

Towards a More Nuanced Approach to Measuring Housing Affordability

Evidence from Pakistan

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Abstract

The inability to afford a decent shelter has a detrimental effect on people's lives, their well-being and productivity, and the broader economy. Given the pervasiveness of the problem on a global scale, housing affordability is increasingly taking center stage in public discourse. Yet, there is little agreement on the definition of housing affordability and how to measure it. This paper draws on academic literature and lessons from government housing programs to evaluate how accurately conventional measures differentiate affordability levels by income segment, household composition, and tenure. With the objective of more accurately measuring the affordability of housing at the household and aggregate levels, the paper recommends testing (i) a

progressive housing Expenditure-to-Income ratio, calibrated by income segment, and (ii) a modified Residual Income Method that uses household expenditure instead of income as well as a simplified budget standard for non-housing expenses. Application of the latter methodology in urban Pakistan highlights a significant underestimation of housing unaffordability using conventional approaches, especially for the lowest income groups. Moreover, the case study indicates that conventional approaches to the measurement of affordability may not adequately reveal the differences in affordability across income segments and household compositions.

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Evidence from Pakistan

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1. Introduction

The inability to afford a decent shelter has a detrimental effect on people's lives, their well-being and productivity, and the broader economy. In the 1970s and 1980s, the unaffordability of housing was considered a problem of lower-income groups; today, it encompasses middle-income households in many of the world's cities. Attempts in both developed and developing economies to stem the growing differential between income levels and housing prices have had limited impact. According to the McKinsey Global Institute, the affordable housing gap is \$650 billion a year and will impact 1.6 billion people by 2025 (Garemo et al. 2014).

Given the pervasiveness of the problem on a global scale, housing affordability is increasingly a focus of public discourse – for policy makers, politicians, academics, industry professionals, and communities alike. Yet, there is little agreement on what affordability means, how to measure it, and whether the conventional measures of housing affordability adequately reflect reality. An ill-defined and poorly measured affordability problem can lead to inappropriate policy responses that may have little or no effect on ameliorating housing problems or may even exacerbate them.

The topic of housing affordability is of particular importance to the World Bank and other development institutions. Sustainable Development Goal 11 requires affordable housing for all by 2030 but does not provide a definition of affordability. There is also a lack of clarity or agreement on what an 'affordable house' is and how 'housing affordability' should be defined for those in the bottom 40 percent of the income distribution.

The conventional practice has been to use a standardized housing affordability measure across all income segments (e.g., the 30 percent housing expenditure-to-income ratio). While this may be a rough measure to calculate affordability, it does not always accurately reflect a household's budget reality, particularly for the poor. The inability of such conventional measures to differentiate affordability levels by income segment or household composition or tenure – which are all critical factors that determine what a household can actually afford to allocate for housing – may result in overestimating affordability challenges for some and underestimating it for others.

Accurate measurement of housing affordability at the *aggregate level* is necessary to inform policy design. For example, what portion of the population is housing cost overburdened? Which sub-groups? Which tenure type? Which cities or sub-markets are facing an affordability crisis? What is the real housing deficit by income segment or sub-group? Similarly, an accurate measurement of housing affordability at the *household level* is also necessary to inform program design: How much can a specific household pay for housing without compromising other essential needs? What housing options are available within that housing budget, and where are the gaps? How much and what type of subsidy does the household need to comfortably make housing payments?

This paper provides a review of the prevailing presumptions, standards, and measures of housing affordability, and proposes ways in which they might be adapted for increased accuracy and scalability, particularly in the context of lower-income households in developing countries. Modified measurement methodologies are then applied to urban Pakistan as a demonstration case, concluding that housing unaffordability is significantly underestimated by conventional measures in that market segment, especially the lowest income groups, and do not adequately reveal the differences in affordability across income segments, household composition, and tenure type.

2. The Concept of Affordability

2.1 What Is Housing Affordability?

The looseness of the term 'affordability' makes it very challenging to address from a policy perspective. According to Gabriel et al. (2005), the emergence of housing affordability as a policy problem stems from the fact that more people face high housing costs, but also because governments and interest groups like the building industry and pro-poor advocates conceptualize the issue – its causes and solutions – in vastly different ways. For example, the building industry often attributes housing unaffordability to high housing costs resulting from bureaucratic regulation and taxation, while advocates for the poor blame lack of government investment in public housing. The contested nature of housing affordability is also evident from discussions on how it is measured, as that directly frames policy solutions that are proposed. As such, "housing affordability can never be defined in any objective sense; it will always be subject to reinterpretation and critical analysis." (Gabriel et al. 2005)

According to Quigley and Rafael (2004), housing affordability as a single term mixes together multiple disparate issues, including the distribution of house prices and quality, income levels, household borrowing capacity, public policy, housing supply, and household choices for housing consumption. "This mixture of issues raises difficulties in interpreting even basic facts about housing affordability."

More generally, the understanding of housing affordability has evolved over the past decades from a purely economic concept to one that incorporates broader social, spatial, and environmental dimensions (Ezennia and Hoskara 2019). Debates on the topic have moved beyond mere housing costs and household incomes as its prime determinants, to include the cost of living, quality of life issues, locational choices, housing quality, access to public services and infrastructure, and broader housing market dynamics, including access to finance.

One of the most widely accepted definitions of housing affordability is the following: "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), an unreasonable burden on household incomes" (MacLennan and Williams 1990). Common among most policy and academic definitions is a consideration of both the adequacy of the housing solution and the ability of the user to pay. Some examples² include:

"The notion of reasonable housing costs in relation to income: that is, housing costs that leave households with sufficient income to meet other basic needs such as food, clothing, transport, medical care and education" (Australia. National Housing Strategy 1991).

"The answer is that any rent will be affordable which leaves the consumer with a socially acceptable standard of both housing and non-housing consumption after rent is paid" (Hancock 1993).

"A household is said to have a housing affordability problem, in most formulations of the term, when it pays more than a certain percentage of income to obtain adequate and appropriate housing" (Hulchanski 1995).

² Cited from Robinson, Scobie and Hallinan (2006).

“Physically adequate housing that is made available to those who, without some special intervention by government or special arrangement by the providers of housing, could not afford the rent or mortgage payments for such housing” (Field 1997).

“Definitions of affordability concentrate on the relationship between housing expenditure and household income and define a standard in terms of that income above which housing is regarded as unaffordable” (Freeman, Chaplin, and Whitehead 1997).

“‘Housing affordability’ refers to the capacity of households to meet housing costs while maintaining the ability to meet other basic costs of living” (Burke and Ralston 2004).

“Affordability is not simply a matter of housing costs and income levels; it is about people’s ability to obtain housing and to stay in it” (Housing New Zealand Corporation 2005).

2.2 Why Is Housing Affordability Important?

Housing affordability has implications not only in terms of one’s ability to procure decent shelter, but also for basic human development. It plays an important role in the health of national and local economies. The social and economic benefits of access to affordable, quality housing are well-documented (Rohe and Lindblad 2013; Herbert and Belsky 2006; Rohe and Han 2012; Rossi-Hansberg et al. 2010; Rossi-Hansberg and Sarte 2012; Newman and Holupka 2014; NAHB 2009; Wardrip et al. 2011).

As stated in Yates et al. (2007), and Gabriel et al. (2005), housing affordability can impact the economy in terms of its stability, efficiency, and equity. First, it is strongly connected to a country’s macroeconomy, and the global economy, as was starkly evident during the 2008 global financial crisis. Second, differentials in housing affordability between areas can affect the efficiency of labor markets, with people having to choose between living in areas with good job prospects but unaffordable housing, and areas with cheap housing but weak employment prospects. Third, it can significantly impact wealth distribution at the household level. High housing costs can result in reduced savings, and at the same time, excessive debt that increases exposure to financial risk.

Lack of housing affordability is a significant problem for the economically weaker and more vulnerable segments of society: the poor, elderly, single parents, and persons with special needs. High housing costs often require them to make trade-offs between consumption of housing and non-housing needs. For some, this could mean having to forego ‘decent’ housing in a safe neighborhood in order to pay for food, schooling, and medical care. For others, it could mean living in overcrowded or unsanitary conditions to be closer to jobs, and possibly even homelessness.

In many developing countries and cities where regulations for housing and urban planning are either outdated or unenforceable, lack of housing affordability is a leading contributor to the proliferation of slums and informality as well as urban sprawl. High levels of disparity across income groups in the ability to access housing contribute to the formation of ‘have’ and ‘have-not’ neighborhoods, with implications on employment opportunities, growth potential, education, health, social safety nets, and security. Generally, the concentration of poor households in areas without growth prospects exacerbates their situation through further isolation, marginalization, exclusion, and increased crime and anti-social behavior. By reducing local spending power and deterring investment, such neighborhoods eventually become areas of blight, with grave long-term consequences (Stegman 1998; Gabriel et al. 2005).

2.3 What Is Affordable Housing?

The term ‘affordable housing’ has gained broad traction globally over the past few decades, but there is no single definition of what it means. In many developing countries, ‘affordable housing’ is a *type* of housing product—a noun, rather than an adjective defining the housing in relation to a specific household’s budget. In some countries, it is used to describe lower-priced, market-based (unsubsidized) housing developed by the private sector, while in others it is substituted with – or is analogous to – subsidized social housing or public housing. Social housing, too, is defined very differently across countries: in some places, it may be reasonable to assume that all social housing is ‘affordable’ and all affordable housing is ‘social,’ while in others, this is not the case at all (Garg and Singh, 2022).

While there is no specific literature to support this claim, the usage of the term ‘affordable housing’ seems to be more prevalent in contexts where the private sector is involved in producing the housing (through public-private partnerships or wholly private), and where there is a need to clearly differentiate this type of housing from the traditional publicly funded housing viewed by most as being of lower quality. It is perhaps intended as a more palatable and progressive alternative to the traditional terminology used for subsidized housing, such as ‘public,’ ‘social,’ or ‘low-cost’ housing.

Just as the meaning of affordable housing varies across countries, so does its target market. Intuitively, one could imagine the term to imply housing that is affordable to the lower and lower-middle income groups (i.e., those in the 30th to 60th percentile of the income distribution). In reality, however, it is rather broad and encompasses varying segments of the income distribution, depending on the country and the context. However, there appears to be some consistency in what the term ‘affordable housing’ *does not* encapsulate—housing for the very poorest (bottom 20 percent) and relatively higher-end housing (top 10 percent of the income distribution).³

2.4 Affordable for Whom?

Although the term affordable housing is explicit in its notion of affordability, the question remains: *affordable for whom?* After all, “affordability (or lack of affordability) is not an inherent characteristic of a housing unit—it is a relationship between housing and people. For some people, all housing is affordable, no matter how expensive; for others, no housing is affordable unless it is free” (Stone, Burke, and Ralston 2011).

As described below, a few dimensions of the affordability discourse for consideration are income distribution, household composition, and tenure type.

Income distribution. Should there be an income threshold for the use of the term affordable housing? In other words, if a house is affordable only to a household above the 80th income percentile, should it be called affordable housing? Logically, and for the purposes of policy making, it would make sense to limit the term’s applicability to the lower segments of the income distribution.

Household composition. Should affordability be measured based on the composition of the household rather than just income level? After all, a 2-person family and a 10-person family with the same income cannot be expected to afford the same house at the same level of comfort (i.e.,

³ Notably, in some countries, the purchase of a formally built housing unit is even unaffordable to some in the top 10 percent.

the same standards of non-housing consumption). Further, while a 1-bedroom house could accommodate the 2-person family, it would likely be inadequate for the family of 10.

Tenure type. Should affordability be measured differently for renters and homeowners? After all, the housing situation of outright homeowners (with no loans) is likely very different from renters with monthly rent obligations and homeowners with housing loans.⁴

2.5 Relationship between Affordability and Adequacy

Often analyses of affordability are focused more on housing expenditure than the adequacy of the housing unit. However, as highlighted earlier by the definitions of affordable housing, both cost and quality need to be considered. As stated by Stone, Burke, and Ralston (2011), “[a]ffordability cannot be divorced from housing deprivation and housing standards. If a household is achieving ‘affordability’, but only by virtue of living in overcrowded conditions, with insecure tenure or in unsafe or inaccessible or faraway locations where land is cheap, is that real affordability? While each of these other forms of deprivation is logically distinct from lack of affordability, in reality most households – particularly lower-income households – who experience one or more of these do so because they cannot afford satisfactory dwellings and residential environments.”

This is particularly relevant in the developing country context, where informal settlements are often the primary source of low-cost housing for the poor. A key question arises when assessing the affordability of housing in this context: should all forms of informal housing be excluded from the calculation of the overall affordability of the housing stock, as is currently the norm? After all, while a lot of informal housing may be deemed inadequate, there could also be a sizeable quantity that is adequate in terms of basic health and safety parameters, but which, due to issues of legality or high building standards, is not included in the formal housing stock. Excluding such housing could result in an overestimation of the housing affordability problem.

On the flip side, some types of formal housing, possibly including public housing, may not meet adequacy standards due to a lack of maintenance. Most developing countries do not have housing data that disaggregate formal housing as adequate or inadequate. Including substandard formal housing in the quantification of affordable housing stock could result in an underestimation of the housing problem.

According to UN Habitat, there are several characteristics of housing adequacy. The 1996 Habitat Agenda specifies that adequate shelter requires adequate privacy, adequate space, physical accessibility, adequate security, security of tenure, structural stability and durability, adequate basic infrastructure, suitable environmental quality and health-related factors, and adequate and accessible location with regard to work and basic facilities, all of which should be available at an affordable cost. In addition, it notes that adequacy often varies from country to country, since it depends on specific cultural, social, environmental, and economic factors.⁵

To determine affordability in a way that factors in adequacy, it would be necessary to establish a normative standard of adequacy (e.g., maximum occupancy per room, access to services, etc.). These issues are typically covered in housing needs assessments and are usually beyond the scope of affordability analyses. The proposed approach is thus to view housing affordability specifically from an

⁴ Note that measuring affordability by disaggregating tenure type was not investigated in the context of this paper or the analysis of affordability in urban Pakistan.

⁵ The Habitat Agenda: Chapter IV: B. Adequate shelter for all, paragraph 60.

economic perspective that includes the full spectrum of housing, irrespective of quality or adequacy (i.e., formal and informal), and all households across the income distribution. But then, such a housing affordability analysis will need to be supplemented with a housing needs assessment – that captures the qualitative aspects – as part of any comprehensive housing sector evaluation.

2.6 Definition of Housing Cost and Expenditure

To reach a consensus regarding a definition of housing affordability, it is necessary to define which expenses can be bundled into housing costs and expenditures.⁶ Like affordability, housing cost has multiple meanings: economists measure the user cost (which incorporates the opportunity cost of capital and depreciation) in economic modelling of the housing market, while policy makers are more interested in the out-of-pocket cash flows (Haffner and Heylen 2011). Financial institutions typically limit their measurement of housing costs to upfront down-payment and transaction costs related to the purchase of a property, and the recurrent sum of money needed to make all the necessary payments.

For renters, housing costs typically include rent and utility fees. For example, under the Section 8 Program⁷ in the United States, the Department of Housing and Urban Development (HUD) calculates the tenant's contribution based on a rent that includes utility costs (e.g., natural gas, electricity, other heat sources, water, sewer, and garbage). When utilities are not included in the rent, utility costs are estimated based on a utility allowance schedule developed by the local public housing authority. In many countries, renters must also pay a security deposit or key money, which may or may not be refundable upon termination of the lease. For example, in the Arab Republic of Egypt, the universal key money phenomenon to overcome rent control restrictions resulted in major distortions in the housing market. The large lump-sum payment is roughly equivalent to the net present value of the difference between market rent and the frozen rent level over the duration of a long-term tenancy contract (World Bank 2007). These types of upfront capital outlays can have a direct impact on the affordability of a housing unit and can present a significant obstacle to access housing for low-income households.

Homeowners incur costs of maintaining the home (utilities, repairs, homeowner association fees, etc.), property taxes and insurance, the costs associated with buying and selling the home, and servicing debt net of any tax benefits (Belsky, Retsina, and Duda 2005). For homeowners in informal settlements, the cashflow structure may be quite different from a household purchasing a unit in the formal market. The building of houses in informal settlements, where access to housing finance is typically non-existent, is invariably an incremental process in which households start with basic shelters. They then invest in the extension and improvement of their dwellings as their circumstances allow and in accordance with their priorities for the investment of their time, energy, and resources as well as their assessment of the risk of eviction (Wakely and Reilly 2011). This process of incremental construction can span decades. As such, the homeowners' housing costs are lumpy and variable over time.

For the purposes of this paper, 'housing costs' are defined as the recurrent out-of-pocket cashflows necessary for occupying and operating the housing unit. However, in practice, measuring the affordability

⁶ One such effort is the International Comparison Program (ICP) under which participating economies collect prices for a selection of the goods and services that make up final consumption expenditure and gross capital formation. There are four main surveys: household consumption, government consumption, machinery and equipment, and construction and civil engineering.

⁷ Section 8 is a rental voucher program funded by the U.S. federal government to assist very low-income families, the elderly, and the disabled to afford decent, safe, and sanitary housing in the private market.

of housing for program or policy design would require consideration of the total housing cost to a household, including any initial capital outlays.

3. Prevalent Approaches to Calculating Housing Affordability⁸

The most widely used approaches to calculating housing affordability are the expenditure-to-income ratio (EIR), the residual income method (RIM), the price-to-income ratio (PIR), and variations thereof.

3.1 Expenditure-to-Income Ratio

The most commonly used approach to measuring housing affordability at the *household level* is the expenditure-to-income ratio (EIR), which is a ratio of housing expenses to the household income. The acceptable affordability threshold of the EIR ratio typically ranges between 20 to 40 percent across countries.⁹ Normatively, this approach recognizes that if a household spends more than a certain portion of its income for housing, it will not have enough left for other essential expenses. The EIR approach is also often used by banks as part of their underwriting process¹⁰ to evaluate the debt repayment capacity of a potential mortgagor (i.e., debt service ratio), and by government housing agencies as the basis for rent and subsidy calculations. Given the simplicity of the EIR measure, it is the most prevalent and commonly used indicator of affordability across markets.

Despite its widespread use, the EIR faces many criticisms. Stone (2004) notes that for low-income families, and many moderate-income families, paying 30 percent of their income for housing could leave them with insufficient money to meet other essential non-housing needs, while many high-income households can pay much more than 30 percent without any hardship. Moreover, Stone, Burke, and Ralston (2011) challenge the basic premise of the EIR which, rather than assessing whether or not a household's housing costs draw on a reasonable share of one's income compared to non-housing essential needs, assigns a predetermined percentage of income to the latter, even in cases where the income may be very low. They make the case that the rationale for the conventional standard has been built upon interpretations of empirical studies of what households *actually* spent on housing in the past and that it should not be the norm for what people can be *expected* to spend today.

⁸ Annex 2 summarizes several other, but less commonly used, measures of housing affordability that target specific characteristics of affordability.

⁹ According to Herbert, Hermann, and McCue (2017), "the 30 percent measure was first a 25 percent measure, derived from an old aphorism that one should devote 'a week's wages to a month's rent,' which, in turn, was based on studies that go back to at least the late 1800s of what typical families spent on housing. The rule of thumb began to find its way into housing policy beginning in the 1930s both as a measure of need and a guide for how much tenants should be expected to pay for housing."

In the US, the Brooke Amendment to the 1969 Housing and Urban Development Act codified 25 percent as the payment standard for public housing. In the 1980s, Congress increased this figure to 30 percent for most programs. According to HUD, a household paying more than 30 percent but less than 50 percent of its income on housing is considered housing cost-burdened and a household paying more than 50 percent of its income on housing is considered severely housing cost-burdened (Herbert, Hermann and McCue 2017).

The official Eurostat indicator for housing affordability is called 'housing cost-overburden', which is a housing cost-to-income ratio of 40 percent (Heylen 2018).

Australia uses a '30/40 rule'. The 30/40 rule defines facing a housing affordability problem as a situation where households in the lowest two quintiles (40 percent) of the equivalent disposable income distribution spend at least 30 percent of their gross income on housing (Gabriel et al. 2005).

¹⁰ Typically, in their decision to lend, banks use the EIR indicator in combination with other key underwriting drivers such as Loan to Value (LTV), credit score, loan amount, collateral quality and value, and consumer profile, among others.

Mayo and Malpezzi (1986) state that there is no single rule of thumb for the share of income to be earmarked for housing. Within a given housing market, as income increases, housing expenditures generally increase, but less than proportionately. When gross national product (GNP) per capita rises, the average fraction of income spent on housing also seems to rise. Indeed, they contend that, “in the medium run, housing is treated as a necessity, so poor households are willing to spend a bigger fraction of their income on housing than are richer households. As economic development proceeds, however, the share of household budgets allocated to housing increases among households at all income levels.”

In Lozano-Gracia and Young (2014), a study of housing consumption in Sub-Saharan Africa found that lower-income households spent the majority of their income on food, and that using the 30 percent measure underestimated their housing affordability problem and failed to measure quality of life aspects or people’s ability to pay for essential non-housing goods.

In summary, the primary advantages of the EIR approach are that it is simple to calculate and can be compared across time and location. Of the multiple disadvantages, the most significant include the following: (i) it does not account for household size or composition, including the number of dependents in a household; (ii) it underestimates affordability challenges for lower-income households while overestimating them for those in the higher end of the income distribution; (iii) it does not account for expenditure differences across household types, income groups or locations; and (iv) it does not distinguish between renters, mortgage-paying owners, or outright owners, who may have very different housing-related expenses.

There are two feasible ways to modify the EIR method to address its disadvantages. The first is to use *equivalized*¹¹ household income (based on household size and composition) instead of raw income. The second is to progressively calibrate the acceptable housing EIR ratio by income group (Heylen 2018) - for example, a 10 percent ratio could be used for the first *equivalized* income (or expenditure) quintile, 20 percent for the second, and 30 percent for the third and higher quintiles.

In practice, many countries have adopted such modified EIRs, particularly in government housing assistance programs, to tailor them to the income level and composition of the households receiving public support for housing. For example, under the Section 8 Program, HUD specifies that the tenant rent payment cannot exceed 30 percent of *adjusted* gross income, which is essentially income adjusted downward to account for the number of dependents, disabled persons, elderly individuals, medical expenses, and childcare expenses.¹² In Argentina, the City of Buenos Aires determines the percentage of income that should be used for social housing payments based on established household budget standards. Beneficiaries whose income is above the ‘basic needs basket’ of expenses, pay no more than 20 percent of their income towards loan repayment. Beneficiaries whose income is between 1.2 times the ‘basic food basket’ and the complete ‘basic needs basket’ of expenses, pay no more than 12 percent of

¹¹ Equivalization is a standard methodology that adjusts household income to account for the different financial requirements of different household types (Gabriel et al. 2005). Household size is important to consider because larger households usually need more resources than smaller ones to achieve a comparable standard of living. The composition of a household also affects its resource needs. “For example, living costs for adults are normally higher than for children. After equivalization has been applied, households with the same equivalized income can be said to have a comparable standard of living” (Horsfield 2015).

¹² 24 C.F.R. § 5.611.

their income on loan repayment. Those with income below 1.2 times the ‘basic food basket’ of expenses, are not required to pay for social housing.¹³

3.2 Residual Income Method (RIM)

The residual income method (RIM), as championed by Michael Stone of the University of Massachusetts, measures how much money is available for housing expenses at the *household level* after other essential expenditures have been taken into account (as measured by a defined non-housing ‘budget standard’ – see Box 3). According to Stone, Burke and Ralston (2011), if there is an insufficient amount of money left for housing expenses after meeting this budget standard, a household has an affordability problem. The RIM recognizes that shelter (formal housing) makes the largest and least flexible claim on income for most households. Non-housing expenditures, including for essential items such as food and healthcare, are therefore limited by how much income is left after paying for housing. This is the household’s residual income, which expresses the household’s *ability to pay* for housing after accounting for essential non-housing costs. Households for whom the squeeze between income and housing cost leaves them unable to meet their non-housing needs are deemed to be facing “shelter poverty” (Stone, Burke and Ralston 2011; Heylen 2018).

Stone et al (2011) describe the RIM as “a sliding scale of housing affordability—with the maximum affordable monetary amount and fraction of income varying with household size, type, and income. Indeed, it implies that some households can afford nothing for housing, while others can afford more than any established ratio.” The RIM thus provides a more precise and nuanced instrument for assessing housing affordability. It can help inform the design of housing subsidies to make them more equitable and efficient and provide a way to refine residential mortgage underwriting to reflect a more accurate assessment of risk (Valdez 2009).

It is uncontested that the RIM is conceptually sounder than any of the ratio-based benchmark approaches to measure housing affordability. However, what remains as one of the main challenges in the adoption and operationalization of the RIM is the complexity of developing a budget standard appropriate to specific contexts and locations. A budget standard is a list of goods and services that a family of a specified size and composition would need to live at a designated level of well-being, together with the costs of those goods and services (Fisher 2007). Although every household has its own unique characteristics, it is possible to define some socially agreed assumptions of what constitutes a minimum, adequate, or decent standard of living. A budget standard indicates the level of income a specific family living in a specific place at a specific time needs to achieve a particular standard of living. It is derived by specifying every item needed by the family, pricing each item, and summing to produce the overall budget. “For housing, food and most other items, data from consumer expenditure surveys, expert opinion and, in some cases, opinion surveys and focus groups are used to establish a minimal standard... The physical standard for each item is then priced to determine a total (after-tax) minimal budget” (Stone 2006). In principle, any household with an income equal to or greater than the total budget should be able to meet its basic needs, including housing, at the physical quantity and quality represented by the budget standard (Saunders and Bedford 2017). The budget standard thus attempts to move beyond relative comparisons of economic well-being and derives the absolute amount of resources that households need to meet their basic needs. The core question that forms the basis of the budget standard is: How much income does a family need to live at a designated level of well-being? (Vranken 2010)

¹³ Ley No. 6129 de la Ciudad Autónoma de Buenos Aires. Boletín Oficial de la Ciudad Autónoma de Buenos Aires 5537.

There are limitations on the viability of including housing costs in the budget standard. Not only do housing costs vary greatly by location and between household types, even those at the same or a similar standard of living, they also constitute a relatively large share of a household's total budget. It would be conceptually flawed to "standardize" this cost. Unlike housing costs, given the relatively low price-variance and high supply elasticity of non-housing costs, it is possible to derive a workable non-housing standard within a particular geographical region. This is used to calculate housing affordability using the RIM approach (Stone, Burke, and Ralston 2011).

Budget standards are not widely implemented in the developing country context for several reasons. First, creating a budget standard is a complex, time-consuming, and specialized task that can take several years to implement, depending on how many household types are being considered, and at how many different points in the income distribution. Second, households of different compositions and incomes differ enormously in terms of their levels and patterns of spending, the degree to which they can engage in cost substitution, and how they allocate their time (Saunders and Bedford 2017; Heylen 2018).

One way to get around this challenge is to arrive at a 'non-housing expense threshold' from household income or expenditure survey (HIES) data that are more easily available. For example, Kutty (2005) operationalized a residual income standard for the United States with the non-housing standard set at two-thirds of the federal poverty threshold and applied it to compute what she calls "housing-induced poverty."

Another challenge in the application of the RIM in many developing countries is the difficulty in obtaining accurate income data. A way around this is to explore the substitution of income data for expenditure data, in particular for the lowest income quintiles who presumably have low or no savings accumulation. An adaptation of the RIM methodology is used by micro finance institutions (MFIs) and affordable housing finance companies (AHFCs) in India as they work with the low-income segment in providing micro-finance loans, including for housing. Loan officers work with community groups and individuals, often leveraging technology, to collect housing and non-housing expenditure data that is used to assess a household's capacity to pay (Bhanot, et al. 2019).

3.3 House Price-to-Income Ratio (PIR)

Another simple and commonly used indicator of affordability is the price-to-income ratio (PIR), which is used to measure the affordability of for-sale housing at both the *household* and *aggregate levels*. Decades ago, a common rule of thumb used by real estate agents and financial advisors in the United States was that a family could afford to purchase a home priced at about 3 times its gross annual income. A 2019 study of first-time homebuyers in 50 metropolitan areas, however, found that this ratio was actually closer to 3.4 on average, and as high as 5.2 in some markets (AEI Housing Center 2019). Also referred to as the *median multiple*, at the aggregate level it is the ratio of median house prices to median annual household incomes. It is widely used by the real estate and lending industry and allows for comparison across markets at various geographical scales.

That said, the PIR can produce some conflicting results as compared to the EIR. Consider, for example, the case of two households who plan to purchase a USD 50,000 house. A 30-year loan with a 5 percent annual interest rate requires a monthly loan repayment of USD 215. For a household with an annual income of USD 10,000, the PIR would be 5 (typically considered unaffordable), but the EIR ratio is 26 percent (typically considered affordable). However, if the annual interest rate is 20 percent and the repayment period is 15 years (which is closer to the reality in many developing countries, particularly in Africa), then

the house is not affordable even to a household earning USD 20,000. And yet, the PIR of 2.5 would indicate that it is affordable.

Like the EIR, the PIR is commonly used due to its simplicity. However, it also has limitations. First, it is focused on for-sale housing; the correlation to rental prices is not direct. Second, it does not take into consideration variations in access to housing finance or financing terms, which directly impact a household's purchasing power. While recognizing the limitations of the two ratio measures discussed above (i.e., EIR and PIR), it must be acknowledged that they are simple to use and are relevant indicators of affordability at the *aggregate level*, both over time and across markets. However, caution is advised when using them in their current form to assess affordability at the *household level* (Herbert, Hermann, and McCue 2018).

3.4 Data Resources

The approach used for measuring housing affordability in a specific location depends heavily on the availability of data at the market and household levels. This is often an obstacle to creating nuanced affordability measures and criteria for housing programs. For the purposes of measuring affordability in the developing country context, the most likely sources of information include national censuses, household income and expenditure surveys (HIES), and customized housing surveys. These data sources vary in availability, quality, and frequency from country to country.

National Censuses. Almost every country conducts a national census on a regular basis (e.g., every 10 years). Data points related to the housing sector in censuses commonly include population, basic demographics, number of households, and household size. In some cases, the census includes a specific housing module that may include data on the number of housing units, housing type, housing quality, and tenure. Typically, housing income and expenditure, housing rents and prices are not collected as part of a national census in developing countries, making it unlikely that housing affordability analyses can be performed with the data.

Household Income and Expenditure Surveys (HIES). The general objective of an HIES is to identify household income and expenditure patterns on a comprehensive range of goods and services, including housing. It may also cover a substantive amount of information on housing characteristics such as the type and quality of housing, tenure, and access to services. Such surveys are used to estimate poverty and income distribution variables and are often conducted on a periodic basis (e.g., every 3-5 years).¹⁴ Notably, they are carried out on a sampling basis, and hence are limited in level of representativeness.

There are difficulties in collecting data on both income and consumption/ expenditure in household surveys. Income is a sensitive issue for many respondents, and non-responses or misreporting of some income components may be significant. In developing countries, high informality and a prevalence of self-employment or own-account workers also make accurate income data collection very difficult. In fact, in many developing countries outside Latin America, these surveys are limited to household expenditure data.

¹⁴ The Living Standards Measurement Study (LSMS) is a HIES established by the World Bank in 1980 that offers data for a subset of Bank client countries.

Housing Surveys. Some countries implement surveys specific to the housing sector on a periodic basis or as part of a one-off policy or program formulation effort. These are typically sample surveys that focus on the number and characteristics of housing units as well as the households that occupy those units. In the case of the American Housing Survey, which is administered every two years, the survey is longitudinal to allow for analysis of trends over time. Depending on the questions included, a national or local housing survey could collect the data necessary to evaluate the affordability of housing using one or more of the approaches described earlier.

4. Towards Refining the Measurement of Housing Affordability

To evaluate the feasibility of using a more refined measure of housing affordability in the developing country context, especially in World Bank-supported projects and analytics,¹⁵ the application of the following approaches could be tested: (i) a modified EIR, progressively calibrated by income segment; (ii) a modified RIM that uses household expenditure instead of income and a simplified budget standard for non-housing expenses; (iii) a proxy non-housing budget standard based available consumption data; and (iv) simplified equivalence scales for different household types that could be used in both approaches. These are explained in more detail in this section, followed by Annex 1 which presents the findings of the application of the modified RIM in urban Pakistan.

4.1 Define a Progressive Expenditure-to-Income Ratio

The EIR approach is simple and widely used to measure affordability at both the aggregate and household levels. However, as mentioned earlier, the application of a single percentage threshold across households in all income segments in a country does not adequately account for differences in the composition of (i) their household budgets and expenditure patterns, or (ii) their household size and per capita consumption patterns. The most straightforward way to address this conceptual deficit is to calibrate the EIR affordability threshold by income segment.

As such, the use of a *progressive* EIR is recommended (e.g., a 10 percent threshold for the first income quintile, 20 percent for the second, and 30 percent for the remaining quintiles). Depending on data availability, these EIR thresholds could be refined by using *equivalized and non-equivalized* income. This would need to be developed on a country-by-country basis, with the possibility of preparing a cross-country analysis once there is a sufficient number of country-level progressive EIRs available.

This paper also posits that for the purposes of calculating the EIR for households in developing countries with incomes below the 40th percentile, it is reasonable to assume that household expenditure could be used as a close proxy for household income (i.e., households do not or have very limited accumulate savings and do not have access to financing for consumable goods). As such, the ratio of 'housing expenditure' to 'total income' could be viewed as equivalent to 'housing expenditure' to 'total expenditure.'

A *progressive* EIR methodology has been applied as part of World Bank technical assistance to the National Affordable Housing Program in Indonesia. Expenditure data available by decile from the National Bureau of Statistics of Indonesia (Susenas) was used as a proxy for income and the progressive EIR calculated for

¹⁵ There is currently no standard approached used by the World Bank. However, the most common methodology used is the EIR ranging from 20 to 40 percent.

each decile. The same progressive method was also used in technical assistance provided to Mongolia and was tested against the market reality and found to be acceptable.

That said, the modified EIR is recommended as a fallback method when data sources do not allow for the modified RIM, described next.

4.2 Modify the Residual Income Method

In countries with relatively good quality household income and/or expenditure data, in particular those with either a recent HIES, LSMS, or equivalent household survey, a modified version of the RIM is recommended. This would provide a more nuanced perspective on the affordability situations of different household types across different income segments. Where income data is unavailable or unreliable, expenditure could be used as a proxy for income. This may be termed the Residual Expenditure Method (REM), where residual expenditure (i.e., total expenditure on non-housing items, or *after*-housing expenditure) is used as a proxy for RIM's residual income (i.e., income remaining after expenditure on housing). Essentially, if residual expenditure is less than the basic minimum non-housing standard for that household type, the household may be considered to be housing-cost-burdened.

The robustness of the REM hinges upon two building blocks as described below: (i) estimating the residual non-housing expenditure and (ii) establishing a proxy non-housing budget standard.

Estimate the residual non-housing expenditure. The REM approach estimates the non-housing expenditure aggregate in a direct manner: The non-housing aggregate is simply a summation of all recurrent expenditures that are not related to housing. This is in contrast to the traditional RIM model, in which residual income is estimated by excluding housing costs from total income. Similar to the poverty methodology used officially, the nominal aggregate is then adjusted for spatial differences in cost of living and transformed using an adult equivalence scale.

Establish a proxy non-housing budget standard. Given that most developing countries do not have an official budget standard, it is necessary to establish proxy living standards for non-housing expenses in order to use the RIM (or REM). It may be possible to use a single non-housing standard across all income groups based on proxies from existing poverty measurements. For example, based on LSMS, HIES or their equivalent, a minimum living standard for food and non-food items (including housing) can be estimated. It may be possible to extrapolate the non-housing expenditure per capita – and accordingly the non-housing budget standard per capita – from this data. This non-housing budget standard per capita can then be used to extrapolate non-housing budget standards for households of different types (e.g., single person household, couple, couple with 1 dependent, couple with 2 dependents etc.) using equivalence scales.

Ideally, it would be better to develop two non-housing budget standards: a low-cost standard for individuals in the bottom income quintiles, and a moderate-cost standard for those in higher-income quintiles. This is because expenditure decisions of low-income persons and households are likely to be different from middle-income groups with regard to what is considered a basic acceptable quality of, for example, education or health care.

4.3 Adopt Suitable Equivalence Scales

While there has been considerable research by statistical and other agencies trying to estimate appropriate values for equivalence scales, there is no single accepted global standard. “The choice of a

particular equivalence scale depends on technical assumptions about economies of scale in consumption as well as value judgements about the priority assigned to the needs of different individuals such as children or the elderly” (OECD, n.d.). The modified-OECD equivalence scale appears to be the most widely used among the different equalization methodologies for household income. It assigns a weight of 1 point to the first adult in the household, 0.5 points to each additional person aged 15 years or older, and 0.3 points to each child under the age of 15 (OECD, n.d.). Equalized household income is then derived by dividing total household income by the sum of the equivalence points allocated to the household.

However, for the purpose of housing affordability calculations using the progressive EIR and the RIM or REM, two sets of equivalence scales will be needed: (i) one based on housing *plus* non-housing costs for the progressive EIR, and (ii) another based on only non-housing costs for the RIM or REM.¹⁶ In countries where there are no equivalence scales, perhaps a standard scale could be developed and applied. Given the variations in the definitions of equalized and non-equalized income, it is recommended that results of affordability analyses be presented in both forms, where possible.

4.4 Summary of Application of the REM in Urban Pakistan

Using data from the Pakistan Household Integrated Economic Survey (HIES) 2018/19, the REM was used to estimate housing unaffordability for households in urban areas of the country (see Annex 1). The results from the application of the REM were juxtaposed with the results from the conventional EIR approach to compare robustness of the two methods.

As described in previous sections, the RIM approach is often limited in its ability to measure housing affordability in low income and developing country contexts due to the lack of reliable income data as well as appropriate budget standards (i.e., the minimum food and non-food expenditure that is necessary to maintain a good standard of living). As with most developing countries, in Pakistan data on incomes is difficult to collect and not particularly informative to gauge welfare, owing to high informality, seasonality (relevant for large agriculture sectors) and irregularity (such as reliance on foreign remittances) of incomes, as well as widespread production for home use. Therefore, consumption expenditure is used as a proxy for household welfare in Pakistan.

The REM approach in Pakistan relies on two key components to estimate housing affordability: (i) households’ non-housing consumption¹⁷ aggregate, as a proxy for residual income, and (ii) a minimum socially acceptable standard for non-housing residual expenditures, or a ‘non-housing poverty line.’ This differs from the traditional RIM method in two ways. First, to determine households’ current level of well-being, it uses survey-based household consumption data as a proxy for household residual income. Second, in place of a predetermined budget standard, the Cost of Basic Needs (CBN) method is adapted to establish a minimum threshold of non-housing needs. Putting the two together allows us to identify households living in unaffordable housing conditions. Households are considered to be living in

¹⁶ The logic behind this is that the economies of scale embedded in general household consumption patterns (housing and non-housing) are not necessarily the same as those with only housing consumption or only non-housing consumption. For example, a couple arguably needs less than twice the amount of a single person to achieve the same living standard, because the couple can share some costs, notably of housing. Further, a single person and a couple are likely to have the same (or similar) housing needs/costs, whereas the non-housing consumption for a couple is likely to be significantly greater than a single person. Hence, adjusting income *before* housing costs will yield different equivalent income compared to adjusting *after* housing costs. These economies of scale are also likely to vary across the income distribution, as well as between countries.

¹⁷ Household consumption and expenditures are used synonymously.

unaffordable housing if their actual residual (non-housing) expenditures are lower than the monetary resources needed to achieve a minimum standard of living based on non-housing needs.

Obtaining the non-housing consumption aggregate. The REM estimates the non-housing expenditure aggregate in a direct manner by summing reported expenditures on non-housing items. Housing-related expenditures, which are excluded from the aggregate, include rental payments (actual and imputed) as well as electricity, water, maintenance, fuel and waste collection.

Estimating the minimum standard for non-housing expenditures. The CBN methodology, which the Government of Pakistan used to establish the national poverty line for 2013-14, is followed. As a first step, the food poverty line is estimated. This is the minimum expenditure required to fulfill basic food requirements for a particular reference group. This reflects the cost of a basic food basket that meets the minimum daily caloric requirement, using food items, quantities, and prices faced by the reference group (see below). In the case of Pakistan, the minimum daily standard has been set at 2350 calories per adult equivalent. Second, the total non-housing basic needs are estimated by scaling up the food poverty line. This is indirectly accomplished by estimating the food share of the total non-housing budget for households whose food expenditure is close to the food poverty line. This share, or scaling factor, is used to inflate the food poverty line to obtain the basic minimum threshold of total (food and non-food) non-housing expenditures.

Application of the REM in Urban Pakistan revealed that 25.2 percent of households cannot meet their basic needs *and* pay for housing, and that housing poverty is concentrated among the bottom 40 percent of the income distribution where more than half of households cannot meet basic needs *and* pay for housing (Table 1). Nearly all (93.7 percent) of those in the bottom quintile are housing poor, and the housing unaffordability rate decreases as household income rises. Using the conventional EIR approach, and adopting 30 percent as the threshold; however, housing is unaffordable for a larger share of households (43.9 percent), and higher-income groups have more affordability challenges. This highlights one of the main shortcomings of the ratio method: it fails to account for the fact that the well-off can afford to spend a larger proportion of their overall expenditure on housing, even after paying for basic needs. Conversely, people at the bottom end of the expenditure spectrum struggle with meeting their basic needs, even if they spend less than 30 percent of their expenditure on housing.

Table 1. Share of Urban Households in Unaffordable Housing as Measured by REM and EIR

| Urban Welfare Quintiles | Housing Poverty - REM (%) | Unaffordability - EIR (%) |
|-------------------------|---------------------------|---------------------------|
| All Pakistan | 25.2 | 43.9 |
| Q1 (lowest) | 93.7 | 28.1 |
| Q2 | 29.3 | 35.6 |
| Q3 | 2.6 | 44.3 |
| Q4 | 0.6 | 52.0 |
| Q5 (highest) | 0 | 59.6 |

Note: Sample restricted to urban areas only. Source: Authors' calculations based HIES 2018-19 microdata.

The REM applied in Pakistan is adapted from the traditional RIM in two ways: (i) expenditure data is used instead of income, and (ii) a non-housing expenditure threshold was derived from HIES data instead of

the traditional 'budget standard'. Compared with the traditional EIR approach, the REM is a more accurate reflection of the ground reality, particularly in terms of the varying capacity to pay for adequate housing by income segments. The comparison between the REM and the conventional EIR approaches highlights the need to measure housing affordability more accurately (using REM whenever possible) to help inform housing policy and programs.

5. Conclusion

Existing literature offers several lessons on the topic of measuring housing affordability, starting with a growing recognition of the need for a more nuanced approach. The conventional 30 percent EIR measure, characterized by its simplicity and comparability, continues to be the prevalent method for calculating housing affordability. However, it may not accurately reflect household cost burdens across the income spectrum. The RIM, on the other hand, offers a relatively more nuanced measure of affordability, particularly for lower-income households, and hence is very relevant for developing countries. However, its underlying data requirements make its application more challenging. The house PIR is widely used by the real estate and lending industry and allows for comparison across markets, but it is best used at the aggregate level, both over time and across markets, rather than for measuring affordability for a specific household. The key question is, how do we define an affordability measure that is both reflective of the expenditure realities of lower-income families as well as easy to apply in the context of housing programs in developing countries?

The literature indicates that it is difficult to get a complete picture of affordability using any one single measure, and therefore it is beneficial to use multiple measures when data and resources are available. This is especially true when considering affordability at the household level. For example, someone could have a high housing EIR (i.e., greater than 40 percent) that could categorize them as being housing cost burdened. But if that person has a residual income (after paying for housing) high enough to comfortably cover non-housing costs, then they are probably not facing a housing affordability problem. On the other hand, a low residual income combined with a high housing EIR would clearly indicate an affordability problem that necessitates government assistance or policy intervention. Even when investigating affordability at an aggregate level, it is useful to consider a combination of data points to inform policy responses. The trends and patterns of multiple measures can help better explain the underlying situation than any one single measure (Robinson, Scobie, and Hallinan 2006).

Furthermore, it is important that affordability calculations, to the extent possible, be disaggregated sufficiently to identify those specific household types and tenures that are under more housing cost duress. For example, there is a general consensus that the types of households most likely to experience housing stress include large (poor) households, single-person households, elderly households with little to no income, ethnic and racial minorities, and people with special needs (Stone 2004). Affordability also impacts some tenures disproportionately, with private tenants, and increasingly first-time homebuyers, bearing the brunt of housing unaffordability as compared to, for example, outright homeowners with decent incomes and minimal housing expenses (Belsky, Goodman, and Drew 2005).

The application of the REM in Pakistan yields multiple insights and lessons for replication in other countries and markets. First, there are significant variations in housing affordability across income segments and household size. Second, the standard EIR approach underestimates the affordability challenges faced by low-income segments and overestimates that of higher-income segments. Finally, and, perhaps most importantly, embedded in the REM determination of housing affordability is a basic

minimum standard – defined by the non-housing budget standard –which all members of society should be able to enjoy –that would be sufficient to feed, clothe, educate, transport, and keep a family healthy.

While the establishment and testing of a refined methodology for measuring affordability in a given country or market will be the first important step, it will need to be followed by developing the capacity of government entities and housing agencies to adopt the new approach, and effectively apply it in housing programs for improved targeting and eligibility assessments. This is particularly critical for supply-side interventions such as public rental and rent-to-own programs, which require the public sector to carry out this function as opposed to demand-side programs that can rely on financial institutions to assess income and eligibility.

Annex 1: Application of the Residual Expenditure Method in Urban Pakistan

This annex provides a detailed explanation of how the Residual Expenditure Methodology (REM) was adapted from the Residual Income Methodology (RIM) for application in Pakistan. It presents the key assumptions used in the analysis, and one way in which the REM methodology can be applied to low-income countries where reliable income data is often not available, but expenditure data is.

Pakistan's housing shortage is currently estimated at approximately 10 million units and growing. About half of this shortage occurs in urban areas, where 47 percent of households live in over-crowded housing units in informal settlements (*katchi abadis*) with inadequate infrastructure and services.¹⁸ In response to the growing housing shortage, the Government of Pakistan launched the ambitious Naya Pakistan Housing Program (NPHP) in April 2019 with the objective of providing 5 million housing units across the country over five years. In the context of the NPHP and the World Bank's housing sector engagement in Pakistan,¹⁹ housing affordability analyses were conducted to inform policy dialogue and project design that would support the better targeting of housing subsidies to those in lower-income brackets for whom affordable housing is out of reach.

Using data from the Pakistan Household Integrated Economic Survey (HIES) 2018/19, the REM was used to estimate housing unaffordability for households in urban parts of the country. The findings suggest that approximately 25 percent of households are unable to cover their basic food and non-food, non-housing expenses after accounting for housing costs, with the poorest segment facing the highest affordability challenge (94 percent). In contrast, the EIR approach suggests that housing is unaffordable for only 44 percent of households, and that housing is least affordable for the highest quintile, with close to 60 percent of households spending more than 30 percent of their household income on housing. The REM approach highlights the need for a much more accurate methodology to facilitate nuanced understanding of affordability in the housing sector in Pakistan.

The RIM measures housing affordability by accounting for a household's ability to meet its non-housing basic needs after paying for housing. By establishing a minimum threshold of non-housing expenditure, the RIM method classifies households as facing unaffordable housing conditions if they do not have enough resources to meet these residual basic needs. However, the RIM approach is often limited in its ability to measure housing affordability in low income and developing country contexts due to the lack of income data as well as limited information on the most appropriate budget standards (i.e., the minimum food and non-food expenditure that is necessary to maintain an adequate standard of living). In most developing countries, including Pakistan, consumption expenditure is used as a proxy for household welfare. This is because income is difficult to measure and may not be an informative indicator of welfare. The large size of the informal economy and the high prevalence of smallholder agricultural production makes it difficult to capture income levels.

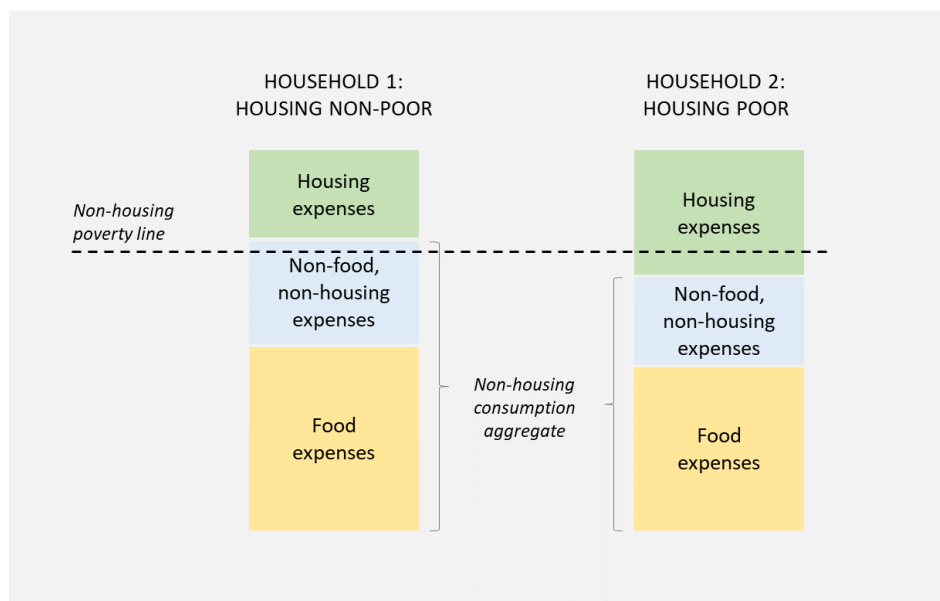
¹⁸ Urban Unit. "Punjab Spatial Strategy 2047 Technical Paper – Housing".

¹⁹ This engagement includes Additional Financing to the Pakistan Housing Finance Project (P172581) which will support the scale-up of the credit Risk Sharing Facility that was developed in 2018 under the parent project to promote access to mortgage loans for low- and informal-income households; and the Punjab Affordable Housing Program (P173663) which will help strengthen housing institutions and systems and enhance housing supply, including affordable housing for lower-income households in Punjab.

To overcome the limitations of using the traditional RIM model in developing countries, a modified version of this approach was used in Pakistan, drawing on principles used in poverty measurement. In most developing countries, monetary poverty is measured using absolute poverty lines that are based on a fixed welfare standard. The theory underlying absolute poverty lines is grounded in welfare economics and constrained utility maximization. In this context, the fixed standard of well-being represented by the poverty line is a level of utility associated with the minimally acceptable standard of living (Ravallion 1992; 1998). Based on the same theory, the REM treats housing and non-housing expenses separately. It posits that for housing to be affordable, households need to be able to afford a minimum standard of living after paying for housing expenses. In this sense, the REM defines housing affordability in the same way as the traditional RIM model: the ability of households to cover necessary living costs after paying for housing.

The REM approach relies on two building blocks to estimate housing affordability: (i) a *welfare indicator*, measuring households' actual non-housing, or residual, expenditures,²⁰ and (ii) a *minimum acceptable standard* for these non-housing residual expenditures. This differs from the traditional RIM method in two ways. First, to determine households' current level of well-being, it uses survey-based household consumption data as a proxy for household residual income. Second, in place of a predetermined budget standard, the Cost of Basic Needs (CBN) method is adapted to establish a minimum threshold of non-housing needs. Putting the two together helps identify households living in unaffordable housing. As illustrated in Figure 1, households are considered to be living in unaffordable housing if their actual residual (non-housing) expenditures are lower than the monetary resources needed to achieve a minimum standard of living based on non-housing needs.

Figure 1: Illustrative Building Blocks of REM and Housing Poverty



Source: Authors

The analysis uses microdata from the HIES and an adaptation of the CBN methodology for poverty estimation currently in use in Pakistan. The HIES is a provincially representative household survey

²⁰ Household consumption and expenditures are used synonymously.

conducted by the Pakistan Bureau of Statistics (PBS) every alternate year that collects item-wise data on household expenditures. The latest data available is for 2018-19, which provides a baseline of spending levels and patterns.

Obtaining the non-housing consumption aggregate. The residual (non-housing) expenditure aggregate is obtained using aggregate consumption expenditures²¹ obtained from the HIES. The dataset categorizes expenditures by type, including housing expenses, food, and other (non-housing) non-food spending. By construction, the REM allows for an estimate of residual (non-housing) expenditures in a direct manner by summing individual reported expenditures on non-housing items. This contrasts with the RIM, in which residual income is estimated by excluding housing costs from total income.

The non-housing consumption aggregate for Pakistan has three main components, including: (i) the aggregate nominal non-housing consumption expenditure, which consists of all non-housing related expenditures (food and non-food) of the household converted into the same time unit, for instance annual, monthly or weekly expenditures; (ii) a spatial price index, which adjusts for the cost of living differences across space or regions; and (iii) an equivalence scale, which adjusts for differences in household size and age composition across households.

The residual consumption aggregate includes all food and non-food expenditures, that are not related to housing, and are incurred on a recurrent basis. This includes both cash and in-kind expenditures for items directly purchased in the market, received as wages or salaries, or received as gifts or assistance. In the case of Pakistan, the key non-food, non-housing items included in the residual consumption aggregate include expenditures on clothing, footwear, education, health, fuel, transport, recreation, and communication. Housing expenditures, which are not part of the aggregate, include rental payments (actual and imputed), as well as electricity, water, maintenance, other fuels, and waste collection.

Expenditures on durable goods are not included in the consumption aggregate, due to data limitations in obtaining the flow of utilities from durable consumption items like furniture and furnishings, electronics, and assets such as cars, refrigerators, and motorcycles. Spending on lump sum taxes, insurance payments and license fees are also excluded from the expenditure aggregate. Moreover, infrequent and lumpy expenditures on occasions like births, deaths, weddings and funerals are also excluded, because these may overstate the welfare levels of households in the reference period.

Before aggregating, expenditures are converted to the single time unit of a month. This requires a decision on how fortnightly expenditures are treated. In Pakistan fortnightly expenditures are taken to represent purchases made over a 14-day period and are therefore multiplied by a factor of 2.17.

In addition, differences in the cost of food and fuel items across the country are accounted for by using a spatial price index. In large countries where regions are diverse and at varying levels of development, these spatial price differences can be substantial. In Pakistan, the spatial price index uses a Paasche formula and is estimated at the level of a primary sampling unit (PSU).²² This PSU-level Paasche index is

²¹ In most developing country contexts, consumption expenditure is used as a marker for welfare.

²² The spatial price deflator only uses food and fuel items for two reasons: (i) unit values or implicit prices (spent/quantity) cannot be constructed for other non-food items, and (ii) quality is likely to be more heterogeneous for other non-food items, meaning that it is difficult to ensure that we are comparing the same goods across regions.

based on a set of items for which both the quantity and the expenditure information is available in the HIES.

Households of different sizes and age composition have differing consumption needs and patterns. In order to reflect these differences, adjustments need to be made to the residual non-housing expenditure aggregate to reflect the age, and sometimes the gender distribution, of the household members. This is also done to account for the fact that larger households may be able to purchase goods in bulk at cheaper rates and may be able to economize on the purchase of certain items. Adjusting the non-housing expenditure aggregate using equivalence scales can address these concerns. The welfare aggregate used for poverty measurements in Pakistan is based on an adult equivalence scale which assigns a weight of 0.8 to each individual below the age of 18, and a weight of 1 to each individual age 18 and above.²³

Estimating the housing affordability threshold: minimum standard for non-housing expenditures. In the absence of readily available budget standards, poverty estimation techniques can be adapted to estimate a minimum standard for non-housing (food and non-food) expenditure. In particular, the process followed for determining the poverty line can also be used to determine a non-housing poverty line – or a threshold for spending on non-housing residual needs. This consists of basic food needs to which a provision is added for basic non-housing and non-food needs.

In the case of Pakistan, this threshold is estimated by adopting a modified CBN method. This methodology is implemented for the REM approach in two stages. In the first stage, the food poverty line was estimated, or the minimum expenditure required to fulfil basic food requirements for a particular reference group. This reflects the cost of a basic food basket that meets the minimum daily caloric requirement, using food items, quantities and prices faced by a specific reference group. In the case of Pakistan, the minimum standard has been set at 2,350 calories per adult equivalent.²⁴ The first stage in the REM approach closely mirrors the CBN methodology. In the second stage, non-food and non-housing basic needs are estimated. This is indirectly accounted for by estimating the food share of the total non-housing budget, for households whose food expenditure is ‘close’ to the food poverty line. This share is used to scale up the food poverty line to obtain the basic minimum threshold of total (food and non-food) non-housing expenditures. This budget share is referred to as the *scaling factor* and allows for scaling up the food expenditures by an amount that is more reflective of the basic non-food expenditures, outside of housing expenses. The scaling factor in the REM approach varies from the traditional CBN methodology since it represents food as a share of non-housing and non-food budget, as opposed to aggregate non-food spending by the household.

Using this method has several advantages. In the absence of predetermined budget standards, this allows for the assignation of a monetary value to the normative standard of living that is deemed to be absolutely necessary in any society. Using quantities of items consumed from the survey data accounts for the composition of the basket of goods based on household preferences and consumption patterns, instead of normatively defining the minimum amount required of each food item. Second, the scaling factor is non-parametrically estimated using the food share of non-housing budget for those consuming ‘close’ to

²³ While this method of measuring adult equivalence does not take into account the higher costs that might be incurred by households that have children, for example, in education, it is also the case that these expenditures are more applicable at higher ends of the welfare distribution. For the bottom quintile, households spend less than two percent of their budget on education, partly because public education is technically free of cost.

²⁴ As defined by the Government of Pakistan’s Centre for Research on Poverty Reduction and Income Distribution (CRPRID) of the Planning Commission.

the minimum food requirement within the reference group. This allows the development of a reasonable estimate of non-food, non-housing expenditure for those who are just meeting the minimum food requirements.

This method hinges critically on the choice of a reference group, which determines the expenditure patterns and scaling factors (food shares) that are used. The assumption is that the consumption patterns of this group provide an adequate representation of what is required to escape the condition of poverty. Thus, the reference group should include households that are neither among the poorest nor the wealthiest in a country, ideally reflecting the needs of those who are at or above the existing subjective minimum threshold. One way to ensure this is to select from among households in the lower 'middle' of the distribution of income or expenditure. In practice, this implies excluding households in the bottom decile and sometimes the bottom quintile of the distribution of expenditure. Similarly, it is not recommended in practice to include households that are much above the median expenditure level.

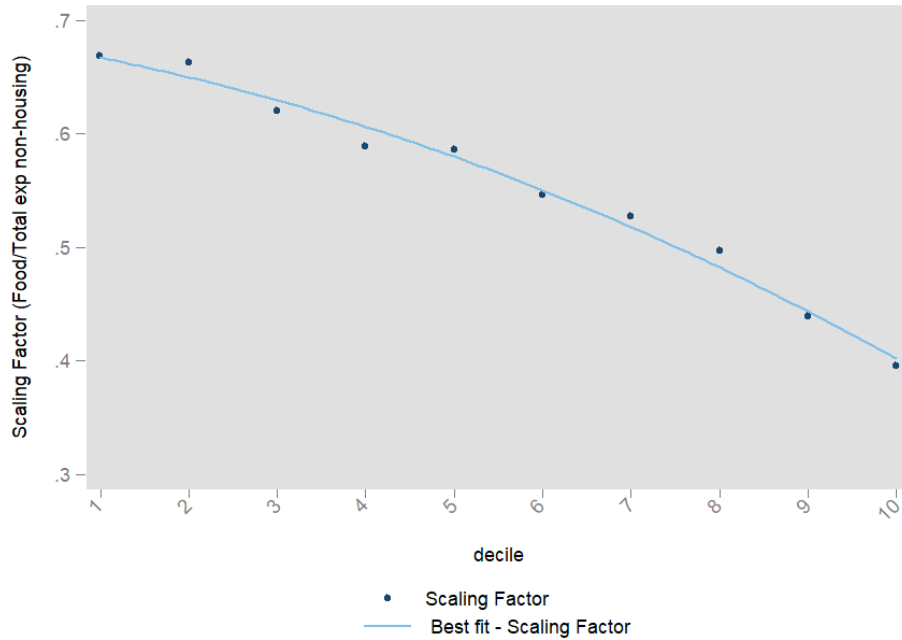
Similar to the 2014 poverty line estimation in Pakistan, the minimum residual non-housing threshold is based on the expenditure patterns of the second, the third, and the fourth decile of consumption expenditure (i.e., the 10th to the 40th percentile). Based on this reference group, the minimum threshold for residual (non-housing) expenditures in urban areas in Pakistan is estimated as Rs.3,715.7 per adult equivalent per month in 2018-19.²⁵ Alternately, this means that a family of five, with three children, requires a minimum of approximately Rs.16,347 per month leftover after paying for housing expenses. Based on this affordability threshold, 25.2 percent of households in urban Pakistan can be considered to be living in unaffordable housing conditions (see Table 2).

The estimations of housing affordability vary based on changes to the reference group. Changing the reference group signifies a change in the typical 'basic' food basket, the prices faced to consume it, and the share of non-food (non-housing) budget relative to food spending. All of these have a bearing on the resultant housing affordability rate. This is shown empirically in Figure 2 (which shows that scaling factors also vary based on the reference group) and Table 1 (which summarizes how the choice of reference group influences the resultant housing affordability rate).

In practice, the choice of reference group is an important lever for policy makers to determine the housing affordability rate for different parts of the welfare distribution. For example, a more ambitious reference group may be better suited to measuring housing affordability for many middle-income households that might not face destitution or poverty but might still experience large and inelastic housing costs. As highlighted in Table 2, changing the reference group between the 20-40 percentiles and 20-50 percentiles yields differences in affordability of 4-5 percentage points, ranging from 35.1 percent to 38.9 percent.

²⁵ These values are spatially deflated using a Paasche index.

Figure 2: Scaling Factor by Consumption Decile for Urban Households



Reference group changes also affect the benchmark “housing quality” standard. As highlighted in Table 3, a higher reference group equates to a lower proportion of households living in poor quality housing (roofs, floors, walls)²⁶ and a higher number of households reporting access to improved urban services, given that the group in question is likely to be better off.

Table 2: Scaling Factors, Affordability Thresholds and Housing Poverty by Reference Group

| Reference group (percentile range) | Scaling factor | Min non-housing expenditure per ae (Rs, 2018/19) (Food + non-food non-housing) | Overall housing unaffordability rate for urban households using this threshold (expenditure) |
|------------------------------------|----------------|--|--|
| 0-10 | 0.67 | 2781 | 7.6 |
| 10-20 | 0.67 | 3329 | 17.1 |
| 20-30 | 0.64 | 3676 | 24.3 |
| 30-40 | 0.62 | 4078 | 32.4 |
| 40-50 | 0.59 | 4519 | 41.8 |
| 50-60 | 0.59 | 4884 | 49.4 |
| 60-70 | 0.54 | 5485 | 59.2 |
| 70-80 | 0.52 | 6147 | 67.9 |
| 80-90 | 0.48 | 7603 | 80.1 |
| 90-100 | 0.42 | 10852 | 91.9 |

²⁶ Characteristics of roofs, floors, and walls in the HIES 2018-19 are used as a proxy for housing quality.

Table 3: Percent of Urban Population with Access to Services and Housing Conditions by Reference Group

| Reference Group (Percentile Range) | Threshold | Housing Unaffordability rate | Households with access to safely managed sanitation | Households with access to safely managed drinking water | Households with access to roof, floor & walls that it is constructed of low-quality material |
|------------------------------------|-----------|------------------------------|---|---|--|
| 10 to 40 | 3716 | 25.2 | 69.1 | 84.3 | 37.5 |
| 20 to 40 | 3911 | 29.1 | 71.1 | 84.2 | 37.8 |
| 0 to 60 | 4049 | 31.9 | 69.2 | 83.3 | 35.0 |
| 20 to 50 | 4156 | 33.9 | 72.3 | 83.9 | 36.2 |

Source: Author calculations based on HIES 2018-19 data

Comparability of expenditure and income data. In most developing countries, consumption expenditure is used as a proxy for welfare. Theoretically, consumption is likely to remain more stable over time than income, which can be affected by seasonality and other shocks. Practically, it is extremely difficult to collect accurate income data in developing economies with high informality, a large prevalence of self-employment or own-account workers, reliance on foreign remittances, in addition to smallholder agricultural production for home use. Income measures are especially problematic due to difficulties in estimating self-employment profits, falsified responses and underestimation (Deaton and Zaidi 2002; Deaton 2019). For these reasons, even though the HIES collects data on income, it is more reliable to continue using consumption as a proxy for income in the REM approach.

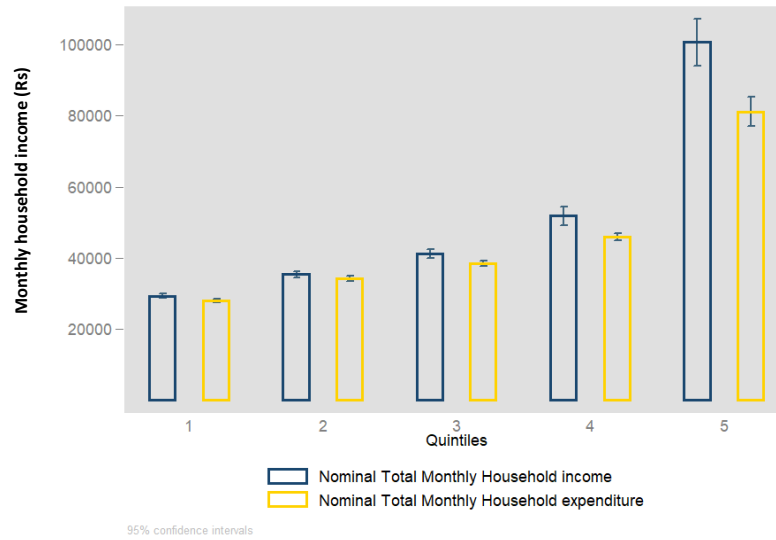
For comparison, household income aggregates were estimated using the data in HIES 2018-19. A household's total income is given by the sum of all the following sources:

- 1) Work or job-related annual income from main, secondary and other occupations;
- 2) In-kind payments for employment as well as transfers such as pensions;
- 3) Main and secondary income from agriculture (including in-kind transfers) for those in agriculture;
- 4) Unearned income sources including local and international remittances, Zakat/Ushr, inheritances, income from insurance, the Benazir Income Support Programme;
- 5) Income earned (rents or sales) from agricultural and non-agricultural land;
- 6) Rent or sale of animals and equipment; and
- 7) Rent or sale of household enterprise property and equipment.

To enable comparisons with the consumption aggregate, self-reported imputed rents for owner-occupants are included to ensure comparability. Without accounting for these, income falls short of consumption for most households.

Estimates from Pakistan reveal that household incomes are higher than expenditures. This relationship holds across all quintiles in urban Pakistan, with the differences between the two estimates being significant - as highlighted by the non-overlapping error bars in Figure 3. While the differences between income and expenditure estimates are likely to correspond to savings, noisy income estimates would indicate that this is not a hard and fast rule.

Figure 3: Income and Expenditures by Quintile



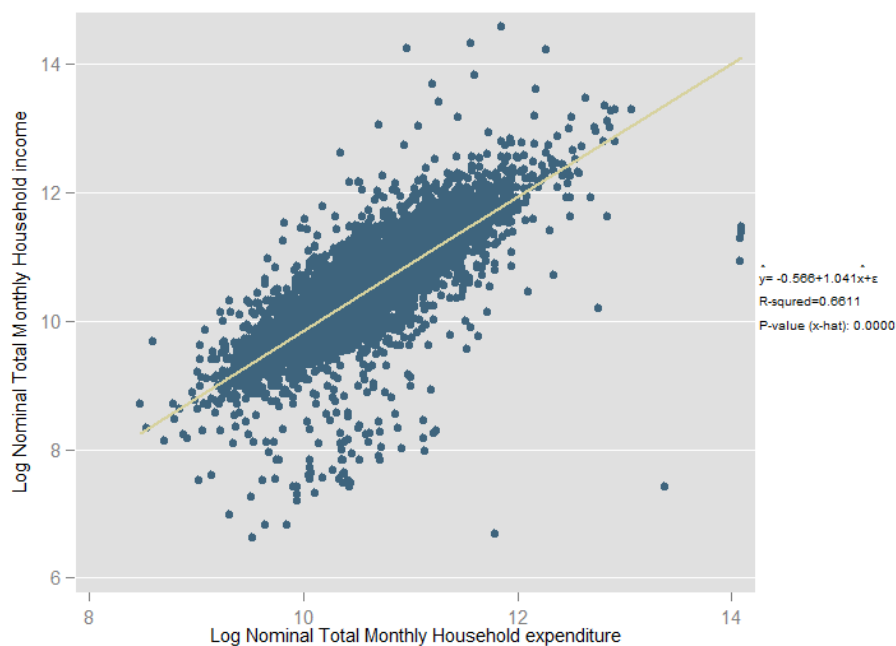
| Quintile | Monthly consumption per household | Monthly income per household (with imputed rents) | Monthly income per household (without imputed rents) |
|----------|-----------------------------------|---|--|
| 1 | 27,974 | 29,365 | 26,446 |
| 2 | 34,276 | 35,466 | 31,232 |
| 3 | 38,436 | 41,281 | 35,834 |
| 4 | 46,013 | 51,840 | 45,029 |
| 5 | 81,188 | 100,665 | 83,147 |

Source: Authors' calculation²⁷

Overall, income and expenditure at the household level are highly correlated. This can be tested by regressing household income on household expenditure and estimating the correlation of determination or R^2 between the two values. Figure 4 highlights that the relationship is both large and significant across all urban households and within provinces. As such, it is confirmed that expenditure data can serve as a useful proxy when estimating RIM in the absence of reliable income data.

²⁷ Author calculations use quintiles generated using spatially deflated expenditure per adult equivalence with household weights.

Figure 4: Scatterplots of Nominal Income and Expenditure for Households in Urban Pakistan



Source: author’s calculations based on HIES 2018-19 microdata
 Note: Sample restricted to urban areas only

Findings and Conclusions. Applying the REM, nearly all households in the bottom quintile are housing poor, and the housing unaffordability rate decreases as households earn higher incomes (Table 4). Using the EIR method, on the other hand, the richer segments are more likely to live in unaffordable housing conditions. This highlights one of the main shortcomings of the EIR method: it fails to account for the fact that the well-off can afford to spend a larger proportion of their overall expenditure on housing, even after paying for basic needs. Conversely, people at the bottom end of the expenditure spectrum struggle with meeting their basic needs even if they spend less than 30 percent of their expenditure on housing. In other words, housing costs matter more for the poor, and we need to measure housing affordability while keeping this in mind.

Table 4: Share of Urban Households in Unaffordable Housing as Measured by REM and EIR

| Urban Welfare Quintiles | Housing Poverty - REM (%) | Unaffordability - EIR (%) |
|-------------------------|---------------------------|---------------------------|
| All Pakistan | 25.2 | 43.9 |
| Q1 (lowest) | 93.7 | 28.1 |
| Q2 | 29.3 | 35.6 |
| Q3 | 2.6 | 44.3 |
| Q4 | 0.6 | 52.0 |
| Q5 (highest) | 0 | 59.6 |

Note: Sample restricted to urban areas only. Source: Authors’ calculations based HIES 2018-19 microdata.

Compared to the RIM, the REM is a second-best solution in estimating housing affordability in developing countries. In the absence of predetermined budget standards and reliable household income data, REM draws on readily available data and widely accepted poverty estimation techniques to yield insights. Compared with the widely applied standard EIR approach, REM is a more precise and conceptually more well-grounded instrument for measuring household affordability.

Annex 2: Other Measures of Housing Affordability

This annex provides a summary of less commonly used measures of housing affordability that target specific characteristics of affordability.

Norm rent. The Canada Mortgage and Housing Corporation distinguishes between those who *choose* to spend more than 30 percent of their income on housing and those households who have no alternative. This is achieved by applying a ‘norm rent income’ value which is used as the low-income cut-off (Gabriel et al. 2005). A household is said to be facing affordability problems if it spends more than 30 percent of its income on housing *and* its income falls below the norm rent income required to rent an average dwelling that is suitable (in terms of the number of bedrooms) and adequate for that household’s purpose (CMHC 1991).

Demand-supply mismatch approach. This approach compares the number of households with incomes at or below a particular level with the number of rentals with rents that are affordable at 30 percent of the threshold income. Threshold incomes vary with household size and threshold rents vary with number of bedrooms. The difference between the number of households at or below the adjusted income thresholds and the number of rentals at or below the adjusted rent thresholds is considered a measure of the mismatch between the supply and demand for affordable housing (Belsky, Goodman, and Drew 2005). Typical thresholds are a defined fraction of an area’s median family income (e.g., 30, 50, 80, and 120 percent), income quartiles or quintiles, or some multiple of the minimum wage.

Housing Wage. Introduced in the U.S. by the National Low Income Housing Coalition (NLIHC), the housing wage is the amount of money a household must earn in order to afford a rental unit of a range of sizes (0, 1, 2, 3, and 4 bedrooms) at the jurisdiction’s Fair Market Rent (FMR).²⁸ This is based on the affordability standard of paying no more than 30 percent of income for housing costs. NLIHC’s Out of Reach report also provides comparisons of the annual equivalent of the housing wage to the local area’s median income as estimated from HUD (NLIHC 2019).

Housing Affordability Index. Housing affordability indices are widely used by the mortgage lending and real estate industries to assess the affordability of the residential sales market, based upon prototypical housing costs, primarily for potential homebuyers. The derived indicators allow for two or more points in time to be compared to determine if, on average, dwellings for sale have become relatively more or less affordable. While useful as a descriptive indicator of affordability, relative approaches do not generally provide a normative standard. They cannot be used to assess how many, and which kinds of households, can and cannot afford which properties for sale, or for that matter, the affordability stresses of owner-occupiers in their current dwellings.

Amenity-Based Housing Affordability Index. Fisher, Pollakowski, and Zabel (2009) developed the Amenity-Based Housing Affordability Index based on the rationale that a housing affordability index should take location factors into account because the goal of housing affordability policy should not only be to provide shelter, but also to supply units that are accessible to jobs, education, and other amenities. This index measures affordable housing stock in a given area for families within a given income range. From their application of this index in the Boston metropolitan area for families earning 50-80 percent of

²⁸ In the U.S., the rent standard commonly used is HUD’s fair market rent (FMR). This standard is typically the 40th percentile rent of recently rented apartments within an entire metropolitan area or of non-metropolitan areas of a state.

the area median income, they found substantial shifts away from affordability in neighborhoods with poor safety, job accessibility, and schools. According to this index, housing considered unaffordable may be considered affordable after improvements to job accessibility, public transportation, and other amenities are made.

Housing plus Transportation (H+T) Affordability Index. The H+T Index, developed by the Center for Neighborhood Technology, incorporates transportation costs into measures of affordability and maps these relationships across metropolitan areas in the United States. It posits that “the relationship between housing cost and transportation is essential to the development patterns of urban form, suburbanization, and housing markets. Households must make trade-offs on how much they spend on housing and how much they spend on transportation.” Moreover, the rationale for this type of index is that “the failure of conventional measures to incorporate transportation costs into neighborhood affordability has led to the exacerbation of sprawl and the location of households in areas far from civic, social, and economic opportunity. The H+T Index provides an estimate of the typical cost of housing and transportation in different neighborhoods and compares this estimate to a typical household’s income.” A neighborhood is considered affordable if a given household would spend less than 45 percent of its income on housing *plus* transportation costs (Homelessness Policy Research Institute 2018).

Bibliography

- AEI Housing Center. 2019. *First-time Buyer Affordability Report*. American Enterprise Institute.
- Australia. National Housing Strategy. 1991. *The Affordability of Australian Housing*. Canberra: Australian Government Publication Services.
- Bhanot, Disha, Manav Khaire, Arti Kalro, Shishir Jha. 2019. Affordable housing finance companies in India: how do they 'differently' serve the underserved?. *Housing Studies*. 35. 1-29. 10.1080/02673037.2019.1614538.
- Belsky, Eric S., Jack Goodman, and Rachel Drew. 2005. "Measuring the Nation's Rental Housing Affordability Problems." Joint Center for Housing Studies Harvard University. https://www.jchs.harvard.edu/sites/default/files/rd05-1_measuring_rental_affordability05.pdf
- Belsky, Eric S., Nicolas Retsinas, and Mark Duda. 2005. The financial returns to low-income homeownership. Working Paper W05-9, Joint Center for Housing Studies, Harvard University. <https://www.jchs.harvard.edu/sites/default/files/w05-9.pdf>
- Burke, Terry, and Liss Ralston. 2004. "Measuring housing affordability." *AHURI Research and Policy Bulletin 45*. Melbourne: Australian Housing and Urban Research Institute Limited.
- Canberra Group. 2011. *Handbook on Household Income Statistics, second edition*. Canberra: United Nations Economic Commission for Europe (UNECE).
- Canada Mortgage and Housing Corporation (CMHC). 1991. *Core Housing Need in Canada*. Canada Mortgage and Housing Corporation, Montreal.
- Ceriani, Lidia, Sergio Olivieri and Marco Ranzani. 2019. Housing, Imputed Rent, and Households' Welfare. Policy Research Working Paper; No. 8955. World Bank, Washington, DC.
- Chancel, Lucas and Thomas Piketty. 2019. Indian Income Inequality, 1922-2015: From British Raj to Billionaire Raj? *Review of Income and Wealth*, 65, S33-S62.
- Deaton, Angus and Salman Zaidi. 2002. Guidelines for Constructing Consumption Aggregates for Welfare Analysis. LSMS Working Paper; No. 135. World Bank.
- Deaton, Angus. (2005). Measuring poverty in a growing world (or measuring growth in a poor world). *Review of Economics and Statistics*, 87.1, 1-19.
- Demographia. 2019. "Rating Middle-Income Housing Affordability." *15th Annual Demographia International Housing Affordability Survey*. St. Louis: Demographia.
- Ezennia, Ikenna Stephen and Sebnem Onal Hoskara. 2019. "Methodological Weaknesses in the Measurement Approaches and Concept of Housing Affordability Used in Housing Research: A Qualitative Study", *PLoS One* 14(8).
- Field, Charles G. 1997. "Building Consensus for Affordable Housing." *Housing Policy Debate* 8 (4): 801-832.
- Fisher, Gordon M. 2007. An Overview of Recent Work on Standard Budgets in the United States and Other Anglophone Countries. United States Dept of Health and Human Services.
- Fisher, Lynn M., Henry O. Pollakowski, and Jeffrey Zabel. 2009. "Amenity-Based Housing Affordability Indexes." *Real Estate Economics* 37(4): 705-746.
- Freeman, Angus, Russell Chaplin, and Christine M. E. Whitehead. 1997. *Rental affordability: a review of international literature*. Cambridge: University of Cambridge, Dept. of Land Economy.

- Gabriel, Michelle, Keith Jacobs, Kathy Arthurson, Terry Burke, and Judith Yates. 2005. "Conceptualising and Measuring the Housing Affordability Problem." *AHURI Research Paper No. NRV3-1*. Melbourne: Australian Housing and Urban Research Institute Limited.
- Garg, Vidhee, Ashna Singh. 2022. "Re-visiting Social Housing", World Bank.
- Garemo, Nicklas, Jan Mischke, Sangeeth Ram, Shirish Sankhe, and Jonathan Woetzel. 2014. *A Blueprint for Addressing the Global Affordable Housing Challenge*. New York: McKinsey Global Institute.
- Government of Pakistan (Ministry of Finance), 2016. "Pakistan Economic Survey 2015-16" Poverty Chapter (Annexure III). Accessed from: https://www.finance.gov.pk/survey/chapters_16/Annexure_III_Poverty.pdf
- Haffner, Marietta and Kristof Heylen. 2011. User costs and housing expenses. Toward a more comprehensive approach to affordability. *Housing Studies* 26(4): 593–614.
- Hancock, K.E. 1993. "'Can Pay? Won't Pay?' or Economic Principles of Affordability." *Urban Studies* 30(1): 127-145.
- Herbert, Christopher, and Eric Belsky. 2006. "The Homeownership Experience of Low-Income and Minority Families. A Review and Synthesis of the Literature." U.S. Department of Housing and Urban Development, Office of Policy Development and Research, February 2006.
- Herbert, Christopher, Alexander Hermann, and Daniel McCue. 2017. "In Defense of the 30 Percent of Income to Housing Affordability Rule—In Some Cases." *Shelterforce* Spring 2017.
- Herbert, Christopher, Alexander Hermann, and Daniel McCue. 2018. *Measuring Housing Affordability: Assessing the 30-Percent of Income Standard*. Cambridge: Joint Center for Housing Studies, Harvard University.
- Heylen, Kristof. 2018. "Measuring Housing Affordability in Flanders. Towards a New Approach?" *Institute for Work and Society (HIVA)*.
- Homelessness Policy Research Institute. 2018. *Housing Affordability Standards*. Los Angeles: Homelessness Policy Research Institute.
- Horsfield, Giles. 2015. "Chapter 3: Equivalised income" in A report on the Living Costs and Food Survey 2013, including spending on housing, utilities and other outgoings. London: Office for National Statistics.
- Housing New Zealand Corporation. 2005. *Building the Future: The New Zealand Housing Strategy*. Wellington: Housing New Zealand Corporation.
- Hulchanski, John. 1995. "The Concept of Housing Affordability: Six Contemporary Uses of the Housing Expenditure-to-Income Ratio." *Housing Studies* 10: 471-491.
- Lozano-Gracia, Nancy and Cheryl Young. 2014. "Housing Consumption and Urbanization." World Bank Policy Research Working Paper No. 7112.
- Mayo, Stephen K. and Stephen Malpezzi. 1985. "Housing demand in developing countries." World Bank Staff Working Paper No. 733.
- Mayo, Stephen K., Stephen Malpezzi, and David J. Gross. 1986. "Shelter Strategies for the Urban Poor in Developing Countries." *World Bank Research Observer* 1(2): 183-203.
- MacLennan, Duncan and R.U. Williams, eds. 1990. *Affordable Housing in Britain and the United States*. York: Joseph Rowntree Foundation.
- Meyer, Bruce D. and James X. Sullivan. 2003. "Measuring the Well-Being of the Poor Using Income and Consumption," *Journal of Human Resources*, 2003, v38(Supplement), 1180-1220.

- Meyer, Moritz, Maria Qazi, Anirudh Rajashekar, and Yan Zhang. 2022. "Behind on Rent or Left Behind: Measuring Housing Poverty in Urban Pakistan." *Poverty and Equity Notes*; no. 49. Washington, D.C.: World Bank Group.
- NAHB (National Association of Home Builders). 2009. "The Local Impact of Home Building in Typical Metro Area: Income Jobs and Tax Generated." June 2009.
- NLIHC (National Low Income Housing Coalition). 2019. *Out of Reach*. Washington: NLIHC.
- Newman, Sandra J. and C. Scott Holupka. 2014. "Housing Affordability and Investment in Children." *Journal of Housing Economics*, vol. 24, June 2014.
- OECD. n.d. "What are equivalence scales?" OECD Project on Income Distribution and Poverty.
- Penne, Tess, Irene Cussó Parcerisas, Lauri Mäkinen, Bérénice Storms, and Tim Goedemé. 2016. "Can Reference Budgets Be Used as a Poverty Line?" *ImPRovE Working Papers* 16 (5).
- Quigley J. M., Steven Raphael. 2004. "Is Housing Unaffordable? Why Isn't It More Affordable?" *Journal of Economic Perspectives* 18 (1): 191-214.
- Ravallion, Martin. 1992. "Poverty Comparisons - A Guide to Concepts and Methods," Papers 88, World Bank - Living Standards Measurement.
- Ravallion, Martin. 1998. *Poverty Lines in Theory and Practice*. Living Standards Measurement Study Paper 133. Washington DC: World Bank.
- Robinson, Mark, Grant M. Scobie, and Brian Hallinan. 2006. "Affordability of Housing: Concepts, Measurement and Evidence." New Zealand Treasury Working Paper 06(03).
- Rohe, William M. and Hye-Sung Han. 2012. "Housing and Health. Time for renewed collaboration." *North Carolina Medicine Journal*, 2012, 73(5):374-380, North Carolina Institute of Medicine and The Duke Endowment.
- Rohe, William M. and Mark Lindblad. 2013. "Reexamining the Social Benefits of Homeownership after the Housing Crisis." Joint Center for Housing Studies, Harvard University, August 2013.
- Rossi-Hansberg, Esteban, Pierre Daniel Sarte and Raymond Owens III. 2010. "Housing Externalities." *Journal of Political Economy*, 2010, vol. 118 (3), The University of Chicago.
- Rossi-Hansberg, Esteban and Pierre Daniel Sarte. 2012. "Economics of Housing Externalities." *International Encyclopedia of Housing and Home*, 2012, Vol. 2, 47-50.
- Saunders, Peter, and Megan Bedford. 2017. *New Minimum Income for Healthy Living Budget Standards for Low-Paid and Unemployed Australians*. Sydney: Social Policy Research Centre, UNSW Sydney.
- Self Sufficiency Standard. n.d. "The Standard." The Self-Sufficiency Standard. Accessed July 21, 2020. <http://www.selfsufficiencystandard.org/the-standard>.
- Stegman, Michael. 1998. "The challenge of revitalizing social housing in the United States" in Badcock, B. and Harris, K. (eds) *Proceedings of the 1998 National Urban Renewal Seminar*, AHURI, Melbourne.
- Stone, Michael E. 2004. "Shelter Poverty: The Chronic Crisis of Housing Affordability," *New England Journal of Public Policy* 20(1), Article 16.
- Stone, Michael, Terry Burke, and Liss Ralston. 2011. "The Residual Income Method: A New Lens on Housing Affordability and Market Behaviour." *AHURI Final Report No.176*. Melbourne: Australian Housing and Urban Research Institute Limited.
- United States Census Bureau. n.d. "American Housing Survey." United States Census Bureau. Accessed July 21, 2020. <https://www.census.gov/programs-surveys/ahs/about.html>.

Valdez, Roger. 2009. "Toward A New Measure of Housing Affordability: Residual Income Approach Offers Advantages for Policy Makers." Sightline Institute.

Vranken, Jan. 2010. "Using Reference Budgets for Drawing up the Requirements of a Minimum Income Scheme and Assessing Adequacy." *Peer Review in Social Protection and Social Inclusion* November 26, 2010.

Wakely, Patrick and Elizabeth Riley. 2011. "The Case for Incremental Housing." Cities Alliance Policy Research and Working Papers Series No. 1.

Wardrip, Keith, Laura Williams, and Suzanne Hague. 2011. "The Role of Affordable Housing in Creating Jobs and Stimulating Local Economic Development: A Review of the Literature." Center for Housing Policy, January 2011.

World Bank. 2007. Arab Republic of Egypt: Analysis of Housing Supply Mechanisms. Washington, DC: World Bank.

Yates, Judith, Vivienne Milligan et al. 2007. "Housing Affordability: A 21st Century Problem." *AHURI Final Report No. 105*. Australian Housing and Urban Research Institute.