Tools for a Land and Housing Market Diagnosis

Land and Real Estate Markets Module
Technical Note for Urban and City Management Core Course

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Introduction to the Module

The land and real estate markets module will cover 1) tools for a land and housing market diagnosis by Ayse Pamuk; 2) land regulations by Alain Bertaud, Charles Hales, and Omar Razzaz; 3) cadastre and registration by Frederic de Dinechin, and 4) property taxation by Enid Slack.

TOOLS FOR A LAND AND HOUSING MARKET DIAGNOSIS

This technical note provides 1) an introduction to the urban land and housing crisis; 2) basic urban land and housing economics; 3) land and housing market information sources; 4) land price surveys; 5) household survey design methods; 6) analysis and dissemination of land and housing market information, 7) estimation of costs; and 8) select bibliography.

1. Introduction to the Urban Land and Housing Crisis

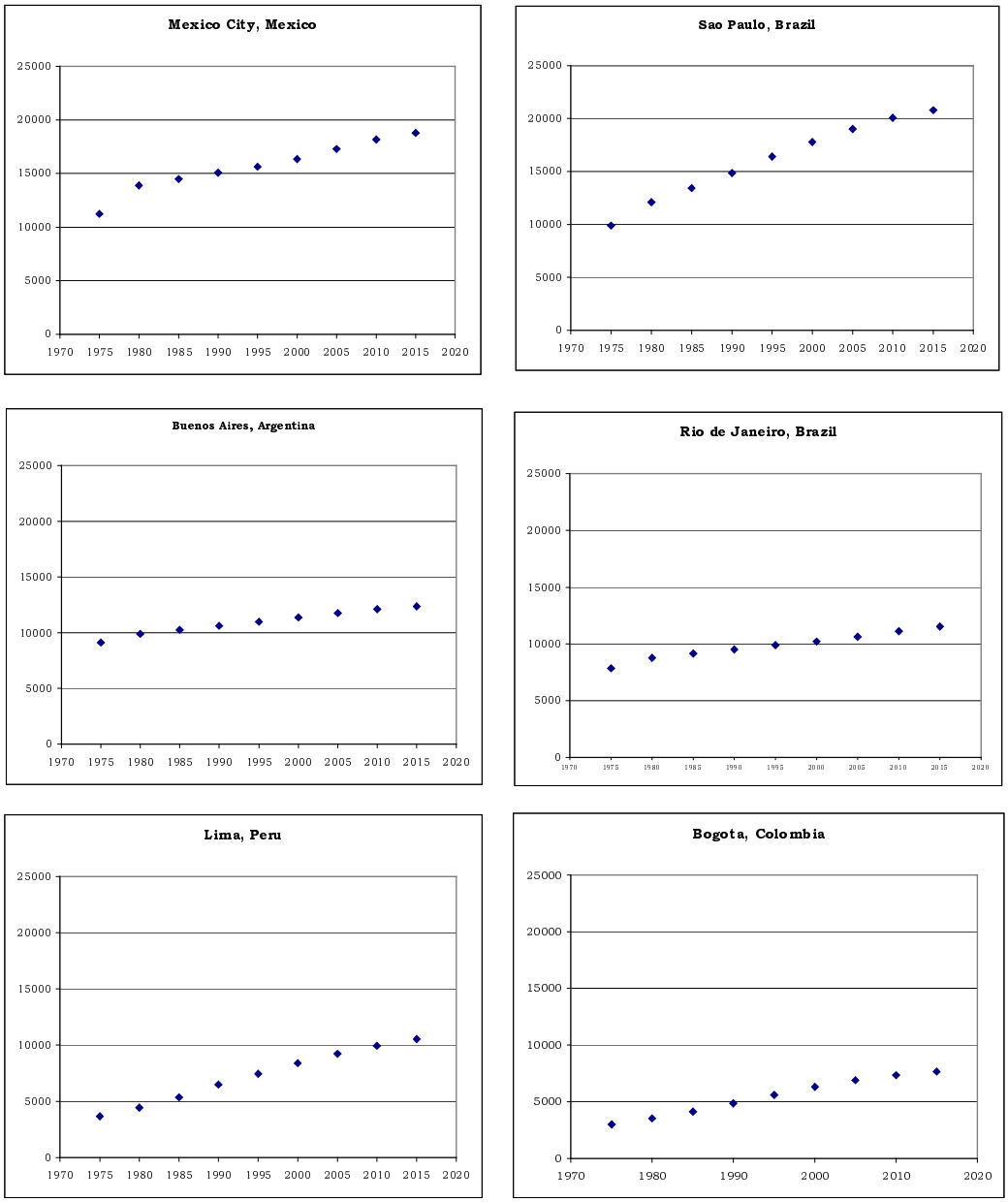
Cities in the developing world are currently growing by 62 million inhabitants per year, requiring some 16 million new dwelling units to be added to their housing stock. As a result, planners in rapidly urbanizing major cities in developing countries are faced with the challenge of making their land and housing markets work efficiently and equitably for all households while striving to finance these efforts with largely locally generated funds.

Latin American cities, for example, have been growing rapidly in the past three decades (figure 1). While growth is expected to slow down in the next two decades, the absolute number of people added to large cities will still be significant. Sao Paulo, for example, is expected to grow at an annual rate of 1.48 percent between 1995 and 2005. While this is lower than its annual growth rate of 2.01 percent between 1985 and 1995, in absolute terms the city will gain nearly 2.6 million new people in 15 years, reaching a population level of nearly 21 million in 2015 (UNCHS 1996: 455-6). This growth will require nearly one million housing units (assuming a household size of 2.6) and nearly 6,000 hectares of land (assuming new development at densities of 443 people/ha).

Faced with such large numbers of people being added to their cities, city managers should be equipped with the know-how and skills to plan for urban growth. Poor urban planning for new growth and redevelopment more often than not results in massive settlements built at substandard quality and without government approvals. This not only means lost planning

control for city managers, but also foregone municipal revenues and expensive upgrading of settlements built at substandard conditions.

Figure 1: Population Growth Trends in Selected Latin American Cities (1970-2015)
(population in thousands)



Source: UNCHS, An Urbanizing World: Global Report on Human Settlements, 1996, p.455-6.

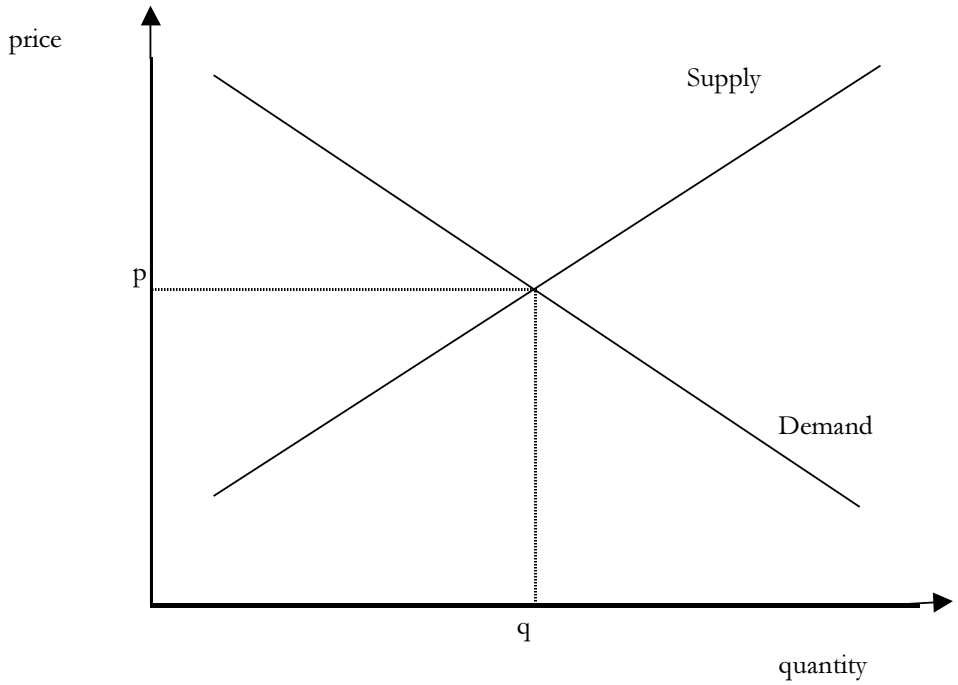
Sound information on land and housing market operations should result in informed decision making by public sector agencies, households, and private sector homebuilders. Lack of knowledge about demand for housing units and housing services, and ambiguities in land ownership, often result in poor business decisions made by the private sector and poor spatial reorganization decisions carried out by urban planners.

Land and housing markets are far from being perfectly competitive and far from being in equilibrium in developing countries, but basic microeconomic theory provides a useful benchmark for understanding what land and housing markets would look like if they were so. The following sections will first introduce this stylized description of land and housing market operations and then discuss how city managers and urban planners can identify deviations from this model.

2. Basic Urban Land and Housing Economics

Basic microeconomic theory holds that most economic relationships between consumers and producers in markets are governed by demand and supply fundamentals. Prices are determined under conditions of perfect competition and perfect information, and in the absence of barriers for market participation. Households seek to maximize their well-being (utility) subject to their budget constraints, and producers seek to maximize their profits by combining inputs (land, labor, capital) with available technology. These conditions enable consumers and producers (market actors) to interact in markets that are in equilibrium and where prices are determined competitively (figure 2).

Figure 2: Demand and Supply in Markets



While the pricing of many products in the market (e.g., automobiles) does fit this model, land and housing prices cannot be assumed to be determined by perfectly competitive market conditions, especially in developing countries. This is due to the following peculiar features of land and housing: 1) land and housing is fixed in space; 2) housing is expensive to build or

acquire; 3) both have long lifetimes (housing usually lasts for 50-75 years); and 4) accessing land and housing requires households and suppliers to incur significant transaction costs (e.g., costs to identify available properties for sale or rent, costs to negotiate sale or rental contracts, costs for land titling, costs for transfer of ownership). Under these conditions, land and housing prices are far from being determined under conditions where demand and supply are equal.

The peculiar characteristics of land and housing, especially locational fixity, are at the heart of the earliest theories of land rent. The notion of location with respect to place of employment has been the focus of access-space models since the 1820s (Von Thunen 1826; Ricardo 1817) and still serves as a good starting point for our discussion on land and housing prices.

2.1. Locational land rent

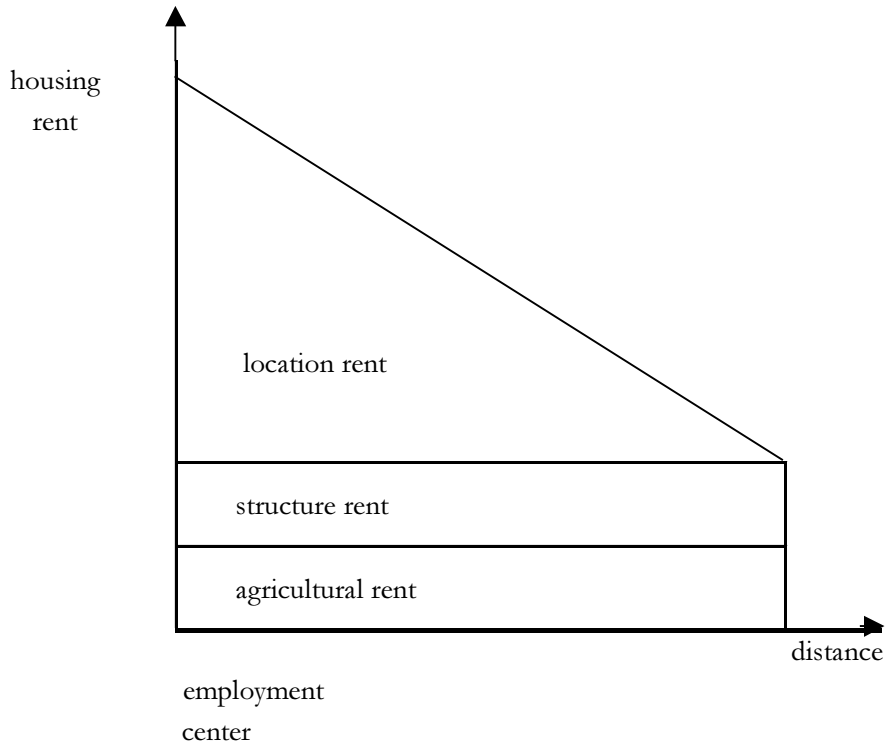
Locational or Ricardian rent, named after David Ricardo, who developed an access-space model in 1817, is the price of land that its occupants are willing to pay for its unique locational advantages. Citywide, the demand for such locational advantages determines the *relative* value of land and housing at different locations. The supply of land and housing, on the other hand, determines the overall *level* of prices in the city. Understanding demand and supply fundamentals for land and housing markets is therefore critical for discovering the spatial pattern of land and housing prices.

To demonstrate the importance of location to land prices, let's consider a stylized city, one that is monocentric (Alonso 1964; Mills 1972; Muth 1969) and where

1) households commute to their jobs from their place of residence along a direct line;
2) households are identical, and the number of commuters per household is fixed;
3) households spend their income on commuting, on all other goods, and on housing;
4) housing quality is uniform at all locations citywide;
5) housing is provided by combining a fixed amount of land per unit of housing and a fixed amount of housing capital (materials and labor); and
6) housing is occupied by households who offer the highest rent (highest bid), and land is allocated to that use yielding the greatest rent.

In this city, under these assumptions, commuting to a single employment center will give rise to locational or Ricardian rent, which is what the tenant would be willing to pay annually to occupy a site. As one moves away from the center, rent will decline because commuting costs will increase. This relationship is depicted by the house price gradient (figure 3).

Figure 3: Components of Housing Rent



Source: DiPasquale and Wheaton (1996), p.39.

Urban land rent is the residual that is left after subtracting the rent for the housing structure (annualized cost of constructing a unit) from the total housing rent. The rent for a housing unit at the edge of the city will be the sum of the land rent and the structure rent. The least expensive rent at the city's edge will be determined by the cost of constructing that new unit. Since beyond the city's edge lies agricultural land that can be converted into urban use, the three components of housing rent in our stylized city will be: 1) the rent necessary to convert a lot from farm land into urban land; 2) structure rent; and 3) location rent resulting from saved commuting costs (figure 3). Housing rents at any location in the city will be equal to replacement costs plus the difference between commuting costs at the urban edge and those at the location in question.

Since urban land rent is the residual (total housing rent minus structure rent), when the city grows, land absorbs all of the anticipated increase in location rent. The possibilities for physical expansion on developable land will vary among cities. And, any changes in a city's spatial pattern will depend on the city's population growth rate, its housing density, and its topography. The Ricardian model emphasizes the effects of population growth on land rents; thus two identical cities with different population growth rates will yield different land and housing prices.

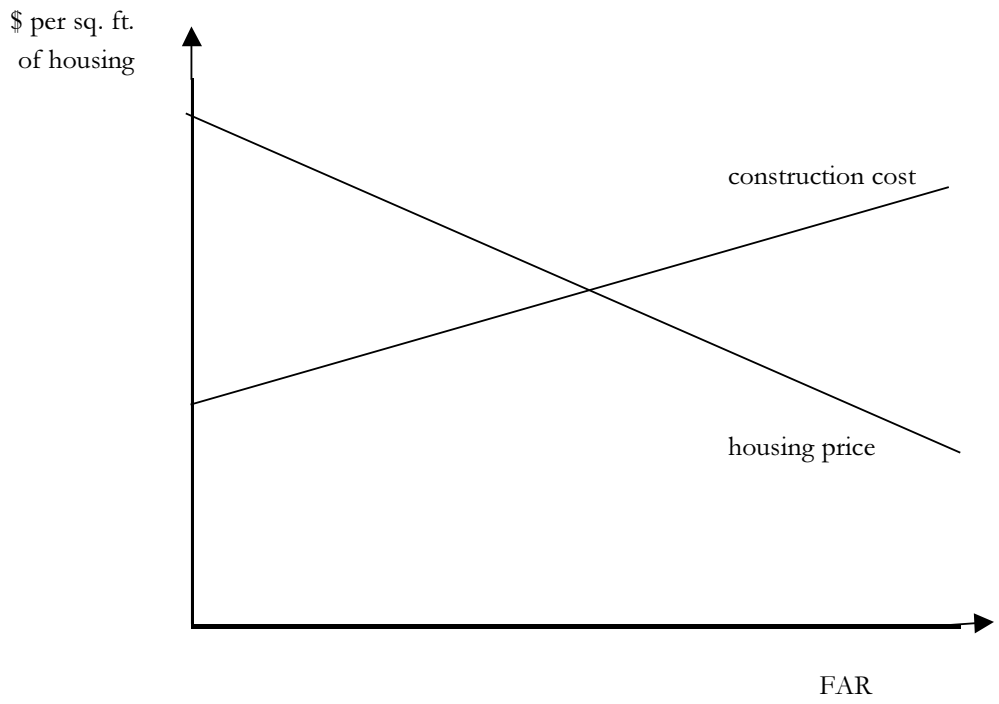
In summary, under basic microeconomic model assumptions, demand for land is derived (as a residual) from the demand for the services produced on the land (e.g., agriculture, housing). Thus, demand for residential land is derived from the demand for housing (see discussion on demand for housing below). Demand for land is also affected by the number of people wanting to hold land as an investment, especially as a hedge against inflation.

Supply of land is determined by topography and possible housing density. Supply of land is also determined by land use regulations (discussed in Session 2) that specify the density and type of use and the level of infrastructure (e.g., roads, municipal water, and sewerage treatment trunk lines).

2.2. Substitution of structure for land

Unlike our stylized city with its uniform residential density, real estate gets developed at different densities in metropolitan areas. The variation in density is due to the possibility of factor substitution: a substitution that takes place between land and structure. At more central locations, where land is more expensive, residential density is greater. Residential density declines with distance from the central city. This relationship is depicted by the density gradient. A common measure of density is FAR (floor area ratio). FAR is expressed as a ratio of building square footage of land. An FAR of 3:1, for example, means that for every square foot of land, the landowner may build three square feet building. Because of setback and lot coverage requirements, the landowner might have to build a taller building to obtain the square footage. Holding housing-unit quality and location constant, consumers usually prefer to pay less for a unit in a denser development. Cost of construction will also vary with the FAR; higher density buildings are more expensive to construct. Thus, developers' profit will depend on the construction costs at the FAR permitted. Figure 4 depicts this relationship.

Figure 4: Relationship between FAR and Cost of Housing



Source: DiPasquale and Wheaton, 1996; p.75.

2.3. Land prices

Land prices are closely linked to demand and supply conditions in land and housing markets. When high population growth exceeds the capacity of land developers to provide land for housing, land prices rise. If land use regulations limit land supply expansion, price increases should be expected. Table 1 shows the relationship between land prices and regulations under different demand conditions.

The absence of strong demand pressures may translate into low land prices in some cases, but regulatory constraints in these contexts should be carefully evaluated. In Trinidad and Tobago, for example, the demand for housing has been weak in the 1980s because of weak macroeconomic conditions, but cumbersome land transfer processes and highly uncertain building permit approval processes are likely to result in land price increases once demand conditions improve (Pamuk and Dowall, 1998).

In most countries local governments regulate land use through zoning and subdivision regulations, and they guide land development through infrastructure provision. Urban land use regulations also affect land prices. Restrictive land use regulations (e.g., growth controls) may result in higher land prices, especially if there are no possibilities of population spillover to neighboring jurisdictions or possibilities for infill development at the city's core. Disparity in

infrastructure and service extension among neighborhoods may also create price differentials among serviced and unserviced land.

Table 1: Demand conditions, regulatory constraints, and land prices

		Demand conditions	
		if weakened	if strengthened
Regulatory constraints	high	stable land prices (e.g., Port-of-Spain)	"skyrocketing" land prices (e.g., Rio de Janeiro, Istanbul)
	low	low growth in land prices	medium growth in land prices (e.g., Bangkok, Jakarta)

Source: Pamuk and Dowall (1998), p.287.

Local governments are major providers of city services to their residents, and they fund these services through the taxation of real estate assets (discussed in Session 4). Service delivery variation among localities in a metropolitan area results in a housing price gradient different from the one that is based simply on commuting distance as discussed above. Poor service delivery in U.S. inner cities, for example, coupled with the flight of wealthier households to the suburbs has produced pockets of centrally located areas with depressed land prices. When better services can be found at greater distances from the city center, the effect of commuting on land prices diminishes.

Population growth can increase land, and therefore housing, prices significantly, because land absorbs increases in location rent as discussed earlier. Since households value proximity to employment, higher land prices near the city center should be expected. The possibility of substitution of structure for land will result in higher residential densities at the city's core.

2.4. Housing prices

So far, we considered housing rents to exactly compensate for commuting costs associated with different locational advantages, assuming structure costs to be uniform citywide. Let's now allow housing rents or prices to compensate for all housing attributes, such as size, number of bathrooms, and construction quality, as well as the locational advantages associated with the site. Thus, potential buyers can make implicit valuation of all the attributes of the house.

The implicit valuation by buyers and explicit prices they assign for each house attribute (e.g., lot size, number of rooms, view) are not directly observed in housing markets but can be estimated by *hedonic price models*. A hedonic price equation considers the market price paid for a house to be a function of all observable characteristics of that house. Data on housing prices can be obtained by tracking sale transactions (e.g., multiple listing services of real estate agents) or by asking residents directly to estimate the current market value of their house (see household survey discussion below).

Housing stock adjustment takes time; therefore, short-term shifts in demand or supply may result in price changes. Responsiveness of homebuilders to changes in housing demand (e.g., population growth) is determined by land use regulations. By reducing the supply of land, land use regulations can cause house prices to rise.

2.5. Demand for housing units and services

In housing market studies, two different measures of housing are used: 1) housing units (stock and flow), and 2) housing services. The market for housing units is simply the demand for and supply of dwelling units and can be relatively easy to measure. The market for housing services considers quality of housing units. One unit of housing service is the quantity of service yielded by one unit of housing stock per unit of time. The price per unit of housing service is rent (what consumers pay for the flow of services from one standard house per unit of time). Housing services therefore takes into account size of the unit, structural quality of the unit, and locational amenities such as the quality of public schools, local taxes, and access to open space.

Demand for housing units is determined by 1) economic factors such as household income, economic base of a local area, savings, and interest rates; and 2) demographic factors such as rate and level of household formation.

Household income is a strong predictor for housing consumption. Housing demand studies in developing countries show that housing demand is inelastic with respect to income. For renters, income elasticity of demand ranges from 0.3 to 0.6. For owners, it ranges from 0.4 to 0.8 (Malpezzi and Mayo, 1985). An income elasticity of demand for housing of 0.8 means that a 10-percent increase in income will result in an 8-percent increase in housing consumption.

Housing demand is also affected by housing prices. Price elasticities of demand for developing country cities analyzed by Malpezzi and Mayo (1985) range from -0.8 to -0.1 (Malpezzi and Mayo 1985). When housing prices are high, effective demand for housing decreases. Priced out of the formal housing market, many lower income households in the developing world undertake informal home-building activities.

Demand for the type and quality of housing (rather than simply quantity) is harder to forecast. It is determined by life cycle and demographic characteristics of households, which in turn influence their tastes and preferences. Housing consumption, for example, increases with age as well as with income. Increases in household size, on the other hand, do not seem to increase housing consumption.

2.6. Supply of housing

Housing is supplied by the private (for-profit and not-for-profit) and public sectors. The percentage of housing built by each varies from country to country. Except in centrally planned economies, most new housing (flow) is supplied by the private sector (with or without plan approvals).

In Trinidad and Tobago, for example, during 1989, 1422 building plans (or 1399 units) were approved by the Town and Country Planning Division, out of an estimated 6,360 units built during that year. Seventy-eight percent of the new housing units in 1989 were thus constructed without a permit. Housing built without government approvals is significant in the developing world. The UNCHS/World Bank Housing Indicators Data, for example, shows that unauthorized housing as a percent of total housing stock ranged from 8 to 54 percent in 1990 in the Latin American cities included in the study. The percentage of permanent dwellings of the total housing stock, on the other hand, ranged from 70 to 99 percent for the same cities, suggesting that many of these households have made significant investments in their housing despite lacking building permits. Water connection figures are also higher than what one might expect based on permit figures (table 2).

Table 2: Housing Indicators for selected Latin American cities (1990)

	Unauthorized housing	Permamnent dwelling units	Water connection
Quito, Ecuador	54%	70%	76%
Bogota, Colombia	8%	97%	99%
Kingston, Jamaica	50%	80%	87%
Santiago, Chile	20%	85%	99%
Monterrey, Mexico	16%	93%	91%
Caracas, Venezuela	54%	90%	70%
Rio de Janeiro, Brazil	27%	99%	97%

Source: UNCHS/World Bank Housing Indicators Database (1993)

One can hardly discover housing supply dynamics in developing countries by examining building permit (flow) statistics alone because unauthorized housing is, by definition, not recognized by building permit statistics. Unauthorized developments can be estimated and monitored by examining aerial photographs (Bertaud, 1989). In-person interviews with home-builders and households (see household survey discussion below) can provide further detailed information about a range of building activities carried out by different actors.

In Trinidad and Tobago, for example, interviews with developers, brokers, and appraisers in 1993 revealed that in 1993, only three developers were involved in the overall development process of buying, subdividing and servicing the land, and constructing houses for sale. And, in the previous 10-year period, the production volume of these developers averaged 350 units per year. With so few developers, the home-building sector has organized around numerous small-scale contractors, most of whom operate through small home-based offices and rely upon crews of seven to eight workers for small-scale construction projects. The household survey in 1993 found that most households build their houses incrementally over time themselves or with the help of these small contractors.

The developer interviews furthermore revealed, in Trinidad and Tobago, a perception of "skyrocketing" land prices between the mid-1970s and the mid-1980s and stabilization afterwards. The building community thus accurately recognized that land markets are not immune to the contraction caused by the economic recession in the 1980s nationwide and scaled down their activities significantly with expectations of weak housing demand in the late 1980s and early 1990s. Such perceptions and their likely impact on land and housing markets can only be discovered by personal interviews with developers and household surveys.

In summary, detailed case studies show that standard price theory currently does not account for several major factors that affect land and housing prices: 1) transaction costs (including information costs about property titles, information on structural and neighborhood characteristics of units, and negotiation costs in transactions); 2) land use and building regulations; and 3) ownership structure. The importance of these factors is evident in developing countries where consumers and suppliers undertake transactions without adequate information about market fundamentals, where outdated land use and building regulations are ignored by most households in home-building, and where a range of claims to land has evolved over time that makes ownership clarification a complex endeavor.

Recent extensions to microeconomic theory, recognizing transaction costs in land and housing markets, show that market actors frequently develop a range of arrangements that help them reduce transaction costs (Pamuk 1997). The emergence, persistence, and change of institutions that respond to these transaction costs require an in-depth understanding of the behavior of market actors.

3. Land and Housing Market Information Sources

Up-to-date and accurate land and housing market information is central for informed public and private sector decision making. For public sector planners, it is the foundation for evaluating alternative development scenarios. For private sector developers, it enables rational decision making in the real estate sector. Reliable and easy-to-use land and housing market information helps consumers make informed decisions about their transactions as well. Data collection, analysis, and reporting are expensive activities but are necessary for the implementation of government programs. Much of this information, however, is gathered, analyzed, and reported by public agencies in a disjointed fashion. Figure 5 shows a range of information sources for land and housing market studies. A good urban planner should be able to piece together data from various sources and present it to public and private sector actors in land and housing markets.

Figure 5: Key Land and Housing Market Information Sources

	Census Data Analysis	Land Price Survey	Household Survey	Developer Interviews	Analysis of Aerial Photos
Housing Demand					
household income	x		x		
household demographics	x		x		
household opinions/preferences			x		
Housing Supply					
housing stock (quantity)	x				
new construction & rehab				x	
housing quality	x		x		
Land Conversion					
from agricultural to urban use		x			x
informal housing settlements		x			x
Tenure/Ownership					
Land		x	x		
Housing	x		x		
Land Values/Prices		x		x	
Housing Values/Prices	x		x	x	
Land Use					x

3.1. Secondary data sources

National census information on population and housing is usually an excellent secondary data source for urban planners and real estate investors, but unfortunately the quality of reporting varies from country to country. One of the most extensive reportings of decennial census information is in the United States. The Census Bureau publishes numerous useful tables at the census-tract level based on a 100-percent count and sample datasets (STF1A and STF3A, respectively), providing a very powerful analytical tool for urban planners (www.census.gov). Simple calculations can be undertaken using these published tables such as calculating simple percentage changes over time; comparing ratios over time; and computing percentiles, quintiles, and deciles from published grouped data.

National census publications based on the decennial census are especially useful for describing population and housing trends in small areas (at the census-tract or enumeration-district level), but are less useful in depicting housing conditions in rapidly changing cities since decennial census information may quickly become outdated. For up-to-date and far more detailed information, specialized surveys must be undertaken.

With census information on population and housing, if available, simple indicators can be constructed to track the performance of land and housing markets over time.

The Housing Indicators Program of the World Bank (1992) identified nearly forty simple indicators to gauge the performance of the housing market. Summary statistics for these indicators for selected Latin American and Caribbean cities are shown in table 3. Select indicator definitions are provided in table 4. Such indicators are especially useful for cross-national comparisons in the region and cross-city comparisons in each nation.

Table 3: Housing Indicators for selected Latin American cities (1990)

	GNP pc 1990	New household formation	House price to income ratio	Land development multiplier
Quito, Ecuador	$1,020	6%	2.38	4.00
Bogota, Colombia	$1,200	3%	n/a	2.87
Kingston, Jamaica	$1,260	1%	4.94	1.30
Santiago, Chile	$1,770	3%	2.09	2.80
Monterrey, Mexico	$2,010	4%	3.74	6.00
Caracas, Venezuela	$2,450	2%	1.99	n/a
Rio de Janeiro, Brazil	$2,540	2%	4.36	10.40

Source: UNCHS/World Bank Housing Indicators Database (1993)

Affordability, for example, is defined as the ratio of median house price to median income. A high value for this indicator (greater than three) indicates that housing is too expensive for a majority of households. Land development multiplier is another useful indicator that measures the premium for providing infrastructure and converting raw land to residential use on the urban fringe. It is defined as the ratio of the median land price of a developed plot at the urban fringe in a typical subdivision and the median price of raw, undeveloped land in an area currently being developed. A high value for this indicator would indicate the presence of land supply restrictions (high regulatory constraints).

Table 4: Select Land and Housing Indicators (UNCHS and the World Bank, 1992)

1) **House price to income ratio:** ratio of the median price of a dwelling unit and the median annual household income
2) **New household formation:** annual percentage increase in the number of new households
3) **Permanent dwelling units:** percentage of dwelling units which are likely to last twenty years or more given normal maintenance and repair, taking into account locational and environmental hazards (e.g., floods, typhoons, mudslides, earthquakes).
4) **Water connection:** percentage of dwelling units with a water connection in the plot they occupy.
5) **Unauthorized housing:** percentage of the total housing stock in the urban area which is not in compliance with current regulations
6) **Persons per room:** ratio between the median number of persons in a dwelling unit and the median number of rooms in a dwelling unit.
7) **Housing production:** net number of units produced (units produced minus units demolished) in both the formal and informal sectors last year per 1000 population
8) **Land development multiplier:** ratio between the median land price of a developed plot at the urban fringe in a typical subdivision and the median price of raw, undeveloped land in an area currently being developed.
9) **Industrial concentration:** percentage of new formal-sector housing units placed on the market by the five largest developers (either private or public) last year
10) **Property tax receipts:** percentage of property tax receipts in the local government budget

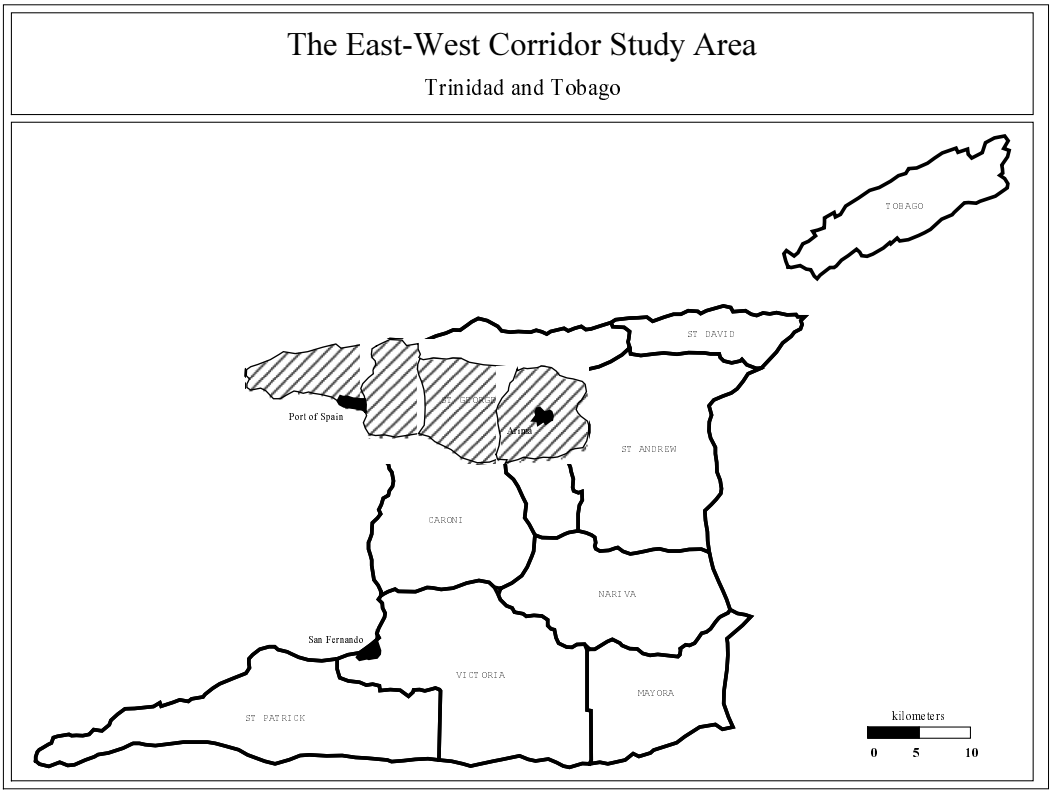
3.2. Primary data sources

When secondary data sources are inadequate to answer questions at hand, primary data should be collected. First-hand information on land and housing markets in developing countries can be gathered by land price surveys (Dowall 1995), household surveys (discussed below), aerial photography interpretation, and interviews with developers. Fine-tuned land and housing markets research also requires data that can be aggregated at different geographic levels (e.g., neighborhoods, planning areas, real estate market zones) depending on specific analysis needs. Far better analytical power can be achieved by using disaggregated data and aggregating it for analysis at larger geographic levels to provide context.

4. Land Price Surveys

For a complete discussion of the land price survey methodology see Dowall (1995). Using this methodology, we designed and implemented a land price survey in the East West Corridor of Trinidad in 1993 (figure 6), and examined land price changes and land conversion patterns between 1989 and 1993 (Pamuk and Dowall 1998). We found that real (inflation-adjusted) land prices have generally remained stable and have even declined between 1989 and 1993 (figure 7). Stable (rather than skyrocketing) land prices during this period, however, appear to be more of a reflection of weak economic conditions, and should be considered temporary due to the presence of cumbersome land transfer processes and an uncertain building permit approval process.

Figure 6

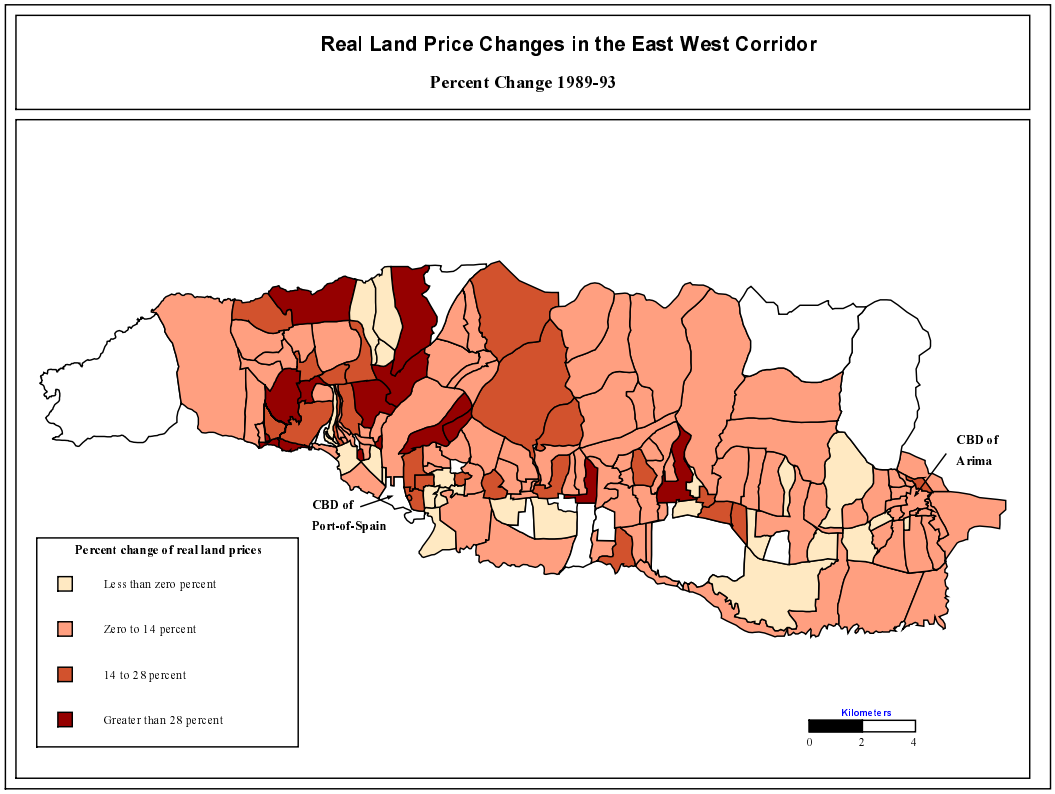


5. Household Survey Design Methods

Undertaking any meaningful analysis of residential development processes, predicting future trends, and simulating alternative development scenarios first requires a sound database, which can best be gathered by implementing surveys. In Trinidad and Tobago, for example, the purpose of the household survey was to gather information on household characteristics, housing conditions, access to land, housing construction and investment, housing finance, community participation, and rental housing. The information gathered through the questionnaire was important to understanding housing consumption patterns and the different "paths to housing" used by households.

Apart from the decennial population and housing census and limited scope surveys, no comprehensive housing surveys had been conducted in Trinidad and Tobago's history, making the 1993 effort to collect this baseline data even more valuable. With an objective to depict housing conditions and production processes nationwide, the questionnaire was divided into three main parts: 1) household composition; 2) housing quality; and 3) acquisition and finance of housing by owners and renters. In addition, it contained sections on market intermediaries, sources of information on locating housing, neighborhood characteristics and accessibility, opinions about the house and the neighborhood, and institutional and community support.

Figure 7



5.1. Defining the sample size

One of the basic decisions in developing survey plans is to determine the appropriate size of the sample. The main objective is to have a large enough sample to allow reaching reliable conclusions using survey results, and at the same time to have a sample as small as possible to economize on survey implementation costs. One can refer to a table of sampling errors (table 5) to determine sample sizes appropriate for computing sample statistics such as percentages. The analyst needs to decide the level of error that can reasonably be tolerated given project budget constraints (see estimation of survey costs below). Then, a sample size from standard tables of sampling errors can easily be adopted.

There is also a common rule-of-thumb approach frequently used in cross-section surveys, which is called the crucial subgroup method. This approach requires that the analyst decide on the minimum number of valid responses required for reasonably accurate statistics for a crucial subgroup (e.g., renters, owners, households below the poverty line).

Table 5: Sampling Error in Percent, by Size of Sample

reported percentage	sample size 2,000	1,000	700	500	300	100
50	3	4	5	6	8	14
30 or 70	3	4	5	6	7	13
20 or 80	2	4	4	5	6	11
10 or 90	2	3	3	4	5	8
5 or 95	1	2	2	3	4	

Source: Kish (1965), p.576.

5.2. The sampling frame

Obtaining a good sampling frame, and adopting methods to remedy any deficiencies present in it, are critical components of good survey design. A desired sampling frame is one containing an actual list of elements to be sampled (e.g., households) where each element appears at least once and not more than once. Another desirable quality of the sampling frame is easy identification of each element along a series of variables important in the study (e.g., land tenure status of households).

Many countries undertake annual or quarterly small sample surveys that gather information on income and employment because decennial census data quickly becomes outdated and becomes less useful for the implementation of government programs where current income data is needed. The Current Population Survey (CPS) in the United States is a good example. It is a monthly survey of about 50,000 households conducted by the Bureau of the Census for the Bureau of Labor Statistics. It is the primary source of data for labor force characteristics of the U.S. population (www.census.gov).

In the case of Trinidad and Tobago, the Continuous Sample Survey of Population (CSSP) Unit of the Central Statistical Office (CSO) undertakes quarterly surveys that focus on labor force characteristics. CSSP had been managing the implementation of a multipurpose household survey since 1963; therefore it had an up-to-date and reliable sampling frame and fairly detailed maps to locate households in the field. The list of households routinely updated by the CSSP served as our sampling frame.

5.3. Sampling strategy

Once the sampling frame is identified, the analyst needs to select a strategy for drawing the sample. Two major strategies in sampling are probability and nonprobability sampling. Probability sampling approaches enable the use of probability theory to make inferences from sample data to the universe and therefore are much more powerful. Among probability samples,

there are a variety of approaches that can be adopted such as clustering, multistage sampling, stratification, and controlled selection (Kish 1965; Lansing and Morgan 1971; Fowler 1993).

In the case of Trinidad and Tobago, we used a stratified multistage sample selection procedure. For our own sample stratification purposes, we decided to define six new geographic regions, called domains (stratas). These domains emerged following our extensive discussions with urban planners, census bureau officials, and human settlement consultants. The sample was drawn from these six domains. The geographic categorization of Trinidad and Tobago into these domains was more than a technique used in sampling for the survey, but had analytical importance in our land and housing market study. The six geographic regions were each relatively homogeneous but differed from each other in terms of ethnic and socio economic characteristics of the population, economic base, and historical background. The six domains were: 1) East-West Corridor (Capital region); 2) Western Caroni (sugar region); 3) San Fernando (oil region); 4) secondary towns; 5) rural Trinidad; and 6) Tobago. We expected to observe distinct settlement patterns in each of these regions to enable a rich comparative analysis of land tenure and housing conditions in the country.

The use of our own domains meant deviating slightly from CSSP's standard sample selection method since CSSP was using nine domains that corresponded to administrative divisions in the country. However, our multistage sample selection procedures were similar. The primary sample unit used was the enumeration district (Ed), the smallest geographic unit into which the country is divided for the purposes of the national decennial census. CSO had defined Eds to fit within specific natural boundaries and to comprise about 100 to 200 households in urban and built-up areas and approximately 100 households in rural areas. All Eds were systematically broken down into wards and counties. The Eds that fell into our six domains were identified with the assistance of urban planners in the Town and Country Planning Department. The primary unit sampled was the enumeration district (stage one), but the ultimate sampling unit was a cluster of five to six households (stage two). This approach was consistent with the units of analyses (i.e., households and dwelling units) that we had defined in the study for analytical purposes. We obtained a computerized list of all Eds (approximately 2,000) from CSO and clusters in each Ed and organized them by our domains. The sampling interval used was 1/200 or 0.5 percent.

For stratification purposes, CSSP was using labor force characteristics in each region to draw samples. In that method, all Eds were first ranked by the percent of total workers in different employment and occupation categories. Nine sub-samples, corresponding to nine regions, were drawn randomly using random numbers: the first selected Ed was taken as the first sampling unit in the first sub-sample, the second selected Ed as the first sampling unit in the second sub-sample, and so on. Each CSSP sub-sample consisted of approximately 800 households.

For our purposes, using a housing-related variable for stratification would have been better than using variables that characterize the labor force as in the CSSP method. Using population growth rates in Eds (1980-90) for further stratification was also considered. Unfortunately, the CSO sampling procedure and the needed data were not fully computerized; therefore, in the end the Eds in each of our six domains were ranked by the number of households each comprised.

We first selected Eds randomly in each domain and then randomly selected clusters in each of these Eds. The next step involved the random selection of individual households to be interviewed. As in many developing countries, the list of households was not computerized, therefore the sample selection process had to be performed manually by the CSO staff. Using their standard manual system of drawing samples from selected Eds with random numbers enabled the sample selection process to be accomplished within a week. Our comparisons to several census variables indicated that we had a nationally representative (unbiased) sample. Thus, sample statistics could be used in making statistical inferences about the nation's land and housing conditions as a whole. The total number of households in the sample (1,524) comprised 0.5 percent of all households in Trinidad and Tobago.

5.4. Strategies to minimize nonsampling error

Standard statistical techniques can be used to calculate sampling error. The importance of sampling error is that it introduces uncertainty about the true value derived from sample data. This uncertainty involves a range that can be calculated, resulting in a confidence interval around the estimate. While sampling error can only be reduced by increasing the sample size, nonsampling errors can be minimized by good questionnaire design, high quality interviewing, and obtaining a high response rate. Researchers can significantly improve the quality of their survey data for same sample sizes by paying attention to these aspects. We achieved a response rate of 89 percent of occupied units.

5.5. Manual for training and fieldwork

A fieldwork manual is a useful and efficient way of summarizing all information necessary to guide interviewers and their supervisors in the field. It is best to use this manual during training in order to familiarize interviewers with its contents for easy reference in the field. The household survey manual should include the following sections:

1. purpose of the survey
2. sequence of events (sampling, focus group meetings, identifying fieldwork supervisors, selection of interviewers, pretest of the questionnaire, training schedule, editing, coding, data processing, administrative and managerial aspects)
3. fieldwork (field material, personal deportment, who to interview, procedures to secure the interview, the conduct of the interview, method of asking questions, important pointers, recording the responses, writing codes or using ticks, placing numbers and codes in boxes, accuracy, correcting mistakes on the questionnaire, ethics and conduct of interviewers and supervisors)
4. outline of the questionnaire
5. review of questions
6. concepts and definitions

5.6. Designing the questionnaire

Special attention needs to be given to framing the questions in order to obtain accurate information from respondents. Some questions are better asked as close-ended questions (e.g.,

land tenure), and others can best be asked as open-ended questions. When choice categories are well-known and discrete, close-ended questions should be preferred since this coding is much simpler. Open-ended questions require responses to be categorized afterwards and require analytical staff time. Common wording problems such as using words that are too vague, too precise, or biased should be avoided (Dillman 1978; Fowler 1993).

While there is a standard group of questions that should be applied in different contexts to enable future comparative analyses, questions formulated based on knowledge from other contexts must be modified. A powerful technique to ensure this is to hold focus group meetings with residents in different communities. In the case of Trinidad and Tobago, three sets of focus group meetings were held: 1) in an upper middle-income planned residential neighborhood; 2) in a squatter settlement on state lands; and 3) in an unauthorized settlement on privately owned lands. In these meetings we sought to clarify the meanings of key survey concepts such as household, dwelling unit, and tenure status on land. The appropriateness of these concepts was further examined during the pretest of the questionnaire.

5.7. Formatting and coding

Formatting the questionnaire is also important. New desktop publishing software makes it relatively easy to have a functional design and layout for questionnaires. Attention must be paid to simple and useful details such as distinguishable areas on the questionnaire where responses from residents can be recorded for coding in the office later.

5.8. Implementation of the survey

In the case of Trinidad and Tobago, the design, implementation, and the data entry of the survey took 18 weeks with critical assistance of government agencies. The CSSP Unit of the Central Statistical Office provided assistance in the areas of sampling, selection of supervisors, training, printing of questionnaires, and workload preparations. The Mapping Unit of the CSO assisted in defining enumeration districts for defining the domains. The Computer Division of the CSO provided the sampling frame in electronic format and speeded up sample selection. The Printing Division of the CSO printed 2,000 questionnaires, thus, reducing our survey production costs. The Town and Country Planning Division of the Ministry of Planning and Development assisted in defining the domains/stratas for sampling. The Ministry of Housing and Settlements assisted in the design of the questionnaire and coding. The interviews were carried out by 21 interviewers under the guidance of 4 supervisors nationwide.

5.9. Preparing a codebook and preparing data for analysis

Once the data is gathered through in-person interviews by the interviewers, the responses must be verified and coded. A full-time office person to manage this process is required. The codes for each variable should be organized in a codebook to speed up data cleaning and analysis. Frequencies can be run to check for data accuracy on an ongoing basis. A data entry program with internal consistency checks, such as SPSS Data Entry, can facilitate data entry and cleaning.

Table 6: Years Required to Save for Land

		Number of Years	
		Authorized Sector Plot	Unauhtorized Sector Plot
Annual Income (*)		@US$2/sqft	@US$.50/sqft
20th percentile	$1,500	33	9
40th percentile	$2,500	20	5
60th percentile	$3,571	14	4
80th percentile	$6,071	8	2

(*): Assumes that households save 20 percent of annual income.
Figures are in US dollars.

6. Analysis and Dissemination of Land and Housing Market Information

Information gathered by land price surveys, aerial photographs, and household surveys can be combined to provide an up-to-date, accurate, and detailed profile of land and housing markets. Land price information from land price surveys can be combined with household income from household surveys, for example, to assess the affordability of land for households at different income levels. In Trinidad and Tobago such an analysis showed that the 40th percentile of households in the income distribution need to save for more than 20 years to get access to serviced land (figure 6).

Information gathered on land and housing market operations must also be disseminated to relevant government agencies, private sector homebuilders, research organizations, and the public. This can be achieved by organizing seminars and workshops that focus on key and topical findings. Resources must also be allocated for dissemination of knowledge through reports, newsletters, and the Internet.

7. Estimation of Costs

This technical note described a range of land and housing market assessment tools ranging from simple calculations from published census reports and housing indicators databases to detailed land price and household surveys. The level and scope of data gathering will largely depend on the 1) quality of census data reporting in the country; 2) availability of land and housing market specialists at the municipality; 3) computing and information technology resources available; and 4) quality of prior studies by researchers in the past that can quickly be summarized as a basis for future work.

The cost estimates of Dowall's land market assessment are discussed in Dowall (1995). Cost estimates for a hypothetical in-person household survey in a developing country are provided in table 7. The key cost categories in household surveys are 1) questionnaire design (9 percent of

total cost); 2) sample selection (5 percent of total cost); 3) survey administration (39 percent of total cost); 4) data processing and analysis (29 percent of total cost); and 5) direct costs (18 percent of total cost) (figure 7). The numbers can vary significantly depending on who carries out the survey (non-profit or for-profit firms) and special inter-governmental staffing arrangements. The actual implementation schedule of the household survey in Trinidad and Tobago is shown in figure 8.

Table 7: Estimation of Household Survey Costs

Steps in the survey process	person days	daily rate		estimated percent of cost total costs
Questionnaire design				
Identifying key questions	10	$300	$3,000	
Framing questions	10	$300	$3,000	
Conducting focus meetings	8	$125	$1,000	
Designing format and layout of questionnaire	5	$50	$250	
Printing the questionnaire (with CSO assistance)	2	$50	$100	
total			**$7,350**	9%
Sample selection				
Defining the sample size	1	$300	$300	
Identifying the sample frame	4	$300	$1,200	
Sample stratification	4	$300	$1,200	
Sample selection	4	$300	$1,200	
total			**$3,900**	5%
Survey administration				
Selecting supervisors	2	$125	$250	
Selecting interviewers	4	$125	$500	
Preparing a training and fieldwork manual	8	$125	$1,000	
Training	10	$125	$1,250	
Pretest of questionnaire	50	$65	$3,250	
Revising the questionnaire based on pre-test results	5	$300	$1,500	
In-person interviewing	720	$25	$18,000	
Monitoring fieldwork by supervisors	120	$40	$4,800	
Monitoring supervisors	8	$125	$1,000	
total			**$31,550**	40%
Data Processing and analysis				
Editing and coding	20	$50	$1,000	
Entering data into computer	20	$50	$1,000	
Data verification and cleaning	20	$125	$2,500	
Preparing a codebook	20	$125	$2,500	
Preparing data for analysis	20	$125	$2,500	
Development of an analysis plan	10	$300	$3,000	
Data analysis	10	$300	$3,000	
Presentation of preliminary results	5	$300	$1,500	
Preparing the final report	20	$300	$6,000	
total			**$23,000**	29%
Direct costs				
Computer hardware				
Pentium			$1,500	
Laser Printer			$400	
Software				
SPSS Data Entry			$995	
SPSS Windows			$795	
Microsoft Office			$500	
Reproduction of reports			$500	
Local transportation			$500	
Per diems for interviewers and supervisors (102 person days x $20)			$2,040	
Per diem for expatriate professional staff (83 person days x $80)			$6,640	
Telecommunications			$200	
total			**$14,070**	18%
Total costs			**$79,870**	100%
			$53.25 per survey	

Assumptions:

Sample size: 1,500 households

In-person interviews carried out by 24 interviewers and 4 supervisors in 4 staff weeks

Area population: 1.2 million

Personnel:

- Expatriate professional staff: $300 per day
- Local professional staff: $125 per day
- Local clerical staff ($50 per day)
- Interviewers ($25 per day)
- Supervisors ($40 per day)

Figure 8:
Breakdown of Survey Costs

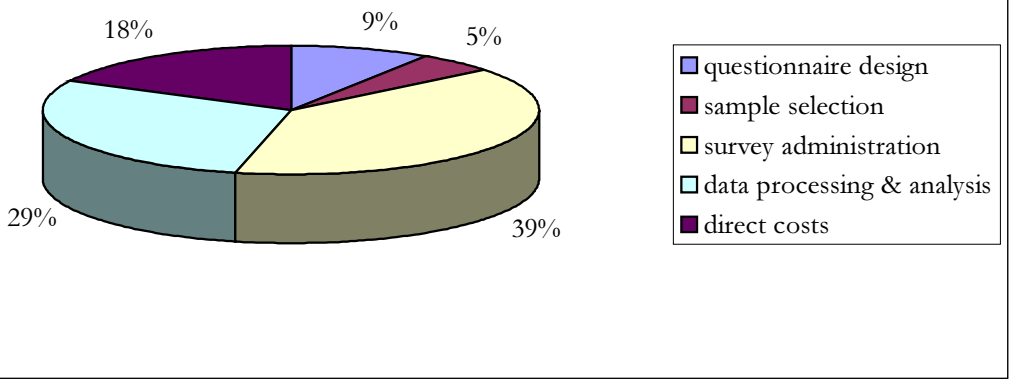
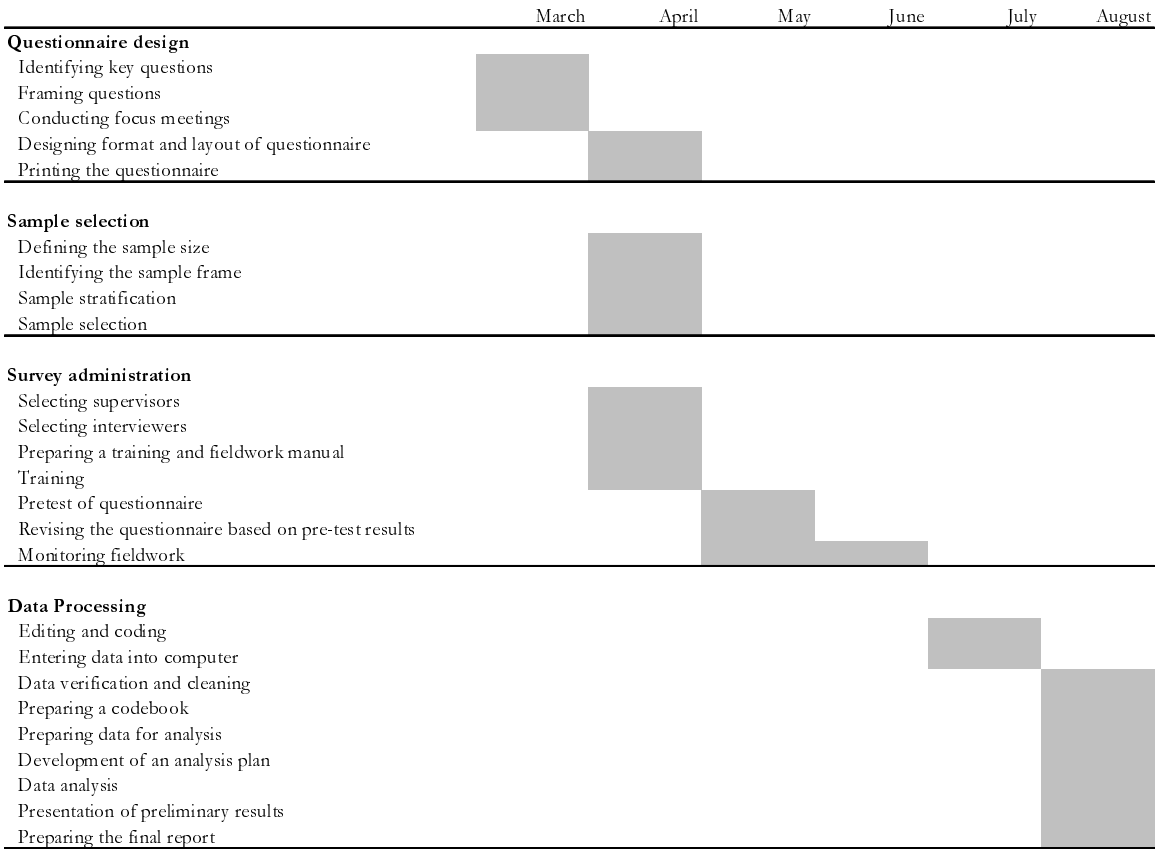


Figure 9: Sequence of Survey Design and Implementation Steps: The case of Trinidad and Tobago



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