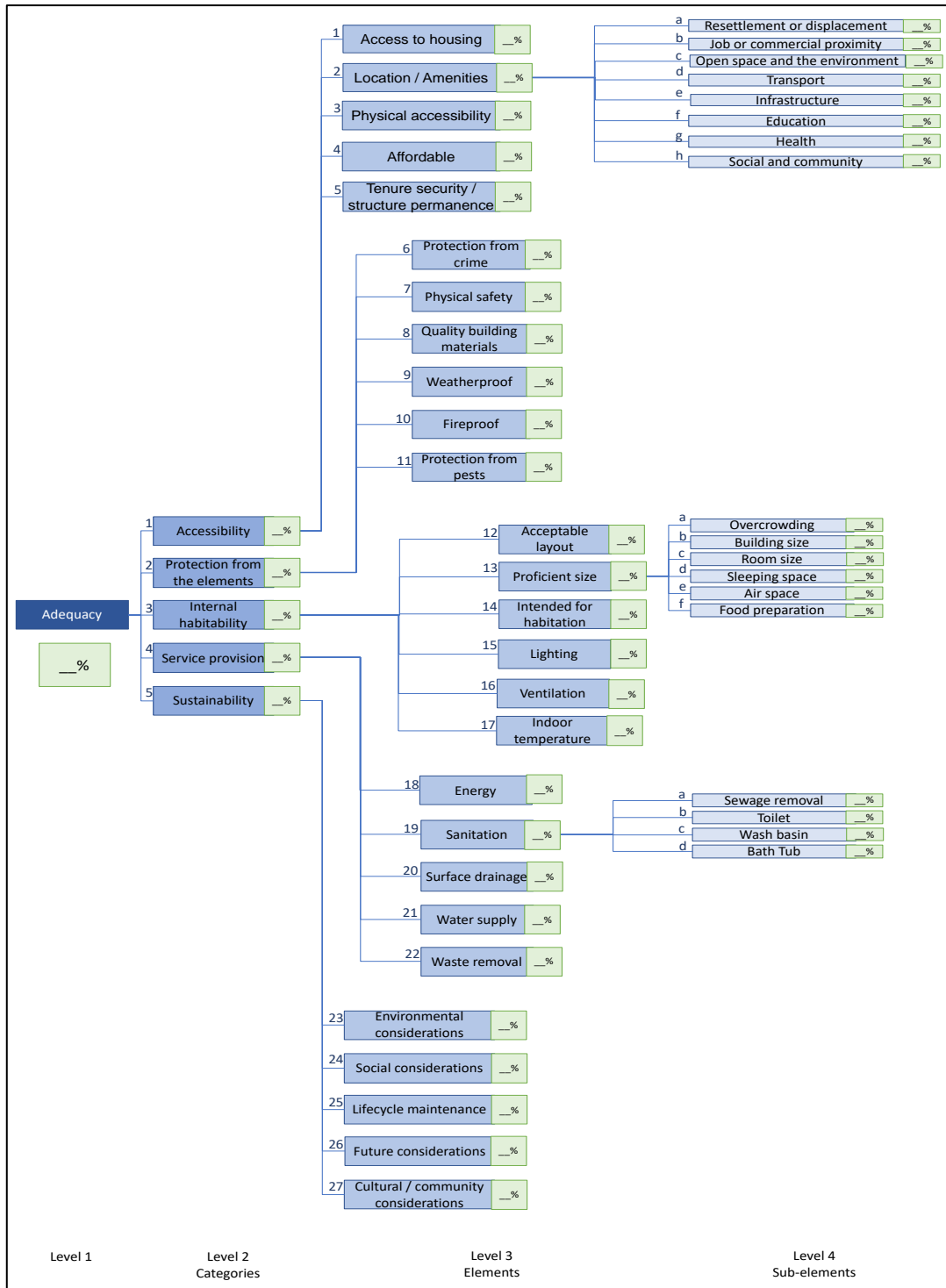


Figure 9: Summary of housing adequacy model

### 6.3 Evaluation capacity

The model evaluates adequacy by determining a percentage value for each category, sub-category and element. These values are then displayed in the model to allow evaluation by the interpreter or reader.

#### 6.3.1 Evaluation formulae

The percentage value for each sub-element, element and category is determined by a set of binary questions, to leave as little as possible open to interpretation. This enables the user of the model to simply answer yes or no to various questions from which the percentage is then calculated. The equation for the percentage value of each category is determined by:

$$CP = \frac{\sum EP}{n_x}$$

Where:

*CP = Category percentage*

*EP = Element percentage*

*n<sub>x</sub> = The number of elements in the category*

The equation for the percentage value of each element is determined by:

$$EP_a = \frac{\sum SP}{n_y}$$

Where:

*EP<sub>a</sub> = Element percentage where sub – elements are involved*

*SP = Sub – element percentage*

*n<sub>y</sub> = The number of sub – elements in the element*

Or:

$$EP_b = \frac{\sum MO}{MA} \times 100$$

Where:

*EP<sub>b</sub> = Element percentage with no sub – elements*

*MO = Marks obtained*

*MA = Marks available*

The equation for the percentage value of each sub-element is determined by:

$$SE = \frac{\sum MO}{MA} \times 100$$

Where:

*SE = Sub – element percentage*

*MO = Marks obtained*

*MA = Marks available*

### **6.3.2 Evaluation criteria**

The evaluation criteria determine the Marks Obtained for each category, element and sub-element, to be used in calculation of the formulae as presented in 6.3.1. The evaluation is done by awarding one mark for each statement that the housing adheres to. The statements are provided as follows for each category: Category 1 – Affordability is in Table 7; Category 2 – Protection from the elements in Table 8; Category 3 – Internal habitability in Table 9; Category 4 – Service provision in Table 10, and Category 5 – Sustainability in Table 11. For each criteria statement that is true, one mark is obtained. It is then tallied and calculated for each sub-element first (if applicable), element subsequently, and category last. The only exception is for element 5 – tenure security – where full marks available is awarded for security of tenure, but one mark is subtracted for each of the restrictions listed that are true. To minimise subjectivity in evaluation, the questions are kept in binary nature – either adheres for one mark per statement, or does not adhere for no marks for that statement.

**Table 7: Evaluation criteria category 1 – Accessibility**

<b>1. Accessibility</b>		<b>n = 5</b>
<b>1. Access to housing (housing should be available):</b>		<b>MA = 9</b>
a.	Regardless of citizenship	
b.	Regardless of gender or sexual orientation	
c.	Regardless of disability, health and pregnancy	
d.	Regardless of household composition and family size	
e.	Regardless of age	
f.	Regardless of income level	
g.	In different forms and types	
h.	For the homeless	
i.	In exceptional circumstances, including disaster and displacement instances.	
<b>2. A location that allows access to amenities:</b>		<b>n = 8</b>
a.	Resettlement or displacement handled acceptably	<b>MA = 5</b>
	i. With proper consultation	
	ii. Alternative housing provision on-site	
	iii. Alternative transport and service options provided	
	iv. Compensation or financial assistance offered	
	v. With appropriate legal court decision backup	
b.	Proximity to jobs and commercial areas	<b>MA = 3</b>
	i. Close to commercial areas	
	ii. Housing and work opportunities mixed in one location	
	iii. Centrally located and linked to limit horizontal expansion	
c.	Access to open space and the environment	<b>MA = 4</b>
	i. Access to green spaces	
	ii. Access to parks and public places	
	iii. Community linkages	
	iv. Open spaces maintained and conserved	
d.	Access to transport	<b>MA = 4</b>
	i. Access to roads	
	ii. Access to public transport	
	iii. Parking spaces and driveways	
	iv. Pedestrian footpaths	
e.	Access to infrastructure	<b>MA = 7</b>
	i. Public lighting infrastructure	
	ii. Solid waste management	
	iii. Water infrastructure	
	iv. Sanitation infrastructure	
	v. Electricity infrastructure	
	vi. Telecommunications infrastructure	
	vii. Drainage infrastructure	
f.	Access to education	<b>MA = 4</b>
	i. Nurseries and childcare	
	ii. Primary school	
	iii. Secondary school	
	iv. Tertiary and further education	
g.	Access to health	<b>MA = 3</b>
	i. Healthcare	
	ii. Hospitals	
	iii. Acceptable healthy location free from noxious industries, landfills and offensive trades	
h.	Access to social, community and religious spaces	<b>MA = 5</b>
	i. Playground	
	ii. Religious building	
	iii. Recreation facilities	
	iv. Social facilities	
	v. Sport facilities.	



3. Physical accessibility to the building:		MA = 5
	a. Vertical lifts	
	b. Horizontal movement with wide enough spaces with low slopes	
	c. Handrails	
	d. Parking bays for the disabled	
	e. Guide dog friendly.	
4. Affordability:		MA = 5
	a. Financing options available	
	b. Monthly housing cost of less than 40%	
	c. 30%	
	d. 25%	
	e. 20% of household income.	
5. Security of tenure and permanence of structure:		MA = 6
	a. Security of tenure with no restrictions	
	b. No evictions with legal recourse	
	c. No arbitrary evictions without legal recourse	
	d. No evictions even if housing deemed 'unfit for habitation'	
	e. No evictions according to tenancy agreement	
	f. No evictions in instances of public interest or national defence.	

**Table 8: Evaluation criteria category 2 - Protection from the elements**

<b>2. Protection from the elements</b>		<b>n = 6</b>
6. Protection from crime:		MA = 2
	a. Crime prevention or suppression	
	b. Windows and doors capable of locking.	
7. A physically safe building:		MA = 3
	a. Safety regulations and standards enforced	
	b. Safety at heights	
	c. Safe structural integrity for soil type and weather.	
8. Quality building materials:		MA = 8
	a. Materials and workmanship adhere to standards and/or codes of practice	
	b. Weatherproof building materials	
	c. Durable materials	
	d. Cost-saving materials	
	e. Locally available and/or produced materials	
	f. Environmentally friendly materials	
	g. Materials with heat reflection, thermal storage and/or heat conduction	
	h. No dated, damaged or proven adverse materials.	
9. Weatherproof building:		MA = 7
	a. Weatherproof roof	
	b. Weatherproof external walls	
	c. Weatherproof internal walls in areas of high moisture, like bathrooms	
	d. Weatherproof floors and subfloors	
	e. Weatherproof windows and external doors	
	f. Weatherproof joints between vertical and horizontal elements	
	g. Proper insulation.	
10. Fireproof building:		MA = 4
	a. Fire-resistant external envelope	
	b. Smoke detectors	
	c. Fire extinguishers	
	d. Emergency evacuation and egress.	
11. Protection from pests:		MA = 5
	a. Free from crawling insects and termites	
	b. Free from flying insects, mosquitos and flies	
	c. Free from bacteria	
	d. Free from vermin, including rat infestations	
	e. Free from noise and vibration.	

**Table 9: Evaluation criteria category 3 - Internal habitability**

<b>3. Internal habitability</b>		<b>n = 5</b>
<b>12. Acceptable internal layout:</b>		<b>MA = 5</b>
a.	Living room	
b.	Sleeping space/bedroom	
c.	Kitchen/cooking area	
d.	Bathroom and sanitary facilities	
e.	Utility spaces such as storage, corridors and cupboards.	
<b>13. Proficient size:</b>		<b>n = 6</b>
a.	Free from overcrowding	<b>MA = 4</b>
	i. One room per four (4) children from one to 10 years of age	
	ii. One room per two (2) people of the same sex aged 10 to 17 years	
	iii. One room per couple aged 18 years and over	
	iv. One room per unattached individual aged 18 years and over	
b.	Building of proficient size	<b>MA = 5</b>
	i. Minimum net floor area of 20 m <sup>2</sup>	
	ii. 35 m <sup>2</sup>	
	iii. 40 m <sup>2</sup>	
	iv. An additional 10 m <sup>2</sup> on top of minimum size for each occupant	
	v. An additional 9 m <sup>2</sup> on top of the minimum size for each additional storey	
c.	Sleeping space of proficient space	<b>MA = 6</b>
	i. Minimum net floor area of 1.5 m <sup>2</sup>	
	ii. 3 m <sup>2</sup>	
	iii. 3.6 m <sup>2</sup>	
	iv. 6 m <sup>2</sup>	
	v. 7.5 m <sup>2</sup>	
	vi. An additional 4m <sup>2</sup> for every adult sharing	
d.	Other habitable room of proficient size	<b>MA = 5</b>
	i. Minimum floor space of 6.5 m <sup>2</sup>	
	ii. 7 m <sup>2</sup>	
	iii. 7.5 m <sup>2</sup>	
	iv. 9.5 m <sup>2</sup>	
	v. 11 m <sup>2</sup>	
e.	Air space and volume of proficient size	<b>MA = 6</b>
	i. Minimum internal height of 2 100mm	
	ii. 2 300mm	
	iii. 2 400mm	
	iv. No space lower than 1 500mm	
	v. Minimum 5.6m <sup>3</sup> air space	
	vi. Minimum 8.5m <sup>3</sup> air space	
f.	Food preparation space of proficient size	<b>MA = 3</b>
	i. One food preparation space for every eight people	
	ii. Minimum width of 1.5 m	
	iii. Minimum area of 4 m <sup>2</sup>	

<b>14. Building intended for habitation:</b>		<b>MA = 2</b>
	a. Building on the list of buildings intended for residential occupation: Apartment, flat, barracks, boarding house, domestic auxiliary room, hostel, hall of residence, dormitory room, boarding house, hotel, house (for a single family—detached, semi-detached or terraced), multi-unit building, outhouse or outbuilding, room, shelter, tent	
	b. Space expressly intended for residential purposes and sleeping.	
<b>15. Adequate lighting:</b>		<b>MA = 3</b>
	a. Natural lighting in all habitable rooms	
	b. Artificial light wherever natural lighting is insufficient—including halls, stairways and landings	
	c. Minimum 30 lux at floor or stair level.	
<b>16. Adequate ventilation:</b>		<b>MA = 7</b>
	a. Fume removal to external air for all heat producing appliances	
	b. Carbon monoxide alarm	
	c. Windows of minimum 5% (1/20 <sup>th</sup> ) of room area	
	d. Windows of minimum 10% (1/10 <sup>th</sup> ) of room area	
	e. Minimum one openable window per room that can be fixed and remain open	
	f. Draught closers for any unintended gap greater than 3 mm	
	g. Artificial or mechanical ventilation for all bathrooms.	
<b>17. Acceptable internal temperature:</b>		<b>MA = 3</b>
	a. Internal temperature kept at 22 °C	
	b. Internal temperature kept at 18 °C and 26 °C	
	c. Internal temperature kept at 16 °C and 28 °C.	

**Table 10: Evaluation criteria category 4 - Service provision**

<b>4. Service provision</b>		<b>n = 6</b>
<b>18. Energy provision:</b>		<b>MA = 7</b>
a.	Domestic energy supply	
b.	Uninterrupted energy supply	
c.	An electrical box for protection and isolation	
d.	Energy distribution with pipework and cables	
e.	Proper outlets and fixtures	
f.	Domestic gas supply	
g.	Lightning protection.	
<b>19. Sanitation:</b>		<b>n = 4</b>
a.	Sewage removal	<b>MA = 4</b>
	i. Through waste disposal	
	ii. Pump out sewage holding tanks	
	iii. Septic tanks	
	iv. Acceptable non-sewered sanitation	
b.	Access to a toilet	<b>MA = 5</b>
	i. One toilet for every six occupants	
	ii. Eight occupants	
	iii. 10 occupants	
	iv. 12 occupants	
	v. Flushable toilet	
c.	Access to wash basins	<b>MA = 5</b>
	i. One wash basin for every six occupants	
	ii. Eight occupants	
	iii. 10 occupants	
	iv. 12 occupants	
	v. Kitchen washing unit	
d.	Access to washing facilities	<b>MA = 7</b>
	i. Access to a tub	
	ii. Access to a shower	
	iii. One washing facility for every six occupants	
	iv. Eight occupants	
	v. 10 occupants	
	vi. 12 occupants	
	vii. Cold and hot water.	
<b>20. Surface drainage:</b>		<b>MA = 3</b>
a.	Gutters, downpipes and drains	
b.	Drainage systems sufficiently sized for usual rain	
c.	Easily and well maintained.	
<b>21. Water supply:</b>		<b>MA = 4</b>
a.	Adequate volume—uninterrupted and continuous	
b.	Adequate temperature—both cold and hot	
c.	Adequate pressure	
d.	Adequate quality—drinkable/potable.	
<b>22. Waste removal:</b>		<b>MA = 3</b>
a.	Waste collected and removed	
b.	Waste properly stored	
c.	Acceptable final disposal location and method.	

**Table 11: Evaluation criteria category 5 - Sustainability**

<b>5. Sustainability</b>		<b>n = 5</b>
23. Take the environment into account:		MA = 8
	a. Energy-efficient fittings and fixtures	
	b. Passive design elements to lower energy requirements	
	c. Alternative or renewable energy sources	
	d. Water saving technologies	
	e. Water reuse technologies	
	f. Environmental preservation and conservation	
	g. Environmentally friendly products	
	h. Natural local products.	
24. Consider the location's social dynamics:		MA = 3
	a. Social development—assist with housing or commercial opportunities in the area	
	b. Equality opportunities—assist with helping marginalised people on the premises	
	c. Contribute to historic or heritage preservation.	
25. Maintained over the building's lifecycle:		MA = 7
	a. Fully completed and finished building	
	b. Free of defects	
	c. Renovated or enhanced building	
	d. Safe in terms of elements, components, finishes and fittings	
	e. Safe in terms of structure	
	f. Safe in terms of health and sanitation	
	g. Safe in terms of technical requirements.	
26. Future considerations, innovations and technology:		MA = 5
	a. Technologies to improve housing quality	
	b. Technologies to reduce costs	
	c. Technologies to reduce environmental impacts	
	d. Technologies to provide better administration	
	e. Aims to solve local problems and use local resources.	
27. Cultural and community considerations:		MA = 6
	a. Acceptable to cultural identity and norms of occupant	
	b. Conservation of archaeological or architectural aspects of historic or cultural sites	
	c. Aligned with religious values of occupant	
	d. Support local solutions, technologies, businesses and materials	
	e. Incorporate local community	
	f. Equitably available to all with no discrimination.	

## 6.4 Summary

By using the evaluation criteria for each category, element and sub-element of housing adequacy, a score of 'Marks Obtained' can be computed. This value is then used in the formulae discussed to calculate a percentage for each sub-element (where applicable) and element. The sub-element percentages (where applicable) are used to calculate the element percentage, and the element percentages are used as variables in the formula to calculate category percentages. Category percentages are left to interpretation and comparison by the user.

## **7 CHAPTER 7: DATA VALIDATION**

### **7.1 Introduction**

This chapter considers the validation of the data and the model presented in Chapter 6. This is firstly done according to the grounded theory approach of achieving theoretical saturation, and confirmations of the data by the data. Validity is also illustrated by providing an example.

### **7.2 Theoretical saturation**

While theoretical saturation and data saturation is not the same, it should be noted that non-probability sampling was used to attempt to get close to data saturation. Theoretical saturation as per grounded theory, was achieved by continuous axial coding. Most of the 27 elements reached theoretical saturation at the point of determining the criteria for each element. Three elements – Location/Amenities; Proficient size; and Sanitation – only achieved theoretical saturation at the point of determining criteria for sub-elements.

### **7.3 Theoretical confirmations**

As per the grounded theory approach as discussed in 3.5, data is validated through the data itself as well. To ensure validation by theoretical confirmation, information should be present in documents across the sample spectrum to be included in the model. A visual representation of theoretical confirmations is shown for each category respectively in Figure 10, Figure 11, Figure 12, Figure 13, and Figure 14. Each category lists the evaluation criteria as per 6.3.2, and all countries in the sample are listed at the x-axis. A green block represents the document from this country verifying the information in the criteria for this category, element and/or sub-element.

From the visual representations it can be seen that the data is validated by other data, and that multiple sample documents determined the criteria derived during axial coding and analysis.





2. Protection from the elements		Aus	Azer	Ban	Ban	Bel	Bhu	Can	Cro	Cze	Elh	Fin	Fra	Gry	Ice	Ira	Jam	Kaz	Kuw	Les	Mal	Mald	Mal	Mar	Mor	Nep	NZ	Poi	Rus	Sam	SA	Sil	Tai	Tur	Uga	UK	USA	Ukr	Vie	Zam	Zim							
<b>6. Protection from crime:</b>																																																
a. Crime prevention or suppression																																																
b. Windows and doors capable of locking.																																																
<b>7. A physically safe building:</b>																																																
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c. Durable materials																																																
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b. Smoke detectors																																																
c. Fire extinguishers																																																
d. Emergency evacuation and egress.																																																
<b>11. Protection from pests:</b>																																																
a. Free from crawling insects and termites																																																
b. Free from flying insects, mosquitos and flies																																																
c. Free from bacteria																																																
d. Free from vermin, including rat infestations																																																
e. Free from noise and vibration.																																																

**Figure 11: Visual display of theoretical confirmations for Category 2**





## **7.4 Illustrative case study**

An illustrative case study is provided by completing the evaluation criteria as discussed in 6.3.2 for a specific property. To this end, some assumptions had to be made on the example case study property and interested parties, as the adequacy would entail an intersection between these two.

### **7.4.1 Assumptions about the property**

For this case study a specific two-bedroom house in Lynnwood, Pretoria, South Africa is used for which all the variables are known and/or can be obtained. For the purposes of the case study, it is assumed that the house is currently for sale, for a middle-class market-related value. The property has recently been checked for structural integrity and termites. The single storey house has been built in 1986, with walls of clay brick, and a tiled roof. The windows are single glazing in steel frames with steel security bars in front of the windows, and no insect screens. It is a freestanding house on a small stand. The building is  $120m^2$ , with two bedrooms of  $9m^2$  and  $12m^2$  respectively, two bathrooms of  $4m^2$  and  $5m^2$  respectively, a living room of  $30m^2$  and a kitchen of  $8m^2$ .

### **7.4.2 Assumptions about the interested party**

It is assumed that the interested party is a family of four – two adults and two children under the age of 10. It is assumed that they do have access to financing and that repayment on a bond of the market related value would equate to approximately 28% of their household income.

### **7.4.3 Case study evaluation discussions**

#### **7.4.3.1 Category 1 – Accessibility**

Because the house is being sold at a market related value, it will not be available for all regardless of income type, homelessness, or in exceptional circumstances. There are also no alternative housing forms or types as it is the only house available. This results in an access to housing percentage of 56%, as this house is not available to all.

In terms of access to amenities and location, there is no resettlement and displacement involved resulting in full marks for this category. The house is situated in a residential area with no mixed-use development or work opportunities on site impacting the proximity of jobs and commercial opportunities. The Lynnwood area of Pretoria does not offer community linkages, and the open spaces, though available, are not seen as well maintained and conserved due to uncut grass and littering in the few open areas impacting access to open space and the environment. While there is access to roads, driveways and parking, there is no public transport – the closest bus stop is more than 1km away and the buses are irregular. There are sections of footpath, but because it is not consistently present it impacts access to transport. Municipality provides all infrastructure for public lighting, solid waste removal, water supply, sanitation, electricity, telecommunications and stormwater drainage. Childcare and nurseries are within walking distance, primary and secondary schools are within a 5-minute radius, and the University of Pretoria is located within a 15-minute radius. Healthcare is within walking distance and hospitals within 5-minute radius. On the assumption that the closest religious building is the applicable denomination, it is within a 5-minute radius, as is a shopping mall with gym and sport facilities. There is no public playground in the area.

The building is single storey, so vertical lifts are not applicable. There are a few changes in level with steps, and these do not have handrails. There is limited parking available, none designated for disabled parking. The property is guide dog friendly, with broad doors with wide spaces and low slopes bar one- or two-level changes in the garden.

Affordability is assigned based on the assumptions for the interested party. Tenure is generally secure, although eviction would be possible based on home loan conditions – it should be with legal recourse. The details of the evaluation of category 1 in the case study is shown in Table 12.

**Table 12: Case study evaluation criteria category 1 – Accessibility**

1. Accessibility			67%
1. Access to housing (housing should be available):		5	56%
a.	Regardless of citizenship	1	
b.	Regardless of gender or sexual orientation	1	
c.	Regardless of disability, health and pregnancy	1	
d.	Regardless of household composition and family size	1	
e.	Regardless of age	1	
f.	Regardless of income level		
g.	In different forms and types		
h.	For the homeless		
i.	In exceptional circumstances, including disaster and displacement instances.		
2. A location that allows access to amenities:		5	78%
a.	Resettlement or displacement handled acceptably	5	100%
	i. With proper consultation		
	ii. Alternative housing provision on-site		
	iii. Alternative transport and service options provided		
	iv. Compensation or financial assistance offered		
	v. With appropriate legal court decision backup		
b.	Proximity to jobs and commercial areas	2	67%
	i. Close to commercial areas	1	
	ii. Housing and work opportunities mixed in one location		
	iii. Centrally located and linked to limit horizontal expansion	1	
c.	Access to open space and the environment	2	50%
	i. Access to green spaces	1	
	ii. Access to parks and public places	1	
	iii. Community linkages		
	iv. Open spaces maintained and conserved		
d.	Access to transport	2	50%
	i. Access to roads	1	
	ii. Access to public transport		
	iii. Parking spaces and driveways	1	
	iv. Pedestrian footpaths		
e.	Access to infrastructure	7	100%
	i. Public lighting infrastructure	1	
	ii. Solid waste management	1	
	iii. Water infrastructure	1	
	iv. Sanitation infrastructure	1	
	v. Electricity infrastructure	1	
	vi. Telecommunications infrastructure	1	
	vii. Drainage infrastructure	1	
f.	Access to education	4	100%
	i. Nurseries and childcare	1	
	ii. Primary school	1	
	iii. Secondary school	1	
	iv. Tertiary and further education	1	
g.	Access to health	3	100%
	i. Healthcare	1	
	ii. Hospitals	1	
	iii. Acceptable healthy location free from noxious industries, landfills and offensive trades	1	
h.	Access to social, community and religious spaces	3	60%
	i. Playground	1	
	ii. Religious building	1	
	iii. Recreation facilities	1	
	iv. Social facilities		
	v. Sport facilities.	1	
3. Physical accessibility to the building:		3	60%
a.	Vertical lifts	1	
b.	Horizontal movement with wide enough spaces with low slopes	1	
c.	Handrails		
d.	Parking bays for the disabled		
e.	Guide dog friendly.	1	
4. Affordability:		3	60%
a.	Financing options available	1	
b.	Monthly housing cost of less than 40%	1	
c.	30%	1	
d.	25%		
e.	20% of household income.		
5. Security of tenure and permanence of structure:		5	83%
a.	Security of tenure with no restrictions		
b.	No evictions with legal recourse		
c.	No arbitrary evictions without legal recourse	1	
d.	No evictions even if housing deemed 'unfit for habitation'		
e.	No evictions according to tenancy agreement		
f.	No evictions in instances of public interest or national defence.		

### 7.4.3.2 Category 2 – Protection from the elements

As can be seen in Table 13, all criteria for protection from crime, a physically safe building, and weatherproof building are satisfied. Quality building materials are mostly satisfied, apart from the environmentally friendly option – as the building is fairly old, there was no specific environmental consideration in material choice. While the external envelope of the building is fireproof, there are no smoke detectors or fire extinguishers, and due to steel bars in front of all openable windows, there is no emergency egress available. As there are no screens for doors or windows, the building is not free from flying insects, although it is assumed to be free of other pests on inspection.

**Table 13: Case study evaluation criteria category 2 – Protection from the elements**

2. Protection from the elements			82%
6. Protection from crime:		2	100%
	a. Crime prevention or suppression	1	
	b. Windows and doors capable of locking.	1	
7. A physically safe building:		3	100%
	a. Safety regulations and standards enforced	1	
	b. Safety at heights	1	
	c. Safe structural integrity for soil type and weather.	1	
8. Quality building materials:		7	88%
	a. Materials and workmanship adhere to standards and/or codes of practice	1	
	b. Weatherproof building materials	1	
	c. Durable materials	1	
	d. Cost-saving materials	1	
	e. Locally available and/or produced materials	1	
	f. Environmentally friendly materials		
	g. Materials with heat reflection, thermal storage and/or heat conduction	1	
	h. No dated, damaged or proven adverse materials.	1	
9. Weatherproof building:		7	100%
	a. Weatherproof roof	1	
	b. Weatherproof external walls	1	
	c. Weatherproof internal walls in areas of high moisture, like bathrooms	1	
	d. Weatherproof floors and subfloors	1	
	e. Weatherproof windows and external doors	1	
	f. Weatherproof joints between vertical and horizontal elements	1	
	g. Proper insulation.	1	
10. Fireproof building:		1	25%
	a. Fire-resistant external envelope	1	
	b. Smoke detectors		
	c. Fire extinguishers		
	d. Emergency evacuation and egress.		
11. Protection from pests:		4	80%
	a. Free from crawling insects and termites	1	
	b. Free from flying insects, mosquitos and flies		
	c. Free from bacteria	1	
	d. Free from vermin, including rat infestations	1	
	e. Free from noise and vibration.	1	

#### **7.4.3.3 Category 3 – Internal habitability**

The building satisfied all criteria for acceptable internal layout, proficient size, building intended for habitation and adequate lighting. There is however, no fume removal for heat producing appliances or carbon monoxide alarm. The building also does not have a central heating or air-conditioning system, resulting in a fairly large range of temperature fluctuations. It is assumed that the passive design and building materials will keep it within the range of 16°C to 28°C. Table 14 can be consulted for the full evaluation of category 3 in the case study example.



**Table 14: Case study evaluation criteria category 3 - Internal habitability**

<b>3. Internal habitability</b>			<b>98%</b>
<b>12. Acceptable internal layout:</b>		<b>5</b>	<b>100%</b>
a.	Living room	1	
b.	Sleeping space/bedroom	1	
c.	Kitchen/cooking area	1	
d.	Bathroom and sanitary facilities	1	
e.	Utility spaces such as storage, corridors and cupboards.	1	
<b>13. Proficient size:</b>		<b>4</b>	<b>97%</b>
a.	Free from overcrowding	<b>4</b>	<b>100%</b>
i.	One room per four (4) children from one to 10 years of age	1	
ii.	One room per two (2) people of the same sex aged 10 to 17 years	1	
iii.	One room per couple aged 18 years and over	1	
iv.	One room per unattached individual aged 18 years and over	1	
b.	Building of proficient size	<b>5</b>	<b>100%</b>
i.	Minimum net floor area of 20 m <sup>2</sup>	1	
ii.	35 m <sup>2</sup>	1	
iii.	40 m <sup>2</sup>	1	
iv.	An additional 10 m <sup>2</sup> on top of minimum size for each occupant	1	
v.	An additional 9 m <sup>2</sup> on top of the minimum size for each additional storey	1	
c.	Sleeping space of proficient space	<b>5</b>	<b>83%</b>
i.	Minimum net floor area of 1.5 m <sup>2</sup>	1	
ii.	3 m <sup>2</sup>	1	
iii.	3.6 m <sup>2</sup>	1	
iv.	6 m <sup>2</sup>	1	
v.	7.5 m <sup>2</sup>	1	
vi.	An additional 4m <sup>2</sup> for every adult sharing	1	
d.	Other habitable room of proficient size	<b>5</b>	<b>100%</b>
i.	Minimum floor space of 6.5 m <sup>2</sup>	1	
ii.	7 m <sup>2</sup>	1	
iii.	7.5 m <sup>2</sup>	1	
iv.	9.5 m <sup>2</sup>	1	
v.	11 m <sup>2</sup>	1	
e.	Air space and volume of proficient size	<b>6</b>	<b>100%</b>
i.	Minimum internal height of 2 100mm	1	
ii.	2 300mm	1	
iii.	2 400mm	1	
iv.	No space lower than 1 500mm	1	
v.	Minimum 5.6m <sup>3</sup> air space	1	
vi.	Minimum 8.5m <sup>3</sup> air space	1	
f.	Food preparation space of proficient size	<b>3</b>	<b>100%</b>
i.	One food preparation space for every eight people	1	
ii.	Minimum width of 1.5 m	1	
iii.	Minimum area of 4 m <sup>2</sup>	1	
<b>14. Building intended for habitation:</b>		<b>2</b>	<b>100%</b>
a.	Building on the list of buildings intended for residential occupation: Apartment, flat, barracks, boarding house, domestic auxiliary room, hostel, hall of residence, dormitory room, boarding house, hotel, house (for a single family—detached, semi-detached or terraced), multi-unit building, outhouse or outbuilding, room, shelter, tent	1	
b.	Space expressly intended for residential purposes and sleeping.	1	
<b>15. Adequate lighting:</b>		<b>3</b>	<b>100%</b>
a.	Natural lighting in all habitable rooms	1	
b.	Artificial light wherever natural lighting is insufficient—including halls, stairways and landings	1	
c.	Minimum 30 lux at floor or stair level.	1	
<b>16. Adequate ventilation:</b>		<b>4</b>	<b>57%</b>
a.	Fume removal to external air for all heat producing appliances		
b.	Carbon monoxide alarm		
c.	Windows of minimum 5% (1/20 <sup>th</sup> ) of room area	1	
d.	Windows of minimum 10% (1/10 <sup>th</sup> ) of room area	1	
e.	Minimum one openable window per room that can be fixed and remain open	1	
f.	Draught closers for any unintended gap greater than 3 mm		
g.	Artificial or mechanical ventilation for all bathrooms.	1	
<b>17. Acceptable internal temperature:</b>		<b>1</b>	<b>33%</b>
a.	Internal temperature kept at 22 °C		
b.	Internal temperature kept at 18 °C and 26 °C		
c.	Internal temperature kept at 16 °C and 28 °C.	1	

#### 7.4.3.4 Category 4 – Service provision

The housing satisfies all criteria for surface drainage, water supply and waste removal through the municipal infrastructure and services offered as shown in Table 15. The sanitation services equate to one sanitation fitting per two occupants, which satisfies all possible options. While energy is provided to the household, it is not uninterrupted in nature, and there is no lightning protection offered.

**Table 15: Case study evaluation criteria category 4 - Service provision**

4. Service Provision		5	94%
18. Energy provision:		5	71%
a.	Domestic energy supply	1	
b.	Uninterrupted energy supply		
c.	An electrical box for protection and isolation	1	
d.	Energy distribution with pipework and cables	1	
e.	Proper outlets and fixtures	1	
f.	Domestic gas supply	1	
g.	Lightning protection.		
19. Sanitation:		4	100%
a.	Sewage removal	4	100%
i.	Through waste disposal	4	
ii.	Pump out sewage holding tanks		
iii.	Septic tanks		
iv.	Acceptable non-sewered sanitation		
b.	Access to a toilet	5	100%
i.	One toilet for every six occupants	1	
ii.	Eight occupants	1	
iii.	10 occupants	1	
iv.	12 occupants	1	
v.	Flushable toilet	1	
c.	Access to wash basins	5	100%
i.	One wash basin for every six occupants	1	
ii.	Eight occupants	1	
iii.	10 occupants	1	
iv.	12 occupants	1	
v.	Kitchen washing unit	1	
d.	Access to washing facilities	7	100%
i.	Access to a tub	1	
ii.	Access to a shower	1	
iii.	One washing facility for every six occupants	1	
iv.	Eight occupants	1	
v.	10 occupants	1	
vi.	12 occupants	1	
vii.	Cold and hot water.	1	
20. Surface drainage:		3	100%
a.	Gutters, downpipes and drains	1	
b.	Drainage systems sufficiently sized for usual rain	1	
c.	Easily and well maintained.	1	
21. Water supply:		4	100%
a.	Adequate volume—uninterrupted and continuous	1	
b.	Adequate temperature—both cold and hot	1	
c.	Adequate pressure	1	
d.	Adequate quality—drinkable/potable.	1	
22. Waste removal:		3	100%
a.	Waste collected and removed	1	
b.	Waste properly stored	1	
c.	Acceptable final disposal location and method.	1	

### 7.4.3.5 Category 5 – Sustainability

The building does not offer any social development on the premises, and as it is an old building it does not incorporate any innovations or technologies. While the building is old and has not been renovated or enhanced, it is still safe and free of defects. The house has energy-efficient fittings and fixtures and has incorporated passive design elements such as north-facing windows, strategically planted trees for shading, there are no further specific environmental considerations. The house is assumed to be culturally acceptable to the interested party, but does not offer any additional cultural or community considerations. Table 16 shows the case study evaluation of category 5 in detail.

**Table 16: Case study evaluation criteria category 5 - Sustainability**

5. Sustainability			29%
23. Take the environment into account:		2	25%
a. Energy-efficient fittings and fixtures		1	
b. Passive design elements to lower energy requirements		1	
c. Alternative or renewable energy sources			
d. Water saving technologies			
e. Water reuse technologies			
f. Environmental preservation and conservation			
g. Environmentally friendly products			
h. Natural local products.			
24. Consider the location's social dynamics:			0%
a. Social development—assist with housing or commercial opportunities in the area			
b. Equality opportunities—assist with helping marginalised people on the premises			
c. Contribute to historic or heritage preservation.			
25. Maintained over the building's lifecycle:		6	86%
a. Fully completed and finished building		1	
b. Free of defects		1	
c. Renovated or enhanced building			
d. Safe in terms of elements, components, finishes and fittings		1	
e. Safe in terms of structure		1	
f. Safe in terms of health and sanitation		1	
g. Safe in terms of technical requirements.		1	
26. Future considerations, innovations and technology:			0%
a. Technologies to improve housing quality			
b. Technologies to reduce costs			
c. Technologies to reduce environmental impacts			
d. Technologies to provide better administration			
e. Aims to solve local problems and use local resources.			
27. Cultural and community considerations:		2	33%
a. Acceptable to cultural identity and norms of occupant		1	
b. Conservation of archaeological or architectural aspects of historic or cultural site			
c. Aligned with religious values of occupant		1	
d. Support local solutions, technologies, businesses and materials			
e. Incorporate local community			
f. Equitably available to all with no discrimination.			

### 7.4.4 Visual representation of case study results

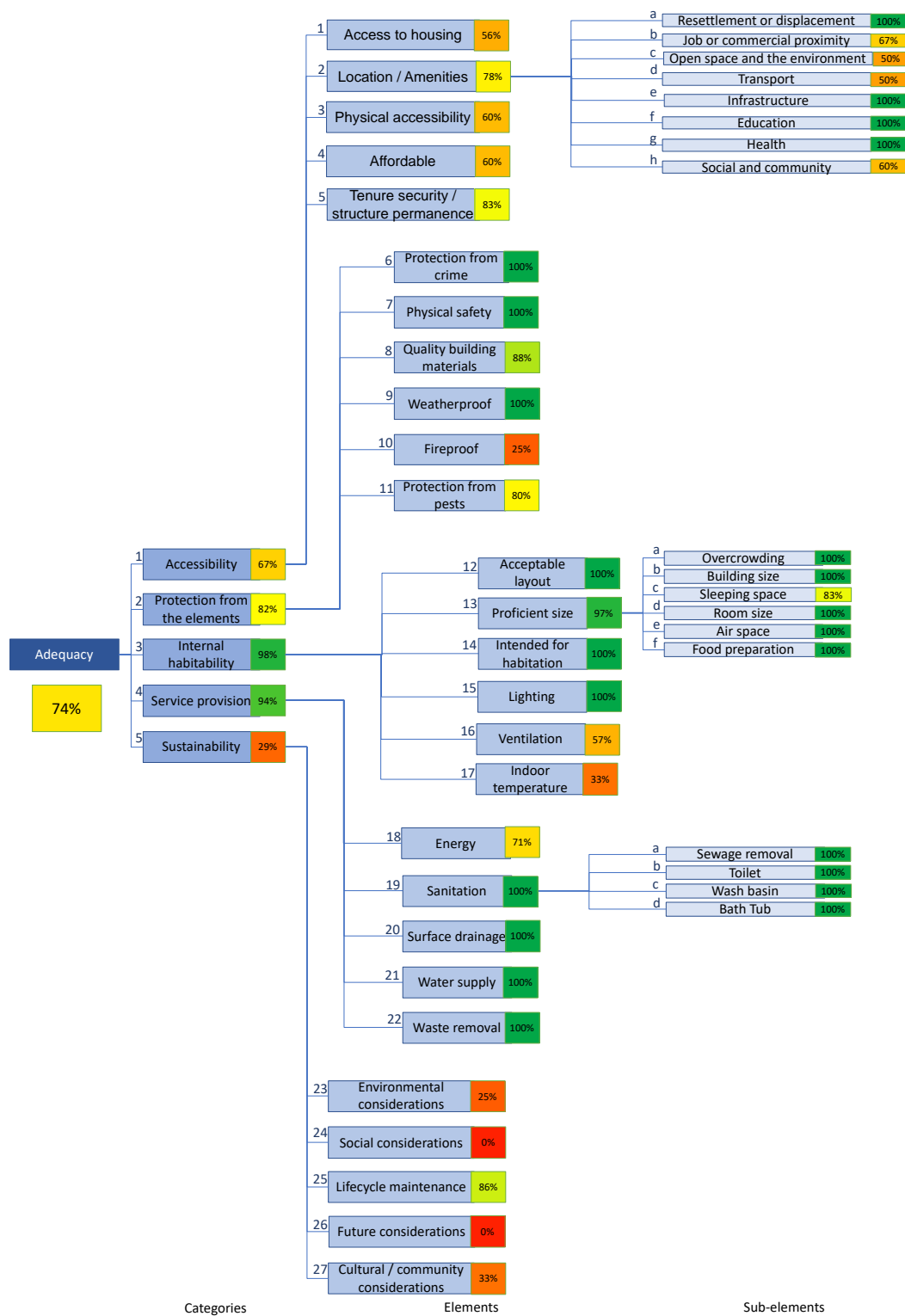


Figure 15: Case study visual representation

#### **7.4.5 Case study discussion**

The visual representation of the results in Figure 15 enables quick interpretation of the results. In this case study a middle-class house was used as an example, and it can be seen that the adequacy model is not limited to evaluation of low-income housing. It should be noted that the measure still remains adequacy, and opulence cannot result in a value exceeding 100%. The interested party could use the results to compare the adequacy of this property with the adequacy of another property. It can also be used to locate points of improvement for this specific housing, for example installation of an alternative energy system to supplement the current supply would improve the scores on elements 18, 23 and 26. Another example would be that if the interested party has limited mobility, a higher score for physical accessibility and access to amenities would be required than would be required for another party. A last example of interpretation by the user would be that if the interested party is satisfied with the affordability score, it might not be of great importance to them that the housing should be accessible to all, therefore a lower score can be interpreted as irrelevant to their needs in this regard. If, however, the user is the property developer or provider (such as public or social housing provision) – these scores would be of higher importance.

#### **7.5 Summary**

This chapter validated the data by confirming where theoretical saturation was achieved in the axial coding process, and displaying how the data is confirmed through the data itself, as per grounded theory. An example case study was then completed to illustrate the practical application of the model.

## 8 CHAPTER 8: DISCUSSION

### 8.1 Introduction

This chapter discusses if and how the research in the document answers the research sub-questions and examines how this contributes to answering the research question.

### 8.2 Research sub-questions

#### 8.2.1 Can the model be considered universally applicable?

To evaluate universal representativeness, the distribution should reflect the population in terms of factors like geographic region, per capita GDP and WESP classification as discussed in section 4.3.

As is clear in Figure 16, the model does have a similar geographic representation apart from South American representation in the sample, which could possibly be because of a language barrier as discussed in 1.10.2, although it should be noted that the language barrier was expected from other continents such as Asia, Europe and Africa as well. The model can be deemed to be applicable universally in terms of geography.

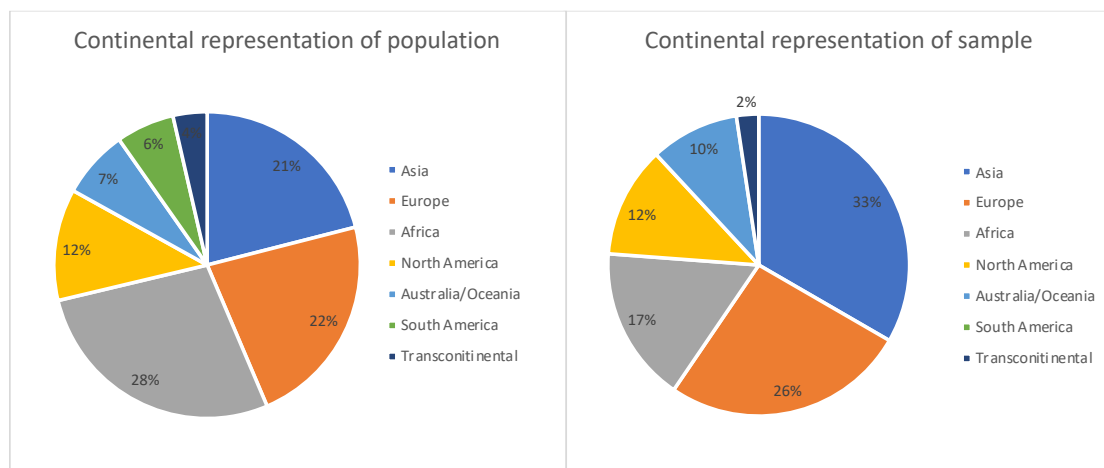
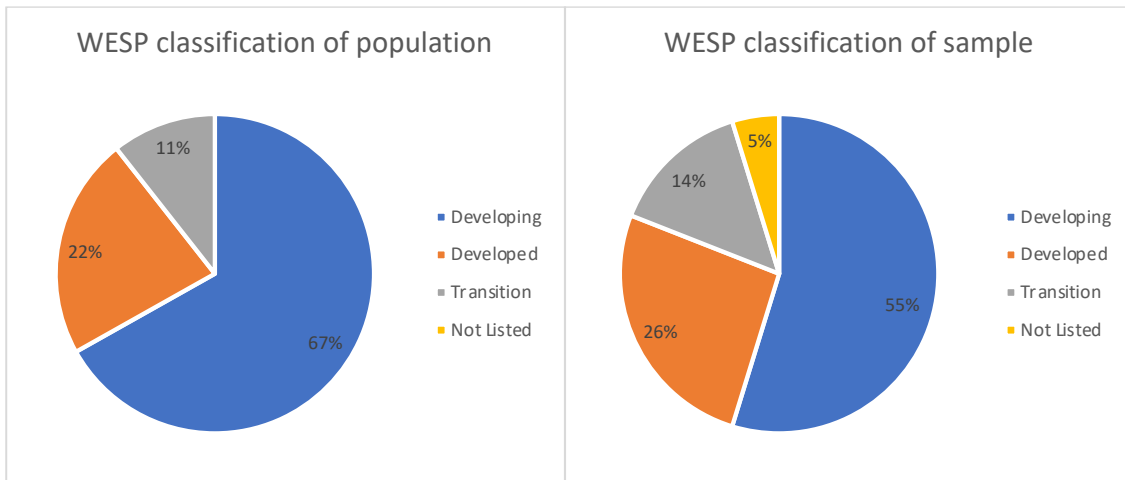


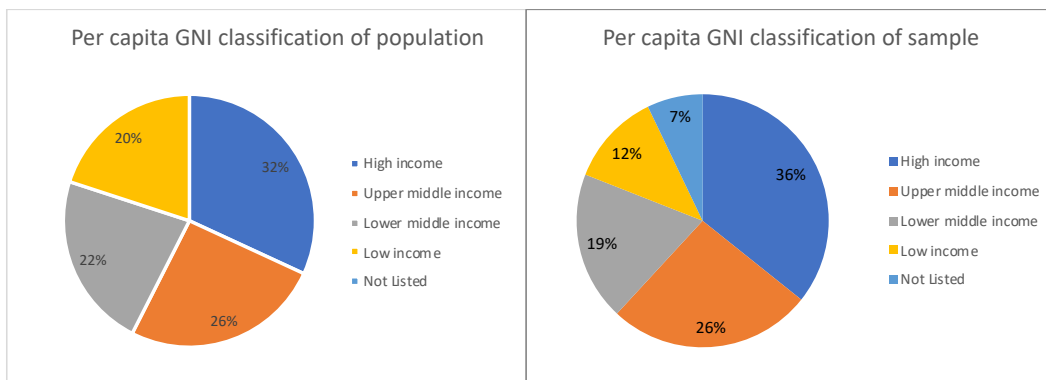
Figure 16: Continental representation population and sample (World Population Review, 2023)

The WESP classification of the sample is similar to and therefore representative of the population as shown in Figure 17. The model can be deemed to be applicable universally in terms of social status.



**Figure 17: WESP classification of population vs sample (World Economic Situation and Prospects, 2014)**

The model can be expected to be universally applicable in terms of economic status, as the sample is representative of the population in terms of per capita GNI classification as shown in Figure 18.



**Figure 18: Per capita GNI classification population and sample (World Economic Situation and Prospects, 2014)**

### 8.2.2 Are there minimum elements to adequacy of housing?

Yes, the 27 elements of adequacy have been determined and listed as per 5.3, visually presented in the model in 6.2, with the criteria of adequacy for each of the elements discussed in 6.3.2.

### **8.2.3 Can these adequacy elements be categorized and compiled into a model?**

By using selective coding after axial coding, these elements were categorised into the five categories discussed in 5.4:

- Accessibility
- Protection from the elements
- Internal habitability
- Service provision
- Sustainability

### **8.2.4 Can the housing adequacy elements be evaluated?**

Yes, the criteria used for each element to determine the level of adequacy that enables evaluation and facilitates comparison of adequacy are discussed in 6.3.2.

### **8.2.5 Does the model of housing adequacy build upon existing theories?**

Yes, the details of existing theories as per 2.5, specifically the details of Table 4 can be found within the categories, elements, and criteria of the proposed model as shown in Table 7, Table 8, Table 9, Table 10, and Table 11. A condensed version of the model specifically indicating the intersection with existing theories is shown in Table 17 (Aroni, 1975; Barber, 2008; Behr, 2021; McClean, 2018; Onibokun, 1985; Russell, 2021; Smit, 2008; South African Cities Network, 2011; UN HABITAT, 2009; Whitehead and Scanlon, 2007; Wimalasena, 2022; Yang, 2008).



**Table 17: Intersection between model and existing literature**

	CECSR UN HABITAT - tenure security	UN HABITAT	CECSR Barber	Behr (World Bank Index)	McClean	Onibulkon	Smit	South African Cities Network	Whitehead and Scanlon	Yang	Russell	South African White Paper	Aroni	Wimalasena
<b>1. Accessibility</b>														
1. Access to housing (housing should be available):	x	x	x		x		x				x			x
2. A location that allows access to amenities:		x	x		x		x	x	x	x	x	x	x	x
b. Proximity to jobs and commercial areas		x			x			x				x		x
c. Access to open space and the environment														
i. Access to green spaces														x
ii. Access to parks and public places														x
d. Access to transport														
ii. Access to public transport														x
e. Access to infrastructure		x	x	x		x	x					x	x	x
ii. Solid waste management		x	x		x		x					x	x	x
iii. Water infrastructure		x	x		x		x					x	x	x
iv. Sanitation infrastructure		x	x				x					x	x	x
v. Electricity infrastructure		x			x		x					x	x	x
vii. Drainage infrastructure														x
f. Access to education		x			x			x						x
i. Nurseries and childcare					x					x				x
g. Access to health		x			x	x		x		x				x
i. Healthcare		x			x	x		x		x				x
ii. Hospitals		x			x	x		x		x				x
h. Access to social, community and religious spaces		x			x			x						x
ii. Religious building														x
iii. Recreation facilities														x
iv. Social facilities		x			x			x						x
v. Sport facilities.														x
4. Affordability:		x	x	x	x		x		x		x			x
5. Security of tenure and permanence of structure:	x	x	x	x	x		x				x	x		x
<b>2. Protection from the elements</b>														
6. Protection from crime:		x	x		x		x					x	x	x
a. Crime prevention or suppression		x	x		x		x							x
b. Windows and doors capable of locking.		x	x		x									x
7. A physically safe building:		x		x		x				x				x
a. Safety regulations and standards enforced											x			x
c. Safe structural integrity for soil type and weather.		x		x		x				x				x
8. Quality building materials:					x									x
10. Fireproof building:														x
11. Protection from pests:														x
e. Free from noise and vibration.														x
<b>3. Internal habitability</b>														
12. Acceptable internal layout:		x	x		x	x	x	x		x				x
b. Sleeping space/bedroom						x				x				x
c. Kitchen/cooking area														x
d. Bathroom and sanitary facilities														x
13. Proficient size:		x		x	x		x			x				x
a. Free from overcrowding														x
14. Building intended for habitation:								x	x					x
15. Adequate lighting:														x
16. Adequate ventilation:														x
b. Carbon monoxide alarm														x
17. Acceptable internal temperature:		x	x	x										x
<b>4. Service Provision</b>														
18. Energy provision:		x	x		x		x					x	x	x
a. Domestic energy supply		x			x		x					x	x	x
f. Domestic gas supply		x			x		x					x	x	x
19. Sanitation:		x			x		x					x		x
20. Surface drainage:														x
21. Water supply:		x			x	x	x					x		x
22. Waste removal:		x										x		x
<b>5. Sustainability</b>														
23. Take the environment into account:								x						x
24. Consider the location's social dynamics:		x	x		x				x		x			x
25. Maintained over the building's lifecycle:									x	x			x	x
26. Future considerations, innovations and technology:									x				x	x
27. Cultural and community considerations:		x	x		x				x		x			x

### 8.3 Research Question

The research question is posed in 1.8 as: Can a universal model be established to evaluate the adequacy of shelter for housing? As summarised in 8.2.1, the model can be considered

universally applicable for different geographical, and socio-economic settings. The model has determined 27 elements of adequacy as discussed in 8.2.2 that can be categorised into five categories as per 8.2.3, with a visual representation of the model as shown in 6.2. The model is capable of evaluating adequacy as summarised in 8.2.4 and detailed in 6.3. Therefore, it can be considered that a universal model to evaluate the adequacy of shelter for housing has been established.

#### **8.4 Summary**

This short chapter referred back through the document and discussed where and how the research sub-questions have been answered. It then also discusses how, in answering the sub-questions, the research question has been achieved. It is concluded that a universal model has been established to evaluate housing adequacy.

## **9 CHAPTER 9: CONCLUSION**

### **9.1 Introduction**

The findings of the research, potential contribution and possibility of future research concludes herewith the document. These elements are initially anticipated in 1.11, and finalised in this chapter.

### **9.2 Research findings**

While Phase 1 of the data collection as per 4.2 did not lead to data for analysis, it did lead to very useful information on the accessibility of housing authorities across the world. Phase 2 of data collection as mentioned in 4.3, did lead to valuable data analysed as per grounded theory in Chapter 5, presented and discussed in Chapter 6, and validated in Chapter 7. The research question and sub-questions are also answered in 8.2 and 8.3.

Based on the analysis of the 42 housing documents from a variety of different backgrounds, it was determined that there are enough commonalities to establish a model that is universal in nature. The analysis indicated that there are 27 elements that comprise adequate housing, that can be grouped into five categories as per 5.3.3 and 5.4. The study also determined evaluation criteria for each of these elements in 6.3, and calculates a percentage adequacy per element and category that can be visually represented as shown in 6.2. This would allow not only for determination of adequacy at a universal level, but also comparison between case studies, geographical areas and/or better comprehension of the importance of these elements to different cultures or contexts.

### **9.3 Potential contribution**

The model can be used to evaluate the adequacy of a specific shelter, and it also provides a platform to compare the adequacy of housing, while the results are open to be interpreted by a housing user, provider or authority. The application can include:

- Adequacy of housing in specific provision systems such as state-provided or public housing systems
- Adequacy of shelter for housing in emergency situations
- Adequacy of shelter for housing in informal settlements
- Adequacy of housing in private developments

- Adequacy and comparison of specifics of design or layout
- Case studies and comparisons in different contexts such as different geographic, social or economic settings.

#### **9.4 Further research**

The detail of accessibility of housing authorities as per phase 1 of the data collection could potentially contribute to better understanding if and how access to housing and the accessibility of housing authorities correlate.

The model leaves a lot of scope to conduct case studies and comparisons through its contribution, and further research through case studies is possible. Such research could also include determining the subjectivity of the assessment.

The model is open to interpretation based on geographic, cultural, organisational and personal preferences. This will mean that the relative importance of elements and sub-elements is expected to differ, and further research could be conducted in this regard.

During the research, a lot of information was found regarding the following aspects that was not necessarily applicable to the study for adequacy of housing, but could however provide scope for future research:

- Informal vs formal housing
- Emergency or disaster situations
- Relocation and resettlement.

Limitations excluded from this study could provide scope for future studies on adequacy of:

- Provision system such as
  - Scope and set-up of housing committees and departments
  - Involvement of public sector or state in provision
- Critique on policies, legislation, legal processes, or other official documentation and governance processes and legislation.
- Manner of usage such as:
  - Selection of beneficiaries,

- Loan assistance,
- Rental management schemes etc
- Rent control
- House-price appreciation
- Cost of maintenance
- Housing subsidies
- Statistics and feedback on historical progress or provision.
- Construction standards and specifications that are not focussed on housing or residential buildings.
- Design processes
- Housing of non-human species

## **9.5 Summary**

This document followed the structure delineated in 1.2, and concluded in this chapter with a short summary of the research findings, contribution of the data and the possibility of future research. It is concluded that a universal model for evaluating the adequacy of shelter for housing has been established.

## 10 REFERENCES

- Abass, Zanaib Ibrahim and Tucker, Richard 2018. Residential satisfaction in low-density Australian suburbs: The impact of social and physical context on neighbourhood contentment. *Journal of Environmental Psychology*,(56) 36-45.
- Alberta - Canada, Health 2012. Minimum Housing and Health Standards. Alberta, Canada: Government of Alberta.
- Alharahsheh, Husam Helmi; Pius, Abraham 2020. A review of key paradigms: positivism vs interpretivism. *Global Academic Journal of Humanities and Social Sciences*, 2,(3) 39-43.
- Aljarallah, S. and Lock, R. 2020. An investigation into Sustainable e-Government in Saudi Arabia. *The Electronic Journal of e-Government*, 18,(1) 1-16.
- Arnot, Chris D. Luckert, Martin K. and Boxall, Peter C. 2011. What is Tenure Security? Conceptual Implications for Empirical Analysis. *Land Economics*, 87,(2) 297-311.
- Aroni, Samuel 1975. The ecology of housing. *Ekistics*, 39,(235) 372-376.
- Asase, Mizpah Yanful, Enerst K. Mensah, Moses Stanford, Jay and Amponsah, Samuel 2009. Comparison of municipal solid waste management systems in Canada and Ghana: A case study of the cities of London, Ontario, and Kumasi, Ghana. *Waste Management*, 292779-2786.
- Australia, JPX Consulting Pty Ltd 2010. National Community Housing Standards Manual. *Families, H., Community Services and Indigenous Affairs (Fahcsia)*, Queensland, Housing NSW.
- Azerbaijan, Republic 2009. Housing Code of the Azerbaijan Republic. *Law of the Azerbaijan Republic*,
- Baker, Emma and Lester, Laurence 2017. Multiple housing problems: A view through the housing niche lens. *Cities*,(62) 146-151.
- Bangladesh, National Housing Authority 2016. National Housing Policy. *National Housing Authority Grihayana Bhaban*, 82 Segunbagicha, Dhaka
- Barber, Rebecca J. 2008. Protecting the Right to Housing in the Aftermath of Natural Disaster: Standards in International Human Rights Law. *International Journal of Refugee Law*, 20,(3) 432-468.
- Baumans, V. and Van Loo, P.L.P. 2013. How to improve housing conditions of laboratory animals: The possibilities of environmental refinement. *The Veterinary Journal*, 19524-32.
- Behr, Daniela M; Chen, Lixue; Goel, Ankita; Haider, Khondoker Tanveer; Singh, Sandeep; Zaman, Asad. 2021 Introducing the Adequate Housing Index (AHI): A

- New Approach to Estimate the Adequate Housing Deficit within and across Emerging Economies *In Series*.
- Belarus, Republic of 2012. Housing Code of the Republic of Belarus. *Republic of Belarus*.
- Bhutan, Ministry of Works and Human Settlement 2020. National Housing Policy. Bhutan, Ministry of Works and Human Settlement.
- Bogdon, A. and Can, A 1997. Indicators of Local Housing Affordability: Comparative and Spatial Approaches. *Real Estate Economics*, 25,(1) 43-80.
- Braun, Virginia and Clarke, Victoria 2021. One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, 18,(3) 328-352.
- Breene, Keith. 2019. *Which countries are best at English as a second language* [Online]. World Economic Forum. [Accessed 2023].
- Creswell, John W. Hanson, William E. Plano Clark, Vicki L. and Morales, Alejandro 2007. Qualitative Research Designs: Selection and Implementation. *Counseling Psychologist*, 35,(2) 236-264.
- Croatia, Parliament 2001. Law on Socially Incentived Housing. *The President of the Republic of Croatia*.
- Czech, Ministry of Regional Development 2016. Czech Republic Housing Policy. *Ministry of Regional Development CZ*.
- Dalbem, Renata Grala da Cunha, Eduardo Vincente, Romeu Figueiredo, Antonio Oliveira, Rui and Da Silva, Antonio César Silveira Baptista 2019. Optimisation of a social housing for south of Brazil: From basic performance standard to passive house concept. *Energy*, 1671278-1296.
- Djebarni, R and Al-Abed, A 2000. A theoretical and methodological approach to the study of residential satisfaction. *Property Management*, 18,(4) 230-242.
- Douglas, David 2003. Inductive theory generation: A grounded approach to business inquiry. *Electronic Journal of Business Research Methods*, 2,(1) 47-54.
- Dubin, R. 1978. *Theory Building*, Free Press.
- Ethiopia, Government of the Federal Democratic Republic of Ethiopia 2016. Urban Housing Policy & Strategy. Addis Ababa, Ministry of Urban Development & Housing.
- Field, Erica 2005. Property Rights and Investment in Urban Slums. *Journal of the European Economic Association*, 3,(2/3) 279-290.
- Finland, Department of Housing and Building 2005. The National Building Code of Finland - Housing Design Regulations and Guidelines. *Ministry of the Environment*, Helsinki

- Ghana, Government of 2015. National Housing Policy. Ghana, Ministry of Water Resources, Works and Housing.
- Glaser, B.G. and Strauss, A.L. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Aldine Transaction.
- Gligor, David M. Esmark, Carol L. and Gölgeci, Ismail 2016. Building international business theory: A grounded theory approach. *Journal of International Business Studies*, 47,(1) 93-111.
- Guyana, Laws of 1998. Housing Act. *Laws of Guyana*.
- Haffner, Marietta E.A.; Oxley, Michael J. 1999. Housing Subsidies: Definitions and Comparisons. *Housing Studies*, 14,(2) 145-162.
- Hardman, Anna 1993. Housing Indicators: A tool for housing research in Europe? *Netherlands Journal of Housing and the Built Environment*, 8,(1) 67-76.
- Heath, Helen and Cowley, Sarah 2004. Developing a grounded theory approach: a comparison of Glaser and Strauss. *International Journal of Nursing Studies*, 41,(2) 141-150.
- Ho, Michael H.C.; Chiu, Rebecca L.H. 2002. The impact of accessibility on housing expenditure and affordability in Hong Kong's private rental sector. *Journal of Housing and the Built Environment*, 17,(4) 363-383.
- Husna, S and Nurizan, Y 1987. Housing provision and satisfaction of low-income households in Kuala Lumpur. *Habitat International*, 11,(4) 27-38.
- Ibem, Eziyi O. Adebayo, Albert B. and Alagbe, O.A. 2015. Similarities and differences in residents' perception of housing adequacy and residential satisfaction. *Journal of Building Performance*, 6,(1) 1-14.
- Ibem, Eziyi O. Opoko, Akunnaya P. Adebayo, Albert B. and Amole, Dolapo 2013. Performance evaluation of residential buildings in public housing estates in Ogun State, Nigeria: Users' satisfaction perspective. *Frontiers of Architectural Research*, 2178-190.
- Iceland, Ministry of Welfare 1998. Housing Act. *Iceland Ministry of Welfare*,
- Iraq, Republic of 2010. Iraq National Housing Policy. Baghdad, Ministry of Construction and housing.
- Ireland, Ministry of Housing - Planning and Local Government 2019. Housing (Standards for Rented Houses) Regulations. Ireland: Ministry of Housing - Planning and Local Government.
- Iwata, Shinichiro and Yamaga, Hisaki 2009. Land Tenure Security and Home Maintenance: Evidence from Japan. *Land Economics*, 85,(3) 429-441.
- Izadifar, Atoosa Yazdanfar, Seyed-Abbas Hosseini, Seyed-Bagher and Norouzi-Maleki, Saeid 2014. Relationship between Support of Social Activities and Fear of Crime in Iran Residential Complex. *Asian Conference on Environment-*



- Behaviour Studies*. Chung-Ang University, Seoul, South Korea: Procedia - Social and Behavioral Sciences.
- Jamaica, Ministry of Housing 1973. The Housing Act. *Ministry of Housing*, Jamaica
- Kaza, Nikhil 2010. Understanding the spectrum of residential energy consumption: A quantile regression approach. *Energy Policy*, 386574-6585.
- Kazakhstan, Republic of 1997. On Housing Relations. *Republic of Kazakhstan*, Kazakhstan
- Kim, Sun-Sook Yang, In-Ho Yeo, Myoung-Souk and Kim, Kwang-Woo 2005. Development of a housing performance evaluation model for multi-family residential buildings in Korea. *Building and Environment*, 461103-1116.
- Kingdom of Bahrain, Ministry of Housing 2010. Standard Specification for Housing Projects - Part 1 (Houses and Apartments). Ministry of Housing - Kingdom of Bahrain.
- Kingdom of Lesotho, and Majale, Michael 2018. Lesotho National Housing Policy. Kingdom of Lesotho Ministry of Local Government and Chieftainship.
- Kuwait, Law 1993. Concerning Housing Welfare and Amending Laws Thereto. *Public Authority for Housing Welfare (PAHW)*, Official Gazette (Kuwait Al-Youm)
- Lagerkvist, Anders 2006. Academic research on solid waste in Sweden 1994-2003. *Waste Management*, 26277-283.
- Mahapatra, Sadhan and Dasappa, S. 2012. Rural electrification: Optimising the choice between decentralised renewable energy sources and grid extension. *Energy for Sustainable Development*, 16146-154.
- Malaysia, Laws of 2021. Employees' Minimum Standards of Housing, Accommodations and Amenities Act 1990. *The Commissioner of Law Revision*, Malaysia
- Maldives 2008. Maldives National Housing Policy. Male, Maldives, Ministry of Housing and Urban Development.
- Malta 1949. Housing Act. *Director of Social Housing*,
- Mara, D.D. 2003. Water, sanitation and hygiene for the health of developing nations. *Public Health*, 117452-456.
- Marshall, Ian H. 1969. Housing Standards: dogma for design. *Official Architecture and Planning*, 32,(11) 1355.
- McCray, J and Weber, M.J. 1991. Perception Boundaries: A Proposed Sociopsychological Framework for Housing Adequacy. *Housing and Society*, 18,(1) 49-61.
- McLean, Kristy 2018. Chapter 55 - Housing. *In Constitutional Law of South Africa*. Second Edition ed.

- Mehta, Runit and Bridwell, Larry 2005. Innovative construction technology for affordable housing in Tanzania, East Africa. *Construction Management and Economics*, 2369-79.
- Meir, Isaac A. Garb, Yaakov Jiao, Dixin and Cicelsky, Alex 2009. Post-Occupancy Evaluation: An Inevitable Step Toward Sustainability, Advances in Building Energy Research. *Advances in Building Energy Research*, 3,(1) 189-219.
- Mikeszová, Martina 2007. Socio-Economic Research on Housing in Czech Republic. *Sociologický Časopis / Czech Sociological Review*, 43,(3) 637-646.
- Mohit, Mohammad Abdul and Nazyddah, Nurul 2011. Social housing programme of Selangor “Zakat” Board of Malaysia and housing satisfaction. *Journal of Housing and the Built Environment*, 26,(2) 143-164.
- Moldova, Republic of 2021. About Housing. *Law of the Republic of Moldova*,
- Nepal 2018. The Right to Housing Act, 2075 Act number 12 of the year 2075 (2018). *Nepal*.
- New Zealand, Government 2013. Housing Improvement Regulations 1947. *Ministry of Business, I. a. E.*, Wellington
- New Zealand, Government Ministry of Business Innovation & Employment. 2021. *Healthy homes standards* [Online]. New Zealand. Available: <https://www.tenancy.govt.nz/healthy-homes/> [Accessed 28 June 2021].
- Ngxubaza, Vuyokazi J. 2010. *An investigation of the low cost housing process with specific reference to the Mbashe local municipality*. Master of Technology: Public Management, Cape Peninsula University of Technology.
- Nordahl, Berit I 2014. Convergences and discrepancies between the policy of inclusionary housing and Norway's liberal housing and planning policy: an institutional perspective. *Journal of Housing and the Built Environment*, 29,(3) 489-506.
- Nurizan, Y 1993. Space deficit in low-cost household of Peninsular Malaysia. *Kajian Malaysia*, 11,(1) 56-75.
- Onibokun, A.G. 1985 Housing in Nigeria *In Series*. Ibadan
- Papadopoulos, Anna. 2019. *Revealed: The world's best non-native English speaking countries* [Online]. CEO World Magazine. [Accessed 2023].
- Poland, Ministerstwo Infrastruktury Budownictwa 2016. National Housing Programme. *Budownictwa, M. I.*, Poland.
- Ratcliff, Richard U. 1952. Housing Standards and Housing Research. *Land Economics*, 28,(4) 328-332.
- Republic of South Africa, Government 2009. The National Housing Code - Part 3. South Africa, Department of Human Settlements.

- Republic of the Marshall Islands, Maritime Administrator 2016. Accommodations, Recreational Facilities, Food, Catering, and Water. *Administrator, M.*, Republic of the Marshall Islands.
- Russell, Helen; MCGinnity, Frances; Privalko, Ivan; Enright, Shannen. 2021 Monitoring Adequate Housing in Ireland *In Series*. Dublin
- Russia, The Russian Federation 2021. Housing Code of the Russian Federation. *Council of the Russian Federation*,
- Samoa, Planning and Urban Management Agency 2006. Planning and Development Guidelines for Housing. *Ministry of Natural Resources, E. a. M.*, Apia, Samoa.
- Sarker, Suprateek Lau, Francis and Sahay, Sundeep 2000. Using an adapted grounded theory approach for inductive theory building about virtual team development. *ACM SIGMIS Database: the DATABASE for Advances in Information Systems*, 32,(1) 38-56.
- Scheba, Andreas; Turok, Ivan. 2018 Review of rent to buy with a particular focus on the Institutional Housing Subsidy Programme.
- Schweigert, Thomas E. 2006. Land Title, Tenure Security, Investment and Farm Output: Evidence from Guatemala. *The Journal of Developing Areas*, 40,(1) 115-126.
- Sirmans, G. Stacy and Macpherson, David A. 2003. The State of Affordable Housing. *Journal of Real Estate Literature*, 11,(2) 133-155.
- Smit, Warren. 2008 Analysis of qualitative survey on accessing, holding and trading land *In Series*.
- Sorenson, Susan B. Morssink, Christiaan and Campos, Paola Abril 2011. Safe access to safe water in low income countries: Water fetching in current times. *Social Science & Medicine*, 721522-1526.
- Sousa 2014. Validation in Qualitative Research: General Aspects and Specificities of the Descriptive Phenomenological Method. *Qualitative Research in Psychology*, 11,(2) 211-227.
- South African Cities Network, SA CN. 2011 State of the cities report.
- South African Human Rights Commission, (SAHRC). 2018 The Right to Adequate Housing - Factsheet *In Series*. Braamfontein
- St Lucia, Government 2006. Emergency Housing Management Policies and Guidelines for Saint Lucia. Saint Lucia, National Emergency Management Office (NEMO).
- St Lucia, Government 2008. Saint Lucia National Housing Policy. Saint Lucia, Ministry of Housing, Urban Renewal and Local Government.
- Statista. 2022. *Worldwide digital population July 2022* [Online]. Statista Research Department. Available: <https://www.statista.com/statistics/617136/digital->



- Whitehead, Christine and Scanlon, Kath J (eds.) 2007. *Social housing in Europe*, London: London School of Economics and Political Science.
- Williams Foster, Angela M. 2007. The CHAS Data: Obtaining Estimates of Housing Market Affordability. *Cityscape*, 9,(3) 161-170.
- Wimalasena, Nipuni Nilakshini; Chang-Richards, Alice; Wang, Kevin I-Kai; Dirks, Kim. Housing Quality Indicators: A Systematic Review *In Conference: Sandanayake, Y. G; Gunatilake, S; Waidyasekara, K.G.A.S, ed. 10th World Construction Symposium, 24-26 June 2022 2022 Sri Lanka. CIOBWCS, 531-544.*
- World Economic Situation and Prospects, WESP. 2014 Country Classification *In Series.*
- World Population Review. 2023. *List of countries by continent 2023* [Online]. Walnut, California, USA: World Population Review. Available: <https://worldpopulationreview.com/country-rankings/list-of-countries-by-continent> [Accessed 2023].
- Yang, Zan; Shen, Yue 2008. The affordability of owner occupied housing in Beijing. *Journal of Housing and the Built Environment*, 23,(4) 317-335.
- Zambia, Republic of 2020. National Housing Policy 2020-2024. Zambia, Ministry of Housing and Infrastructure Development.
- Zimbabwe 1972. Housing Standards Control Act. *Minister of Local Government Public Works and National Housing.*