Jahangirnagar University Planning Review ISSN 1728-4198
Vol. 21, June 2023, pp. 81-94, © Jahangirnagar University

Approaches of Measuring Housing Affordability: Retrofitting Affordability Approach from Replicability to Reality

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Abstract

Unprecedented urbanization along with concern for affordable housing in developing countries require to rethink about the comprehensive approach of measuring affordable housing that fit as per their socio-economic, institutional, and legal context. However, developing countries are replicating the typically used ratio approach that has been picked from the developed English speaking nations for measuring housing affordability. It has been evident that contextual differences between that of English speaking countries and developing countries underpinning the tension of theoretical rigor versus policy implications along with affordable housing versus housing standard and housing induced poverty. Hence, this study explores the critical overview of approaches for measuring housing affordability from global practices. To attain the objective, this study adopts qualitative approach. The argument to explore the critical overview of approaches of measuring housing affordability have been crafted from related literature. The defining criteria of affordable housing in the USA, UK, Australia and developing countries have been reviewed. Herein, gross scenario of Dhaka city as an example of developing country has been considered. Finally, to explore the critical overview of different approaches of measuring housing affordability, emergence, significance, recommended authority, and major criticism has been portrayed through review of literature. Result found that the definition of housing affordability has been delineated from different point of views. The current trend of defining housing affordability not only includes the financial dimensions but also social and environmental dimensions. Hence, the typical method of measuring housing affordability may not meet the criteria of affordable housing. For instance, The USA, UK, Australia and developing countries define affordable housing through fixing benchmark of 30%, 25%, 30-40% and 30% of total household income respectively considering financial dimension solely. There are basically two contrasting approaches of measuring housing affordability. One is ratio approach which may be measured as ratio of income and house rent, mortgage and house price and does not consider housing standard and other non-housing cost that determines quality of life. Another approach is residual income approach that eliminates criticism of ratio approach through incorporating the housing standard and other non-housing cost. In addition, multiple decision making model incorporates the environmental dimensions in housing affordability. In the meantime, context of Dhaka city reveals that social dimensions and environmental dimensions need to be incorporated in measuring housing affordability. Hence, more than one measure can be considered while formulating policy to achieve enhanced housing and transportation infrastructure, a better quality of life, improved housing for the poor in developing countries like Bangladesh.

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1. Introduction

The concern for affordable housing is gaining a significant momentum over last few decades in developing countries due to rapid urbanization, shortage of housing supply, poor governance and lack of policy instruments (Nwuba & Kalu, 2018). Due to increasing housing cost burden along with these factors, there is an increasing debate on the concept of affordability and measures that can truly measure housing affordability. The conversional methods of measuring housing affordability such as housing expenditure to income ratio though widely practiced are not free from flaws since they consider only the housing related cost indicators ignoring the physical adequacy and overcrowding. Over the years, these traditional methods have been advanced in growing number of studies incorporating sustainable housing and poverty aspects. Despite these efforts debate over the theoretical basis and contextual applicability of the affordability measures demands a re-examination of the conventional definition and traditional methods. In this respect, this paper reviews various researches exploring the affordability concept and challenges of affordability measures with reference to a developing county megacity context like Dhaka.

Dhaka city accommodating about 25 million people in 1528 sq.k.m area is characterized by chaotic development (Kamruzzaman et al., 2014), violation of plans and policies (RAJUK, 2016), weak institutional capacity, spontaneous market prices hikes (Haque, 2019) that significantly affect living cost and quality of life of the poor. Here a significant portion of middle-class and lower-class family's monthly income is less than BDT 20,000 (RSTP, 2015). Affordable housing is thus, a grave concern for the city dwellers and the policy makers. National Perspective Plan, 2021 for Bangladesh identifies both the transport and housing affordability as the key challenges for the country's urban areas. At the same time, the plan also identifies access to affordable urban housing as an increasing problem in the country, as population pressure increases and prices of land and construction costs rise. Besides, the cost of all daily necessities is too high in the kitchen market of Dhaka city, making things worse for those on fixed income. Most popular method of measuring affordable housing especially in developed countries is income and house rent ratio approach that has been replicating in developing countries (Badhan & Siddika, 2019; Stone, 2006; Stone, 2011; Belsky et al., 2005; Yates & Gabriel, 2006). This approach recognizes affordable housing as those which consumes less than 25-40% of total household income for housing purposes considering their developed institutional and legal context along with strong economy (Belsky et al., 2005; Yates & Gabriel, 2006; Tang, 2009; CNT, 2020). However, contextual differences between that of developed countries and developing countries underpinning the tension of theoretical rigour versus policy implications along with affordable housing versus housing standard and housing induced poverty (Stone, 2011; Burke, 2012; Nwuba, C. C., & Kalu, 2018). Considerable studies have been conducted also in Dhaka city to explore the picture of housing affordability (Road et al., 2012; Jahan, 2012; Sharna et al., 2016; Giti, 2018; Razon & Ahmad, 2017; Badhan & Siddika, 2019; Rahaman & Ahmed, 2016) all of which are based on income to cost ratio without considering the standard of housing and quality of life. Thus, non-housing cost issues are being ignored in current researches that are being conducted focusing housing affordability in Dhaka city. However, there is a strong evidence in legal, institutional, and economic condition of Dhaka city that housing cost

burden may impact non housing cost and the quality of life of the poor. Therefore, it is necessary to re-examine the housing affordability concept and affordability measures that can capture the social and economic dimensions of the society.

2. Objective and Methodology

Considering the theoretical rigor of measuring housing affordability, this study intends to explore the critical overview of affordability meaning and approaches for measuring housing affordability from global practices. The fulfillment of this objective may generate a knowledgebase that may contribute to underscore the necessity for development of a multidimensional approach for measuring housing affordability considering the context of a developing country. Herein, the contemporary practices of measuring housing affordability in Dhaka city have been used as an example as Dhaka city is experiencing reckless rural urban migration (RSTP, 2015; RAJUK, 2016) that affect housing sector significantly (Stone, 2006). To attain the objective, this study adopts qualitative approach. The argument to explore the critical overview of approaches of measuring housing affordability has been crafted from relevant literature.

Firstly, a review of related literature was undertaken between March 2023 to May 2023. Definition and measurement methods of housing affordability were explored leading to an understanding of the strengths and limitations related to each method. One of the main selection criterion was housing affordability concept and measurement approach. Peer reviewed journal papers were given priority. However, papers and repots on application of the approaches at different contexts were also considered. For affordability concept purposes, Hulchanski, 1995; NHPAU, 2010; Mayo & Stephens, 1992; Jones et al., 2011; NAR, 2017; CNT, 2020; Stone, 2006; Marshal et al., 2000; Tang, 2009 have been reviewed. Secondly, defining criteria of affordable housing in the USA, UK, Australia and developing countries context were explored. Additionally, transit oriented development (TOD) area was also considered as special planning area where housing sector is significantly affected due to increased land value. For this purposes, Belsky et al., 2005; Yates & Gabriel, 2006; Tang, 2009; Wetzstein, 2017; Abad et al., 2016; Dewita, 2018; Fariha et al., 2018; Dewita et al., 2019; CNT, 2020; Stone, 2011 have been reviewed.

3. Housing Affordability from International Context: Ratio Approach Versus Residual Income Approach

Housing affordability is generally described as households' capability to obtain decent housing without experiencing much financial hardship. The Earlier attempts by researchers to define housing affordability was primarily focused on the economic dimension (Table 1). For instance, according to Howenstine's definition of housing affordability is 'The ability of the household to acquire decent accommodation by the payment of a reasonable amount of its income on shelter' (Howenstine, 1983). Another popular definition says 'Affordability is concerned with securing some given standard of housing (or different standards) at a price or rent which does not impose, in the eye of some third party (usually government) as unreasonable burden on household incomes' (Maclennan & William, 1990; p.9). However, their concept of a 'given standard of housing' and 'unreasonable burden' was also not comprehensive. Thus, these two definitions highlight two issues (1) Accessibility of housing at a reasonable cost and (2)

obtaining and maintaining a given standard of housing that doesn't cause any economic hardship. Another comprehensive definition by Bramley in 1990 says 'Household should be able to occupy housing that meets well-established (social sector) norms of adequacy (given household type and size) at a net rent which leaves them enough income to live on without falling below some poverty standard' (Bramley, 1990). The weaknesses in the concept created an understanding of housing affordability that does not suggest any form of measurement approach (Stephen & Hoskara, 2019). However, there are also some researchers who tried to distinguish the concept of affordability from its measurement approaches. For instance, Chapman (2006), who said that housing affordability measure the financial outcome for a household of renting or purchasing the house. Additionally, some researchers started to consider some non-monetary dimensions into the concept and measurement of housing affordability. To incorporate this non-monetary dimensions, Leishman & Rowley (2012) suggested that housing affordability should be comprised of housing standards and appropriateness along with social, neighborhood issues and economic participation. However, Rowley & Ong (2012) questioned the extent to which neighborhood quality is addressed when evaluating the appropriateness of affordable housing with regards to cost (Stephen & Hoskara, 2019).

Now, while translating the concept of affordability to measure the level of affordability, globally, it is noted in the literature that the common practices for measuring housing affordability includes ratio of income to rent approach (for rental housing); H+T index[3] (Mostly in TOD area); ratio of house price and income approach; ratio of income and mortgage approach and residual income approach. Table 1 shows the general configuration of these approaches. A school of thought (Stone, 2006; Burke et al., 2011 & Hancock, 1993) claimed that ratio approach for measuring housing affordability is theoretically and practically flawed and there is no underpinning rational behind the normative benchmark of 30% or 45% standard. The residual income approach considers the housing sizes, demands and quality of life of different classes of people which underpin the rationality of measuring affordability. Hence, housing demand and housing quality based on economic classes differentiate the theoretical paradox between two classes.

Additionally, ratio approach fails to capture the neighborhood characteristics along with non-housing needs that are left over after paying the rent (Belsky et al., 2005; Stone, 2006). These non-housing cost determines the quality of life (Stone, 2006; Mayo & Stephens, 1992; Jones et al., 2011) and thus, traditional ratio approach only depict the widespread of housing affordability problem rather housing induced poverty. In the meantime, the residual income approach starts by identifying key categories of essential spending, which include food, health care, transportation, and child care (Stone, 2006). Therefore, there are significant differences between these two approaches, which have been portrayed in the Table 1. The Table 1 reveals that ratio approach is concerned with the financial burden of housing.

[3] H+T index is expressed as ratio of total household income and housing plus transport cost, if the total cost exceeds 45% of total income, the housing is considered as unaffordable.

Table 1: Approaches of Measuring Housing Affordability

Method/Model/ emphasis	Description	Variables Considered	Recommended By	Significance	Major Criticism
Ratio of income and rent approach (RIR)	It is expressed as the ratio of median annual income and median annual cost for housing. Thus, it represents how much of household income is being consumed for housing cost that includes cost for utilities also.	Income of household, house rent and utility bills.	Word Bank and United Nations	It represents the ability to pay for housing and housing affordability scenario among the tenants.	It does not consider the non-housing cost of tenants and their socio-economic conditions and demands.
H+T Index (Housing +Transport)	By calculating the transportation expenses related to a residential area, the Housing+ Transportation (H+T) Affordability Index is used to gauge housing affordability. Herein, H+T is expressed as ratio of total household income and if the total cost exceeds 45% of total income, the housing is considered as unaffordable. It also considers utility bills in housing cost. Generally, 30% is considered for housing purposes and 15% for transport purposes.	Transportation cost, house rent and utility bills	Center for Neighborhood Technology (CNT)	It represents the location wise housing affordability in TOD area for tenants.	It does not consider the non-housing cost of tenants and their socio-economic conditions and demands.
Ratio of house price to income approach (PIR)	It delineates the indication of affordable house price as compared to income level at the median level. In this approach, ability of residents to buy a house is considered and thus, percentage of household income is saved for buying a house in respect of house price in free market is considered.	Free market price of house and annual income level of households at median income level	World Bank; United Nations; Dermographia International and Center for housing Studies of Harvard University.	Explores housing market performance in relation to the economic condition of residents.	It does not explore the potentialities and challenges of housing accessibility under current housing price; It does not applicable to estimate affordability over a time period.
Ratio of income and mortgage approach	This approach stipulates that the monthly mortgage should not be more than a certain proportion of monthly income, assesses the	Income level and details of cost for livelihood of households.	Real estate financial institutions.	Explores the threshold income of household for qualifying	This approach does not consider the living

Method/Model/ emphasis	Description	Variables Considered	Recommended By	Significance	Major Criticism
	affordability of repayments for households which have borrowed money to buy their houses. The housing is called unaffordable for those household if the repayment on the mortgage each month exceeds the established threshold (let's say 20 to 30%).			toward loans for typical housing.	quality after mortgaging the property for housing. Thus, this approach holds the similar drawback of other ratio approach.
Residual Income Approach	The capability of households to retain a basic living standard after spending for housing costs is represented in their ability to satisfy non-housing demands at a minimum level of sufficiency, according to the residual income approach to gauging housing affordability. This approach concentrates on the amount of money that is still available after paying for housing. Hence, gap between the costs rather than a ratio is the proper indicator of the link between housing expenses and incomes is shown in this approach.	Income level and details of cost for housing and livelihood of tenants along with housing quality.	Currently some scholars recommending this approach for better representation of housing affordability	It may explore the welfare system; Actual scenario of housing affordability problems of city; standard of living; Highly applicable for less developed countries, adequately explores relationship among income level, and the composition of housing.	This approach is more complex than other approaches. Besides, data collection and data analysis are more complex for this approach.
Affordability is a Multi-dimensional concept	Housing Affordability concept should be connected with housing adequacy standards along with social and economic and neighborhood issues.	Socio economic	Not yet been used to measure affordability	Represents the habitability of housing	
Multiple criteria decision making model	Housing affordability should consider economic, social and environmental criteria that have an impact on household's quality of life.	Social economic and environmental	Not yet been used to measure affordability	Represents the habitability and sustainability	Complex method to apply in different contexts

Source: Author adopted from, Hulchanski, 1995; NHPAU, 2010; Mayo & Stephens, 1992; Jones et al., 2011; NAR, 2017; CNT, 2020; Stone, 2006; Marshal et al., 2000; Tang, 2009. Leishman & Rowley, 2012; Mulliner, et al., 2016.

However, most comprehensive definition of affordable housing by Bramley, reveals that 'Household should be able to occupy housing that meets well-established (social sector) norms of adequacy (given household type and size) at a net rent which leaves them enough income to live on without falling below some poverty standard' (Bramley, 1990; p.16). Hence, indicators of actual affordability in housing may include the necessary

space to reside in dignity and stability, as well as safeguarding from outside forces, structural hazards, and vectors of illness that endanger physical health of people (Bramley, 1990; Road et al., 2012). Concurrently, variables used in residual income approach includes, details of cost for housing and livelihood of tenants along with housing standard (Stone, 2006; Burke, 2012). Therefore, residual income approach as compared to ratio approach disclose not only housing scenario but also scenario of quality of livelihood that may explore diverse aspects of life especially for urban poor. In addition, the measure includes a small allowance for other necessary expenses, such as clothing and household goods, and incorporates estimates of income taxes owed (or tax credits received) (Herbert & Mccue, 2018). Therefore, housing affordability problem may be more acute when affordability is measured by the residual income approach. Burke, (2012) claimed that housing affordability level might reduce about 10%-20% when it is measured by residual income approach instead of traditional ratio approach. Hereafter, applicability of residual income approach needs to reconsideration for better representation of affordable housing in developing countries considering social, economic, legal, and institutional framework.

4. Affordable Housing: Defining Criteria by Major Developed and Developing Countries

Universal truth of affordable housing that there is lack of universal consensus on how to define or assess housing affordability, and no one metric can adequately reflect the range of issues surrounding people's ability to find excellent housing in a suitable location at an affordable price (Organiztion for Economic Co-opration and Development, 2021; Jones et al., 2011; Stone, 2006). The socio-cultural differences may be the major reason of this controversy. Table 2 represents the defining criteria of affordable housing from developed country context to developing country context.

Table 2. Definition of Affordable Housing from International Context

Context	Emergence	Definition
The USA	In late 1960s and early 1970s	Commonly 30% benchmark of total household income is used to define affordable housing. If the cost for housing including utilities consumes less than 30% of total household income, the housing is considered as affordable housing. The total cost between 30% to 50% is considered as cost burdened house and more than 50% is considered as severely cost burdened house.
Australia	1990s	Australia uses 30/40% benchmark for defining housing affordability in private housing. However, for social housing 25% of total income is considered.
The UK	1990s	The local government department of the UK define affordable housing using 25% benchmark of total household income.
Developing Countries	2000s	The traditional ratio approach considering 30% benchmark of total household income are used to define housing affordability. This benchmark is frequently being used in Philippine, Pakistan, Indonesia, India and Bangladesh.

Context	Emergence	Definition
Most of TOD area	2000s	The Housing + Transportation (H+T) affordability index is a technique for calculating housing affordability by factoring in the transportation expenses related to where a person chooses to live. Total 45% benchmark of household income (30% for housing and 15% for transportation). This method was developed by "The Center for Neighborhood Technology" in the USA, 2020.

Source: Adopted from, Belsky et al., 2005; Yates & Gabriel, 2006; Tang, 2009; (Wetzstein, 2017; Abad et al., 2016; Dewita, 2018; Fariha et al., 2018; Dewita et al., 2019; CNT, 2020; Stone, 2011.

5. Housing Affordability in Dhaka City

The urbanization of Bangladesh, standing at a crossroad, struggling to reach upper-middle income status which is only possible when the cities especially Dhaka do realize their full potential (Bank & Venables, 2019). Herein, 90% of total structures are constructed for residential use (Badhan & Siddika, 2019). Dhaka, the capital city of Bangladesh is performing as sole economic, political, administrative, and cultural center of the country. Apart from higher population growth and consistently rapid inward migration from rural areas, concentration of economic activities and better job opportunities than other cities reinforced policies towards expansion of Dhaka (Ahmed & Bramley, 2015). Dhaka is experiencing a shortage of affordable housing of all types as a result of a complex interplay of different underpinning causes. Dhaka's housing sector consists of a formal sector (45%) including government or public housing, cooperative housing and private housing, and an informal sector (55%) comprises private housing supplied by illegal small private developers (RAJUK, 2016). Public housing is mainly provided by RAJUK (75%) and predominantly allocated to public servants.

Additionally, there is a huge gap between demand and supply for affordable housing, which is predominantly controlled by the private sector (Haque, 2019). The share of public housing supply is only 7 percent, even private supply of housing is highly skewed and 53 percent of this come from informal sector (BIGD, 2017). Each year approximately 25,000 new housing unit are supplied in response to the demand of about 0.12 million (RAJUK, 201). Hence, low income people in Dhaka city are being compelled to reside in dilapidated housing that they can afford. Thus, living environment and housing quality may be pressing concern in measuring housing affordability in Dhaka city.

In addition, it has been evident that because of high land price middle income group can hardly afford the rent in city. Around 56 percent of the city dwellers live in rented place and the number would be around 70 percent if the slum people are included (RAJUK, 2016). In another hand, an empirical investigation claimed that 44% households near the MRT line-6 [4]of selected stations is affordable in terms of only housing cost considering the benchmark of 30% share of income. From the consideration of transportation cost, the study identified 81% households near the MRT line is affordable comparing with the benchmark of 15% share of the total household income (Haque et al., 2019). This scenario may be more acute, if residual income approach is applied to measure the housing affordability level. Additionally, housing induced poverty may be another concerning

[4] MRT Line 6 is the first mass rapid transit in Dhaka city that connects Uttara and Motijhheel via Mirpur, Agargaon, Farmgate, Shahbagh and Paltan area. The selected literature examined Mirpur 11 station.

issue in context of Dhaka city. Similar scenario can be observed in Philippine, Pakistan, Indonesia, India. They also use ratio approach (Wetzstein, 2017; Abad et al., 2016; Dewita, 2018; Fariha et al., 2018; Dewita et al., 2019; Un-Habitat, 2012). Hence, it is high time to rethink about the approach of measuring housing affordability in these contexts.

6. Discussions

As discussed earlier the debates, concerns and opinions about the concept of housing affordability reflect the different norms and core concerns of researchers of different academic or professional interests. While the focus of the economists revolve around concept clarity, utility, and objectivity, sociologists tend to focus on social inequality and the research capacity of housing affordability to capture real-world experiences of household housing stress and architects mostly focus on creating savings and cost savings. This varied academic orientation led to underpinning the weaknesses in conventional measurement methods and arguments in support of methods that better reflect the concept of affordability (Ezennia & Hoskara 2019).

It is evident from the discussions in the above sections that since so far there is no agreed standard by which affordability can be defined or measured, most countries adopt a simple '30%-40% rule'. This method that calculates the proportion of income spent on housing and housing related cost is so far the most commonly accepted and internationally recognized method of measuring affordability. its relative advantage of 'easy to calculate' taking only few accessible variables also makes it less effective to address a number of factors that can potentially affect affordability and household situation. Even after a wider recognition of the limitations and weaknesses about this overly simple 'standard method' among the intellectuals this rule of thumb still persists generally for housing policy purposes and for allocation of housing vouchers or for grants in many developed countries. However, in the developing country contexts the 'standard rule' is severely flawed since the current housing situation is an outcome of complex interplay of social, economic, political and environmental factors.

Although the concept of housing affordability has received considerable attention over the last decades, the inherent meaning and measurement of housing affordability still remains a challenge. The critical overview of different approaches for measuring housing affordability reveals that quality along with affordability of housing are major underpinning factors of creating theoretical paradox among different approach. The justification for measuring housing affordability is that the proportion of housing rent to income is not an accurate indicator of the difficulty caused by housing expenditures. It explores only cost burden of housing however, neither the negotiation scenario cannot be represented (Stone, 2006; Burke et al., 2011 & Hancock, 1993) nor can represent the housing cost differences due to perceived better location or neighborhood quality (Bogdon,1997). This traditional simple method also fails to take into account tradeoffs households can and do make to lower housing costs (Belskyet al. 2005). According to them these tradeoffs such as poor quality housing, distressed neighborhoods, or crowded conditions, longer commutes etc. can leave them spending more than 30 per cent of their income. Thus, just because a household has an 'affordable dwelling' does not essentially mean it has 'affordable living' (Stone et al., 2011). Therefore, housing affordability must include quality and location tradeoffs (Rowley & Ong, 2012). Even in the developing

counties the affordability problems are not only confined within rent burden of housing but also non-housing cost burden and the tradeoffs. It has been evident that low income people in developing countries especially in slum areas negotiates with standard of housing for cost burden (Kaufman, 2003, Nasrin, 2011; The Daily Star, 2019). Hence, traditional affordability measures such as ratio approach may not be appropriate to explore actual housing conditions of low income people in developing countries. Since, the ratio approaches fail to represents the actual scenario of affordable housing, the vision of 2030[5], for representing equitable access to affordable housing, the residual income approach that can address tradeoffs considering economic as well as social dimensions justified the range of achievable realistic consumption parameters for determining house affordability. Yet, it has several similar limitations to those of other contemporary metrics (Burke et al., 2011). The complexity of data requirement and data representation may hinder the implication of residual income approach (Stone, 2006). However, these limitations are neglectable. Regarding its burdensome relevant data and determining the minimal level for the non-housing requirements, application is limited for residual income approach, especially in developing nations like Bangladesh where the provision of trustworthy data is a recurring problem. Hence, it follows that governments in developing nations must build up procedures to ensure the frequent availability of current data on wellbeing and create social welfare system that will define minimal living standards.

7. Conclusions

Housing affordability, as a concept, is a complex and multi-dimensional in nature. Thereby, measuring affordability must entail multi dimensional aspects. The researchers suggest that housing affordability must be defined and measured in a more comprehensive way, require a new paradigm that goes beyond the monetary implications experienced by households. Literary arguments and debate over the issue clearly portray that it is not possible to address all aspects related to affordability within one simple measure. Therefore, to gain a better insight into the problem, affordability must not be analyzed using just one definition or concept or measure. Housing scenario in developing counties characterized by ever increasing demand for low cost housing fuelled by rural urban migration, lack of accessibility, insecurity of tenure, unplanned urbanization and lack of policy framework particularly demands a more comprehensive method. The method should be able to address issues such as housing adequacy, e.g., physical and neighborhood quality, transportation, location and access to services and appropriateness in addition to income and expenditure aspects. However, one single measure that could fits all dimensions while assessing affordability is problematic (McCord et al., 2011). Therefore, more than one measure can be considered while formulating policy to achieve enhanced housing and transportation infrastructure, a better quality of life, improved housing for the poor.

[5] Vision 2030 refers the goal of sustainable development. Herein, goal 11.1 states that everyone must have access to affordable, safe, and quality housing.

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