Poverty Maps and Public Policy in Mexico

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ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>HDI</td>
<td>Human Development Index</td>
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<tr>
<td>INEGI</td>
<td>Instituto Nacional de Estadística, Geografía, e Informática (National Institute for Statistics, Geography, and Informatics)</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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In Mexico, as in many other countries, there is a need for more accurate information for the design and evaluation of public policy. In the context of macroeconomic analysis, we may access data on income, interest rates, exchange rates, and so on, but, when we move to the realm of microeconomic policy, the lack of information becomes evident. In the case of social policy and poverty alleviation interventions, we usually have nationally representative surveys at specific levels of aggregation, such as rural versus urban population, or national poverty rates. If we wish to fine-tune policy regionally to deal with clusters of poverty or backward regions, the only available source of information is often the census, which, in the case of Mexico, has been shown generally to be imprecise in terms of household income and expenditure data.

Through a joint effort by the Secretaría de Desarrollo Social (Ministry of Social Development), academics, and the office of the United Nations Development Programme (UNDP) in Mexico, poverty maps became available in 2005. Because of this and because

The authors would like to thank Hector Sandoval for his assistance in carrying out interviews with around 50 relevant actors on the use of poverty maps.
of the growing use of data on poverty and inequality, as well as human development indicators, awareness has increased on the need to sharpen policies for specific local interventions. A program in Mexico to target policies on the 50 municipalities with the lowest levels of human development and highest poverty rates has been a direct result of this awareness.

The traditional source of information for the measurement of poverty in Mexico has been the Encuesta Nacional de Ingresos y Gastos de los Hogares (National Household Income and Expenditure Survey). The survey was carried out in 1984, 1989, and 1992, and has been carried out every two years since then. The survey allows the estimation of poverty at the national level, as well as in rural and urban areas generally. As the disaggregation increases, the standard errors of the indicators begin to rise, such that estimates become unacceptably imprecise even for the states (Soloaga and Torres 2003). It has thus become apparent that more accurate estimates of poverty, inequality, income, and consumption at lower levels of disaggregation would be excellent tools for improving policy design.

When the decision was taken to pursue the poverty mapping project, several other events had already occurred favoring the attainment of this goal, though the process still faced hurdles. The first event was the arrival of a new staff member at the Office of the President of Mexico. Formerly with the Research Department at the Inter-American Development Bank, this individual, Miguel Székely, had been exploring poverty mapping for some time and wanted to establish a partnership with academics in Mexico who were also interested in the methodology. Through the Office of the President, a meeting was therefore organized involving the participation of selected researchers and an advisory group at the World Bank. The mapping methodology was reviewed. A workshop was held, and a Mexican team started looking into specific data requirements.

This team later moved to the Ministry of Social Development, where the direct relevance of the project to policy design was immediately appreciated. Especially because of the interest generated during the launch of the first Human Development Report on Mexico (UNDP 2002), the participation of UNDP Mexico attracted external institutional support and helped bring the project to completion.²

This chapter describes the process, obstacles, and outcomes of the poverty mapping project in Mexico. This is a story of innovation. The process involved the intervention of academics, the Ministry of Social Development, and an external agency, the UNDP. The strengths of each of the agents joined to bring the process to fruition. The description of poverty mapping in Mexico, the use of the mapping output in policy analysis and public advocacy, and the perceptions of academics, policy makers, and politicians in Mexico on the potential importance of this tool are the themes of the chapter.

The Evolution of Poverty and the Need for Disaggregation

The reduction in poverty in Mexico in recent years, a trend that started during 1996–98 after the peso crisis, has gained a great deal of attention in academic and public policy
circles in Mexico and abroad. Several explanations have been hypothesized for the success in reducing poverty, among which the following are the most common:

- The importance of macroeconomic stability and changes in the relative prices for essential goods
- The recovery of sustained positive growth rates
- The consistency and expansion of well-targeted social expenditure policies, such as the Progresa-Oportunidades conditional cash transfer scheme
- The increase in remittances from migrant members to poor families

Recent trends in household poverty in Mexico are illustrated in tables 10.1 and 10.2. Research has focused on analyzing the overall time trends, but only recently has there been an emphasis on the fact that the reduction in poverty is occurring mainly in the rural sector and that poverty in the urban sector has been persistent. Reductions in poverty rates in the rural sector have also been accompanied by a reduction in inequality.

In any case, the discussions about the design and implementation of specific social programs such as Progresa-Oportunidades made clear that it would be impossible to understand trends in poverty properly without the regional dimension. The need for disaggregated data was evident.

Disaggregated information was available in Mexico on social indicators, but not specifically on poverty. The three most important indicators that have been developed and used in Mexico in recent years are the marginality index (National Population Council), a so-called welfare index (Instituto Nacional de Estadística, Geografía, e Informática [National Institute for Statistics, Geography, and Informatics, INEGI]), and the deprivation index, which was used during the implementation of the budget reform of 1997. These indexes are all based on census or population count information and are multidimensional. They differ in the dimensions included and the way they are aggregated. For example, the marginality index relies on factor analysis. All of them, however, use income information directly from the census, which makes them susceptible to the usual criticism, that is, that the census has not been designed as an instrument for the collection of data on income. Using it for this purpose results in an inaccurate account of the phenomenon, which becomes especially important when the policy objective is related to regional targeting. Combining census information and household survey data turns out to be an obvious option in this case.

At least two important institutional changes in the last decade have also prompted the need for better data at a low level of disaggregation. In the late 1990s, a pathbreaking budget reform took place in Mexico that established a new mechanism to distribute a larger share of federal resources to states and municipalities based on specific socioeconomic and demographic criteria. Later, in 2003, the General Law on Social Development was passed in Congress. Among other steps, the law required data on poverty in municipalities to be made available at five-year intervals.
Table 10.1 Trends in Poverty Incidence among Households, Mexico 2000–02

<table>
<thead>
<tr>
<th>Poverty</th>
<th>Headcount</th>
<th>Standard error</th>
<th>$P_{2002} - P_{2000}$</th>
<th>Incidence change</th>
<th>Difference in standard error</th>
<th>Z-statistic</th>
<th>Significance level</th>
<th>Significance</th>
</tr>
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<tbody>
<tr>
<td>National</td>
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</tr>
<tr>
<td>PL1</td>
<td>18.6</td>
<td>15.8</td>
<td>0.7418</td>
<td>0.8605</td>
<td>-2.789</td>
<td>1.136</td>
<td>-2.455</td>
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<tr>
<td>PL2</td>
<td>25.3</td>
<td>21.8</td>
<td>0.8583</td>
<td>0.9687</td>
<td>-3.542</td>
<td>1.294</td>
<td>-2.736</td>
<td>0.0031</td>
</tr>
<tr>
<td>PL3</td>
<td>45.9</td>
<td>43.0</td>
<td>1.0698</td>
<td>1.2061</td>
<td>-2.865</td>
<td>1.612</td>
<td>-1.777</td>
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<tr>
<td>PL1</td>
<td>34.1</td>
<td>28.5</td>
<td>1.5681</td>
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<td>1.7174</td>
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<td>2.879</td>
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<td>60.7</td>
<td>57.2</td>
<td>1.7358</td>
<td>2.8962</td>
<td>-3.573</td>
<td>3.377</td>
<td>-1.058</td>
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<tr>
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<tr>
<td>PL1</td>
<td>9.8</td>
<td>8.5</td>
<td>0.7334</td>
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<td>PL2</td>
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<td>13.3</td>
<td>0.9449</td>
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<td>1.0189</td>
<td>-2.510</td>
<td>1.696</td>
<td>-1.480</td>
<td>0.0695</td>
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</tbody>
</table>


Note: PL1 corresponds to what is officially called food poverty, PL2 to capabilities poverty, and PL3 to asset poverty.
Table 10.2 Trends in Poverty Incidence among Households, Mexico 2002–04

<table>
<thead>
<tr>
<th>Poverty</th>
<th>Headcount</th>
<th>Standard error</th>
<th>$P_{2004} - P_{2002}$</th>
<th>Incidence change</th>
<th>Difference in standard error</th>
<th>Z-statistic</th>
<th>Significance level</th>
<th>Significance</th>
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<tr>
<td>National</td>
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<tr>
<td>PL1</td>
<td>15.8</td>
<td>13.7</td>
<td>0.8605</td>
<td>0.5269</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PL1</td>
<td>28.5</td>
<td>22.3</td>
<td>2.1064</td>
<td>1.4853</td>
<td>−6.196</td>
<td>2.577</td>
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<tr>
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<td>2.3109</td>
<td>1.8751</td>
<td>−7.155</td>
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<tr>
<td>PL1</td>
<td>8.5</td>
<td>8.7</td>
<td>0.5746</td>
<td>0.3781</td>
<td>0.116</td>
<td>0.688</td>
<td>0.168</td>
<td>0.5668</td>
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<tr>
<td>PL2</td>
<td>13.3</td>
<td>14.2</td>
<td>0.7276</td>
<td>0.4183</td>
<td>0.899</td>
<td>0.839</td>
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<tr>
<td>PL3</td>
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<td>34.2</td>
<td>1.0189</td>
<td>0.5593</td>
<td>−0.670</td>
<td>1.162</td>
<td>−0.576</td>
<td>0.2822</td>
</tr>
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</table>


Note: PL1 corresponds to what is officially called food poverty, PL2 to capabilities poverty, and PL3 to asset poverty.
Institutional Changes That Have Reinforced the Need for Data

Two institutional perspectives that require more finely disaggregated data on poverty have recently become significant within a legal context in Mexico: first, the federalist perspective and, second, the growing awareness of the need to maintain continuity in social policy and in policy evaluation across political cycles.

Decentralization

Mexico has recently experimented with two major reforms aimed at strengthening a decentralized approach to development. The first reform, passed by Congress in 1983, sought to enhance the policy-making authority of local governments. In 1997, after a long process of negotiation between the federal government, state governments, and coalitions of local governments, a second major push toward a more decentralized system was undertaken in the country. This second reform was the result of a decisive effort by the federal government to transfer funds to local governments for specific development initiatives such as infrastructure development. The resources going directly to local governments have increased substantially since then (see figure 10.1). Persistent questions that have been raised during this process are: How are funds to be allocated across states and municipalities? How is this to be done objectively so that the political slant is eliminated as much as possible? There was a clear need for accurate poverty data at the local level.

The decision was therefore taken to use the deprivation index (see above), despite the drawbacks in the quality of the data on incomes and the greater weight assigned to population segments and marginality, rather than poverty itself.

The public discussion has since focused on ways to improve the procedures for the allocation of funds. According to a recurring argument, accurate information on poverty at the local level is needed for the establishment of an allocation system that is more progressive.

Figure 10.1 The Composition of Local Government Budgets, Mexico 1978–2000

Source: Cabrero 2003.
The search for continuity in policy and policy evaluation

In 2003, Congress passed the General Law on Social Development, which is aimed at providing institutional stability for social policy and establishing rules for social policy evaluation. The law covers social rights, the development of budgets for social initiatives, the evaluation of specific policies, and the measurement of poverty and deprivation. The law requires information to be collected on poverty at the state level. It also requires information on poverty in municipalities to be published at least every five years. Because the National Household Income and Expenditure Survey does not supply information disaggregated at the municipal level that is statistically accurate, INEGI was faced with the obvious problem of complying with the law and gathering poverty data down to the municipal level in a cost-effective way. Poverty mapping methodologies seemed an option.

The Mapping Process and Its Diverse Dimensions

In 2001, government officials asked academics and the World Bank to join in launching a poverty mapping project in Mexico. The initial project was undertaken by the Office of the President and El Colegio de México. Eventually, after key actors moved to the Ministry of Social Development and academics were invited to take the lead in drafting the first Human Development Report on Mexico (UNDP 2002), the project moved as well to the Ministry of Social Development and UNDP Mexico. This partnership was cemented through a formal agreement between the two organizations, in collaboration with INEGI. The involvement of UNDP Mexico in support of the internal agreements within the public administration fostered a politically neutral approach within the project. The project aimed at producing poverty measures, indicators of inequality, and human development indexes (HDIs).

A serious obstacle remained, however. The methodology required that the mapping team have full access to the census. INEGI usually makes census information available solely in the form of cross-tabulations and aggregated data. Information at the level of households is never made public, mainly because of confidentiality and privacy laws. The Ministry of Social Development and INEGI negotiated for almost 18 months to determine procedures so that the team would be able to exploit the census. According to the agreement that was finally reached, the database would be made available to the Ministry of Social Development only for the purpose of composing the maps. Codes would be attached to households so as to protect personal identities, while permitting all relevant data to be manipulated. The United Nations system in Mexico also reached a general collaboration agreement with INEGI that may be invoked to update the poverty maps when the need arises.

First: applying the technique

The technique used in Mexico has followed Elbers, Lanjouw, and Lanjouw (2002). The stages are described below.
Zero stage: the selection of variables

In Mexico, both a census and a household survey are available for the same year (2000). Standard tests have been required to ensure that these sources are comparable (see annex 10.1).

Stage one

The first-stage estimation involves modeling household per capita income at the most disaggregated geographical level for which the household survey is representative. In the case of the National Household Income and Expenditure Survey, this is the national level, broken down into rural and urban sectors.

So as not to force the parameters into a single nationwide model, the country was divided into five groups of states to produce a stratification according to the levels of marginality rather than any criterion of geographical proximity. Statistical tests showed that it was possible to divide the 32 federative entities into five groups. The fact that these groups were selected according to indexes of marginality rather than according to geographical proximity created some resistance from public officials. How might one justify the inclusion of Mexico City and Nuevo León in a single “region” even though they are far apart in geographical terms? The justification was purely methodological: to minimize heterogeneity. It was more important to create statistical groupings rather than geographical groupings. The results would then have higher precision, but the regions could not be used in these groupings for any sort of geographical purpose. The approach was accepted, with the caveat that the five combinations should not be called regions, but statistical groupings. The exercise was therefore carried out with the help of INEGI, and states were clustered together according to marginality indexes, proceeding from high to low index scores.

For each geographical region and area (rural and urban), the first-stage estimation produced an association model of household per capita income for a household in the location, where the explanatory variables were a set of observable characteristics, as laid out in the model. Ten variants of the model were estimated.

Stage two

In this stage, the first-stage parameters that had been estimated were combined with the observable characteristics of each household in the census to generate incomes and simulated disturbances (see López-Calva et al. 2005). For each simulation, a set of first-stage parameters was used. In this way, a set of coefficients was obtained. Finally, the poverty maps were developed illustrating the relevant indicators, including incidence of poverty, poverty gaps, severity of poverty, inequality, and HDIs. Figure 10.2 is a map showing poverty incidence by state. The consistency with other indicators was also analyzed (see figure 10.3).

Second: filling technical and institutional requirements

At least five ingredients were critical in guaranteeing that the project to construct poverty maps on Mexico was feasible.
Data and methodological requirements

The first precondition in seeking to establish the feasibility of the project to construct poverty maps was the existence of good, reliable census and household survey data. Fortunately, INEGI is a well-regarded institution that has been producing statistical data for decades, and the two basic inputs for the construction of the poverty maps—the census and the household survey—were among the most respected products of the institution.

The second precondition was the existence of a well-accepted methodology for estimating poverty. During 2002–03, the Mexican government adopted a methodology that had been proposed by an independent committee of seven renowned academics; thus, when the time came to define poverty lines for the poverty map, the relevant procedures had already been tested and integrated with sufficient success to avoid rehashing a debate on the definition of poverty. Moreover, the work of the independent committee on poverty measurement and the publication of the official methodology contributed to a boost in the demand for accurate poverty data on states and municipalities.

Technical capacity

The three technological requirements for the construction of the poverty maps were (1) the existence of skilled human capital able to engage in the technical process of deriving income and consumption data using small area estimation methodologies, (2) the existence of an appropriate technical appreciation of the importance of the new instrument, and (3) the availability of adequate computer equipment, software, and data processing time.

In Mexico, meeting these preconditions was guaranteed partly because the original initiative had been undertaken by a qualified team that was supported by academics. The team followed no particular training routine. The principal researcher and two research assistants studied the technical needs and methodological requirements. The World Bank team provided key input during a workshop held to clarify details of the technique and to share the poverty mapping software. Likewise, INEGI and the Ministry of Social Development supplied essential technical assistance, including all the software required to manage the large database.

Administrative capacity

It was also necessary to guarantee the availability of adequate administrative capacity. The UNDP was key in maintaining this capacity throughout the three-year life of the project. Likewise, there had to be enough personnel involved on a steady basis so as to
Figure 10.3 Consistency with Other Indicators, Mexico 2000

be able to carry out the substantial amount of data processing. Specific staff were assigned to the poverty mapping exercise. Junior staff (research assistants) from the Human Development Report team at UNDP Mexico and staff at the Ministry of Social Development devoted part of their time to this endeavor. Thus, the cost of the project was shared by the UNDP and the ministry.

**Institutional arrangements**

It was critical for the Ministry of Social Development and UNDP Mexico, which took the lead in the poverty mapping effort in Mexico, to establish an agreement with INEGI to gain access to the relevant data and the processing capacity. Similarly, for technical support, it was vital to guarantee World Bank assistance throughout the process and to elevate poverty mapping to a mainstream project within the Ministry of Social Development. Because the decision was made to take advantage of geographic information system techniques and use geo-referenced data in targeting social programs and responding to natural disasters, maps were developed for other purposes as the mapping process became more refined. These various tools allowed decision makers to rely on more detailed information in fine-tuning policy.

**Budget**

Of course, the project would not have been successful or even possible without adequate financial resources. Specific budget allocations were made for the projects, both in the Ministry of Social Development and the UNDP. UNDP Mexico played a major role by securing a permanent budget and meeting any shortfalls in the government contributions.

**Data publication**

The data produced through the project were used widely within the Ministry of Social Development and at the UNDP, but public access was delayed for several reasons. When the UNDP published HDIs on municipalities, the decision was made not to include detailed data on poverty so as not to interfere in the cooperative interaction between the ministry and local government institutions, mainly with regard to the allocation of funds. Eventually, in 2005, data on poverty at the local level in 2000 were posted on the ministry’s Web site.

**Third: political economy considerations**

The identification of key partners and of individuals and institutions that might have an interest in a project or might oppose or resist it helps one to understand the potential benefits and drawbacks of a project and facilitates the establishment of conditions favoring a successful outcome. The data produced through a project of this sort are instruments of power in certain areas of public action. Therefore, it is important not to impose a new methodology, but to create a fresh, open pathway in the design of public policy and in public advocacy. Concretely, the following issues should be addressed:
The power of information: Information is a means to power. It is possible that the construction of the poverty map would increase substantially the power of the groups and individuals involved in the mapping process and in distributing the related data. It is therefore critical to engage individuals and groups in the process that are at ease with sharing data rather than monopolizing data so as to increase their power. Thus far, the approach in Mexico has been successful in that the mapping data are shared widely within the Ministry of Social Development, though the maps are not well known and are rarely used in other government offices or in public forums. Greater emphasis should now be placed on disseminating the information more widely and spreading awareness about the related techniques in such a way that they may be understood by nonexperts.

Poverty mapping as an additional tool: Alternative methods for creating tools similar to poverty maps were already available in Mexico when the poverty maps were being developed, for instance, marginality indexes and principal components analysis. Researchers who have developed applications based on these other tools have sometimes tended to view the new project as threatening. It is therefore important to emphasize that poverty maps are an additional tool rather than necessarily a better tool. This approach has helped attract others to cooperate in the endeavor and use the mapping data. For example, designers of other indexes, such as the marginality index, joined the mapping team and came to appreciate the complementarity of the indicators. Likewise, INEGI is now one of the main supporters of the use of poverty maps.

Create demand: Creating demand for the final product during the early stages of the project in Mexico proved to be important along the way. Without the support of potential users, it would have become difficult to find resources for a project that initially seemed excessively expensive and time intensive to some of the relevant actors. Even today, though other groups in the Ministry of Social Development have become acquainted with the usefulness of the mapping information and are more willing and able to use it, the data and methodology are still not widely disseminated among government, academia, or the public.

Incentives for producers: The production of poverty maps is a time-intensive activity. It is therefore worthwhile to create incentives for the team working on the project. For example, the possibility of writing up an innovative project in an academic publication or specialist journal played an important role in Mexico by stimulating the young professionals and academic researchers involved. Among public officials, the potential for the creation of additional tools for policy making represented an incentive.

The participation of INEGI, the UNDP, and the Human Development Report team was also an incentive in that it enhanced the visibility of the project. It was clear that a specific product would be developed and that the timeline would be respected. The loss in credibility caused by a failure to abide by the agreements with these partners would have been too great.
The Use of Poverty Maps

Poverty maps have definitely improved the way in which social policies are planned and implemented in Mexico. We present concrete examples in this section. The examples highlight the use of poverty maps in policy design and implementation and in public advocacy on specific policies.

The application in policy design and implementation

The first example relates to budget allocations. In Mexico, as in many other developing countries, a portion of the central government budget is transferred to state and municipal governments for decentralized allocations. This has especially been the case since the reform of the late 1990s discussed elsewhere above. The financing has been distributed to each entity according to criteria that are typically proxies for poverty indicators, since local poverty estimates have not normally been sufficiently accurate.

The information made available through the poverty maps represents a general quality improvement. The data are technically more sound than the criteria that have been used for decades. The appearance of the maps therefore rekindled a debate on whether the method for distributing the budget should be modified. This debate was already ongoing because the urgent need for improvement had been obvious, but now that the new data are available, it has also become obvious that changing the allocations to local governments might lead to a touchy political problem. Since the size of the overall budget would remain the same, any reallocation would produce winners and losers. The probable losers would naturally oppose any modification in the status quo. Nonetheless, the poverty map has successfully placed the issue to the forefront, and Congress will likely take it up at some point. The key discussion may revolve around whether the current allocation system is progressive and the extent to which the maps may help lessen any regressivity.

The second example relates to targeting in welfare programs. For several years, the Ministry of Social Development lacked a specific program aimed at reducing poverty in urban areas through the provision of infrastructure in part because the technology for targeting such an intervention was inadequate. In densely populated areas such as cities, poverty maps may supply detailed information on poverty within communities and even neighborhoods, making refined targeting possible. Relying on indicators of the concentration of poverty among neighborhoods in the main cities of the country, the Habitat Program has thus now been launched in Mexico. The program identifies city areas with the highest concentration of poor people and directs a series of integrated actions at these areas to improve standards of living among the inhabitants of slums and the neediest neighborhoods.

Likewise, used in conjunction with geographic information systems, detailed poverty maps are now being applied widely in social development programs, including those that tend to favor alternative techniques, to help identify the geographical areas in which particular policy interventions may have their greatest impact. A good illustration is Liconsa, a milk subsidy program that has been running for more than 50 years and that, guided by poverty maps, is now able to pinpoint priority areas for intervention in a transparent way for the first time.
Using mapping outputs for public impact

The municipality is the appropriate geographical unit for the analysis of local development. HDIs have been calculated for municipalities in Mexico based on census and household survey data for 2000. The indexes were published in 2004. This was the first time that HDIs were made available at the municipal level in a format that might be used by the general public.

The examination of human development at the municipal level revealed great inequalities. Thus, if municipalities were to be classified as countries in the world ranking according to the international HDI, Benito Juárez, one of the boroughs of Mexico City, would have an HDI similar to that of Italy, whereas Metlatonoc, a municipality in the state of Guerrero, would have an HDI similar to that of Malawi.

Some of the information that emerged from the publication of the HDIs had an important public impact. For example, 11.3 percent of the inequality in human development in municipalities across the nation is accounted for by the health component of the index, 31.2 percent by the education component, and 52.1 percent by the income component. On the other hand, most of the inequality in human development may be attributed to differences in development within federal states (64.1 percent); the inequality across states is not as significant (35.8 percent). Inequality in human development at the national level may be explained mainly by the low HDIs in the states of Veracruz (8.9 percent), Oaxaca (7.1 percent), Chiapas (6.9 percent), Puebla (6.3 percent), and Guerrero (6.1 percent), and in the State of México (not to be confused with the capital of the country or the surrounding territory, 5.0 percent).

For the first time, discussions about poverty and inequality in specific states in Mexico became possible based on income data, as well as nonincome indicators in terms of their consistency with income data (see figure 10.3). The publication of the municipal HDIs and a compact disc containing the poverty data fostered public awareness about the importance of regional inequalities and the need for more disaggregated analysis. As a result of the mapping, discussions on marginality, access to services, and other indicators have been enriched. In particular, because of the importance of the income component in the HDI, it became evident that the economic determinants of development and income inequality among municipalities and regions and the way these determinants have evolved over time should be reviewed in light of the new data. During the first year, there were more than 1,900 downloads from the Web page where the information had been posted. Multilateral organizations, public officials, and academics requested the income and poverty estimates, as well the HDIs.

Fresh analyses have been generated. National labor market studies have found new details confirming that labor markets in the various regions of the country have distinctive features (Hernández Laos 2005). The labor markets of Mexico City and the large northern regions are relatively more well integrated, and they are relatively more competitive than those of the center and south or southeast regions. Geographical mobility within the country and abroad is more feasible for individuals with higher educational attainment. Labor mobility eases the demographic pressure on local labor markets, but also
clearly reflects the lack of local labor demand. Other studies have found that the concentration of economic activities among municipalities declined between 1989 and 2000, even while inequality persisted among states. The increased concentration of fixed capital investment in certain municipalities has played a key role in maintaining inequalities.

Public policy responses have also been prompted. One immediate use of the poverty maps was the estimation and publication of HDIs by the UNDP. HDIs had previously been calculated on the basis of census data on incomes, but, because the census was not considered adequate on incomes, the HDIs were not regarded as a reliable tool for policy making. However, shortly after the publication of the HDIs based on data from the poverty maps, the president of Mexico announced a special plan to reduce poverty and promote human development by concentrating government efforts on the 50 municipalities that presented the highest poverty rates and the lowest HDIs according to this newly published information. Seven ministries operating 12 different, but related programs are now focusing efforts on the poor in these 50 municipal areas. The high visibility of the new HDIs was certainly a factor in this outcome. One of the candidates for president had started his campaign in 2005 precisely in the municipality that exhibited the lowest level of development in the country according to the poverty mapping exercise.

The federal plan of action against poverty required coordination among actors in a way that had not been observed in Mexico for many years. The priorities, objectives, and criteria for selecting geographical areas for targeting had typically been unique to each ministry and program. The establishment of common criteria now had two important positive outcomes. The first was that the budget allocations flowing to the 50 municipalities were increased substantially. Many of the municipalities experienced budget inflows that were unprecedented for a single year. The second outcome was the benefit of greater coordination. When each government agency has different objectives and criteria, programs are isolated one from the other, and, although they might generate a positive impact each on their own, their impact is generally less than if they had been combined with other programs to trigger multiplier effects. The accuracy of the poverty mapping played no small part in the more positive result.

The application of poverty maps

Novelty often generates skepticism among key actors. This resistance must be addressed to guarantee the use of a new tool in improving day-to-day processes such as planning and policy implementation. The use of poverty mapping in policy making has highlighted several interesting phenomena relating to political economy, as follows:

- **Ideological resistance:** The creation of poverty maps relies on data processing and econometric estimation techniques that sometimes appear obscure to people who are involved in local planning processes in which beneficiary communities and households participate in decision making. Indeed, in our case, doubts were frequently raised about the effectiveness of a tool developed by bureaucrats in Mexico City to reduce
poverty, which they hardly knew or understood. To face this challenge, it was important to emphasize that poverty maps are one of many possible tools for policy making and that, rather than replacing other tools, such as local planning through community participation, they enrich these other processes. People working in private interdisciplinary research groups and nongovernmental organizations have been exposed at workshops to this principle of the complementarity of the maps and other quantitative and qualitative tools, but an aggressive strategy is still needed in this respect.

- **Acceptance of results:** When used in distributing budget allocations, poverty maps inevitably generate winners and losers, and it is common for the losers to try to discredit the new technology simply because its application might imply fewer resources for them in the future. For example, in Mexico, a new policy initiative undertaken by the president shifted the target of welfare programs toward the 50 poorest municipalities identified through the use of the poverty maps. This shift generated opposition. Without the endorsement of the World Bank, the UNDP, and academics, it might have been difficult to defend poverty mapping as a valuable tool for improving policy making.

- **The effective life of poverty maps:** Once a poverty map has been estimated, its effective life span depends on the gap between the latest household survey and the next census. Data eventually become outdated, and using outdated data may lead to errors in policy decisions. It is important to remember that poverty maps are imperfect tools; like other statistical techniques, they will only be as good as the data underlying them.

### Are Poverty Maps Perceived as Useful? Are They Being Used by Other Agents?

We developed a questionnaire and carried out in-depth interviews with relevant actors in various realms to examine how poverty maps are perceived in Mexico. For the interviews, we approached staff at the Ministry of Social Development, the Ministry of the Economy, the Ministry of Finance and Public Credit, and the Ministry of Labor, people involved in the Progresa-Oportunidades program, distinguished academics, and members of Congress.

**Actors involved in social policy**

The interviewees involved in social policy making were all aware of the poverty maps and the impact of small area estimation methodologies in the design of public policy. Indeed, they told us that the mapping data help in analyzing whether social expenditure reaches the poor and in evaluating the effectiveness of the targeting of programs, especially at the municipal level. However, we learned that these people do not use poverty maps at all in carrying out their own routine activities. Only a few of the interviewees had actually used them and then merely to obtain a snapshot of the poor in Mexico. The main reason they do not use the maps is their lack of experience with the methodology. They are more familiar with, for example, the marginality index pub-
lished by the National Population Council. In the case of Progresa-Oportunidades, the program staff use the information generated through that program.

**Other government actors**

Few people in the ministries of finance and public credit, labor, and the economy knew about the poverty maps. None of them had used the maps. Other government actors who were familiar with the poverty maps agreed that the maps are definitely helpful in the design of public policy and in targeting social expenditure. They also said that the poverty maps may be used to determine whether subsidies or investments for infrastructure should benefit one region or another. The members of Congress whom we approached all felt that this sort of information may be extremely important in the design and analysis of public policies, especially income redistribution policies and policies aimed at raising household incomes. However, none of the members of Congress had ever had occasion to use the maps, and none of them were aware that this kind of mapping information is available for Mexico. They did express interest in learning more about the methodologies behind the maps and the characteristics of the maps.

**Academics**

Mapping methodologies are not well known among academics. Only half of the academics who were interviewed said they were aware of the existence of poverty maps. They all agreed, however, that this disaggregated information is unquestionably useful in the design of public policy and, in particular, in the targeting of poverty reduction policies. They said a seminar should be organized locally to demonstrate the methodologies, compare poverty mapping with other options, and make the maps available for more analysis.

**Updating Poverty Maps: Selected Issues**

The success of the poverty maps and their widening application will inevitably raise new questions and lead to the identification of other uses.

If poverty maps are seriously applied to enhance the effectiveness of welfare policy and the targeting of government action toward the poorest households and most impoverished areas of a country, we would expect poverty to be reduced precisely among these households and in these geographic spaces. In fact, to be able to evaluate whether a poverty map has actually exercised a positive impact on poverty reduction, it would be necessary to remap poverty in states and municipalities periodically. This is, in our opinion, the natural next step in the evolution of poverty maps.

This is an important challenge, since, strictly speaking, updating a poverty map requires access to a population census and a household survey for the same (or a proximate) year. Because population censuses are commonly carried out about every 10 years, there is a usually a significant lag between censuses and household surveys.

One alternative is the use of older censuses and newer household surveys to update existing maps. Although this approach might generate useful information, it also intro-
duces additional errors in poverty estimates, and the errors grow as the time lag becomes greater. It is an imperfect method.

In Mexico, however, supplementary population counts are conducted between censuses, which means that there is a new census for 2005, though it has produced less information than the regular full-scale censuses. An ongoing project has been examining the possibility of updating the poverty maps based on data from 2000 using the narrower information made available through the population count of 2005. This might permit the creation of a new, though less detailed set of maps that would be helpful in analyzing the dynamics of poverty and inequality at the local level. Thus far, the results have been promising.

Lessons Learned

Poverty mapping methodologies have been applied successfully in Mexico. They have become an important tool especially because of the needs and requirements created by recent institutional changes, such as the decentralized budget reform and the General Law on Social Development. Undoubtedly, they will be used in analyzing the dynamics of local development, especially once the maps have been updated and the analysis has been able to focus on trends in poverty at the state and municipal levels.

Nonetheless, even in this context in Mexico, poverty maps have not been accepted as a substitute for welfare and deprivation indicators in local resource allocations. They are being used for policy design at the federal level, and the methodology has been applied to estimate local HDIs. The information has been made public by academics and government officials. Partly as a result of the greater awareness, specific policy responses have been prompted, such as the program to assist the 50 municipalities with the lowest HDIs in the country.

We have presented information on the various ways in which poverty maps have been used to inform policy dialogue and interventions. We have also analyzed the views of various actors who have had contact with the poverty maps or who are likely to have the opportunity to use the poverty maps because of their professional activities. The main findings from our personal in-depth interviews are as follows:

- Although not all the interviewees knew about the new methodology, they all agreed that poverty maps contain valuable information that should be taken into account in the identification, design, and evaluation of public policy.
- The maps are not seen as a substitute, but as a complement for other tools of analysis and policy design.

Poverty maps have been used in welfare policy design and to build public awareness on poverty in Mexico. Our questionnaires and surveys have shown, however, that the maps and the related methodologies need to become more well known within the federal government and academia, and, especially, among local governments.
Annex 10.1 The Process for the Selection of Variables

The following illustrates the process undertaken in the selection of information from the 2000 census and the 2000 household survey on variables for inclusion in the poverty maps on Mexico (see López-Calva et al. 2005):

- The census questionnaire and the survey questionnaire were compared to identify those questions that were identical or similar conceptually. Whether the questions were directed at the same population groups was considered. For instance, if questions sought to provide information on household literacy, the responses were considered only if they applied to the same age groups in both questionnaires.
- The distributions of the variables identified and selected through the above method were statistically compared. The comparison of the sample means against the population means for the selected quantitative variables was based on tests of statistical significance. Variables that were not rejected were considered for the modeling. Qualitative variables were selected if the mean value of the census variable was within the confidence interval of the corresponding survey variable. The statistics from the national household survey were recalculated for each of the newly defined statistical regions and according to rural and urban areas.4

The variables that turned out to be both conceptually and statistically comparable in the National Household Income and Expenditure Survey in 2000 and the 2000 census were the following:

- **Housing characteristics**: water access, electricity access, fuel for cooking, construction materials used in floors, construction materials used in walls, construction materials used in ceilings, room used for cooking, connection to a sewage system
- **Household appliances and other equipment**: telephone, radio, television, videocassette machine, blender, refrigerator, washing machine, water heater, automobile or van, computer
- **Sociodemographic characteristics**: sex, age, marital status, kinship, school attendance, literacy, education
- **Labor characteristics**: labor force participation, employment, hours worked, position
Notes

1. The census in Mexico has questions on income, though income tends to be misreported because the census instrument is not designed appropriately to capture it.
2. Since 2001, when the idea of the map was first being explored, the support of Peter Lanjouw and the World Bank team has been crucial.
3. The deprivation index is known in Spanish as the índice de masas carenciales. Hernández and Székely (2005) provide a detailed description of the three indexes.
4. The division by statistical region is discussed in the subsection on the first-stage estimation (Stage one).

References


