JANUARY 2020

Urban Land and Housing Market Assessment:
A Toolkit

Global Platform for Sustainable Cities

URBAN POVERTY AND HOUSING GSG

WORLD BANK GROUP
Urban, Disaster Risk Management, Resilience & Land

Acknowledgements

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Quick user guide

WHO IS IT FOR?

This Toolkit aims to assist practitioners in undertaking a standard upstream diagnosis to inform policies and programs in the housing sector at the city level in developing countries, with a focus on the supply side. The diagnosis is designed to balance the need for achieving a comprehensive assessment of a complex sector like housing and the political impetus to identify problems and take actions within a short timeframe.

WHAT IS IT FOR?

The Toolkit has been designed to provide a flexible diagnostic framework to aid a team in evaluating a city's housing challenges and developing a prioritized set of possible interventions – both reform and investment – that government and private entities can take to address them. By applying the Toolkit, the team will:

- Quantify the city's quantitative and qualitative housing deficit
- Describe the city's urbanization and housing development trends
- Quantify residential growth patterns of the city compared to other cities in the country
- Develop a housing typology to frame different housing challenges
- Identify constraints – regulatory, financial, political, or physical – to different types of housing development
- Describe the most important institutions of the housing sector and relate them to major constraints and housing problems
- Develop an informed and prioritized approach to intervention– reform and/or investment
- Communicate the importance of the housing sector to relevant agencies and give them the tools to advocate across sectors

HOW DO I USE IT?

This Toolkit is envisioned as a *living document* that incorporates learning and continued refinement. It builds on decades of research and practice in the land and housing sector, combining elements from the three existing types of assessments, tapping into new technology while striving for practicality and ease in application. It resembles a scaled-back version of the UN-Habitat Housing Profile and draws on recent World Bank Group experience. Users are encouraged to apply this Toolkit – either in its entirety or in part, depending on the primary questions to be answered. The Toolkit is to be regularly updated with feedback from its applications in a variety of urban contexts.

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1. Introduction

1.1 Overview

Access to affordable, safe, and secure housing in cities is critical for human well-being and national prosperity. Cities in emerging economies often face multiple housing problems – formal housing is unaffordable to most, informal housing is of low quality, basic infrastructure is lacking, and population growth outpaces government supported urbanization. Providing affordable and adequate housing is central to delivering the United Nations' Sustainable Development Goals (SDGs), especially with regard to Goal 11 of Sustainable Cities and Communities. Prioritizing government intervention in the housing sector is challenging because well-functioning housing markets depend on competent government action in overlapping spheres, from infrastructure provision to appropriate development regulations, as well as multiple private sector industries, namely real estate development and building materials production. The high cost of completed housing units relative to household incomes means that a system of private sector-built housing depends on financing instruments. An effective primary mortgage market requires not only sound financial and prudential policies, but also stable local governance of property rights and public services.

Housing Value Chain. One way to understand the complexity of the housing market is the Housing Value Chain. This framework links the different elements that must come together within national and local policy environments to produce housing. As illustrated by Figure 1, each link in the chain adds value to the final product. When all the links function well, the housing market functions well. When any link is broken, the whole system will run less smoothly.

A commonly damaged link in developing countries is that of infrastructure and services. Public works agencies often fail to recover their costs from users and supplemental funding from the state is insufficient for them to expand to cover newly built neighborhoods, let alone anticipate new neighborhood development and install infrastructure in advance. Moreover, the problems compound without proper management of public assets – the infrastructure.

Another commonly damaged link is the planning and building regulations, which often impose unrealistic and counterproductive minimum lot sizes and limitations on floor area ratios. When a majority of residents cannot afford a housing unit that meets minimum building and zoning codes, it is likely that on the one hand, these standards are too high, and on the other, a lack of coordination along this chain has made the production of housing inefficient. Additionally, the goal of preventing congestion is thwarted by imposing low densities. In fact, city governments in countries worldwide create gridlock through low-density sprawl and giving free road space to private cars.

This housing value chain portrayed in Figure 1 is an idealized version of the housing production process. In many places, a formal housing value chain produces a small share of the overall housing stock, and the informal value chain deserves the majority of attention given its importance for most people. This informal housing value chain exists because the formal chain is often missing links entirely. Thus describing the institutions that could play needed roles in housing production is illustrative for policymakers.

This toolkit, therefore, serves as a guide to create an evidence-based assessment of a city's land and housing market performance. The focus is on describing the formal and informal value chains for housing production to highlight the main challenges in this sector. The

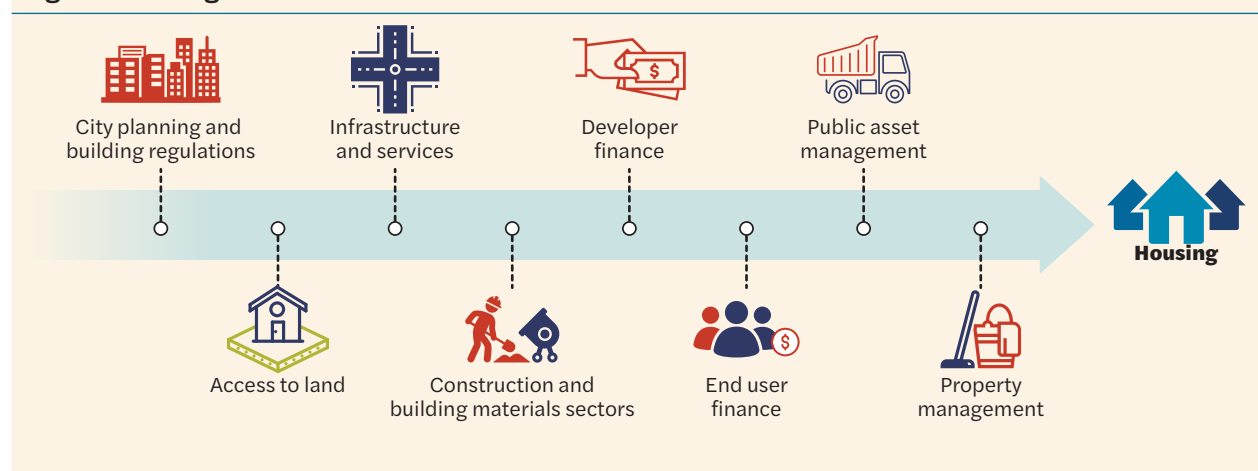**Figure 1. Housing Value Chain**

City planning and building regulations

Infrastructure and services

Developer finance

Public asset management

Access to land

Construction and building materials sectors

End user finance

Property management

Housing

constraints preventing the different components of the value chain from functioning will assist in identifying entry points for reform and investment. This assessment can be viewed as due diligence for urban development and housing sector lending operations of the World Bank Group, and used by governments to inform their policy formulations and investment decisions. It is intended to work as a "quick scan" rather than a comprehensive review of the housing sector. The goal is to identify the most critical gaps in the housing sector and then later channel resources into examining and intervening these critical areas. This document is also intended to be a living document, as data sources improve and change, and its application provides feedback for improvement.

The approach is primarily focused on the supply side and on local government policies. This is an important direction for work in the housing sector because the supply side and local-level housing policies are less well understood and less systematically analyzed than the demand side and the national level[1]. A companion to this toolkit is a review of housing sector assessments over the past three decades, which emphasize the importance and complementary nature of both supply and demand side interventions.

The prevalence of informal housing solutions means that local governments can have a large positive impact in the housing sector by removing local constraints in the formal housing supply chain. Small adjustments to rules and regulations to adapt to the reality of a city's resources can have a large impact, and expansion of access to land, trunk infrastructure, targeted and transparent subsidies, and the delivery of basic services are also critical for the housing sector.

The toolkit has three parts. **Part A** is focused on indicators to assess problems in the city's housing and land value chain, and current housing and related policies. The indicators guide the team in responding to questions about the nature and pace of urban growth and housing development, housing policies, housing deficits, land availability, development regulations and informality, the different types of existing and recently built housing stock, and the magnitude of the city's housing problems. Some indicators will guide fieldwork and others will be gathered during fieldwork.

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1   For references, see: Chiquier, L. and Lea, M. 2009. *Housing Finance Policy in Emerging Markets*. Washington, DC: The World Bank. Available here: http://documents.worldbank.org/curated/en/833371468152071863/Housing-finance-policy-in-emerging-markets. Struyk, R. 2009. Guide to preparing a housing finance strategy. Nairobi: UN-Habitat. Available here: https://digitallibrary.un.org/record/788908.

Table 1. Overview of Toolkit

PART	QUESTIONS	METHOD / OUTPUT
A. Indicators of Housing and Land Markets	What are the city's housing deficits? What are the city's affordability challenges for different social groups and for renters/owners? What are the main housing policies and land governance frameworks? Where is the city adding housing and is there room to grow? Do resale markets exist and how do they differ by market segment?	Create indicators using remotely accessed secondary data and local data sources / Nine groups of indicators that highlight housing problems and scale of current policies
B. Constraints to Housing Development and Upgrading	What are the steps of developer-built housing and self-built / incremental expansion of housing units? Where are the constraints to different types (formal/informal, greenfield/infill) of housing production?	Create indicators and narratives using survey data of housing development / Description of process, assessment of major constraints
C. Institutional Map and Prioritized Intervention Strategy	What are the most important governmental and non-governmental institutions in housing arena at different levels of government? What institutions relate to the most constrained links in the housing value chain? Which have the greatest potential for change? How can housing reforms align with existing political priorities and development programs?	Survey stakeholders, review existing literature / Institutional map and ranking of potential for change, assessment of intervention strategy

Part B is focused on assessing the different factors restricting housing production and ranking them in importance. A set of expert surveys will generate both a detailed description of the process of building different types of housing – formal and informal, infill and greenfield – and the constraints to these different types of development. The survey methodology also provides a rough estimate of the importance of different constraints to development and identifies the main actors involved. The team can then prioritize government agencies, private organizations, and civil society groups to assess their potential for engagement.

Part C prioritizes potential interventions by assessing which government actors are the most amenable to engagement and have the greatest capacity for action and/or reform. It builds on Parts A and B by adding surveys of actors associated with the most significant constraints to housing production.

This document describes each of the three parts separately. The concluding section suggests an organization for the final report along with guiding principles for the housing sector. Additionally, it articulates some arguments for the economic and financial importance of the housing sector, which many governments may not recognize. Table 1 presents the main questions, methods, and outputs of the toolkit.

1.2 Motivation: Taking the pulse of land and housing markets

Many low-income countries are experiencing rapid urbanization. With more than half of the world's residents live in urban areas, providing affordable housing to accommodate the population growth is becoming more challenging for national and local governments alike. Informal settlements have mushroomed as a coping strategy and gateway to opportunities for migrants, while posing substantial challenge to urban management. One of the targets of UN's Sustainable Development Goal 11 is to ensure access for all to adequate, safe and affordable housing and basic services and to upgrade slums by 2030.[2] One of the root causes for the lack of affordable housing in the formal sector is the ill-functioning land market which pushes up housing costs and distorts the spatial distribution of housing versus employment.

There has been an increasing interest from client countries for the World Bank Group's technical and financial support to expand the supply of affordable housing. However, there has not been a common framework for diagnosing the urban land and housing sector as a whole, particularly on the supply side. In the absence of

2 https://sustainabledevelopment.un.org/sdg11

a robust framework and standard assessment tool, the diagnoses tend to be either overly comprehensive and costly or incomplete or simplistic. They also lack the ability of identifying key constraints, and are not driven by specific analytical lens or focused on a particular "building block" of the housing value chain, resulting in inaccurate identification of key constraints. This limits the effectiveness of proposed interventions.

Housing is a uniquely complicated economic good and an essential human need. A house is fixed in space and features of its location – e.g. access to jobs, and basic services and amenities in a neighborhood – drive much of its value. A house is durable. Although it deteriorates over time, urban growth usually means central locations become more valuable due to their proximity to jobs and amenities. Facilitating infill development and densification becomes increasingly important as cities grow, for affordability and environmental sustainability reasons. Climate change is also reshaping intervention in the housing sector, especially long-term planning with regards to increasing vulnerabilities to natural disasters.

Housing is a challenging sector. The benefits of urbanization are such that coordinating interventions in urban areas and investments in roads, public transit, water, and sewage have substantial multiplier effects and benefits that far outweigh the costs. Urban housing requires land serviced with infrastructure (roads, water, sanitation, and electricity), which depend on government agencies financing and coordinating their provision. This is often in short supply and housing competes with other land uses, which might seem more economically productive. Local governments may think of their well-serviced land as zero-sum rather than coordinating the expansion of services to create more of this important input to housing and other uses. Additionally, some governments think of housing only as a consumption or social sector, rather than the important part of the economy it is.

In most countries, housing is a private good – produced by the private sector as well as by the very individuals who will consume it. Yet in all countries, the housing sector is interconnected with and dependent on government action – and inaction – at multiple levels. Because housing is expensive relative to incomes, financing tools and subsidies for low-income families and individuals are needed if they are to access what a society agrees to be a minimum quality standard of housing unit.

Reforms and investments in many areas can lead to large improvements across the entire housing value chain. The most common examples are expanding property rights governance, urban infrastructure and the creation of serviced land for housing, rationalizing local development regulations to match a city's resource level, improving property rights and land governance, facilitating infill and urban densification, and removing perverse incentives in the tax system.

Frequently, growing the mortgage finance system or ambitious new town development are government's first instincts in addressing housing deficits. But the benefits of mortgage finance are limited to the higher income segments of the population. New housing construction on apparently cheap peri-urban land can end up being very costly to service and can produce dysfunctional neighborhoods disconnected from the city. While they are market-creating measures, these approaches tend to benefit a small share of the population and not able to reach down market effectively.

There are many options for intervention, however, that can improve housing access and housing quality for everyone. For example, improvements to existing infrastructure to facilitate infill, increased investment in trunk infrastructure to create serviced land, expanding competition in building industries, increasing property tax collection to fund urban services, fair application of property rights rules and land management, microfinance programs for housing improvement, and reducing overly restrictive regulation of new development, such as large minimum lot sizes or excessive requirements for building permits.

The challenge of ill-functioning urban land markets and lack of affordable housing has been studied by development professionals and academic researchers for decades.[3] In developing countries, notable attempts to provide a framework for evaluation with indicators include the 1989 the Global Housing Indicators program spearheaded by the World Bank and UN-HABITAT and Urban Land and Housing Assessment tool developed by the World Bank in 1995[4]. Neither effort has been sustained by the sponsors, nor widely practiced in development countries. In part, the difficulty in and cost of obtaining data in low data availability environments has limited their use.

With the quest for land and housing market interventions on the rise, an accessible and cost-effective tool for assessing the land and housing markets has a significant

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3   For a review of World Bank experience, see the IEG report on housing finance here: https://ieg.worldbankgroup.org/evaluations/world-bank-group-support-housing-finance, the World Bank report on urban land here: https://openknowledge.worldbank.org/handle/10986/24377, and reviews of World Bank shelter lending here: http://siteresources.worldbank.org/INTHOUSINGLAND/Resources/339552-1153163100518/Thirty_Years_Shelter_Lending.pdf and here: http://documents.worldbank.org/curated/en/449241468157185647/Housing-policy-in-developing-countries-conjectures-and-refutations.

4   For details, see the companion document that reviews and summarizes prior work in this area.

potential benefit. Moreover, since the ambitious efforts of the 1989 Global Housing Indicators program and 1995 Land and Housing Assessment tool, the world has undergone many changes. New drivers and patterns of urbanization and land development, the availability of new data in more cities, and the adoption of new technology point to the need for revisiting the diagnostic approach. In 2018, the UN-HABITAT developed the Housing Barometer[5]. It is a useful tool to support a rapid analysis of the housing sector by qualitatively assessing its performance and has been tested in a few countries. This toolkit is more in depth, outlining an assessment framework that combines a more detailed qualitative approach than the barometer with quantitative indicators.

The present toolkit will need to be tested and improved based on its roll out in a variety of urban contexts (regions, levels of urbanization, and institutional setups). It will be most effective as a living document that incorporates learning and continued refinement.

1.3 Objectives

The toolkit aims to provide a flexible, diagnostic framework designed to aid a team in evaluating a city's housing challenges and developing a prioritized set of possible interventions – both reform and investment – that government and private entities can take to address them. By applying the toolkit, the team will:

- Quantify the city's quantitative and qualitative housing deficit
- Describe the city's urbanization and housing development trends
- Quantify residential growth patterns of the city compared to other cities in the country
- Develop a housing typology to frame different housing challenges
- Identify constraints – regulatory, financial, political, or physical – to different types of housing development

- Describe the most important institutions of the housing sector and relate them to major constraints and housing problems
- Develop an informed and prioritized approach to intervention – reform and/or investment
- Communicate the importance of the housing sector to relevant agencies and give them the tools to advocate across sectors

1.4 Approach

This toolkit builds on decades of research and practice in the land and housing sector, combining elements from the three existing types of assessments.[6] It resembles a scaled back version of the UN Habitat Housing Profile[7] and draws on recent World Bank experience[8]. It is focused more on the supply side, without losing sight of the entire value chain. The supply side focus responds to the common association of "housing policy" with subsidies and mortgage finance, by illustrating the potential for improving housing outcomes through improved delivery of urban services, streamlined and rationalized bureaucratic procedures, competitive building industries, and well managed land markets.

The first group of existing housing and land market assessments are those that attempt to gauge the efficiency of a market through quantitative analysis, primarily of land and housing prices. The most well-known examples of this approach - and the main basis of this toolkit - are the 1989 Housing Indicators Program[9] and the World Bank's 1995 Urban Land and Housing Market Assessment[10].

The second group are assessments of governance and regulation that take a qualitative, survey-based approach to ranking constraints. Notable examples are the 2012 Habitat International Framework[11], the Land Governance Assessment Framework (LGAF)[12], the Doing Business project[13], and lately, the Housing Barometer introduced by UN-Habitat in 2018. This toolkit draws from the survey approach of these frameworks heavily.

5   UN Habitat. 2018. The Housing Barometer: A Tool to Support a Rapid Housing Sector Review. Available here: http://capacitybuildingunhabitat.org/housing-barometer/.
6   For more, see the companion document that reviews and summarizes prior work in this area.
7   UN Habitat. 2010. A Practical Guide for Conducting Housing Profiles. United Nations Human Settlements Programme. Available here: https://unhabitat.org/series/housing-sector-profile-series.
8   For example, see World Bank. 2019. Unlocking Ethiopia's Urban Land and Housing Markets. Urban Land Supply and Affordable Housing Study Synthesis Report. Washington, DC: World Bank. Available here: http://documents.worldbank.org/curated/en/549221572382742218/pdf/Unlocking-Ethiopias-Urban-Land-and-Housing-Markets-Synthesis-Report.pdf.
9   World Bank. 1989. The housing indicators program: extensive survey (English). Washington, DC: World Bank. Available here: http://documents.worldbank.org/curated/en/678951468337476946/The-housing-indicators-program-extensive-survey.
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11 Habitat for Humanity. 2012. Global Housing Indicators: Evidence for action. Available here: https://www.globalurban.org/Global_Housing_Indicators_report.pdf.
12 Deininger, Klaus, Harris Selod, and Anthony Burns. 2012. Land governance assessment framework: Identifying and monitoring good practice in the land sector. Available here: https://www.landequity.com.au/assets/Uploads/LGAF-ESW.pdf and here: https://www.worldbank.org/en/programs/land-governance-assessment-framework#1.
13 For more, see: https://www.doingbusiness.org/

The third group are outcomes-focused assessments in data rich environments that focus on detailed aspects of housing affordability across household types and neighborhoods. The highest quality examples of this approach are from California[14], New York[15], London[16], and Cape Town[17]. These provide useful and sophisticated indicators to assess affordability and housing market activity.

A comprehensive quantitative assessment of an urban housing market - like that outlined by the UN Habitat Housing Profile - is a complex and ambitious undertaking. The Housing Profiles invite teams to conduct multiple surveys and specific studies of different aspects of the housing sector. The data scarcity of most middle and low-income countries means that this comprehensive approach would requires costly collection of survey data. Although this is an ideal knowledge base, these efforts may ultimately not yield insights that are any more actionable than a less data intensive approach. For this reason, this toolkit relies on limited quantitative assessment using globally available data and windshield surveys, and dedicates more resources to targeted qualitative fieldwork. It can always be supplemented by primary data gathering in for any of the components. One way to see this toolkit is as sitting in between the UN Housing Barometer and the UN Housing Profile in terms of comprehensiveness and resource commitment.

An important first step in the assessment is identifying the right scale of analysis, especially as it relates to jurisdictional boundaries of local governments. The appropriate analytical unit for a housing market is an urban area defined roughly by a labor market or commute shed even though policies and investments are made at the municipal or state level. Housing markets, like labor markets, often spill over municipal boundaries and can include many municipalities in one area. Defining the scope of analysis is an important initial decision that can be made based on data availability, the urban area's administrative context, and the goals of the engagement.

To identify which interventions have the greatest potential benefit in a city, and which is most feasible, an assessment of the local land and housing markets is often broad, considering the potential importance of the multiple sectors that shape housing outcomes. We have included the most important of these guiding questions and highlight them below to orient the team and as a potential framework for the final report.

Urbanization Trends

How do this city's urbanization trends – physical expansion, population growth, changes in density – compare to other cities in the country?

What kind of housing predominates in the recently urbanized parts of the city?

Housing needs and demands

What are the quantitative and qualitative housing deficits?

What is the distribution of housing tenure?

How do housing deficits differ for renters and owners?

For what share of the city's population is (new and existing, formal and informal, rental and ownership) housing affordable?

What are average rents and prices?

How does household formation compare to the rest of the country?

What are housing needs projected into the future?

Housing policies

What are the major housing policies in effect in the city?

How important are they to overall housing outcomes?

What are the agencies in charge of implementing these policies?

What are the most significant laws and regulations in the housing sector?

14 For more, see: https://lao.ca.gov/reports/2015/finance/housing-costs/housing-costs.aspx
15 For more, see: https://furmancenter.org/files/sotc/SOC_2018_Full_2018-05-22.pdf
16 For more, see: https://www.london.gov.uk/sites/default/files/london_shma_2017.pdf
17 For more, see: https://housingfinanceafrica.org/app/uploads/Cape-Town-Residential-Property-Market-FINAL-REPORT-Feb-2018-2.pdf

Urban land supply for housing

What kinds of land ownership exists – public/private/customary – how much of the city's land is in each category?

How common is informal land occupation?

How tolerant is the government of informally developed land?

How do people access new land for housing?

How expensive is land for housing relative to other costs of producing housing?

What are the fees and taxes for transferring/using land?

Is there sufficient greenfield land for projected urban expansion over the next two decades?

Urban planning, building regulations and processes

Do urban development standards unduly constrain housing development?

How is land management organized in the city?

How hard is it (time and cost) to urbanize rural land for housing, in terms of zoning changes and tenure arrangements?

Infrastructure and services

What is the governance structure for infrastructure provision?

What is the backlog in coverage, deficits in quality and the rate of infrastructure provision?

What is the cost to add infrastructure and how is it financed?

What do households pay for water/other basic utilities?

Housing supply

What are the main categories of new housing supplied (government, formal private, informal private)?

How many units are typically produced by these different actors?

How expensive are the different types of new housing?

What are the major constraints to the supply of the least expensive formal housing?
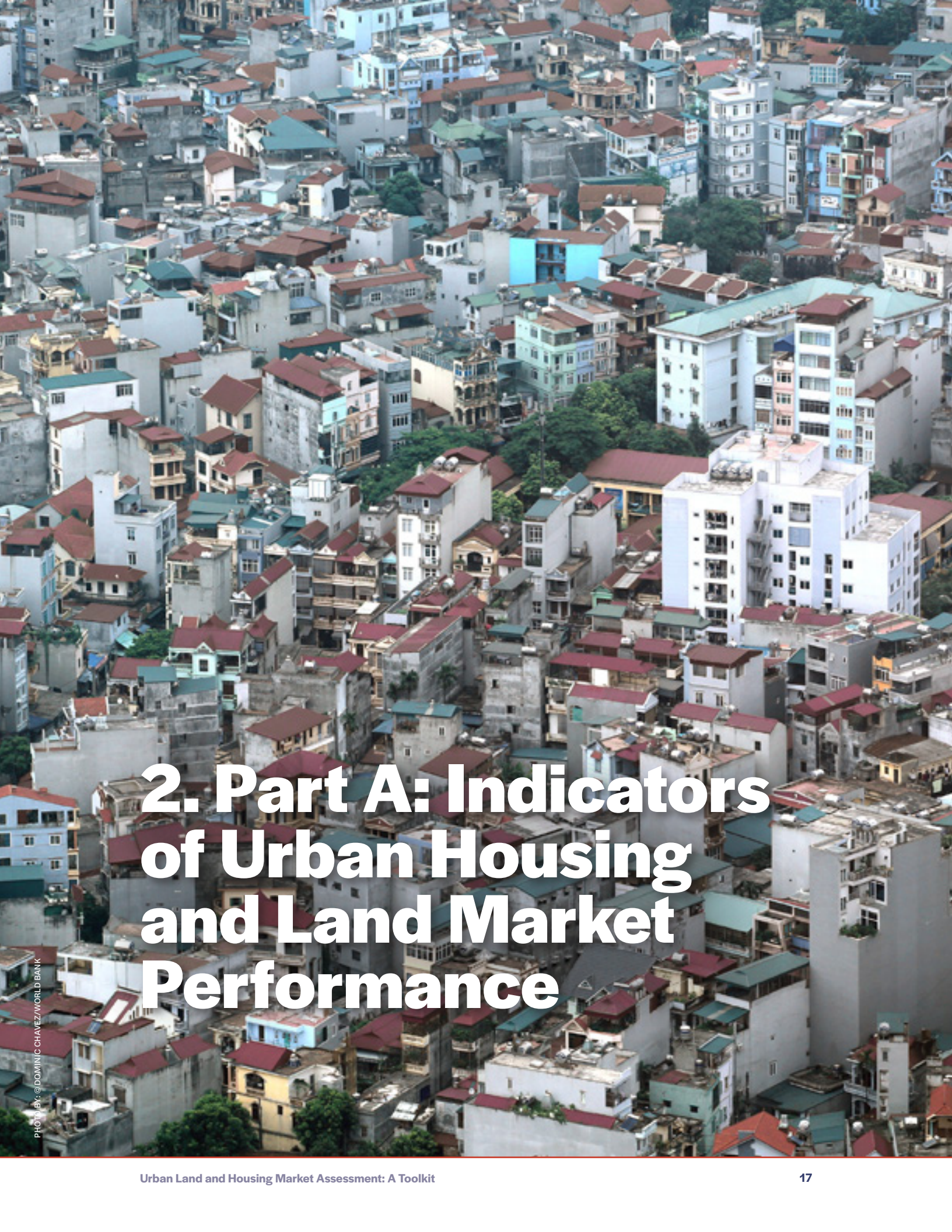
Building materials and construction industry

What are construction costs relative to the other costs of building housing?

Are building materials sourced locally?

How important are building material costs compared to other costs of construction?

What share of new housing is built by large, medium, and small developers?

Does the organization of the construction industry adversely affect housing production?

Housing finance

How prevalent (share of new housing) is mortgage lending & housing microfinance?

What is the average size, prevailing interest rate, and most common terms of a residential mortgage?

What is the average size and terms of a housing improvement microfinance loan?

PHOTO BY: @DOMINIC CHAVEZ/WORLD BANK

2. Part A: Indicators of Urban Housing and Land Market Performance

The first part of the assessment is a set of quantitative indicators that the team will use to frame the city's problems and urbanization trends in a national context, assess the severity of housing problems, and assess major policy deficiencies and constraints. The specific mix of indicators will vary from city to city based on data availability. The toolkit provides varying levels of analytical precision for different contexts, after a contextual overview below (see Table A1 for a detailed list of data sources).

2.1 Desk Review for Context

The team can first conduct a desktop review of policy and academic literature on land and housing issues in the city and country. The review includes official reports (legislation and regulation, policy and strategy documents), academic research, plus recent and relevant media. The team can use a standardized set of online search engines to look for the research and reports. The review will accomplish two things beyond providing basic contextual information.

First, the desk review will assist the team in identifying potential respondents to the surveys in Parts B and C. The team can identify survey respondents in several ways, including the people who wrote source materials, or who are referenced in them. Additionally, the team can identify experts through existing World Bank networks or through chambers of commerce and real estate associations. The experts will include public officials, real estate developers, chamber of commerce officials, property lawyers, and leaders of non-profit and community organizations focused on the urban poor and housing.

Second, the desktop review will help the team assess the coverage and quality of available data sources, and learn about the country's statistical agencies. From there, the team can begin collecting quantitative data on its own, as described below.

At the same time, basic indicators at the national level provide context. Data on the urbanization rate in recent decades, the level of economic development inequality, the economic structure and major clusters of economic activity, demographic trends, and the political system help frame the institutional capacity, long-term development trends, and the place of cities in the national economic and political agenda.

2.2 Geographic Scope of Analysis

This toolkit is an assessment of housing and land markets for an urban area (also referred to as a city). The exact boundaries of an urban area can be defined in different ways. The team can familiarize themselves with idea of the Functional Urban Area (FUA), developed by the Organization for Economic Cooperation and Development (OECD) [18] to use as a consistent and comparable definition of a city, distinct from boundaries of a political jurisdiction. It is likely the team will not calculate the FUA precisely,[19] but rely on existing definitions or create an urban area boundary in the spirit of a labor market area.

The FUA defines an urban area by identifying an urban core and hinterland that together constitute integrated housing and labor markets. Box 1 provides details. To calculate it precisely requires commuting data. Alternate approaches in the same spirit, e.g. using an urban footprint plus any small towns within a buffer of ten kilometers, achieve the same intention. An analysis of the housing and land market of one municipality within an urban area is also possible but should consider the flow of people and money across municipal borders. For detail on FUAs, see Appendix A.

The focus of this toolkit is on one city. But time and resources permitting, calculating the basic indicators for other, similar cities provides a comparative analytical baseline for the focal city. Being able to compare one city's trends to others in the country can provide direction for the team to examine specific problems and policies. For example, if there are two cities with similar incomes but one is growing much faster, it may indicate housing market is a constraint to expansion. If similarly sized cities are increasing faster in density, it may indicate a policy constraint to infill development. The team can choose comparison cities based on the national context, or simply use all cities of a similar population size. If resources permit, the team could include all cities above some minimum population size (e.g. 50,000 people as per the OECD Functional Urban Area guidelines).

Important differences in land and housing markets exist within any urban area, even in cities that are relatively small. Therefore, resources permitting, the team can divide the urban area into a rough typology of districts or neighborhoods. Some indicators benefit from assessment at the neighborhood or district scale, especially infrastructure and housing quality. Distinguishing

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18   For more, see: https://www.oecd.org/cfe/regional-policy/functionalurbanareasbycountry.htm

19   The OECD and UN Statistical Commission will be issuing a report in 2020 shortly with a definition of all FUAs in the world, the team can rely on those definitions once they are available.

neighborhoods by housing quality and growth rates assists the municipality in assessing the spatial magnitude of intervention needed as well as the numerical.

There are a number of approaches to defining neighborhoods or districts. A city's planning documents may contain a map with neighborhood outlines. Alternately, the team can create a new set of boundaries, though it is a relatively resource intensive activity. Analysts commonly use land-use and population patterns to define relatively homogenous areas. Combining data on land-use intensity (building footprint and height) with population numbers allows for reliable inference about the type of neighborhood. At a more basic level, the team can use satellite imagery to divide a city into districts with a similar urban form (more discussion on this in Appendix A).

Of the nine groups of indicators, housing typology and quality (especially infrastructure), market activity, new supply, rents and prices, affordability, and overcrowding are the most useful to disaggregate by neighborhood.

2.3 Considerations in Gathering Indicator Data

The indicators outlined here rely on multiple primary and secondary data sources. As indicated in Table 2, there are five potential data sources. Two are secondary data: global data (available online) and national census data. Two are primary data, collected through this project from local government agencies or through interviews with experts (Part B and C). The fifth, labeled 'uncertain' in the table, refers to indicators for which secondary data may or may not be available. If not, the team has options for gathering data - a "quick and dirty" approach or a full survey. This toolkit outlines the former.

Secondary data indicators: Compiling indicators that rely on global data requires an initial investment in a set of tools to make processing the data possible for analysts with limited experience. There are large economies of scale in developing this set of tools and other units in the bank or international organizations are working on this. The World Bank's recent experience[20] has shown that a GIS expert with knowledge of remote sensing data and housing related data could develop this set of tools to automate the process in 30 days. With this set of automated tools, producing the global data indicators on Urbanization Trends and Land Availability for any city would take roughly one week.

Primary data indicators: Indicators marked local agency and interviews in Table 2 will be collected through fieldwork. The survey instruments for Part B in the Appendix contain a list of questions cross-referenced to the indicators for which they provide data. Additionally, Part C indicates the sources for the indicators with a data source 'Local Agency.'

Uncertain indicators: The indicators that do not have an easily identifiable data source are marked uncertain. Some of these are the most common and important housing indicators, for example, indicators of qualitative housing deficit (1C), housing typology (7A), and major types of new housing (7B) may rely on the same base data of materials and infrastructure access, and similarly, the indicators of affordability (1D, 1E), average rents and price (7E), and income percentile that can access mortgage finance (9C) may rely on the same base data of rents, housing prices and incomes.

Resources required to compile these indicators vary based on data availability, format, and the degree of precision the team desires. The primary distinction is places with census surveys that record building materials, infrastructure access, rents, prices, and incomes at the housing unit or household level. In these places, for example, estimating the qualitative housing deficit will be relatively straightforward. If census data are not comprehensive, however, the team will need to decide how much effort to expend on gathering these base data. For housing quality indicators, for example, very rough estimates can be made based on strategic site visits, use of satellite imagery, and interviews of government agencies in the space of about two weeks. A representative survey of housing quality in a city, on the other hand, would take several months.

To calculate a complete set of indicators in a place with sufficient census data, an experienced housing analyst will require at least three months. Where census data are not available or not comprehensive, the team will need to decide how accurate and precise an estimate they need for indicators, and a complete housing profile using original surveys for all areas could take several years.

A final consideration for many of the indicators is that the most easily available data are biased towards formal housing. This data bias can lead analysts to a greater focus on what is sometimes a smaller share of the overall housing stock, simply because data are available. Thus, focusing more energy on gathering data on informal sector housing is important, acknowledging the limitations in the data that are easily obtained.

PHOTO BY: ©WORLD BANK

2.4 Urbanization and Housing Indicators

The toolkit groups indicators into nine categories: urbanization trends, housing needs and demands, housing policies, urban land supply for housing, building regulations and processes, infrastructure and services, housing supply, building materials and construction industry, and housing finance. The indicators highlight the magnitude of different potential housing problems. They also reveal the level of government attention to different aspects of the housing sector.

When indicators do not align with expectations, it may indicate a problem. These discrepancies can be assessed through fieldwork. For example, population growth requires urban expansion either horizontally or vertically. Comparing a city's population and rate of expansion to nearby cities gives an indication of its housing market performance. Cities with ample land availability in the periphery that are not expanding horizontally, for example, may have regulatory or land ownership constraints.

Table 2 lists the indicators and the rest of the section describes them one by one. Appendix A provides additional detail on definitions.

2.4.1. Urbanization trends

Urbanization indicators show where housing is being built and how a city's expansion compares to other cities. While national or local statistical agencies may have their own databases, one way of generating globally comparable indicators on urbanization trends is to tap into globally available data. The idea is to inform policymakers about the city's growth trajectory. Is there a tendency towards greenfield expansion? Infill development? Or both? Is urban expansion is keeping pace with population growth? Time permitting, these indicators can be compared to those of other cities in the country (for example, using the Atlas of the Human Planet 2018) for context and a reference point for discussion.

1A. Rate of urban expansion

The rate of urban expansion measures how fast a city is expanding outward. The team can measure it with a map of the urban footprint from multiple years. An urban footprint refers to the contiguous urbanized land within the functional urban area. Using GIS tools, the team can calculate the rate of urban expansion as the percent change in urbanized area between two time periods. Figure 2 illustrates the visual output from this exercise in measuring urban growth around Johannesburg and Pretoria from 2000 to 2014.

Table 2. Overview of Housing and Land Market Indicators

SECTOR	INDICATORS	SOURCE
1. Urbanization Trends	1A Rate of urban expansion*	Global data
	1B Population growth*	Global data
	1C Changes in urban density*	Global data
2. Housing Needs and Demands	2A Quantitative deficit	Census
	2B Projected quantitative deficit	Census
	2C Qualitative deficit	Uncertain
	2D Affordability (housing costs to income)	Uncertain
	2E Affordability for different income groups (for renters and owners)	Uncertain
	2F Age-specific household formation rates*	Census
3. Housing Policies	3A Share of housing subsidized	Local Agency
	3B Size of housing agency budgets	Local Agency
	3C Mass evictions or relocations in last 5-10 years	Local Agency
	3D Property tax rates (and collection rates)	Local Agency
4. Urban Land Supply for Housing	4A Land Administration Coverage	Global data / Interviews
	4B Developable land for expansion	Global data
	4C Developable land and environmental hazards	Global data
	4D Land prices: rural peri-urban / urbanized / commercial / industrial	Interviews
	4E Share of peri-urban land by ownership type (public, private, customary)	Interviews
	4F Steps, time and cost to Registering Property	Global data + interviews
5. Building Regulations and Processes	5A Minimum lot sizes, Floor Area Ratio (FAR) restrictions, and/or height limits	Local Agency
	5B Share of urban land zoned low density	Local Agency
	5C Share of urban land zoned residential, industrial, commercial	Local Agency
	5D Steps, time and cost to obtain a construction permit	Global data+ interviews
6. Infrastructure and Services	6A Share of housing with paved roads, water, sewage, electricity	Local Agency
	6B Infrastructure expenditures per capita	Local Agency
	6C New infrastructure connections per year	Local Agency
	6D Steps, time and cost to obtain electricity	Global data+ interviews

SECTOR	INDICATORS	SOURCE
7. Housing Supply	7A Housing typology (% housing informal)	Uncertain
	7B Major types of new housing	Census
	7C Share and nature of rental housing	Uncertain
	7D Price of cheapest new formal unit	Uncertain
	7E Average rents and prices (informal/formal)	Uncertain
8. Building Materials and Construction Industry	8A Construction costs	Interviews
	8B Number of companies & size	Local Agency
	8C Use and common terms of construction lending	Interviews
	8D Share of materials sourced locally	Interviews
9. Housing Finance	9A Number and value of mortgages per year	Local Agency
	9B Average size, interest rate and terms of a residential mortgage	Local Agency
	9C Income percentile that can access smallest mortgage	Uncertain
	9D Number and value of housing improvement loans per year	Local Agency
	9E Average size interest rate and terms of housing improvement microfinance	Local Agency

The Global Human Settlements Layer (GHSL)[21] is the most convenient off-the-shelf product with global coverage. It reports population estimates for grid cells of one square kilometer with reliable data for 1990, 2000, and 2014. Another data source is World Pop[22]. Assessing expansion upward is more challenging. The above data sources give a measure of increase in population density, which is not always associated with building height increases.

1B. Rate of population growth

While there are population growth data available in respective countries/cities, they may or may not be geographically reference. Using the GHSL data, the team can calculate total population growth, and the direction and extent of that growth. Figure 3 illustrates the densification of the city's central areas and expansion to the north and south.

1C. Changes in density

The gridded population data described above provide global coverage of population concentration at a scale that provides a useful picture of density change in the city overall. In addition, the flexibility of grid-based data enables calculations for the urban core (e.g. central 25% of land area) versus urban periphery (e.g. outlying 25%)[23]. This indicator is especially useful in assessing the relative importance of greenfield and infill housing development. The team can use it to determine what share of a city's population growth occurred in land already urbanized at the beginning of a period, compared to population growth in newly urbanized land.

2.4.2. Housing Needs and Demands

2A. Quantitative deficit

The basis of housing demand is household formation, and a basic goal of housing policy is that every household have shelter. Demographic measures are relatively widely available and provide a reliable source of information about access to housing. At the most basic level, a conservative estimate of the quantitative housing deficit is the number of households sharing one housing unit and the number of households without any shelter at all.

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21   Here: https://ghsl.jrc.ec.europa.eu
22   Here: https://www.worldpop.org/geodata/listing?id=32
23   See, for example, Monkkonen, Paavo. 2019. Empty Houses across North America: Housing Finance and Mexico's Vacancy Crisis. *Urban Studies*, 56(10) 2075-2091.

Figure 2. Urban Expansion in South Africa Using GHSL Data

Human settlement layer

Value

● Non built-up

● 2014

● 2006

Pretoria

Johannesburg

Source: https://www.earthobservations.org/geo_blog_obs.php?id=209
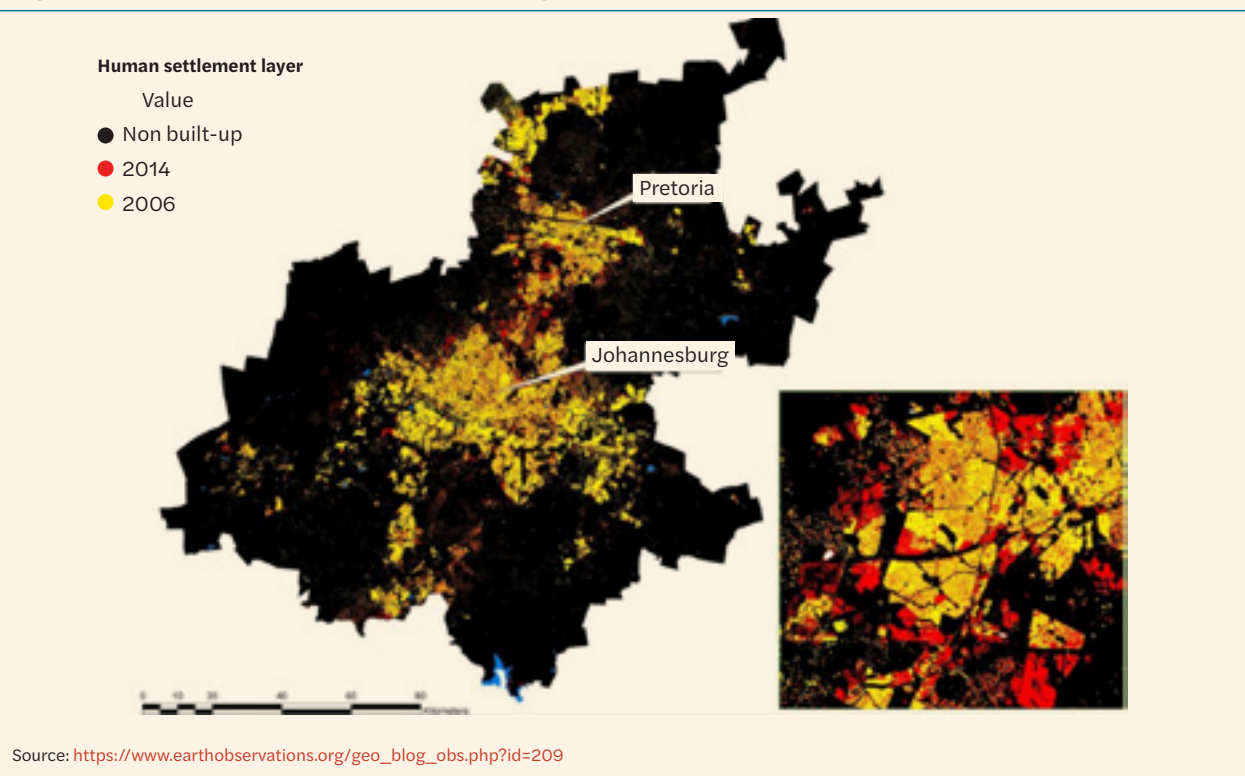
Figure 3. Gridded population data, years 1975 and 2015 at 250m resolution

Source: Global Human Settlement Layer, https://ghsl.jrc.ec.europa.eu
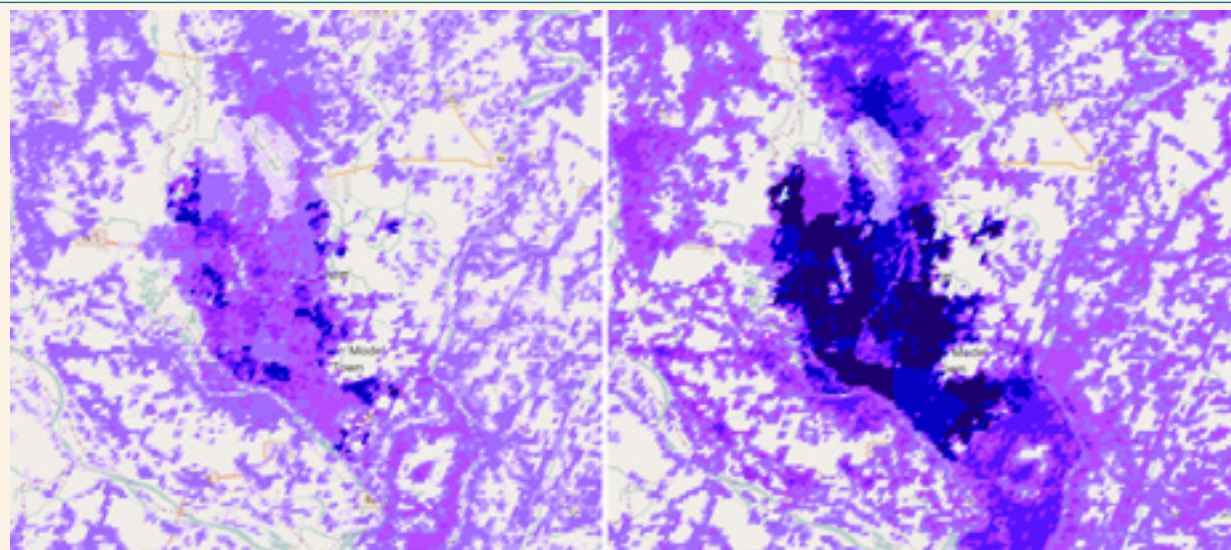
A broader idea of a well-functioning housing system is that people are able to access a housing unit when they form a new household. New families for example, or young people deciding to move out from their parents' home. In places where housing costs are very high, people delay these household formation decisions. A quantitative housing deficit, therefore, is the shortfall in housing units compared to some ideal quantity, which would house those new families that want to form.

This quantitative deficit can be calculated either in reference to past rates of household formation, or ideal rates of household formation (see Monkkonen, 2013 for the example of Indonesia). The roughest estimate of the

Figure 4. Age-Specific Headship Rates in Indonesia, 1995, 2001, 2007
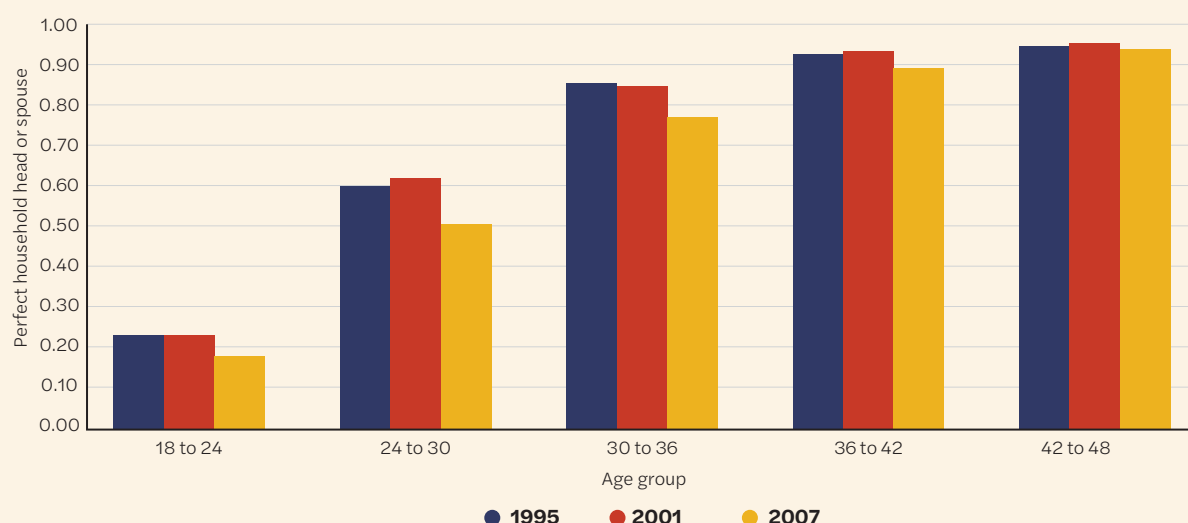
Source: Monkkonen, P. 2013. Housing Deficits as a Frame for Housing Policy: Demographic Transition, Economic Crisis and Household Formation in Indonesia. *International Journal of Housing Policy*, 13(3): 247-267.

household formation rate is headship, the share of the adult population that is a household head. Most censuses contain data on household structure, which indicates an individual's position in the household including whether they are household head.

The difference between the current headship rate and a past number or a comparable place with a better functioning housing market can be interpreted as a quantitative housing deficit. This approach includes overcrowded households, though calculating deficits using both methods would provide the team with a range. There is a risk of interpreting the hard number of a housing deficit as set in stone, but it is a rough indicator and not a precise measure.

A more precise way to calculate housing deficits – and an essential step deficits are to be projected into the future – is to estimate headship rates for different ages of the population. Figure 4 shows estimates of age-specific headship rates, again just the share of the population of a given age that is a household head. In this case, a significant drop in headship / household formation is observed between 2001 and 2007, indicating that many households failed to form relative to past periods. The current quantitative housing deficit can be estimated using past trends or ideal rates of household formation.

2B. Projected Housing Need

Projections of population growth and age distributions can be used to generate projections of housing need in the future. These estimates, when compared to trends in housing production, generate a rough estimate of future housing deficits. Data on housing production is often not formally available (i.e. number of building permits issued, for example). If not, the team can rely on housing unit counts in the census. In cities with large shares of young adults, if rates of housing production do not match expected growth, the quantitative deficit will increase.

2C. Qualitative deficit

A city's qualitative housing deficit is an estimate of the number of houses that are substandard in some way. This refers to the type and conditions of building materials (roof, walls, and floor), the level of access to water and sanitation in the dwelling, and overcrowding. A precise survey of housing conditions is a large task, but a rough estimate of a city's qualitative deficit can be generated through the housing typology described below and data on access to infrastructure. A study used in Chile used a methodology that segments the housing stock into three categories: acceptable, repairable and unacceptable. It is important to highlight that upgrading is generally a more beneficial and less disruptive approach to addressing housing quality deficits[24].

An overcrowded dwelling is one with "too many" people living in it. Measuring overcrowding requires data on the number of residents per room or per square foot (usually from the census and/or additional surveys) and a subjective decision as to how many is too much. Most countries

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24   For more, see: MINVU 2004, El deficit habitacional de Chile. Ministerio de Vivienda y urbanismo, Santiago de Chile

Box 1. Two Measures of Affordability for Households in Different Income Categories in Three US Cities

Two common approaches to assess renters' cost burden* are the 30-percent standard, which simply states that a household that spends over 30 percent of its income on housing is cost burdened, and the residual income approach, which estimates typical non-housing expenditures for households of different sizes and income levels and subtracts this from actual household incomes. For households where the residual is less than their actual housing expenditures, they are considered to be cost burdened.

Renter Cost Burden Rate (Percent)

● **30% of income Standard**   ● **Residual Income Approach**
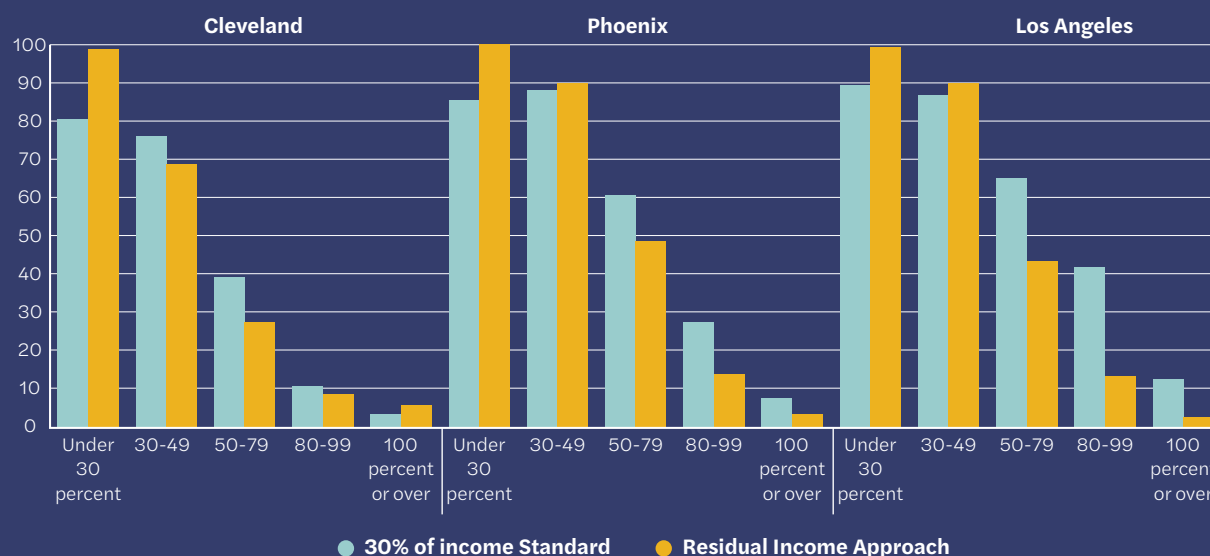
Disaggregating affordability measures across the income distribution is important. Exhibit 8 from the Joint Center report high-lights two features of housing markets in different US cities. The first is that low-income households have high levels of cost burden no matter how inexpensive the overall housing market is. Households earning below area median income have high rates of cost burden – well over 80%. Second, the rate at which affordability increases with household income differs across cities, reflecting the housing markets. More median income households have high cost burdens in expensive cities. Households between 50 and 80 percent of area median income have half the rate of cost burden in Cleveland but three quarters or more in Phoenix and Los Angeles.

* Available online here: http://www.jchs.harvard.edu/sites/default/files/Harvard_JCHS_Herbert_Hermann_McCue_measuring_housing_affordability.pdf.

have their own definition. If they do not, or if it is unrealis-tic, the UN defines overcrowding as more than three peo-ple person per room[25], though definitions based on square feet of dwelling space per person are also considered.

2D. Affordability (Rent to Income, Price to Income)

Housing affordability is one of the most common indi-cators of housing problems. Depending on data avail-ability and need for precision, there are multiple ways to estimate affordability. The most common is that if a household spends over 30 percent of income on hous-ing[26], they are in an unaffordable situation.[27] Considering the burden of housing costs plus transportation costs

(H+T) gives a more comprehensive measure of housing burdens because households obtain affordable housing by moving to the periphery but then have to pay higher transportation costs. This is especially relevant in large urban areas.

In many contexts, however, the 30 percent indicator of affordability does not make sense. A World Bank study[28] on housing consumption in Sub-Saharan Africa (SSA) found that 60 percent of the household or more spent the majority of their incomes on food, and that they accept low housing quality because of their limited re-sources which first are spent on subsistence. Household expenditure on housings in SSA ranged between 3%

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25 For more, see: https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf

26 Renter housing cost is gross rent (rent + utilities). Owner housing costs include any payments on mortgages, utilities, real estate taxes, insurance (fire, hazard, and flood), and condominium fees, if any.

27 In European Union and OECD countries, households spend more than 40 % of disposable income on housing are considered housing cost overburdened.

28 Available here: http://documents.worldbank.org/curated/en/998081468003944551/pdf/WPS7112.pdf.

to 20% of household income. Therefore, it is critical to base affordability analysis on local context and empirical data, rather than using the 30% cut off. On one hand, in the SSA case, it will underestimate housing challenges; on the other hand, if a subsidy program is designed by assuming that household can spend 30% of their household income to housing, such program will likely to fail as there will still be sizable gaps.

2E. Affordability for different income groups

Average measures of affordability mask the considerable variation and often more serious affordability problems for low-income households[29]. Housing markets are segmented, meaning households with different incomes tend to look for different types of housing in different neighborhoods. If data and resources are available, the team can assess affordability for different housing sub-markets. A simple disaggregation would be to calculate affordability indicators (e.g., price/income ratio and rent burden) for different quartiles of incomes. If census data and household budget survey data are not available, a survey approach can be used (though as mentioned this is resource intensive[30]).

2.4.3. Housing Policies

The indicators describing the city's policies specifically focused on housing – rather than the important parallel areas such as infrastructure or financing – are critical basic information to assess how active the government is in this sector. Comparing expenditures on housing to other sectors may be a useful indicator in discussions of priorities. These numbers may not be available from local government agencies, but this lack of disaggregated data may itself be framed as a policy problem. In some cases, data accessibility is an issue. Governments should be encouraged to make agency budgets – and subsidies – transparent and accessible.

3A. Share of housing subsidized

The number of housing units that benefit from direct subsidy can include housing units directly built by the government, government-issued mortgages, as well as units purchased with subsidized mortgages, subsidized down payments, any rental vouchers, or other form of public subsidy (tax holidays for developers for residential property, for instance). An additional indicator would

be the incomes of the inhabitants of these publicly subsidized housing units, in order to assess the targeting of subsidies. These data may be challenging to gather in a comprehensive manner, but beginning a database with what data are available will be beneficial.

3B. Size of housing agency budgets

Part of the institutional map will be to identify all public agencies in the housing sector operating in a city – be they local, state, or national agencies. The size of their annual budget is an important indicator of commitment to the housing sector – especially in comparison to budgets in other sectors.

3C. Mass evictions or relocations in last 5-10 years

If the local or state government has recently evicted or relocated households at a significant scale, the number of instances and the number of affected households can be used as an indicator.

3D. Property tax rates (and collection rates)

The property tax is an important housing policy – and the rate for different kinds of residential property can be recorded. Equally important is the degree of property tax collection, and the rate of payment and total revenue are useful indicators. The ability of the tax collection agency to provide this information is also an indicator of its capacity.

2.4.4. Urban Land Supply for Housing

In a well-functioning housing market, planned land is adequately available and serviced-land are supplied at a scale compatible with the demand for housing. The bundle of rights associated with real estate property is registered in a land administration[31] system. Because land and buildings (a majority of which is residential) account for between half and three-quarters of the wealth in most economies, having an up-to-date, transparent, and efficient land administration system that records registered property rights is essential to ensure security of tenure and support the development of real estate markets.

4A. Land Administration Coverage

The percentage of the city covered by a land administration system which allows for buying, selling, long-term leasing,

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29   For a useful resource on segmentation and affordability issues for different groups, see https://www.gapminder.org/dollar-street
30   One such approach is the World Bank's 2013 Land and Property Market Assessment - Housing Market Segmentation Study: Existing Tools and Survey Strategy.
31   The term was established by the United Nations Economic Commission for Europe (UNECE) in its Land Administration Guidelines adopted in 1996. In these guidelines the UNECE defines land administration as "the processes of determining, recording and disseminating information about ownership, value and use of land and its associated resources. These processes include the determination (sometimes called 'adjudication') of land rights and other attributes, surveying and describing these, their detailed documentation, and the provision of relevant information for supporting land markets". Source: http://www.fao.org/in-action/herramienta-administracion-tierras/glossary/l/en/

Figure 5. Map showing open land within the urban extent (yellow) and in periphery (darker gray)
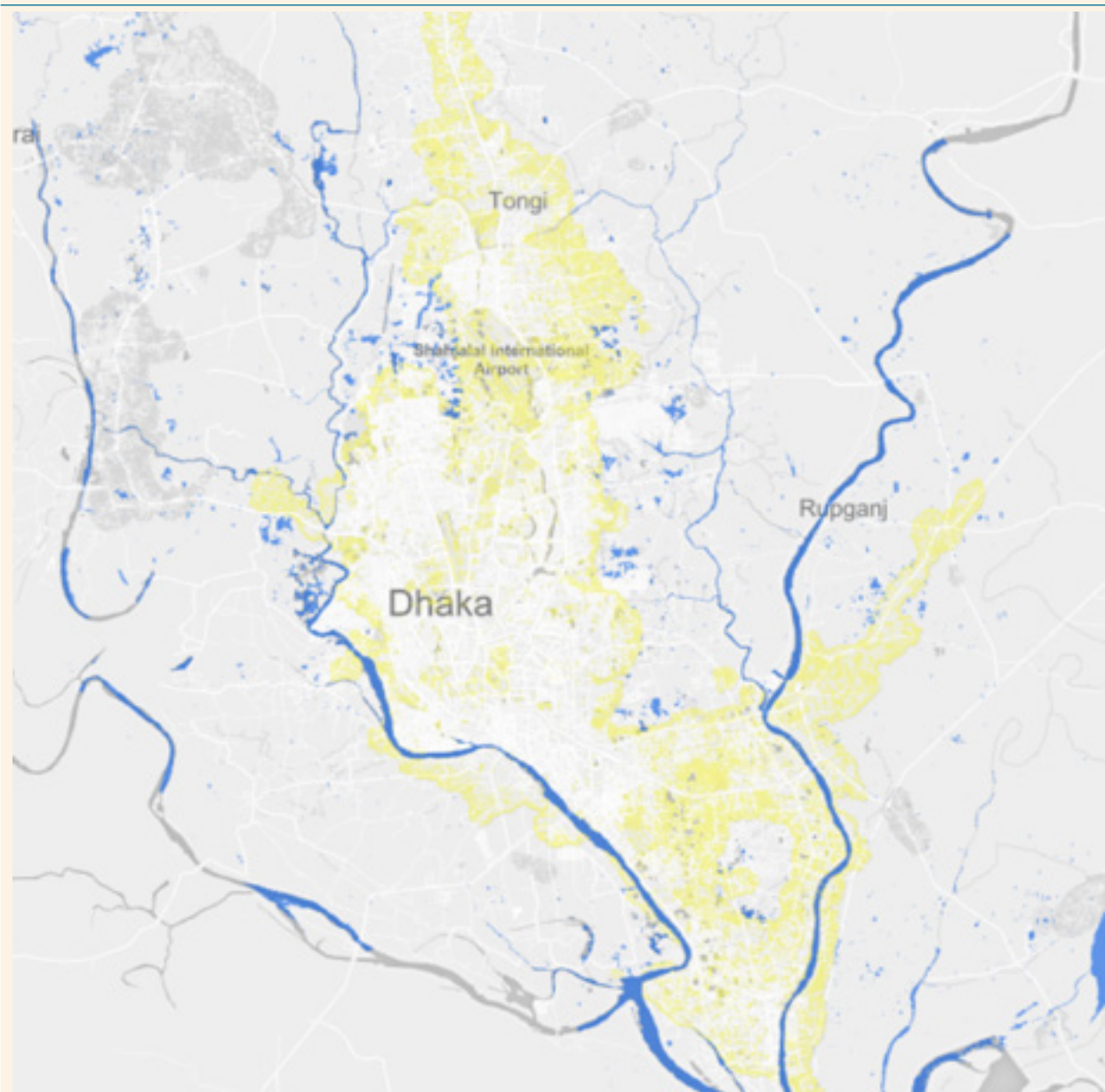
or mortgaging land is an important indicator to gauge the degree to which formal land and housing market exist.

As a first step, the team can refer to the World Bank's Doing Business[32] website to get an overview of the functioning of the land administration system in the country by examining the quality of land administration index and the score and ranking on registering property.[33] The latter examines the steps, time, and cost involved in registering a property, assuming a standardized case of an entrepreneur who wants to purchase land and a warehouse that is already registered and free of title dispute. This indicator measures only a small part of the housing value chain, excluding the often-lengthy process of adjudication of property rights, rural to urban land conversation, land assembly, putting in infrastructure and servicing the land, in the case of greenfield development.

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32 The *Doing Business* project aims to provide objective measures of business regulations and their enforcement across 190 economies and selected cities at the subnational and regional level.

33 For definition and methodology, see https://www.doingbusiness.org/en/data/exploretopics/registering-property

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Figure 6. Road network in Dhaka, with hypothetical locations for development.

Doing Business collects data for each country's largest city, but also has data for the second largest city in 11 economies. The data on registering property is not for residential property, so the team should make sure there is a close correlation between the steps, time, and cost involved in registering a residential property with a warehouse. Expert interviews can help gauge the correlation. In Part B some in-depth surveys are recommended to capture key steps in the land value chain to complement the Doing Business coverage on land administration.

4B. Developable land for expansion (urbanization of rural land)

There are two sources of developable land: rural land, or "greenfield" land, and vacant land within city boundaries. This indicator measures the first. The team can define an urban expansion buffer – undeveloped land surrounding the existing urbanized area – to assess land availability

outside the existing urban area. The size of the buffer depends on the city size and growth rate. One rule of thumb for growing cities is that this area should be at least as large as the rate of expansion in the last decade. Figure 5 shows the expansion land within the urban extent of Dhaka.

Once a buffer is determined, the team can calculate the share of land within that buffer suitable for residential development. The share of land is the total area of the buffer minus existing urban land uses, bodies of water, and steep terrain. This rough measure can be refined by taking road accessibility into account. The team can assess developable land within one or two kilometers of existing paved roads, for example.

Figure 6 illustrates this approach with a map of the road network of Dhaka and two locations in the urban edge periphery. The green polygon overlaps a major road that connects to the main network and highway system. The red

shape, in contrast is far from major roads. Adding a major road would have to destroy existing residential areas.

These measures provide direction for intervention. Regions with scarce peripheral land apt for development may prefer to focus on infill development, whereas those with plentiful peripheral land can develop long-term strategies for the best use of that land.

4C. Developable land and environmental hazards

A more refined assessment of developable land accounts for existing natural hazards, and likely changes in climate that could make land dangerous for settlement in the short to medium term. In some countries, entire cities are at risk (e.g. from sea level rise or flooding). In general, land where mitigation from the impacts of climate change and extreme weather is more feasible is prioritized for development. The data on climate projection is unlikely to be exact enough to pinpoint areas that are riskier than others, but models (e.g. Climate Impact Lab for temperatures, the DLR flooding risk maps) are accurate enough to develop a common-sense typology of land at-risk from the most likely events (e.g. flooding). models like ThinkHazard! provide risk assessment along multiple dimensions at the same time (e.g. flood, earthquake, tsunami).

4D. Land prices: rural peri-urban / urbanized / commercial / industrial

Land value data is notoriously challenging to obtain. Nonetheless, estimates – albeit rough ones – of land values in various parts of the city and zoned for different uses (e.g. agriculture, residential, industrial) will be useful. One source for these estimates are the experts interviewed in Part B. If deemed necessary, a separate survey of land brokers for different neighborhoods can generate data that are more accurate. In some contexts, online sources or private consulting companies may have land price data. Vacant infill parcels transact relatively infrequently, so subtracting an estimate of a structure's value from the sale price of a parcel with a building on it is one approach. In many contexts, however, the benefits of having precise, location-specific data on land prices may not exceed the costs of acquisition and rough estimates by the team ought to be sufficient.

Land prices can also be used to assess how costly it is to urbanize rural land. A 'land development multiplier' compares the value of rural land and urban land nearby (see glossary for definition). This ratio measure demonstrates how hard it is to urbanize land – a higher ratio of urban to rural prices indicate environments in which one can find a combination of unrealistically high regulatory development standards and high transaction costs due to poor property registration and bureaucratic red tape.

4E. Share of peri-urban land by ownership type (public, private, customary)

The prevalence of different types of land ownership in the area surrounding the city's edge can have important consequences on the ease of urbanizing land and housing access. If land is not privately owned and it is difficult to be traded, new housing construction may be more difficult. It is possible that the local land registry and/or planning agency does not have easily analyzable data on the distribution of ownership, in which case a rough estimate of this indicator can be generated through the interviews in Part B. An ideal indicator in this case is a map along with estimates of land area, but rough shares of ownership type is nonetheless useful.

4F. Steps, time and cost to Registering Property

The World Bank's Doing Business project has surveyed the largest business city of each of the 190 economies in the world to gather indicators of 12 regulatory processes – including registration of property. While its focus is on a hypothetical case of commercial warehouse, rather than a residential property, it is worthwhile for the team to gauge the degree to which the processes and procedures are similar (i) between transactions of warehouses and transactions of residential property; and (ii) between the largest business city of the country and the case city. This indicator has great potential utility to aid in Part B and to begin to highlight bottlenecks in land administration.

2.4.5. Building Regulations and Processes

The formal rules and regulations for urbanizing land and building housing can have significant cost impacts if they are overly restrictive – for example prohibiting high density housing in areas with high demand. The list here is a minimum set of indicators, some cities may have other regulations that constrain development – which will be part of the interviews in Part B. These indicators will likely be available from local planning agencies except for the last one, which is available from the Doing Business project of the World Bank.

5A. Minimum lot sizes, Floor Area Ratio (FAR) restrictions, and/or height limits

One of the most common constraints to affordable housing is the requirement of low residential density. Cities restrict densities of residential development in a number of ways. The most common are requiring a minimum lot size (e.g. housing units must be built on parcels above a certain size), restricting the Floor Area Ratio (FAR) to limit the amount of physical structure (floor area) that can be built on a parcel of land, and/or though building height limits. These all achieve a similar outcome: mandating a

low urban density. The team should assess the different restrictions on density as well as the level of enforcement.

5B. Share of urban land zoned low density

Restricting housing unit density[34] in high demand neighborhoods causes prices to rise. This can be done through minimum lot sizes (as above) or other restrictions. An assessment of the city's zoning regulations as simple as noting what percent of residential land is restricted to a low density use (and what that density is) will serve as an important indicator.

5C. Share of urban land zoned residential, industrial, commercial

Restricting significant amounts of urban land in high demand neighborhoods to uses other than residential can make housing more expensive, and the assessment of the city's zoning rules – what kind of residential development is legal in what percent of land area – is an indicator of this potential constraint.

5D. Steps, time and cost to obtain a construction permit

The World Bank's Doing Business project has also covered the aspect of obtaining construction permits. The structure of these surveys is to ask for a detailed description of the steps required to complete a procedure like getting a construction permit, as well as the time and cost for each step. In this case, the focus is on a commercial warehouse, not a residential property, so the procedure will likely be less complex. Moreover, it is unlikely that a survey has been done for a given city. Nonetheless, the numbers from the largest business city of the country the team is working in will provide a useful reference point not only for Part B, but also for a hint of bottlenecks with the permitting process in a given city.

2.4.6. Infrastructure and Services

6A. Share of housing with paved roads, water, sewage, electricity

In many cities, a major part of the housing quality deficit is infrastructure. Lack of access to water, sewage, electricity and paved roads is a challenge for health, well-being, and economic development. Access to water, sewage and electricity is often surveyed by the census. The team can also consult with local public works agencies for their assessment of infrastructure access. This is likely to vary dramatically by neighborhood. Assessing the unevenness

of access across the city can provide an important indicator. The extent of road paving, for example, can be assessed using satellite imagery by choosing a random set of points across the city and visually identifying road paving. For example, in a city of four million with about 10,000 kilometers of streets, a sample of 95 points would produce an estimate of the percentage of streets without paving with a margin of error of +/- 10%.

6B. Infrastructure expenditures per capita

Although it may prove to be elusive, data on total local expenditures (operations, maintenance, and capital) by all levels of government on different infrastructure services (roads, sewerage, drainage, water supply, electricity and garbage collection) is important to assess what a priority this area is in budgets. The cost and time for acquiring different types of on site infrastructure by developers will be recorded through the interviews in Part B, but annual expenditures on trunk infrastructure is a data point that should be assessed.

6C. New infrastructure connections per year and relative to household growth

A rough and simple estimate of the efficiency of the local public services agencies can be generated by comparing new connections to water, sewage and electrical systems relative to household growth. What share of new housing is serviced? This percent, if low, can be an important motivation to focus on infrastructure.

6D. Steps, time and cost to get electricity

The World Bank's Doing Business project also surveys experts on obtaining a permanent electricity connection for a hypothetical commercial warehouse. Although the focus is not on residential property, this indicator gives some insight on the ease of access to public utilities. Electricity is sometimes the easiest to obtain of basic infrastructure for housing (it is less costly to run wires than it is to install piped water), the indicator aids in developing Part B and begins to inform the team about local infrastructure providers and complications to expanding service networks.

2.4.7. Housing Supply

7A. Housing typology (including % housing informal)

A core component to understanding a city's housing sector is a typology of housing. The dimensions for categorization and the number of types depends partly

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34   Housing unit density is defined as number of housing units divided by the land area.

Box 2. Simple Housing Typology: Mexico

The images below present the most basic typology of urban housing in Mexico divided into formal / informal and multi-family / single family. The multi-family / single-family category also tends to locate housing more centrally or more peripherally. Of course, within each of these four categories, further subdivision is possible. One crucial issue is that informality generally overlaps with the incremental production of housing. This is important because many interventions seek to support incremental production but not necessarily endorse informality. Whether further sub-categorization warrants effort depends on its relevance to possible intervention.

A. Formal Single Family

B. Informal/Incremental Single Family

C. Formal Infill

D. Informal/Incremental Infill

Other sub-categories in the Mexico case include the origin of financing for formal developments. Much of the formal, single family housing is built and sold through a national housing finance agency, which is an important distinction for any intervention. There are multiple dimensions of informality as well – e.g. the original ownership of land versus compliance with zoning or building regulations. These may also be important distinctions for intervention. When creating a housing typology, the team can highlight these possible sub-categories.

on the city's complexity. It can be informed first by the background literature review and categories in a national Census. Usually there are at least four major categories of housing – formed by the matrix of formal / informal and multi-family / single family.

Informal housing is different from informal housing development. The UN defines informal settlements as those cut off from city infrastructure and basic services, without tenure security, where housing does not comply with regulations.[35] Informality is a spectrum

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35 http://habitat3.org/wp-content/uploads/Habitat-III-Issue-Paper-22_Informal-Settlements-2.0.pdf. However, this definition does not cover, for example, a formally developed building which is informally occupied. In this case, formal and informal development can even look similar, with the differences being administrative rather than in the outcome.

Figure 7. Screenshot from Google Street View in the northern periphery of Oaxaca, Mexico

rather than a binary.[36] Informal housing development is also incremental, lacking access to finance, not going through a permitting process, and sometimes not built according to existing regulations. The categorization of housing in this typology can usefully overlap with the categories of housing development surveyed in Part B of this toolkit. The team can further classify a city's housing stock in many ways, for, example, by different levels of housing quality (based on building materials and/or infrastructure), height/density, tenure, and geographically by neighborhood. The housing typology and neighborhood classification can be as precise as data and time allow.

The most basic approach to creating a typology of housing by materials and infrastructure would use satellite imagery and Google Street View. A team using this approach groups districts of the city by their predominant housing type as seen from above, and then roughly assesses the nature of this housing stock – at least the materials and unit density. Doing this in two time periods will allow the team to locate changes and assess the nature of new stock.

Where coverage is sufficient, Google Street View provides valuable information without resource intensive ground truthing. Figure 7 is an example of a street in the periphery of Oaxaca, Mexico. It demonstrates the coverage of Street View and the wealth of information a single image

contains. Specifically, that the road is not paved, electricity is available, and that there is a mix of building materials with most buildings being one-story high. The team can sample random points within each neighborhood and develop an overview of the local housing typologies through this virtual windshield survey.

A more precise approach would use census data (either aggregated or microdata) to group the housing stock into categories. Census microdata on housing would allow the team to classify by building materials, infrastructure, height/density, price/rent, and neighborhoods using factor analysis. The team can also use these data to generate measures of housing quality (details on various approaches are in Appendix A).

An assessment of housing quality will assist the team in directing the focus of fieldwork. In rapidly growing cities with ample peri-urban land, the focus ought to be constraints to greenfield development, whereas in cities with a housing quality deficit and slow growth or land constraints for expansion, infill development will take precedent.

7B. Major types of new housing

Following from the housing typology generated in 7A, the team can roughly estimate the share of new housing being built in each type. At a minimum, differentiating between the extent of large-scale planned development

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36 Wells, J. 2007. Informality in the construction sector in developing countries, Construction Management and Economics, 25:1, 87-93. Available here: http://tandfonline.com/doi/abs/10.1080/0144619060060133.

and gradual informal development gives an important start to understanding the city's context. The team can use satellite imagery to differentiate development types based on patterns (e.g. gridded streets vs. amorphous patterns), and to assess change in urban form over time. Documenting the existence and prevalence of mass housing subdivisions in the urban periphery and large infill developments, even at the project level, provides broad context and aids in identifying large developers to interview.

7C Share and nature of rental housing

The most basic categories of housing tenure are owner-occupied and rented. However, in many developing countries, informal and sharing arrangements are quite common. Data on tenure, if not available in the census, will be hard to come by, but a general sense of the types of arrangements will be obtained from interviews. Where possible, the team can include a description of the tenure security implied under different sharing or informal arrangements.

7D. Price of cheapest new formal unit

The price of a newly built housing unit is an important indicator of housing sector performance. New housing is always more expensive than old housing of similar size/structure/material in similar/comparable locations, but the relative difference in prices is indicative of the efficiency of the housing production process. The difference between costs and types of new housing vis-à-vis existing housing can indirectly reveal the impacts of regulatory constraints.[37] Data for formal housing is easier to obtain. Nonetheless, the team can identify the types of recently built housing (e.g. formal suburban and central city apartments, informal units, and any state subsidized housing) through a review of the policy literature, online research, and interviews, and collect data for each category. This indicator will also benefit from interviews in Part B.

7E. Average rents and prices (informal/formal)

The accuracy of basic market indicators depends on data availability, especially through sources such as online listings and newspaper classifieds. These ought to be available in most cities, though they vary greatly in their representativeness.[38] Additionally, the team can assess property tax records and real estate industry reports and contacts for these market indicators. The latter are

generally not representative in developing countries, however, and the former are usually well below market value.

2.4.8. Building Materials and Construction Industry

In some cases, the structure of the construction industry and, for example, the reliance on imported building materials, can unduly increase the price of housing. These data can be obtained both through interviews in Part B, as well as through inquiries with any real estate industry association representatives or chambers of commerce.

8A. Construction costs

Construction cost data will not only allow the team to assess their relative constraint to housing production, but also assess the land development multiplier and the cost of new housing. The team will likely need to rely on interviews with developer and contractor associations to find out unit price of different housing typologies. The unit cost could have break down as follows: on-site infrastructure, housing construction and other costs, on a per square meter basis.

Given the affordability focus, the team is advised to work with Quantity Surveyors on two type of housing in respective market: (1) the cheapest formal housing built; and (2) a median-priced dwelling unit. The Center for Affordable Housing Finance in Africa (CAHF)'s methodology in benchmarking housing construction costs across Africa presents a good example, although the land and compliance cost in CAHF are covered by other indicators in this toolkit.[39]

8B. Composition of real estate industry - number of companies and their concentration

The organization of the real estate development and construction industry impacts housing costs and production activity. In conversation with real estate associations, the chamber of commerce, and in interviews with experts in Part B, the team can assess the structure of the industry and relative concentration of large firms by estimating the total number of firms and a measure of concentration in the industry, for example the percentage of new formal sector housing units constructed by the five largest developers (either private or public) in the urban area last year.

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37 For more, see: https://www.brookings.edu/research/reforming-land-use-regulations/

38 One way to assess concerns about data representativeness is to measure the prevalence of rental and sales listings relative to quantity of housing stock in the different neighborhoods / districts of the city. This gives an indicator of the size of the current market and volume of transactions, as well as an indicator of variation in formality because formal property is more likely listed for rent and sale online. If there are districts with a low share of listings, data are unrepresentative.

39 For more, see: http://housingfinanceafrica.org/documents/using-cahfs-housing-cost-benchmarking-methodology-to-analyse-housing-costs-in-fifteen-african-countries/

8C. Use of construction finance

The availability and use of construction finance can be measured in a number of ways, and depends to a large extent on the local context. For this reason, a specific indicator is not described here. Nonetheless, the way formal speculative housing development is financed is extremely important as a lack of construction lending hinders the sector just as much as a lack of end user finance. The team can use several of the indicators in the following section focused on end user finance (e.g. number and size of construction loans, interest rates and other terms, requirements for lendees).

8D. Share of materials sourced locally

Through expert interviews, and the housing typology (especially new housing) the team can assess to what degree housing is built with locally sourced materials (in value terms). In some countries, the availability of building materials can be a significant constraint to production and support for the building materials industry is warranted.

2.4.9. Housing Finance

9A. Number and value of mortgages per year

As part of the description of the housing sector, consulting with the major finance institutions about their activity can provide data for several indicators - the number of mortgages issued per year in recent years, as well as their total value and their characteristics (described below). This will help frame the relative importance of formal housing finance for the city in question. The locations of these mortgages in the city would also be a useful dataset for this study.

9B. Average size, interest rate and terms of a residential mortgage

The interest rate, terms, and average size of a residential mortgage can be obtained from financial institutions (both public and private), and income requirements for borrowers will also be a useful indicator for the housing affordability assessment.

9C. Income percentile that can access smallest mortgage

If income data are available for the city, even rough estimates, the team can use the data from 7D and 9B to estimate the possible reach of the residential mortgages.

9D. Number and value of housing improvement loans per year

Ideally, the availability and use of housing microfinance would be quantified, as well as the type of institutions it is from, i.e. public or private. These data may be challenging to acquire, but the team can try to capture the prevalence of this industry.

9E. Average size, interest rate and terms of housing improvement microfinance

In addition to the overall volume of microfinance lending for housing improvement, typical interest rate, terms and size of microloans will be useful for the study. This information can be obtained both from formal microfinance institutions if they exist and through interviews with experts. Community funds, savings groups and other forms of non-conventional housing finance mechanisms in the city can also be identified to assess their relative importance.

3. Part B: Assessing Constraints to Housing Development and Upgrading

In Part B, the team assesses the constraints to housing development and upgrading through expert surveys. This part is less prescriptive than Part A. The team can use the knowledge developed in the desktop review and in conversation with country experts to shape their interview strategy and adapt the survey questions. The amount of qualitative fieldwork will ultimately depend on team resources and the complexity of the city.

The surveys will generate both a detailed description of the process of building different types of housing – formal and informal, infill and greenfield – and the constraints to these different types of development. The team will also develop a rough estimate of different constraints to development, their significance, and the main actors involved.

3.1 Survey Strategy

The survey methodology proposed here is similar to that of the Doing Business project, a survey conducted annually that measures regulations for local firms in 190 economies and selected cities[40]. Expert practitioners and local government officials are asked to outline the steps, costs and time required to complete various bureaucratic procedures, such as starting a business, paying taxes, and registering a property transfer.

In this case, the team will ask a dozen or more expert practitioners to describe the procedures of different phases of housing development, from acquiring land, to obtaining a permit, to construction. Then, these experts will break down each procedure into individual steps, complete with forms required and relevant government agencies. They will estimate the costs and time to complete each step, as well as the relative burden and their perspective on potential reform of the step.

Interviewing at least three experts for each type of housing development provides a more robust and accurate perspective of the process. Surveying experts with different roles in the development process provides some checks and balances. For formal housing development, for example, this may be one developer, one real estate lawyer or notary, and one local government official from the most relevant institution(s) in the development process. Depending on their experience, practitioners may be able to complete a survey for more than one type of housing development. An 'expert' can be someone

currently practicing in the relevant field with have a minimum of 10 years' experience, for example.

Finding the right expert for informal housing development is a greater challenge than for formal housing development. To identify these experts, the team can consult with academic researchers working in these areas, and cast a wide net to find informal land brokers or community leaders to survey. Someone who can provide specific information on the process as well as a broad perspective is ideal.

The responses of expert will be more informative if the team tailors questions to the local context. The team can use the indicators 4F, E, and 6E from Part A to inform the surveys. The team can drop and add questions as necessary. The results of Part A may lead the team to focus on a specific, high-priority area of the housing sector (e.g. relocation of environmentally vulnerable population). The sample questionnaires (Appendix B), therefore, provide templates with flexibility.

Interviewing experts is the most straightforward way to identify constraints to housing development. But this approach has limitations. Practitioners are not aware of all the structural constraints they face and may not have an expansive perspective. A recent study of land use regulations in California illustrates this point[41]. In it, developers asserted that bureaucratic procedures were the major constraints to housing development, whereas city planners considered them to be land availability. The survey therefore also includes questions about a broad range of housing market issues. The team can tailor these supplementary questions to the city's context, informed by Part A.

Two techniques employed by the Doing Business project are worth replicating. The first is to pay respondents for their time. The second is to use an iterative approach for the description of procedures and steps. That means the team can present the first expert with a description of a stylized housing development process, and even some of the steps for construction permits, registering land ownership, and obtaining electricity from the largest business city as recorded by indicators 4F, 5D, and 6D, which rely on existing Doing Business data.

After the first survey is complete, the team can present subsequent respondents with the steps and procedures written down by previous respondents. Respondents can add to or modify the process as previously laid out as they see fit. This will save time. The team will likely want

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40   More information on the Doing Business methodology is available here: http://www.doingbusiness.org/en/methodology and an example of the full survey is here: http://www.doingbusiness.org/content/dam/doingBusiness/media/Methodology/Survey-Instruments/DB19/DB19-RP-questionnaire-en.pdf. Experts are asked to list all the steps required, along with the cost, time, and agencies involved with that step. Appendix C is an example of the output.

41   See http://californialanduse.org/index.html

Table 3. Four Basic Types of Housing Development in Mombasa, Kenya

A Formal greenfield

B. Informal greenfield

C. Formal infill

D. Informal infill

to withhold the time and costs estimates for the steps, so that their opinions are not biased by prior respondents.

The team will use surveys to assess constraints to at least four types of housing development –formal and informal, and greenfield (peri-urban) and infill (redevelopment). Greenfield development is the conversion of rural to urban land, which occurs at the urban edge. The land must not be in urban use previously. For the interviews, greenfield development also refers to land outside the urban footprint. As such, empty parcels surrounded by urban land uses are considered infill. Infill development includes both vacant parcels within the urban footprint and parcels that would require the replacement of existing uses with new ones (e.g. from low-density residential to multifamily residential).

The distinction between informal housing and informal housing development is made in the housing typology discussion in Part A. To clarify the categories unambiguously for interviewees, a definition can be provided. The team can modify this definition to suit local context. The

basic idea is that informal development has one of the following characteristics:

1. Lacks a state-sanctioned permit for construction on the parcel.
2. Does not conform to building, land use, or zoning regulations.
3. Claim to land is legally uncertain.

Table 3 above demonstrates how these two dimensions create four types of housing development of interest. If local context suggests and resources allow, the team can introduce other dimensions and assess constraints to other types of housing. For example, project size (above 100 units / below 100 units) or public / private financing.

3.2 Outlines of four surveys

Each of the four surveys has three parts (sample survey instruments are available in Appendix B). The details

differ by housing type, especially between formal and informal housing. The steps in informal housing development are similar but questions emphasize practice and variation in enforcement rather than formal procedures with cost and time estimates. The team will likely want to modify the survey instruments to fit local context.

The first part is the description of the housing development process. Interviewees first list the steps required for the procedures of housing development. For each type of housing development, the survey instrument suggests procedures and steps to give experts a sense of the task. Then, for each step, respondents report the typical time to complete the step, as well as the costs, relevant actors (e.g. public agencies, private institutions), the importance of this as a constraint to development (on a scale of 1-5), and their opinion on the potential for reform (on a scale of 1-5).

The second section focuses on the most consequential constraints to development. Experts answer a series of questions that reflect on their previous description of the production process, to judge what the most significant challenges are.

The third section is comprised of questions about other challenges and issues for each type of housing development. This section differs the most between housing types. For example, formal greenfield development respondents are asked about land ownership in the urban periphery, infrastructure access and costs, condominium laws, and the context of construction and mortgage financing, whereas informal greenfield respondents are asked about property rights and land regularization. The topics for both types of infill development are similar - land ownership, infrastructure, condominium laws, and the context of construction and mortgage financing

– but the specific questions differ. The answers will provide data for some of the indicators in Part A. The surveys detail which questions correspond to which indicators.

In all cases, including a map with the survey can ensure the locations that the questions focus on are consistent. Additionally, the outlines of construction permitting, registering property, and obtaining electricity can be taken from the Doing Business indicators for the capital city of the country as recorded in Part A (Indicator 4F, 5D, and 6D).

3.3 Analyzing survey responses

Once the surveys are complete, the team can summarize and analyze responses. Before this, the team can follow up with interviewees to assess any discrepancies between answers to the same questions, for example, one respondent leaves out a step, or two respondents report wildly different costs for the same step. How large a variation merits a follow up? Differences beyond 20%, for example. In general, using the median, or middle value, of answers to the quantitative questions in presenting a summary of the description of housing development is the most reliable approach.

The team will present a summary of the major constraints and potential for reform based on these descriptions and the answers to part two of the survey. Additionally, as described in the survey itself, some of the survey questions yield answers directly for the indicators in Part A. The organization of the narrative is described in Section 5 of this toolkit. It can be based on several of the components of the housing value chain that frame the indicators.
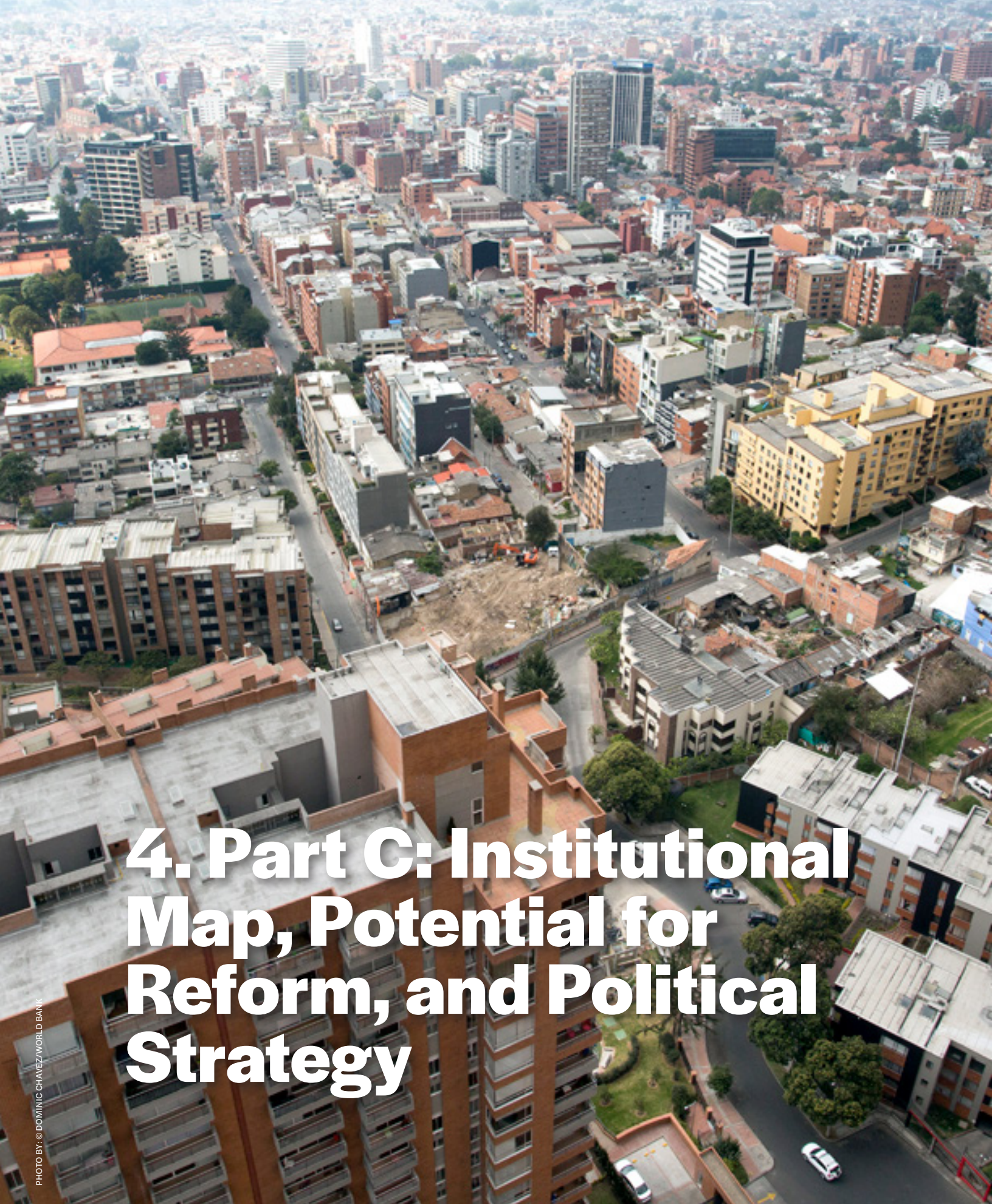
4. Part C: Institutional Map, Potential for Reform, and Political Strategy

Building on the results of the expert surveys in Part B, Part C consists of additional surveys of institutions identified with the most significant constraints for housing development. The surveys aid the overall study in four ways. First, they direct the team to flesh out the institutional map of participants in the housing production process. Second, they provide further information about the most consequential laws, regulations, policies, or programs for housing access and production. Third, they provide a framework for assessing potential entry points in the most important agencies in the housing system. Understanding the resourcing (both budgets as well as human capital), the longevity of leadership, independence from politics, and the subjective judgements of practitioners will inform action. Fourth, this part of the study provides a space to think about the politics of reform. It prompts the team to consider framing the housing sector as an important part of the economy, and highlighting the role of institutional reforms in the sector as crucial to economic development.

Part C is the least prescriptive part of this guide because it depends so much on the structure of local institutions and local politics. The team can rely on their judgement and knowledge gained to this point to refine the survey strategy and questions. Identifying housing problems and institutional bottlenecks to housing production is easier than intervening. Assessing potential for institutional change has less of a clear blueprint, and depends on making an argument in line with the existing political agenda.

4.1 Institutional map

The institutional map describes the function of and connections between the main actors who formulate and implement housing policies in the context of national development priorities. In assessing institutions and organizations the team can adopt recognized guidelines for institutional and organizational assessment.[42] The team may also be able to gather data on budgets for the major housing agencies. Much of the information for this institutional map will come from the desktop review and consultation with country experts before fieldwork.

The goal is to create an overview of the network of decision makers and organizations that shape how rules are made and applied, and to assess the alignment between development priorities and actual commitment in budgets and organizational attention. The output will enable targeted decision-making to alter the institutions producing these rules.[43] The map points to the strategic locations where decisions are made.

The typical set of institutions most relevant to urban land and housing markets are:

Public sector:

- National & state government housing agencies (decentralization, public finance)
- Local government regulatory agencies (planning agency, building permit agency)
- Local public works and infrastructure agencies (roads, water, sewage, energy)
- Local land management agencies (cadastre, property registry, property tax)
- Government organizations involved in housing production
- Finance institutions (state-owned)

Private Sector:

- Housing producers (developers, contractors, real estate associations)
- Finance institutions (private commercial banks, micro-finance institutions, savings and credit groups, housing cooperatives)
- Real estate professionals (lawyers, realtors, brokers, notaries, property management companies)

Civil Society:

- Urban civil society organizations including community-based organizations
- International non-governmental organizations

An exhaustive analysis of all above institutions is likely beyond the scope of the project. Therefore, the team should evaluate a selection of these institutions – the most important ones and ones most amenable to changing or taking action. The exact number depends on the resources of the team, the complexity of the city, and the number of institutions Part B identified as consequential. In general, there are at least ten important institutions, but if time is available, the team could collect data on more. The following institutions are the most common, and interviews with them will provide information about several indicators (highlighted below in parentheses):

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42   DIFD (2003) Promoting Institutional & Organizational Appraisal & Development. A Source Book of Tools and Techniques. London: DFID.

43   Aligica, P.D. 2006. Institutional and Stakeholder Mapping: Frameworks for Policy Analysis and Institutional Change. *Public Organization Review* 6, 79. Available here: https://doi.org/10.1007/s11115-006-6833-0.

- Housing policy agencies (3A, 3B, 3C, 7C)
- Property tax agency (3D)
- City planning agency (5A, 5B)
- Real estate associations (including any developers and builders associations) (8B)
- Public works agency (6A, 6B, 6D)
- Housing finance institution (9A, 9B, 9C, 9D)

4.2 Surveys of high priority institutions

In addition to the six institutions above, surveys of select institutions will aid the team in prioritizing conversations about interventions and direct those interventions. The goal of the surveys is to identify institutions most interested and able to change or act with investment. This type of assessment is not quantitative analysis, but a systematic approach that uses some quantitative indicators as a framework.

What are the characteristics of institutions with the most potential for successful reform? Research shows that educated, experienced leaders of institutions with stable funding and capable staff that can continue through changing political cycles are more likely to successfully reform. This, of course, assumes leadership is interested in change. Assessing these features of institutions is challenging, and the team will need to rely on their own judgement throughout.

The questions below are guidelines for a survey to gather information on the one hand, and gather a narrative understanding of an agency's motivations and constraints on the other. The exact phrasing of survey questions will depend on context, but can include both closed questions and some relatively open ended questions.

Leadership:

1. What level of education do leaders have?
2. How are the institution's directors selected?
3. What is the oversight of institution's leadership?
4. What is the length of tenure of leadership?
5. (open ended) Are leaders interested in reform?

6. (open ended) What are their goals while directing the institution?
7. (open ended) What are the constraints as they see them?

Capacity:

8. Technical: How many staff focus on technical aspects of institution? What are their levels of education and degrees? What is the level of Information Technology?
9. Staff: Is the organization staffed at a level commensurate with its functions? Do staff have appropriate resources and autonomy?
10. Financial: How is the budget determined? What is the fluctuation from year to year?
11. Patronage appointments: What share of workers are on temporary contracts vs. career appointments? Are there phantom workers?
12. (open ended) Do leaders think their agency has the capacity to change and improve operations?
13. (open ended) What is constraining them from achieving their goals?

External factors:

14. Are there financial incentives or resources from state or federal government to address supply constraints? How significant are they relative to agency budget?
15. Are there bureaucratic networks (e.g. associations or conferences) for this institution? Does staff/leadership participate?
16. Are there community-based organizations that could be included in data collection, monitoring, and formulation and enforcement of reforms[44]?

17. How dependent are the institution's functions on other institutions?
18. Are there legal constraints or motivations that reformers can leverage (right to housing laws, for example)
19. (open ended) What other agencies limit or help this one in achieving its goals?
20. (open ended) To fulfill its mandate, how would other institutions need to change?

4.3 Analyzing survey responses

The team can analyze the above questions in two ways. The first is a narrative summary based on the team's judgement and the answers to open ended questions.

The second is a rough 'quantitative' assessment of the closed questions. This is a simple coding system for the answers to the dozen closed questions above. Each question will have roughly ranked answers, from 1 to 3, with larger numbers indicating greater potential for change. For example, take question 17. How dependent are the institutions functions on other institutions? The respondents could be given three possible answers: A lot, Somewhat, and Not at all (ranked 1, 2 and 3 later).

The team can use these closed answers to generate a rough relative indicator of potential for reform for each agency by adding up the values. Institutions with larger totals have greater potential for change. The team can use this more as a systematic framework to compare institutions than a 'true' measure of reform potential.

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44 For example, see the slum mapping efforts by Shack/Slum Dwellers International here: https://www.ideo.org/project/santa-fe-institute-of-architects.
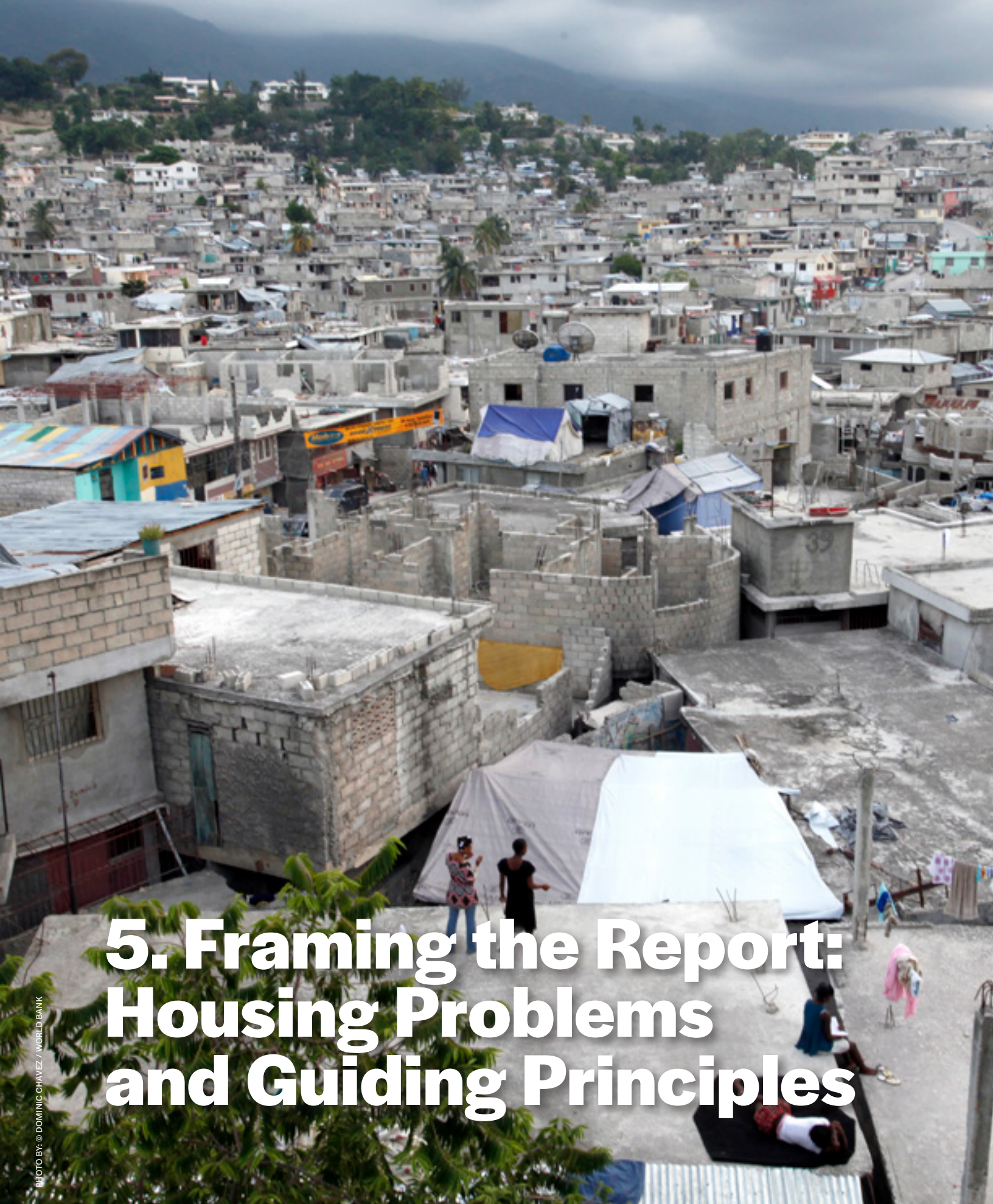
5. Framing the Report: Housing Problems and Guiding Principles

Housing is an essential human need and the benefits of well-managed urbanization are substantial. Local and national governments often recognize the importance of the housing sector and want to intervene, but the sector is complex. The most common policy impulses – large development projects or mortgage interest subsidies – can be less effective and less progressive if there is no substantial change and corresponding intervention on the supply side at the local level. A well-functioning housing market has a balance between supply and demand, supported by a supply of planned and serviced land, as well as building materials in diversity and scale, and access to mortgage financing and micro-finance, as well as a straightforward and enforceable regulatory environment.

This toolkit proposes a framework to analyze a city's housing context, problems, and local policy environment, and to develop a strategy for policy reforms and investments to improve access to land and housing for residents. The following three part approach (problem definition, connection between local policies to national development agenda, and strategy for intervention) may be useful for presenting the toolkit's three analytical components.

First, begin with the problem. Using the first set of indicators, the report can present housing deficits, both qualitative and quantitative. Most cities do not have enough housing of a decent quality that is affordable to their residents. New formal housing is usually unaffordable to the majority of a city's residents. As a result, families seek informal solutions, building their own housing or renting rooms of low quality or other temporary, insecure accommodation. By comparing population projections to housing production rates the report can assess future housing deficits.

Qualitative housing deficits, especially in terms of infrastructure and services, negatively impact on health and well-being. Assessing where housing quality is deficient is important to frame local housing agendas in most middle and low-income countries. The figures from the recent Jordan Housing Sector Review[45] can serve as an aspirational model for presenting deficits, although it is from a relatively information rich context. Presenting qualitative and quantitative deficits for different market segments – income groups and districts of a city – can be a very effective way to focus on different kinds of constraints to housing access for specific sectors.

Importantly, housing problems are not just social problems. Housing can be a significant share of a national economy and financial system. Emphasizing the missed economic opportunity that a dysfunctional housing sector represents can be a useful framing for securing political support for reforms.

The second section of the report can discuss the role and importance of local and supply policies, and frame these in the context of the national housing agenda and development goals. The detailed description of the housing production process for different types of housing will be especially illustrative, and highlight the importance of local government policies and practices for housing outcomes. Governments may not understand the role that different policies play in housing outcomes.

This section can emphasize the importance of both demand and supply side policy interventions in the housing sector, and their connections. The effectiveness of demand side interventions like mortgage interest subsidies is hindered by supply side bottlenecks[46]. New formal construction programs fueled by demand side subsidies without due consideration of the supply side contraints, may have ultimately negative outcomes, like abandonment of suburban houses, costly infrastructure needs, or expensive commutes.[47] Moreover, exclusive focus on mortgage finance or subsidies in the form of concessional interest rates may be captured by higher income segments.

The third section focuses on a strategy for intervention. How can a government intervene to improve access to quality housing for all, especially for the bottom 40% of the income distribution? The housing value chain can be a useful framework to focus attention on local level interventions with potential to improve housing and expand access in a programmatic and progressive manner. Using the analysis generated through this toolkit, this can be done in two ways. The first is simply to highlight the indicators that arise as the most constraining in the production of housing through the interviews.

The second is contrast the formal production process with informal development – as described above – to reveal inefficiencies in local rules and practice. By focusing on how the bulk of de facto "affordable housing" is actually produced, and the challenges in producing it, the team can identify seemingly small interventions that may have large impacts. Because of this focus on local level

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45 World Bank, 2018. Jordan Housing Sector Review, Project P158331, May 2018, Washington, DC: The World Bank. Available here: http://documents.worldbank.org/curated/en/855101555960778525/Jordan-Housing-Sector-Assessment-Housing-Sector-Review.

46 IEG report on housing finance, available here: https://ieg.worldbankgroup.org/evaluations/world-bank-group-support-housing-finance.

47 For a comparison of costs to residents of different kinds of social housing in Brazil, Colombia, and Mexico, see Libertun de Duren, N. 2017. The social housing burden: comparing households at the periphery and the centre of cities in Brazil, Colombia, and Mexico. *International Journal of Housing Policy*. Available here: https://www.tandfonline.com/doi/abs/10.1080/19491247.2017.1298366.

Table 4. Guiding Principles for Five Areas of Local Housing Policy

AREA	GUIDING PRINCIPLES
Urban land supply	▪ Security and tradability of real estate rights ▪ Sufficient serviced land for expansion ▪ Sufficient serviced land for infill
Development regulations	▪ Appropriate to incomes ▪ Allow density ▪ Clear and non-discretionary
Infrastructure and services	▪ Universal ▪ Sustainably financed ▪ Upgrading with community participation
Building materials and construction industry	▪ Transparent rules ▪ Low-cost building materials ▪ Governance of multi-owner buildings
Housing Subsidies	▪ A policy of last resort ▪ Transparent ▪ Well targeted to low-income households ▪ Well-located

interventions, housing finance interventions may not be as extensively highlighted in this assessment.[48]

Below, we suggest guiding principles for intervention in five overlapping areas –urban land supply, development regulations and processes, infrastructure and services, building materials and construction industry, and housing subsidies. Table 4 presents an overview of the sixteen guiding principles. Most of these reform efforts are long term, and as such, building in feedback loops and learning into the report is important, as is incorporating any past efforts that likely exist in a given city.

5.1 Urban land supply for housing: Security, Tradability, Expansion and Infill

Security and tradability of real estate rights: Ensuring security of real estate rights and that rights to own and freely trade housing are established by law and enforced is fundamental to the well-functioning of urban land and housing markets. In market-based housing contexts where both customary and/or informal systems of land trading occur, the government should heavily invest in modern, transparent land cadaster and real property registration system that facilitate registration of property, mortgage and liens is to delivery of formal affordable housing. Security of tenure removes the risk of eviction and also provides dwellers with access to credit for housing construction and upgrading.

Sufficient serviced land for expansion both outward and upward is needed if housing supply is to meet demand. Understanding current urban expansion trends can yield important policy insight. Large cities that are rapidly expanding at the periphery and not experiencing densification may need interventions in both peripheral areas – like ring road and other trunk infrastructure – as well policies to facilitate dense infill development – allowing density and increasing infrastructure capacity in central neighborhoods. On the other hand, cities with overcrowding and increasing population densities that are not expanding horizontally may benefit from revising rules or removing barriers for expansion.

In order to harness the benefits of agglomeration economies, to support urban density with adequate infrastructure, we offer two guiding principles for cities to strike a balance between horizontal growth and densification.

Sufficient serviced land at the periphery: Striking the right balance in regulations governing the urbanization of peripheral land is a challenge. On the one hand, overly strict rules can lead to inefficiently low-density development or widespread informality because household incomes do not support the construction of even the minimum legal standard for housing quality. On the other hand, a lack of regulation can lead to uncoordinated and inefficiently sprawling development patterns. One way to change the approach to guiding development is to use infrastructure, not regulation, to encourage expansion. Building transit lines into the urban periphery, for example, or rind roads, will direct urbanization more effectively than zoning certain land for housing and certain land for ecological reserves. Similarly, building trunk infrastructure will direct urban expansion in a way that planning alone cannot.

Sufficient serviced land within the city: Cities can support infill development in multiple ways. Guidance on the needed combination of infrastructure support and finance, as well as appropriate and clear development regulations is described below. Additionally, institutional structures to facilitate land assembly – land readjustment agencies or mediation services – may be needed.

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48 For more on housing finance focused policy reform, see the IEG report on housing finance here: https://ieg.worldbankgroup.org/evaluations/world-bank-group-support-housing-finance and Chiquier, L. and Lea, M. 2009. *Housing Finance Policy in Emerging Markets*. Washington, DC: The World Bank. Available here: http://documents.worldbank.org/curated/en/833371468152071863/Housing-finance-policy-in-emerging-markets.

PHOTO BY: © JOHN HOGG / WORLD BANK

5.2 Development regulations: Appropriate, Dense, Clear and Non-discretionary

Though not obviously a housing policy directed at affordability, the failure to consider the downstream impacts of overly restrictive, unrealistic urban development regulations makes housing less affordable. Simply because a city government mandates that all housing must conform to some ideal standard of size, open space and building materials, does not make it happen. It can often backfire. We offer three guiding principles for housing development regulations.

Appropriate requirements: The benefits of appropriate land use regulations for housing markets have long been recognized. The definition of appropriate is the main challenge. Building codes are important for public health and safety, but should be adopted and revised based on a reality check of the resources of most households and what kind of housing they can afford.

Allow density: Minimum lot sizes and strict limits restrictions on the number of dwelling units per lot are well-known[49] to exacerbate segregation, reduce affordability,

and make cities less sustainable. Allowing small lots for housing and high floor area ratios facilitates housing supply of different types and increases affordability.

Clear and non-discretionary permitting process: Permitting processes that are clear and non-discretionary reduce the potential for corruption and allow certainty among developers. Sensible rules applied consistency is a surprisingly challenging, but worthwhile goal.

5.3 Infrastructure and services: Universal, Sustainably financed, and Community participation in upgrading

Infrastructure and services are a large part of the housing problem in many developing country cities. Expanding infrastructure networks to reach all residents and providing consistent service is among the most important goals for local governments. We offer three guiding principles for infrastructure and services.

Provide services to all neighborhoods: Basic infrastructure and services are fundamental to health and quality

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49   For example, see Dowall, D. 1992. *Cato Journal*, 12(2), 413. Available here: https://object.cato.org/sites/cato.org/files/serials/files/cato-journal/1992/11/cj12n2-7.pdf.

of life. Infrastructure investment and service provision should be well coordinated with land use planning; local public works agencies should be as proactive as possible in providing services to all neighborhoods. In places where informal housing is prevalent, denying these neighborhoods public infrastructure is counterproductive to development.

Sustainable financing through property taxation and land value capture: Funding urban infrastructure with property taxes is challenging but extremely important. Many cities have low property tax rates and do not collect most of them. Though the shift to property taxes can be unpopular, when residents see their tax money being invested in public infrastructure, they will be more likely to pay. Other land value capture mechanisms should be explored as well, including transferrable development rights, density bonus and Tax Incremental Financing, depending on legal and regulatory environment and enforcement at respective localities.

Community inclusive urban upgrading: Investment in improving urban infrastructure in low-income neighborhoods is a core component of urban housing policies to ameliorate the housing quality deficit. Community involvement is important for urban upgrading to succeed. This is not only because it will lead to community ownership and sustainability of the upgrading, but also cost effectiveness of the investments undertaken, and more importantly, to deeper and more constructive engagement with local government.

5.4 Building materials and construction industry: Transparent rules, Promoting low-cost building materials, and Management of multi-owner buildings

A well-functioning housing sector depends on a competitive building industry, which in turn requires affordable building materials. The best way to support developers and construction companies facilitate building materials acquisition depends on the particular national and local context. Potential approaches include creating greater competition on the building industry,

improving the business environment through transparent, simple regulatory processes, providing better

information for the sector, removing constraints to the development and use of local building materials, and reducing trade barriers that apply to housing inputs, subsidizing building materials that target low income households, and improving the governance of multi-owner properties. We offer three guiding principles for the building materials and construction industries.

Transparent, Simple Regulatory Processes and Information: Governments can increase competition by creating transparent planning and permitting processes that treat all companies equally in the process, and by creating one-stop shops for permitting. Simple and clear development rules benefit smaller companies, reducing the potential for corruption and allowing for more competition.

Promoting low-cost building materials: Ensuring the availability of affordable building materials, especially in a manner that targets low income households, can greatly improve housing conditions. As starting point, local governments should meet with construction and building materials industry and assess any constraints they face, including norms, standards, fees, taxes tariffs that go into the final building material products that are sold in the market. In countries where a considerable portion of construction materials are imported, import substitution strategy needs to be formulated, including measures such as specific waivers, fiscal incentives, subsidies, tax relief, etc) to stimulate the utilization of alternative or traditional building materials. A more proactive approach is to provide low-income households with subsidies for building materials.

Allowing forms of multi-owner arrangements to flourish: A sometimes overlooked element of supporting dense urban housing is ensuring that the rules governing multi-owner properties are effective. Multi-owner properties present governance challenges and in some places, legal systems do not work well at ameliorating those challenges.

5.5 Rationalizing Subsidies: Transparent, Targeted, and Well-Located

Housing subsidies[50] are usually divided into supply side subsidies and demand side subsidies[51]. Supply side subsidies are largely those that (i) lower the opportunity

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50 For the purpose of this toolkit, a subsidy is an incentive provided by government to enable and persuade a certain class of producers or consumers to do something they would not otherwise do, by lowering the *opportunity* cost or otherwise increasing the potential benefit of doing so. (adapted from the US Congress, 1969).
51 Some subsidies may be considered as either. For instance, the interest rate subsidy for the low-income self-help builders can be categorized as a supply side subsidy, or can be considered as a demand side subsidy (for owner occupation).

Box 3. Regulations, Policies or Subsidies?

Subsidy should be a policy of last resort or, more precisely, should be used only in conjunction with other steps. The hierarchy of complementary government actions needed to improve the housing conditions for the majority of households in an economy are:

i. Develop or reform institutions and policies to facilitate the role of private and non-profit lenders and developers in expanding the moderate/low income housing supply, and provide education and training to consumers and producers to improve the operation of the housing finance industry;

ii. Improve the regulatory system in the different supply markets (land, finance, infrastructure) to allow more households to acquire authorized and healthful housing; and lastly

iii. Provide subsidies to address well-defined objectives.

Simply put, if government does not do what is necessary to encourage the housing construction and finance industries to function efficiently, housing supply cannot respond to price signals, and higher incomes or subsidies will not translate into better housing.

Source: Marja C. Hoek-Smit and Douglas B. Diamond, 2003, The Design and Implementation of Subsidies for Housing Finance.

costs and risks for private lenders or developers to deliver moderate to low income housing such as tax benefits for private developers, the provision of below-market funds for housing loans, credit risk insurance or guarantee schemes, or (ii) direct government lending or government construction and management of housing, provision of serviced land, infrastructure or housing at below market rate. Demand side subsidies focus on increasing the ability of households to consume better housing, such as housing allowances or housing vouchers for rental or owner-occupied housing, up-front grants tied to mortgage or savings for housing. We offer four guiding principles for housing subsidy programs as below:

Subsidy as a policy of last resort: Subsidy should be designed and implemented in conjunction with other complementary government actions (as outlined above) to improve the housing conditions for the majority of households in an economy. If the supply side is not responsive, demand side subsidy alone can be distortive and ending up subsidizing in-efficiencies in the market. Therefore, it is critical to have a systematic understanding of the supply and demand dynamics, avoid distorting housing markets, and design a blend of supply and demand side instruments accordingly.

Transparency: Clear, transparent processes of administration and dispersal, as well as clarity in costs to the government are important. Clear income eligibility criteria, for example, and non-discrimination in who among income groups can receive a subsidy ensure subsidies reach their intended targets. Unlike one time payments, for example, mortgage interest rate subsidies are opaque in that future changes in inflation change the effective size of the subsidy meaning governments do not have a clear accounting of their commitment to the sector.

Targeting: Subsidy can be geographically targeted (place-based), or people based. Refers to what kind of household (e.g. what income level) receives the subsidy. Some kinds of subsidies, however, like mortgage interest rate supports, tend to inevitably benefit higher income households.

Location: There is a tension between breadth and depth in subsidy programs (i.e. will they help a lot of households a little bit, or a few households a lot). The tension is often resolved by subsidizing the least expensive type of housing. However, this sometimes means housing located far from the city (hence on cheaper land) and the opportunities city provides, and that such housing tend to be abandoned by its beneficiaries. This should be avoided or ameliorated by carefully designing the subsidy to ensure that subsidies units are built in well-located areas with infrastructure, services and access to jobs.

PHOTO BY: © KIM EUI YEUL / WORLD BANK

6. Conclusion

The housing sector depends on a complex set of interactions between public and private actors. Many institutions and interventions that might not obviously be considered as housing policy have consequential impacts on housing outcomes. On the one hand, this makes intervention to improve housing challenging, but on the other hand, there is potential for relatively small inexpensive programmatic changes in local policy to have noticeable impacts. The most effective strategy is coordinated intervention and investment in multiple areas.

This toolkit serves as a guide to create an evidence-based assessment of a city's land and housing market performance. It has three analytical components. First, it outlines a set of indicators to assess problems in the city's housing and land value chain, as well as the nature of current housing and other policy actions. Then, through a series of expert interviews, it guides an assessment of the factors restricting different types of housing production and a prioritization of these constraints. Finally, it outlines a method to prioritizing interventions, by assessing which government actors are the most amenable to engagement and have the greatest capacity for action and/or reform. In addition to guiding analysis of a city's housing context, problems, and potential interventions, the penultimate section provides a framework for writing this analysis in a report structured as an argument for action with a menu of options for intervention.

This toolkit is envisioned as a living document. The next step is to apply the methodology. After initial application in a variety of contexts - ideally in different regions, with different levels of economic development, urbanization, and institutional setup – the approach can be further improved and adjusted, before potential roll-out as a standardized global method of urban land and housing market assessment.
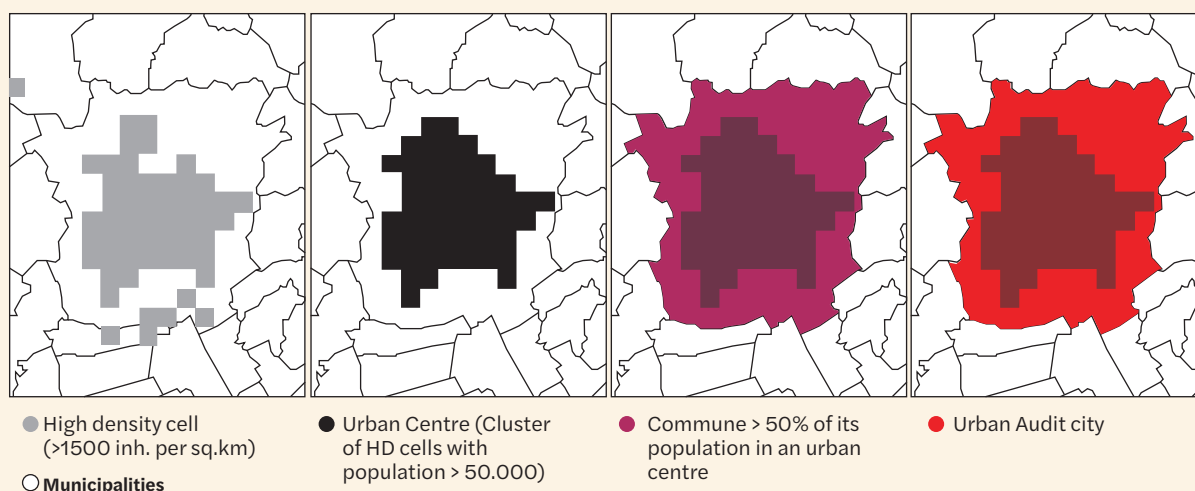
Technical Definitions

1. **Functional Urban Area (FUA):** FUAs include urbanized land linked through labor and housing markets to an urban core. The OECD uses a three-step process to delineate FUAs, though this approach may be simplified and urban areas defined using step 1 alone:

   a. Combine a measure of density (e.g. over 1,000 people per km^2) and total population size (e.g. 50,000 people) to define the urban core. The core is the aggregate of all contiguous cells with density above the minimum. If the sum of the population in these 'high-density' cells is greater than the population threshold, the area is a core area. Population thresholds vary from region to region.

   b. The second step addresses the interdependence of adjacent or abutting cities. If their economies are integrated, they can be considered as one urban area for land and housing planning purposes. The OECD uses data on commuting to assess integration - if over 15% of one city's residents commute to a nearby city they are integrated. Without data on commuting, a more basic decision rule (e.g. cities with borders within 15 kilometers are integrated) or consult with local experts.

   c. The third step is to assess where the urban core's area of influence or hinterland ends. There is no 'correct' way to do this, and the process usually relies on commuting data. If this is unavailable it is a more challenging process, and a simple buffer area of 10 or 15 kilometers can be used as a rule of thumb.

   Exhibit A illustrates urban core cells, a hinterland definition of 10 km, and the challenge of including a neighboring city into the greater urbanized area. It also reveals a typical case, FUA boundaries overlapping administrative boundaries, and how administrative units often include large areas of non-urban land.

2. **Urban extent:** The urban extent is the base unit of analysis. It is the area covered by urban land use in the Functional Urban Area. Urban centers in close proximity are usually included as part of one FUA because they form an integrated labor, land, and housing market.

Exhibit A. Schematic of FUA definition process: urban core, hinterland, and municipal boundaries

- High density cell (>1500 inh. per sq.km)
- ○ **Municipalities**
- Urban Centre (Cluster of HD cells with population > 50.000)
- Commune > 50% of its population in an urban centre
- Urban Audit city

3. **Core urban areas:** Using the GHSL data, urban cores can be identified as clusters of cells with density above 1,000 people/km² that add up to a population greater than 50,000 people.

    a. Use the GHSL dataset to trace the urban extent by including all pixels as long as at least 50% of pixels within a 1km buffer are urban. This is the urban extent of the core.

    b. To obtain the regional urban extent, extend a buffer equal to 25% of all urban cores and aggregate all buffers that intersect. The urban extent is the footprint of the built-up area and all open areas within that footprint.

    c. Cities in close proximity may be considered integrated. For example, if more than 15% of the population commutes from one core to another, they are considered linked. Data on commuting intensity is rare. A gravity model is an alternate approach that takes into account pull by region size and transportation costs to determine the number of trips between areas. The existence of transportation infrastructure (e.g. main road or railway) is easy to determine. As such, a buffer proportional to the size of cores (their pull) can be added around cores that are connected through large capacity infrastructure to determine if a core will be included as part of the FUA.

4. **Built-up area:** The built-up area of an urban extent is the sum of all areas that are coded as urban land use in the GHSL database.

5. **Density:** Density is the total population divided by a set area. Density can be calculated for both the urban extent and built-up area.

6. **Urban expansion rate:** Urban expansion rate is the growth of the built area on a yearly basis. It is created using the built-up area of an urban extent at various points in time. Based on the Global Urban Footprint, the growth of the urban footprint within the urban extent can be calculated precisely for the past several decades.

7. **Developable land:** Developable land is the area of land within a 10km buffer around the urban extent that is open, with a slope less than 10 degrees.

8. **Developable land accessible:** Accessible developable land is land that could be developed without creating new major infrastructure, especially transportation. It captures land that is within 2km of a major transportation link.

    a. Use the 10km buffer around the urban extent to create a clip mask of the road network map.

    b. Create a 2km buffer around major roads and transit line from the Open Street Map (OSM) project or other country-based data set.

    c. Calculate area of developable land within that transportation network buffer.

9. **Secure developable land:** Much land is at risk from natural disaster. Secure developable land takes into account relevant risks. Based on the developable land or accessible version, calculate the share of land based on assessed risk level. Figure A1 provides an example based on probability of rain and slope of the terrain for suitability in the land around Davao City in the Philippines.

10. **Housing tenure:** This variable will depend on the categories used in census or other available data. The basic breakdown is owner-occupied, rental, and shared/other. These categories can be complex in some cities, with owner-occupied including forms of semi-formal ownership claims, for example. Fieldwork, though resource intensive, gives a more detailed description of tenure categories. Work on tenure has gained attention and several projects can provide complementary sources (e.g. Prindex[52]).

11. **Housing quality:** Housing quality is generally divided into the materials with which it is built and infrastructure. Building materials – often separated by walls, floor and roof – are usually categorized as permanent / improved or temporary / substandard. Infrastructure – usually separated as water, sewage, and electricity – is usually ranked as available or not, although a more precise measure would also indicate how consistently they are available. Thus, there will usually be six separate components of this indicator. The team can combined them into an index. The main source of data for these variables is a national census. Another alternative is to use Google Street Map to gather information on building material and general quality.

12. **Housing types:** The core dimension of describing housing type is the size of the building, both footprint and height. Footprint is the more feasible measure. Machine learning is making the tracing of building's footprints for entire cities possible. The technology remains too onerous to achieve coverage beyond select case studies, but is worthwhile in cases where administrative data are lacking. Similarly, tools to acquire data on building height are being refined

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Figure A1. Suitable land for greenfield development.

Land Use Suitability
- Built-up-area
- Very high
- High
- Moderate
- Low
- Very Low

Sources: Shuttle Radar Topography Mission (30m) SSBN 3 arc second Global Hazard Data (World Bandk License)
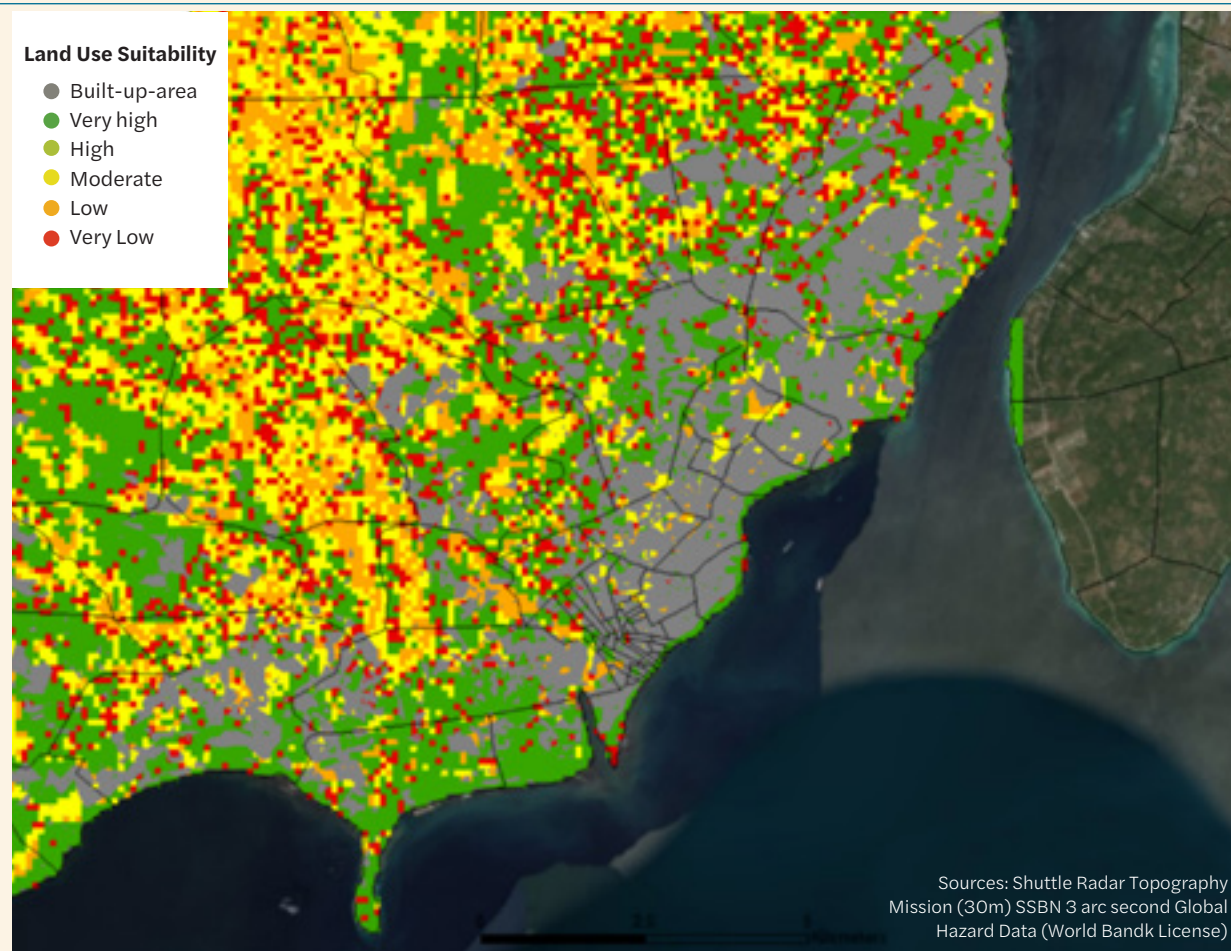
Source: City Scan, Davao City. City Resilience Program

and expanded. The technology requires one more dimension (z-axis) and therefore even more resource intensive (e.g. the Airbus project in Senegal[53]).

13. **Housing costs:** The exact definition of this variable will depend greatly on available data. The most common measures are rent and price. The source of data can be self-reported variables in a census, assessments in the property tax registry or cadaster, and the listed rent and value of housing units for rent or sale. The latter may be posted in newspapers or online and the team would need to collect and aggregate them. In markets with high levels of digital technology penetration, web scraping may provide enough data at the neighborhood level in an inexpensive and rapid manner. Such estimates pertain only to current prices or rents rather than the average, and all three sources have caveats.

14. **Housing affordability:** The standard indicator is a cost burden measure of rent as a percentage of income or the house price to income ratio. A common international standard is that paying over 30% of household income on rent or mortgage indicates an unaffordable housing market. This 30% standard shall be revisited and a more grounded threshold should be established based on empirical data in respective localities. Additionally, a more useful measure would be cost burden measures for different segments of the income distribution.

15. **Household formation rate:** The standard measure of household formation is the headship rate, which in its most simple form is the percent of individuals above 18 that are household heads. Higher headship rates indicate easier access to housing. Headship rates for different age groups, especially focusing on

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53 https://www.intelligence-airbusds.com/files/pmedia/public/r50290_9_dakar_satellite_image_analysis.pdf

Table A1: Data Sources with Full and Partial Global Coverage

FULL GLOBAL COVERAGE		
DATA NAME	**DESCRIPTION**	**SOURCE**
Global Urban Footprint (GUF)	Worldwide inventory of human settlements (urban & rural) using one global coverage of SAR data with 0.4 arcsec (~12 m) ground resolution collected by the satellites TerraSAR-X / TanDEM-X in 2011-2013.	Urban TEP: https://urban-tep.eu/puma/tool/?id=567873922&lang=en
Global Humans Settlement Layer	The Global Human Settlement (GHS) framework produces global spatial information about the human presence on the planet. Built up maps, population density maps, and settlement maps is based on new spatial data mining technologies, satellite imagery, census data, and volunteered geographic information.	https://ghsl.jrc.ec.europa.eu/index.php
Gridded Population of the World Version 4 (GPWv4)	Models the distribution of human population (counts and densities) on a continuous global surface. The essential inputs are census data and geographic boundaries. For GPWv4, population input data are at the smallest spatial resolution from the 2010 round of censuses, which occurred between 2005 and 2014.	Socioeconomic Data and Applications Center (sedac): https://sedac.ciesin.columbia.edu/data/set/gpw-v4-population-density-adjusted-to-2015-unwpp-country-totals-rev11
World Pop	Open spatial data on a number of topics including Global Settlement Growth.	https://www.worldpop.org/geodata/listing?id=32
Shuttle Radar Topography Mission (SRTM)	High-definition elevation data and well-defined water bodies and coastlines and the absence of spikes and wells (single pixel errors), although some areas of missing data ('voids') are still present. The Version 2 directory also contains the vector coastline mask derived by NGA during the editing, called the SRTM Water Body Data (SWBD), in ESRI Shapefile format	Jet Propulsion Laboratory: https://www2.jpl.nasa.gov/srtm/
Global Land Cover	The CCI-LC project delivers consistent global LC maps at 300 m spatial resolution on an annual basis from 1992 to 2015. The Coordinate Reference System (CRS) is a geographic coordinate system (GCS) based on the World Geodetic System 84 (WGS84) ellipsoid. The legend (Table 1) uses the UN-LCCS, compatible with most models.	European Space Agency: http://maps.elie.ucl.ac.be/CCI/viewer/index.php
DATA SOURCES WITH PARTIAL COVERAGE		
Open Street Map	OpenStreetMap is a map of the world, created by people like you and free to use under an open license.	OSM: https://www.openstreetmap.org
International Census Microdata	IPUMS-International collects and distributes harmonized census data from around the world, for free. Currently has 94 countries – 365 censuses – over 1 billion person records	IPUMS: https://international.ipums.org/international/
Prindex	A global dataset that measures perceptions of property security in more than thirty countries by the end of 2018. A survey of perceptions of a representative sample of citizens.	https://www.prindex.net/data/
ThinkHazard!	*ThinkHazard!* provides a general view of a locations hazards to be considered in project design and implementation to promote disaster and climate resilience. The tool highlights the likelihood of hazards (very low, low, medium and high) and guidance on how to reduce their impact.	http://thinkhazard.org/en/
Google Street Map	Google Street View is a free and fully accessible tool to the public that provides the virtual experience of walking down the street.	https://www.google.com/maps

the prime household forming years, make for useful comparison. Cities with higher headship rates among 25-30 year olds, for example, are likely to have more affordable housing. This can be calculated with most census data from the variable position in household.

16. **Household structure:** The prevalence of non-family households generally indicates a less affordable housing market. Additionally, family households with unrelated adults also can indicate lower access to housing.

17. **Overcrowding:** The number of persons per room is a standard manner to measure overcrowding, though many countries draw the line differently. The WHO uses over 2.5 people per room as an indicator of overcrowding.

18. **Land development multiplier:** A proxy for the value of obtaining development permissions and/or connection to municipal infrastructure systems is the ratio of the cost of permitted land with infrastructure at the edge of a city to the cost of adjacent land zoned for agricultural use and without infrastructure. Although a precise estimate is challenging, a rough estimate based on interviews with real estate practitioners and land brokers is nonetheless useful. A full land value survey is also possible, or the use of administrative data if available.

Sample Survey Outlines for Housing Experts

A. Formal Greenfield Development: Survey for Housing Development Expert

We would like to thank you for your participation in this survey on housing development. Your expertise in housing development in «Survey_City» is essential to the success of an ongoing analysis of the city's land and housing markets that seeks to lay the foundation for positive reforms. Please fill out the section on your personal information and professional background before proceeding. <<insert questions on respondent background here>>

Again, we are honored to be able to count on your expertise for this survey. Please do the following in completing the questionnaire:

- Review the assumptions of the case study before answering questions
- Please answer all questions
- Contact our team with any doubts or questions about the survey

Case Study Assumptions

Consider the development of a housing subdivision of roughly 100 relatively low-priced units in the edge of the city (for example, in the location indicated in Map A). <<more details can be added based on local context, gathered through the housing typology in Part A>>

I. The Process: Steps, Time, Cost, and Reform

The following seven activities are typically required for a new housing subdivision. For each, please list the steps required to complete this activity. For each step, indicate how long it typically takes time to complete, what the costs involved are, who the relevant actors are (e.g. public agencies, private institutions), whether this is a roadblock to the housing development process (on a scale of 1-5), and your opinion on whether this step can be changed to make housing development easier (on a scale of 1-5).

Feel free to add or remove activities beyond these seven, or to reorganize the activities in a manner that better matches your housing production process. Additionally, for each activity, we have listed possible steps based on other countries' processes. These are merely prompts to give an example of the kinds of steps in each activity.

1. Acquiring a parcel
   a. Possible prompts: find a site, negotiate with owner, purchase

2. Rezoning the land to urban use
   a. Possible prompts: prepare a proposal, submit to city planning

3. Obtaining construction permits *
   a. Possible prompts: obtain certificates from water, fire or property tax, and other agencies, prepare renderings, prepare urban impact study, submit proposal to city, notify city upon completion of construction for certificate of occupancy

4. Obtaining infrastructure *
   a. Possible prompts: prepare required documents (e.g. topographical map, subdivision plan, etc), submit subdivision plan to water agency, electrical agency, public works, pay required fees

5. Obtaining construction financing
   a. Possible prompts: obtain development permit, submit business plan to financing agency

6. Construction
   a. Possible prompts: grading, infrastructure, foundations, core housing, interiors

7. Transferring property title *
    a. Possible prompts: obtain clear title history for land, create new property registries, submit to notaries or recorders offices

II: Most consequential constraints

Please respond to the following questions, which ask you to reflect on the process outlined above:

1. Of the steps in housing development described above, which do you think are the three most significant limitations or challenges?
2. Of the three major challenges to housing development, which do you think would be the most easily reformed? Why?
3. In which areas do you think the actual practices and actions of developers differ most from the officially mandated process?
4. Do you think there other significant roadblocks or constraints to new subdivision type development not yet mentioned in this survey?

III: Other challenges and issues

Finally, we would like your opinion on two additional topics: land ownership, planning, and infrastructure in the peri-urban area, and the context of construction and mortgage financing.

The map below shows the urban footprint of your city, with a buffer indicating an area of about 10 kilometers surrounding the current edge of the city. This buffer area is what we consider the peri-urban area.

1. How concentrated is landownership in this area, that is, is it fragmented into many small parcels or are there specific large parcels? How big the large parcels? (Indicator 4D)
2. Is most of the land privately or publicly owned?
3. How much of the peri-urban land has contested ownership (e.g. multiple owners, land with legal conflicts)?
4. What percentage of peri-urban land is zoned for urban use presently? (Indicator 5C)
5. How much are typical greenfield land costs per square foot under different zoning regimes? (Indicator 4C)
6. Are you aware of any plans to expand trunk infrastructure in peri-urban areas?
7. How is infrastructure in these areas financed (e.g. by developers, by local taxes, or state transfers)? (Indicator 6C)
8. What are infrastructure costs as a share of construction costs? (Indicator 6C)
9. How much are typical construction costs per square foot? (Indicator 8A)
10. What is the price of cheapest new unit? (Indicator 7D)
11. What share of construction materials are sourced locally? (Indicator 8D)
12. Is there construction finance available for housing developers from private or public banks? How common is it? What are the major lenders? (Indicator 8C)
13. What is the prevailing interest rate and tenure for mortgage financing? (Indicator 9B)
14. What share of new housing is purchased with a mortgage? (Indicator 9A)
15. Do microfinance institutions give loans for housing improvement? What are the prevailing rates and tenure? (Indicator 9E)

Thank you for your participation!

B. Formal Infill Development

We would like to thank you for your participation in this survey on housing development. Your expertise this process in «Survey_City» is essential to the success of an ongoing analysis of the city's land and housing markets, which will hopefully result in a set of positive reforms. Please fill out the section on your personal information and professional background before proceeding. <<insert questions on respondent background here>>

Again, we are honored to be able to count on your expertise for this survey. Please do the following in completing the questionnaire:

- Review the assumptions of the case study before answering questions
- Please answer all questions
- Contact our team with any doubts or questions about the survey

Case Study Assumptions

Consider the development of a housing a multi-family housing project of 25 units in centrally located neighborhood (for example, in the location indicated in Map A). <<more details can be added based on local context, the typical type of multi-family housing, gathered through the housing typology in section I>>

I. The Process: Steps, Time, Cost, and Reform

The following seven activities are typically required for a new multi-family housing project. For each, please list the steps required to complete this activity. For each step, indicate how long it typically takes time to complete, what the costs involved are, who the relevant actors are (e.g. public agencies, private institutions), whether this is a roadblock to the housing development process (on a scale of 1-5), and your opinion on whether this step can be changed to make housing development easier (on a scale of 1-5).

Feel free to add or remove activities beyond these seven, or to reorganize the activities in a manner that better matches your housing production process. Additionally, for each activity, we have listed possible steps based on other countries' processes. These are merely prompts to give an example of the kinds of steps in each activity.

1. Acquiring a parcel
   a. Possible prompts: find a site, negotiate with owner, purchase

2. Rezoning the land to residential use and/or higher density
   a. Possible prompts: prepare a proposal, submit to city planning

3. Obtaining construction permits *
   a. Possible prompts: obtain certificates from water, fire or property tax, and other agencies, prepare renderings, prepare urban impact study, submit proposal to city, notify city upon completion of construction for certificate of occupancy

4. Obtaining construction financing
   a. Possible prompts: obtain development permit, submit business plan to financing agency

5. Construction
   a. Possible prompts: grading, infrastructure, foundations, core housing, interiors

6. Creating and transferring property titles *
   a. Possible prompts: create new property registries, submit to notaries or recorders offices, create owners's corporation

II: Most consequential constraints

Please respond to the following questions, which ask you to reflect on the process outlined above:

1. Of the steps in housing development described above, which do you think are the three most significant limitations or challenges?
2. Of the three major challenges to housing development, which do you think would be the most easily reformed? Why?
3. In which areas do you think the actual practices and actions of developers differ most from the officially mandated process?
4. Do you think there other significant roadblocks or constraints to new multifamily development not yet mentioned in this survey?

III: Other challenges and issues

We would also like your opinion on four additional topics: land ownership, infrastructure, condominium laws, and the context of construction and mortgage financing.

1. How big of a challenge is the size of most parcels to developing multifamily housing? How hard is it to assemble land?
2. Is most of the land in central parts of the city privately or publicly owned?
3. What share of parcels have contested ownership (e.g. multiple owners, land with legal conflicts)? (Indicator 4D)
4. Are there any programs to assist with land assembly?
5. Is low density zoning a challenge for multi-family development? (Indicator 5B)
6. Is trunk infrastructure a challenge for multi-family housing development?
7. What are infrastructure costs as a share of construction costs? (Indicator 6C)

8. How much are typical construction costs per square foot? (Indicator 8A)
9. What is the price of cheapest new unit? (Indicator 7D)
10. How much are typical infill land costs per square foot under different zoning regimes? (Indicator 4C)
11. Are there any requirements to improve infrastructure when building multi-family housing? If not, how are infrastructure improvements financed? (Indicator 6C)
12. What share of construction materials are sourced locally? (Indicator 8D)

13. What are the regulations of establishing owners' corporations for condominium buildings? Are they excessively onerous? In what way?
14. Is there construction finance available for housing developers from private or public banks? How common is it? What are the major lenders? (Indicator 8C)
15. What is the prevailing interest rate and tenure for mortgage financing? (Indicator 9B)
16. What share of new multi-family housing is purchased with a mortgage? What share of financing is provided by the developer? (Indicator 9A)

Thank you for your participation!

C. Informal Greenfield Development

We would like to thank you for your participation in this survey on housing development. Your expertise this process in «Survey_City» is essential to the success of an ongoing analysis of the city's land and housing markets, which will hopefully result in a set of positive reforms. Please fill out the section on your personal information and professional background before proceeding. <<insert questions on respondent background here>>

Again, we are honored to be able to count on your expertise for this survey. Please do the following in completing the questionnaire:

- Review the assumptions of the case study before answering questions
- Please answer all questions
- Contact our team with any doubts or questions about the survey

Case Study Assumptions
Consider the typical process of incremental / informal housing development in the periphery of your city (for example, in the location indicated in Map A). <<more details can be added based on local context, the typical type of multi-family housing, gathered through the housing typology in section I>>

I. The Process: Steps, Time, Cost, and Reform
The following seven activities are typically required for developing informal housing. For each, please describe the process by listing the steps required. For each step, indicate how long it typically takes time to complete, what the costs involved are, who the relevant actors are (e.g. public agencies, private institutions), whether this is a roadblock to the housing development process (on a scale of 1-5), and your opinion on whether this step can be simplified (on a scale of 1-5).

As with other types of development, add or remove activities beyond these seven, or to reorganize the activities in a manner that better matches your housing production process. Additionally, for each activity, we have listed possible steps based on other countries' processes. These are merely prompts.

1. Acquiring / claiming a parcel of land
    a. Possible prompts: find a site, negotiate with broker, purchase

2. Obtaining construction materials and building
    a. Possible prompts: where and how are materials typically acquired, who does the labor, how long is the process

3. Obtaining infrastructure *
    a. Possible prompts: who can lobby local government for infrastructure, how does this process function

4. Preserving property claim *
    a. Possible prompts: who has oversight of property claims, how frequent are negotiations, is regularization possible

II: Most consequential constraints
Please respond to the following questions, which ask you to reflect on the process outlined above:

5. Of the steps in housing development described above, which do you think are the three most significant limitations or challenges?
6. Of the three major challenges to housing development, which do you think would be the most easily reformed through government action? Why?
7. Are there other significant roadblocks or constraints to new subdivision type development not yet mentioned in this survey?

III: Other challenges and issues
Finally, we would like your perspective on land ownership, property rights, and land regularization. The map below shows the urban footprint of your city, with a buffer indicating an area of about 10 kilometers surrounding the current edge of the city. This buffer area is what we consider the peri-urban area.

1. How much (and where) of this area is viable for incremental / informal housing construction?
2. Why is some land available for informal development and some land not? (Indicator 4D)
3. What are the different levels of tenure security for housing developed informally in this area?
4. How do neighborhoods get trunk infrastructure if developed informally? How common is this – after 5 or 10 years, for example?
5. How much are typical construction costs per square foot? (Indicator 8A)
6. What is the price of cheapest new unit? (Indicator 7D)
7. How much are typical infill land costs per square foot under different zoning regimes? (Indicator 4C)
8. How functional is the city's land and housing regularization system? What are the reasons it is not more successful (e.g. underfunded, no demand, contested ownership, etc)?
9. What share of construction materials are sourced locally? (Indicator 8D)
10. Do microfinance institutions give loans for housing improvement in informal neighborhoods? What are the prevailing rates and tenure? (Indicator 9C, 9D)

Thank you for your participation!

D. Informal Infill Development

We would like to thank you for your participation in this survey on housing development. Your expertise in housing development «Survey_City» is essential to the success of an ongoing analysis of the city's land and housing markets, which will hopefully result in a set of positive reforms.

Please fill out the section on your personal information and professional background before proceeding. <<insert questions on respondent background here>>

Again, we are honored to be able to count on your expertise for this survey. Please do the following in completing the questionnaire:

- Review the assumptions of the case study before answering questions
- Please answer all questions
- Contact our team with any doubts or questions about the survey

Case Study Assumptions

Consider the incremental expansion of residential buildings in centrally located neighborhood (for example, in the location indicated in Map A). <<more details can be added based on local context, the typical type of informal infill expansion, gathered through the housing typology in section I>>

I. The Process: Steps, Time, Cost, and Reform

The following activities are typical of incremental expansion of informal housing. For each, please describe the process by listing the steps required. For each step, indicate how long it typically takes time to complete, what the costs involved are, who the relevant actors are (e.g. public agencies, private institutions), whether this is a roadblock to the housing development process (on a scale of 1-5), and your opinion on whether this step can be simplified (on a scale of 1-5).

1. Obtaining construction materials and building
   a. Possible prompts: where and how are materials typically acquired, who does the labor, how long is the process

2. Obtaining infrastructure *
   a. Possible prompts: who can lobby local government for infrastructure, how does this process function

3. Preserving property claims *
   a. Possible prompts: who has oversight of property claims, how frequent are negotiations, is regularization possible

II: Most consequential constraints

Please respond to the following questions, which ask you to reflect on the process outlined above:

1. Of the steps in housing development described above, which do you think are the three most significant limitations or challenges?
2. Of the three major challenges to housing development, which do you think would be the most easily reformed through government action? Why?
3. Are there other significant roadblocks or constraints to new subdivision type development not yet mentioned in this survey?

Part III: Other challenges and issues

Finally, we would like your perspective on land ownership, property rights, and land regularization in existing informal neighborhoods. The map below shows some locations that have been adding housing density.

1. What neighborhoods are most viable for the expansion of incremental / informal housing?
2. Why do some households expand their houses upwards and some not? Especially those reasons that are not economic?
3. What are the different levels of tenure security for housing developed informally in this area? (Indicator 4D)
4. How important is infrastructure for the expansion of housing density?
5. How important is the renting out of rooms as a motivation to expand an existing house?
6. How much are typical construction costs per square foot? (Indicator 8A)
7. What is the price of cheapest new unit? (Indicator 7D)
8. How much are typical infill land costs per square foot under different zoning regimes? (Indicator 4C)
9. How functional is the city's land and housing regularization system? What are the reasons it is not more successful (e.g. underfunded, no demand, contested ownership, etc)?
10. Do microfinance institutions give loans for housing improvement in informal neighborhoods? What are the prevailing rates and tenure? (Indicator 9C, 9D)

Thank you for your participation!

Sample Doing Business Survey Output: Obtaining a Construction Permit in Mexico

NO.	PROCEDURES	TIME TO COMPLETE	ASSOCIATED COSTS
1	**Request and obtain the alignment certificate (alineamiento) and official number (número official)** *Agency*: Delegational One Stop Shop (Ventanilla Única Delegacional), Urban Development and Housing Ministry (Secretaría de Desarrollo Urbano y VIvienda) and Mexico City Government (Gobierno de la Ciudad de México) For the official number, the Mexico City Government will assign a single official number for each property, at the request of the interested party, that has a front facing the public pathway. For the official alignment, the plot across the land indicates the restrictions or expropriation lines to be respected in the interaction between the property and the public pathway. Obtaining the single zoning certificate stating specific land use and feasibility is required. The following documents must be submitted: ■ Proof of payment of applicable real estate taxes (copy) ■ Public deed certifying property or title ownership (original and copy) ■ Payment of all fees ■ Application form (original) ■ Identification of the person completing the procedure and document certifying the respective identity (original and copy)	11 days	MXN 1,221
2	**Obtain a topographic map** *Agency* : Private licensed company A topographical study is conducted prior to construction to measure the levels on the specific terrain. It is a general technical requirement when building a structure of this class. Although a topographical test is not required by law, it is consistently conducted in practice.	11 days	MXN 17,500

NO.	PROCEDURES	TIME TO COMPLETE	ASSOCIATED COSTS

3	**Request and obtain single zoning certificate stating specific land use and feasibility**
	
	Agency : Subdirección de Ventanilla Única of the Secretaría de Desarrollo Urbano y Vivienda attached to the Dirección del Registro de los Planes y Programas de Desarrollo Urbano of the Dirección General de Desarrollo Urbano
	
	At this stage, BuildCo obtains the document that certifies whether a specific use of a given building is authorized.
	
	I. For the Single Land Use Zoning Certificate, the application must contain:
	
	    a) Official format of the Manual de Trámites y Servicios al Público del Distrito Federal;
	
	    b) Receipt of payment of rights according to the Tax Code of Distrito Federal;
	
	    c) Current official identification and copy;
	
	    d) Property Ballot, no earlier than 12 months after the application was submitted.
		6 days	MXN 1,466

4	**Request a water feasibility study** *Agency* : Sistema de Aguas de la Ciudad de México Upon reception of the zoning certificate, BuildCo must request a water feasibility study in order to continue the request of building permit.	1 day	no charge
5	**Receive inspection for a water feasibility study** *Agency* : Water Services Agency After requesting for a water feasibility study, there is an inspection to assess the feasibility of the water connection, sewage and rainwater drainage services will be installed in the construction.	1 day	no charge
6	**Obtain a water feasibility study** *Agency* : Water Services Agency Once the inspection has been conducted, a water feasibility study report is given to BuildCo, which will be used to continue processing the building permits.	10 days	no charge
7	**Obtain a certificate of debts for Water services** *Agency* : Water Services Agency Once the water feasibility process is on its way, Buildco. can also request a certificate of debts. This is another mandatory requirement to register a construction statement type B	0.5 days	MXN 159
8	**Request and obtain a certificate of good standing with the property tax** *Agency* : Tax Administrator Agency Obtaining a clearance providing evidence that there are no outstanding land taxes on the property is a required document to be submitted in order to obtain a building permit. The certificate of good standing of the seller on the property tax ("impuesto predial") is one of the documents to be provided by the interested parties under art. 27 of the Fiscal Code for Mexico City for 2018; the receipts of payments of the predial (boletas) are no longer required. The applicant has to submit the Cadaster Number (Cuenta Predial) in order to obtain the information of any outstanding debts of the property.	0.5 days	MXN 159

NO.	PROCEDURES	TIME TO COMPLETE	ASSOCIATED COSTS
9	**Register Construction Statement Type B** *Agency* : Ventanilla Única Delegacional Construction Statement Type B applies to nonresidential or mixed uses of up to 5,000 square meters or up to 10,000 square meters for residential use or for single-family dwelling units within a risk zone. The following documents must be submitted: ▪ Valid alignment certificate and official number (simple original copy or certified one) ▪ Single zoning certificate for specific land use and feasibility (simple original copy or certified copy for collation) ▪ Four copies of the architectural project for the construction work on duly outlined scale maps and containing all specifications regarding materials, finishes, and equipment to be used, signed by the owner, the director responsible for the construction work, and the co-responsible party for urban and architectural design and installations, as the case may be ▪ Project descriptive report ▪ Calculation report ▪ Registration and identification card of the director responsible for the construction work and the co-responsible party for structural safety, urban and architectural design, and installations as appropriate (simple original copy or certified copy for collation) ▪ Two copies of the structural design signed by the director responsible for the construction work and the co-responsible party for structural safety ▪ Proof of payment of improvement taxes for potable water and sewerage works provided by the Federal District Department and license issuance fees if the application is required (simple original copy or certified copy for collation). Because the building considered here requires installation or modification of the water main and hook-up to the sewage system, the application and proof of payment of the corresponding fees are attached. After registration of the construction statement, the one-stop shop (Ventanilla Única Delegacional) reviews the submitted data and documents and verifies the progress of the construction work under the terms stated in the Administrative Verification Rules (Reglamento de Verificación Administrativa) for the Federal District. The director responsible for the construction work undertakes to post a signboard showing the registration number in the construction work statement and the general construction work data, including the location and statement validity. The signboard must be posted in a visible place and legible from the public pathway. The validity of the statement (for construction work completion) is as follows: ▪ Up to 300 square meters: 1 year ▪ 300 – 1,000 square meters: 2 years ▪ More than 1,000 square meters: 3 years The cost for the water connection includes the installation of the main pipeline, board, and meter. The cost to connect to water and sewage services are included in this procedure since the proof of payment of such fees are needed to request connection to these utility services (procedure 10). The cost is established by the Financial Code of the Federal District.	1 day	MXN 891,071

NO.	PROCEDURES	TIME TO COMPLETE	ASSOCIATED COSTS
10	**Notify the Municipal Authority upon completion of construction work** *Agency* : Municipality The notification of completion is made in writing once the construction has been completed. Once notified, inspectors may visit the location within a week to verify the construction is in compliance with all applicable regulation.	1 day	no charge
11	**Receive inspection upon completion of construction work from Directorate of General Works** *Agency* : Directorate of General Works (Municipality) BuildCo. request the occupancy clearance once all the previous inspections have been passed in a satisfactory way.	1 day	no charge
12	**Request and obtain occupancy clearance** *Agency* : Delegational One-Stop Shop Building use clearance is granted by the one-stop shop, once the occupancy clearance is issued to BuildCo.	6 days	no charge
13	**Request and obtain authorization from civil protection** *Agency* : Secretaria de Protección Civil An inspection from the civil protection agency (Secretaria de Protección Civil) will be conducted upon request by BuildCo. Once the form and the emergency plan are filed, the civil protection agency will issue a certificate.	7 days	no charge
14	**Request and connect to water and sewage services** *Agency* : Sistema de Aguas de la Ciudad de México Once BuildCo. receives the authorization by the Civil Protection Department, it can request and obtain the water and sewage services.	30 days	no charge
15	**Update the building record at the Tax Ministry** *Agency* : Ministry of Finance of Mexico City (Secretaría de Finanzas de la Ciudad de México) Finally, BuildCo is apt to register the new warehouse. The time and cost of updating the building record are established by the Financial Code of the Federal District, Article 217. The building is not actually registered with the Property Registry. Once built, a cadastral actualization document (manifestacion de actualisacion del valor cadastral) is filed for tax purposes with the Tax Ministry. The information in the new deed is updated only when the property (with the building included) is sold. In Mexico, the owner of the land is automatically the owner of the building unless otherwise specified. Only in cases where the owner of the building and the owner of the property are two different people would the building be registered.	1 day	no charge