During the 1990s, Bolivia followed the practice of many Latin American countries by developing poverty maps based on unsatisfied basic needs (UBN) almost immediately after the execution of the population census. These maps have been influential in the portrayal of geographical disparities in living conditions and in access to basic services. However, while census data often allow considerable geographical disaggregation (for example, at the municipal level), they do not capture household income and expenditure. Meanwhile, household surveys rarely allow for reliable estimation of income and consumption poverty in small geographical areas (such as municipalities).¹

The small area estimation method developed by Elbers, Lanjouw, and Lanjouw (2003) allows one to circumvent these restrictions. It permits consumption poverty maps to

¹The authors would like to thank Milenka Figueroa, Wilson Jimenez, and Fernando Landa for invaluable support and input during the development of this chapter and Björn-Sören Gigler for useful comments.
be derived by combining census and household survey data so as to supply missing expenditure data in the census at adequate statistical confidence levels using hedonic regression models. This methodology has been successfully applied in several countries in Latin America and other regions.

In Bolivia between November 2002 and June 2003, the method was used to create consumption poverty maps at the level of municipalities. The maps were developed by a joint team at the Unidad de Análisis de Políticas Sociales y Económicas (Social and Economic Policy Analysis Unit, UDAPE) and the Instituto Nacional de Estadística (National Institute of Statistics, INE) that was supported through World Bank technical assistance. The purpose was to generate local indicators of monetary poverty and consumption inequality for the measurement of municipal disparities and to provide an additional tool for planning and targeting within Bolivia’s poverty reduction strategy and the ongoing process of decentralization and local participation.

This chapter documents the Bolivian experience in developing and using these monetary poverty maps. It focuses on the impact of the consumption poverty maps developed by the World Bank and the Bolivian government in 2003 on the design and targeting of public policies in the country. It draws on lessons from the experience of the authors and numerous interviews with diverse stakeholders in and outside government in Bolivia (see Figueroa 2006).

The chapter is structured as follows. The next section provides a brief description of the context and the process of the development of the consumption poverty maps. The subsequent section describes succinctly the main methodological aspects of this process. The section thereafter illustrates some of the main results that highlight the policy relevance of the poverty maps to Bolivia. The penultimate section reports on the field interviews. The chapter concludes with an examination of the main lessons that arise from the Bolivian experience and that may help tap more effectively into the policy potential of monetary poverty maps.

The Demand for Poverty Maps in Bolivia

Bolivia underwent important economic, political, and social changes in the 1990s. Macroeconomic stabilization in the late 1980s was followed by market reforms to deregulate the economy, liberalize trade, simplify taxes, reform the pension system, privatize nonperforming public companies, and decentralize public resources to municipalities. The decentralization process gained impetus with the development of the Bolivian poverty reduction strategy through the broad participation of various sectors and donors as part of the Heavily Indebted Poor Countries Initiative in 2000–01 (see World Bank and IDB 2004; World Bank 2005).

Bolivia’s reform efforts swiftly paid off through high rates of investment and growth. The economy expanded at an average annual rate of 4.7 percent (2.2 percent per capita) during 1993–98. Exports diversified; social spending increased substantially; and living conditions improved, particularly as measured by education, health, and other Millennium Development Goal indicators.
Expenditure decentralization started with the *Ley de participación popular* (law on public participation) in early 1994 and the *Ley de descentralización* (law on decentralization) in 1995, which transferred primary responsibility for the planning and implementation of public investment to the municipalities and prefectures. These advances were augmented by the 2001 law on national dialogue. These reforms, aimed at smoothing the large regional disparities in living conditions, established mechanisms to allocate public resources, expand the abilities of local governments to deliver basic services, and increase community participation in the formulation and execution of social programs. In particular, the Bolivian government developed a poverty map using 1992 census data and the UBN method to guide social investment allocations (see Ministry of Human Development 1995). This map was later updated according to the 2001 census and became the basis for the formula that was established in the 2001 law on national dialogue and that guided the allocation of intermunicipal transfers under the Heavily Indebted Poor Countries Initiative. These maps revealed the country’s large regional disparities in living conditions, particularly between urban and rural areas and between the central highlands, where many of the indigenous people live, and the lowlands of Santa Cruz.

The decentralization process, supported with growing tax revenues, had a positive impact on social expenditure and service delivery in the poorest municipalities. Social spending rose from 2.5 percent of gross domestic product in 1986 to 18.5 percent in 2001. This was the second highest share in Latin America and the Caribbean and led in turn to greater human capital and social investments in localities with poor indicators in literacy, nutrition, and connection to water and sewerage services (see World Bank and IDB 2004; Faguet 2004; Bossert 2000).

However, progress was limited in many areas and not sustained. After several external and internal shocks in 1999, economic growth decelerated to an average rate of only 1.7 percent during 1999–2002. Fiscal imbalances and financial sector difficulties weakened macroeconomic stability, reducing job creation and poverty reduction. In 2002, 65 percent of the population was living in poverty, of which nearly 40 percent were in extreme poverty. Bolivia remained one of the poorest and most unequal countries in Latin America, and the opportunities for income generation among the poor, particularly the poor indigenous population, continue to be a critical issue today.

Two factors made this situation ripe for the production of disaggregated data on monetary poverty. First, the Bolivian poverty reduction strategy and the law on national dialogue required an evaluation every three years of the impact of the strategy on poverty conditions, and the resources from debt reductions were to be distributed using poverty indicators on municipalities. Second, the UBN poverty maps only illustrated the non-monetary aspects of the geographical distribution of poverty, and they were therefore inadequate tools to help improve the impact of public expenditures on monetary poverty at the municipal or even departmental level. In fact, some government officials were concerned that the system of intermunicipal transfers based on targeting according to the UBN poverty maps (the formula of the law on national dialogue) was less responsive to the conditions in the many municipalities with entrenched pockets of monetary poverty.
UDAPE thus made a request to the World Bank for technical support in the development of monetary poverty maps using the small area estimation method of Elbers, Lanjouw, and Lanjouw (2003). This was followed by an official request from the Bolivian government to the World Bank for technical and financial support for the joint development of the new poverty maps. A team of highly qualified technical staff from the INE, UDAPE, and the World Bank started preparing a consumption poverty map on Bolivia in early 2003. UDAPE undertook the related technical production and overall project coordination, and the INE provided the data platform for the exercise, while the Bank supplied technical support and some financial assistance. The basic data requirements and methodological details were defined during a technical mission by Bank staff with the local team. During a second visit, initial results were examined, and data consistency was assessed. A map was completed in June 2003, and, by the end of August, the local team had prepared and published a report on the results.

The consumption poverty map document was launched successfully, and the results were well received in Bolivia, although the impact of the instrument on policy making has been limited by several factors (see elsewhere below). We now discuss some of the methodological aspects of the development of the consumption poverty maps and some of the findings that highlight the policy relevance of such a map for Bolivia.

Data and Methodology

The main data sources for the exercise were the National Population and Housing Census of 2001 and household surveys that were conducted through the Programa para el Mejoramiento de las Encuestas de Hogares y la Medición de Condiciones de Vida (Program for the Improvement of Household Surveys and the Measurement of Living Conditions) and carried out in 1999, 2000, and 2001 by the INE. Data from these sources were combined to obtain a larger sample that could be disaggregated according to the main administrative regions (departments) and areas in Bolivia. The approach followed closely the small area estimation method used in other applications elsewhere. The approach was tailored to the data and country context of Bolivia. The methodology linked household consumption expenditure with variables measured in the household surveys and the census so as to impute the missing expenditure data (see INE and UDAPE 2003; Elbers, Lanjouw, and Lanjouw 2003). The approach involved the following steps:

- An econometric model of per capita household expenditures was estimated (through generalized least squares) as a function of variables in the surveys and also collected in the census. The variables included household structure, household durable goods (including appliances and other equipment), basic services, and the sociodemographic characteristics of household members. Separate models were developed for the urban and rural sectors in each of the country's departments. There were thus a total
of 16 models. (There are nine departments, but Beni and Pando were combined for purposes of the exercise.)

- The estimated parameters of the models were applied to the census data to obtain conditional estimates of average per capita consumption. From these, several indexes of poverty and inequality were derived for each locality (the headcount index, the poverty gap and the severity of poverty, the Gini coefficient, the Atkinson index, and three generalized entropy inequality indexes).

- The errors of estimation in the model have two parts: one attributed to geographical or location effects, and the other related to individual or idiosyncratic errors. The first indicates the presence of nonobservable characteristics that affect household consumption in a certain area or community; to address this, explanatory variables were generated for each community or area (the average characteristics of the urban and rural areas) that predicted the location error with fixed effects. The idiosyncratic error was then estimated through random draws of the unexplained regression residuals from a normal or t distribution, while account was taken of the dependence of the dispersion of the residuals on the observed variables.

- The data samples of the 1999, 2000, and 2001 household surveys were pooled to obtain more reliable estimates of indicators on localities. The small area estimation method presumes that survey samples have been split into homogeneous area clusters so as to render more accurate and robust estimates and statistical inferences. However, the surveys closer in time to the 2001 census had smaller sample sizes that were representative only at the regional level and in the urban and rural sectors. (There are three regions: the western and central highlands, the valleys at the eastern slopes, and the eastern lowlands.) The three independent surveys were therefore pooled to obtain a higher frequency of observations in the primary sampling units common to the three surveys. Since the sample frames were different (the 1999 and 2000 surveys used the 1992 census, while the 2001 survey was based on the 2001 census), the sampling expansion factors were adjusted to maintain the consistency with a single sample frame (that of the 2001 census). Based on the list of common primary sampling units and the corresponding number of dwellings, the expansion factors were recalculated on the assumption that the primary sampling units had been randomly selected in each of the 16 geographical territories modeled (see elsewhere above).

- The computation of poverty lines (extreme, low, and high) for each of the 16 geographical units was based on data from the 1990 household expenditure survey (urban areas) and the impact evaluation survey for the Social Investment Fund (rural areas). The required minimum per capita daily caloric intake was set at 2,120 kilocalories. The poverty lines were adjusted according to the consumer price index corresponding to the reference period of the survey. The household reference group was composed of households that showed food expenditure levels capable of covering the minimum nutritional requirements within an interval of 1 percent, 5 percent, and 10 percent above and below the minimum caloric intake. The poverty lines were obtained by averaging the values of the household expenditures for each interval. Besides the
extreme poverty line, two other lines were used: a high poverty line that reflected an upper limit on the value of nonfood products and a lower poverty line corresponding to an inferior, survival limit.6

The data and statistical strategy summarized in the final two points above may be instructive in other country contexts. Too often, the sample size in a household survey permits the reliable estimation of consumption expenditure regression models only at a regional level, which is too broad. In our case, the pooling of time-adjacent surveys offered a way to circumvent the problem. Moreover, in practice, few households meet the totality of basic caloric and protein intake requirements. Combined with expenditure measurement errors, this supports the use of interval rather than ordinal estimation in assessments of the robustness of locality poverty rankings (Wodon 1997).

Policy Lessons from the Monetary Poverty Mapping Exercise

The mapping exercise has corroborated many suppositions about the concentration of the income poor in Bolivia, while shedding light on the geographical patterns in monetary poverty and the links to inequality in the country. Poverty and inequality in Bolivia transcend rural-urban and regional boundaries. The exercise has pinpointed more unequal areas and localities with the highest concentrations of poverty and the implied relative indicator rankings. It also shows that the variability in the levels of extreme consumption poverty is greater than indicated in the UBN poverty maps.7

The heterogeneity of poverty and inequality in Bolivia

The poverty mapping exercise demonstrates in detail the heterogeneity of monetary poverty and inequality in Bolivia and helps identify the places where greater public policy efforts are needed. While poverty is widespread, there are important differences across locations. Figure 4.1 shows the incidence of consumption poverty and the intensity of consumption poverty (the poverty gap) across municipalities.

Although an overwhelming portion of the rural populace is living in consumption poverty, there are also large pockets of urban poverty. Nonetheless, many intermediate cities and small municipalities also have low poverty rates. The main results may be summarized as follows:8

- Monetary poverty is concentrated in the valleys and the western and central highlands, especially in the departments of Chuquisaca and Potosí, then Bení, La Paz, and Oruro (with minor differences in the rankings according to low or high poverty lines). The urban conglomerations of Cochabamba and Santa Cruz show the lowest poverty rates, while Bení and La Paz present the highest levels of poverty (over 50 percent for the low poverty line). About 40 percent of the population in the department of Santa Cruz is poor, but the poverty rate is only 20 percent in the capital; the situation observed in Cochabamba is similar. Urban development in Cochabamba and Santa
Cruz has created broad-based income opportunities. However, owing to their higher population density, the two cities contain the largest number of poor people in absolute terms.

- Rural areas throughout the country are overwhelmingly poor regardless of the poverty line used. In fact, in rural areas, the incidence of extreme consumption poverty is almost as high as the incidence of total poverty. The rural areas of Cochabamba and Santa Cruz exhibit a poverty incidence as high as the incidence of poverty in rural Chuquisaca and Potosí.

- Monetary poverty is widespread in a large number of municipalities in terms of magnitude and intensity and regardless of the poverty line. Many municipalities exhibit poverty above national levels, and a significant fraction exhibit poverty above 80 percent. In at least 20 municipalities with dispersed populations (such as Buena Vista, Morochata, Ravelo, San Pedro in Pando, and San Pedro in Potosí), most residents are unable to cover their basic food needs.

- Bolivia also exhibits high levels of inequality in consumption at the local level. In the more egalitarian departments (Beni, Pando, and Tarija), inequality may be attributed mainly to rural-urban disparities. However, in the most unequal (Chuquisaca, Cochabamba, and Potosí), inequality is pervasive within both urban and rural localities. Chuquisaca, Cochabamba, and Potosí show the highest inequality with regard to consumption expenditures. The more equitable distribution of consumption expen-
Poverty, average consumption, and inequality

The results of the poverty mapping exercise reveal core connections at the local level among increases in average consumption (such as would occur with economic growth), consumption poverty, and inequality. Poverty incidence is lower in municipalities with higher average consumption, but the association is mediated by inequality. Many localities may be caught in poverty traps (Azariadis 2004). Such patterns should be taken as tentative since they may reflect cross-sectional correlations, but they illustrate the rich interrelationships revealed by the monetary poverty mapping exercise.

Figure 4.2 shows the relationship between per capita consumption and the incidence and intensity of consumption poverty in municipalities. It is clear that increases in consumption are weakly correlated with poverty reduction in the poorest municipalities, but that this association becomes stronger among the less poor municipalities. Municipalities with an average consumption far below (above) the national average register poverty rates above (below) the national level. These municipalities are typically located in more economically dynamic urban areas. Around the average per capita expenditure level, several municipalities perform below and above national poverty levels. This reflects, in part, the differences in poverty intensity among localities. As shown in the chart on the right in figure 4.2, higher per capita consumption correlates with lower poverty intensity almost linearly, but the association becomes more dispersed among

Figure 4.2 Average per Capita Consumption and Monetary Poverty in Municipalities, Bolivia

Note: The results correspond to the low poverty line. The poverty gap is the total consumption shortfall (expressed in proportion to a poverty line) of those families (households) showing consumption below the poverty threshold, divided by the total number of families (households).
municipalities at average per capita consumption. This pinpoints the role of programs targeted at the poorest municipalities in complementing or reinforcing the impact of economic growth.

Meanwhile, figure 4.3 shows no clear-cut correlation between municipal average consumption and inequality. While most municipalities at low consumption also exhibit low inequality, we find both low and high inequality among municipalities at higher average consumption. Thus, for most municipalities (the mass of points at the bottom of the figure), there is little evidence that higher average consumption necessarily entails higher inequality. Municipalities at average per capita consumption show greater variation in inequality.

The municipal data also illustrate that inequality is a key factor in the country’s significant poverty rates. Figure 4.4 shows the relationship between inequality and the incidence and intensity of extreme consumption poverty. The horizontal and vertical
lines depict the national levels for each variable and divide each of the charts into four quadrants. High inequality and high extreme poverty are pervasive in many localities, but there is significant variation. Three groups of municipalities are worth distinguishing:

- The largest group is comprised of municipalities with high extreme poverty and low inequality (the quadrants at the bottom and on the right in each chart), which are mostly low-population, remote, indigenous communities living at a subsistence level.
- The second largest group includes those municipalities with high extreme poverty and high inequality (the quadrants at the top and on the right in each chart), which are generally larger urban localities with better resource endowments and small cities involved in mineral exploitation or the border trade with Argentina or Brazil. Small, wealthier groups typically coexist with large pockets of poverty.
- The third group consists of municipalities with low extreme poverty and low inequality (the quadrants at the bottom and on the left in each chart), which are mainly more economically dynamic urban areas.

This typology suggests that a wide range of interventions may be needed depending on the poverty and inequality levels, location, and resource endowments of the various municipalities. For instance, in many municipalities in the first or second groups, poor basic infrastructure, costly access to markets, limited natural resource endowments, low returns to human capital, ineffective protection from natural and idiosyncratic risks may all prevent poor households from engaging in higher-yield economic activities and long-term investments in human capital. Low incomes also restrict the demand for local goods and services, especially given the importance of the consumption of home production in rural areas.

In this situation, raising consumption through growth alone may be insufficient, and targeted interventions may be required to increase the incomes of the poor in these areas. Such interventions might include growth-enhancing investments; targeted programs to develop human capital, community assets, and income generation; and investments that promote gradual integration among communities by migration. Moreover, in high-poverty, high-inequality municipalities, there may be a greater risk of the elite capture of local public investments, highlighting the need for mechanisms to ensure accountability and community participation in budget development and investment.

**An additional tool for targeting**

These results confirm that monetary poverty and UBN measurement tools may capture closely related, but distinct aspects of welfare. Figure 4.5 shows that UBN and consumption or monetary poverty are not always coincident (the dark areas do not coincide). The map on the incidence of extreme poverty captures welfare from the perspective of current income-generation and consumption capacity. The map on UBN reveals the
The geography of monetary poverty in Bolivia

Figure 4.5 UBN and Consumption Poverty Maps on Municipalities, Bolivia 2001


The welfare landscape of the structural aspects of poverty related to differences in household physical assets (such as housing quality and access to basic infrastructure).9

Figure 4.6 shows the direct relationship between UBN poverty and poverty incidence and intensity (high poverty lines) with the corresponding national levels (the horizontal and vertical lines). Severe poverty—high proportions of a population with UBN and

Figure 4.6 Poverty and UBN in Municipalities, Bolivia 2001

low consumption levels—characterizes a large number of municipalities in Bolivia (note the sizable concentration in the quadrants on the top and to the right in the charts). However, the relationship between consumption and UBN measurements is weak among municipalities at moderate levels of poverty, which are precisely the municipalities where the need to go beyond geographical targeting is greater.

In this sense, the UBN and monetary poverty maps should not be viewed as substitutes. Rather, they represent complementary targeting tools. Each map or a combination of the maps might be used as a means of targeting in various, specific types of interventions or to track the evolution of different aspects of poverty. The UBN map is well suited for targeting investments in basic infrastructure or policies that promote the accumulation of assets or for monitoring the progress in closing gaps in living conditions between municipalities. The monetary poverty map is better suited for targeting income transfers or programs aimed at raising the skills of the poor, employment, or minimum income protection against risks or for tracking the impact of economic growth on different localities. Meanwhile, the consumption poverty map is better suited for studying geographical differences in the distribution of welfare within localities through indicators on the intensity and severity of poverty and Gini consumption inequality.

Multisectoral projects and monitoring of the national poverty reduction strategy might benefit by exploiting information from each of these maps. This view is in line with the concerns expressed by several observers in Bolivia that the current system of intermunicipal transfers based on targeting according to the UBN poverty maps (the formula of the 2001 law on national dialogue) tends to be less responsive to the needs of municipalities with entrenched pockets of monetary poverty. This observation is meant simply to highlight that monetary poverty maps offer important insights into the interaction of poverty and inequality at the local level and that they might help inform social investment allocations and policy design.

More Than a Technical Exercise: Uses and Impact of the Monetary Poverty Map

In this section, we discuss the extent to which, in practice, the potential of the monetary poverty mapping tool has been realized in Bolivia. To investigate the actual uses and impact of the monetary poverty map in the country, a local consultant conducted on-site interviews with potential users in February and March 2006 (Figueroa 2006). The initial list targeted interviewees at 24 institutions. Of these institutions, 14 were government agencies, including central planning and line ministries involved directly in poverty and social policy (9 of 15 government ministries), while 10 were international cooperation agencies (such as multilateral and bilateral donors) operating in the country. The interviewees were to be managers, program officers, or technical staff who were likely to be exposed to or make use of the poverty maps. In five cases, it was not possible to conduct the interviews because of staff rotations (that is, changes associated with the transition to the new government) or nonresponses.10
Interviewees were asked about their knowledge about and use of poverty maps in their work (the results of the mapping exercise, the map tool, or the mapping publication). Five levels of knowledge or application were identified: (1) planning, (2) prioritization or targeting, (3) reference within studies, (4) general knowledge, and (5) no knowledge or awareness. The results may be summarized as follows (see figure 4.7; also see annex 4.1 for a list of the institutions and their responses):

- More than half the public institutions that responded were unaware of the monetary poverty maps, while this was true of only one of the international institutions.
- Among public institutions, only UDAPE, one of the main partners in the project, has used the maps for planning purposes. UDAPE has included the map statistics on its municipal data sheets, and all the map information may be found on its Web site. Meanwhile, three of the seven international institutions that took part in the interviews used the maps in planning strategies, activities, and programs in Bolivia. For instance, as part of the assistance it has provided through the Programa de Apoyo a la Democracia Municipal (Program to Support Municipal Democracy), the Swiss Agency for Development and Cooperation has included consumption and poverty indicators from the mapping exercise in the program database used by all municipalities in the country. Similarly, the United Nations Development Programme has used the municipal estimates of per capita consumption in calculating its municipal human development indexes.
- Only one public agency, the Directorio Único de Fondos (the Unified Directorate of Funds, which, until 2005, was part of the Ministry of Popular Participation), has used the maps to target resources. This is the entity charged with administering funds for public productive and social investments and for regional development. It has an important role in the coordination and financing of poverty reduction interventions at the local level. It has used the maps in the selection of the beneficiary municipalities for the Programa Contra la Pobreza y Apoyo a la Inversión Solidaria (Program against

**Figure 4.7 Uses for and Awareness of Monetary Poverty Maps among Institutions, Bolivia**

<table>
<thead>
<tr>
<th>Category</th>
<th>Public Institutions</th>
<th>International Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>7%</td>
<td>37%</td>
</tr>
<tr>
<td>Targeting</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>Reference – Studies</td>
<td>21%</td>
<td>25%</td>
</tr>
<tr>
<td>Reference – General</td>
<td>7%</td>
<td>25%</td>
</tr>
<tr>
<td>Did not know</td>
<td>58%</td>
<td>13%</td>
</tr>
</tbody>
</table>

**Source:** Based on field interviews described in Figueroa 2006.
Poverty and in Support of Solidarity Investments), a community investment program funded at US$36.6 million and sponsored by the Inter-American Development Bank. It has also used the maps in setting budget limits for selected municipalities. The maps were also used in a study by a private consultant for the directorate that sought to select beneficiary municipalities for the support provided by the German Agency for Technical Cooperation to strengthen institutions in Bolivia. The initiative was never completed because of the change in the administration in government. Among international agencies, no organization has used the maps for targeting purposes.

One-third of the public institutions and one-half of the international organizations that participated in the interviews were aware of the results of the poverty mapping exercise, but had not used the maps in strategy or program design. This included the Japan International Cooperation Agency, which financed the second printing of the publication on the poverty maps, but which did not make extensive use of the maps in targeting interventions. Most of the institutions used the publication in the development of other studies or tools. For example, the Division of Health Reform Planning of the Ministry of Health compared the municipal rankings on extreme poverty with the rankings from a composite health index that had been developed to identify localities needing special interventions to ensure the achievement of the Millennium Development Goals in health. This highlights the potential use of poverty maps in monitoring the Millennium Development Goals at the local level (Gigler and Terborgh 2006). The World Food Programme likewise used the municipal poverty data and the human development indexes of the United Nations Development Programme (which in turn uses per capita municipal consumption as a main component) as a check on its food vulnerability index. Similarly, the Planning Division of the Ministry of Education used the information on municipal poverty incidence as a reference in the development of its multiannual operations program, 2004–08.

Overall, these results suggest that monetary poverty maps have had a modest impact on policy making in Bolivia. More than half the interviewees were not aware of the existence of the maps, although, having learned about them, many expressed interest and thought the maps might be valuable to their work. Even among the interviewees who knew about the tool, the use of monetary poverty maps in planning and targeting has been limited. Indeed, although a major motivation for the development of the tool was to help meet the requirements of the formula established for intermunicipal transfers by the law on national dialogue, this use has not materialized. While the decentralization of expenditures and targeting based on UBN have had positive effects in reducing disparities in access to basic services, investment allocation policies have not yet exploited the potential of monetary poverty maps for the more accurate targeting of interventions aimed at expanding the opportunities for income generation among the poor.

The prevailing economic and social environment in Bolivia and the interviews with stakeholders suggest three main factors behind these limited impacts: (1) the country’s generally fragile political and institutional context in recent years; (2) the weak effort in
dissemination and outreach; and (3) the lack of sustained, broad capacity building, including plans to update or develop applications of the mapping tool. We discuss these three factors in the next sections.

**A Challenging Political and Institutional Context**

It is not possible to isolate the reasons for the limited adoption, use, and impact of monetary poverty maps from the political and social turmoil in Bolivia in recent years. The country’s political situation changed dramatically in late 2003. Discontent and social unrest over the economic and social situation and the export policy on natural gas forced President Gonzalo Sánchez de Lozada to step down. He was succeeded by Vice President Carlos Mesa, who later resigned as a result of social and political pressure to hold national elections. Social and political conflict dominated the political landscape. It became difficult to adopt policy innovations or reforms. Policies were devised in an incremental fashion so as to avoid resistance and social unrest. Public institutions lacked the stability or focus to formulate and implement plans with longer-term objectives.

Reforming the criteria for public resource allocation was particularly difficult. There was a legitimate and shared concern over the narrow policies on basic infrastructure investment, which did not address the need to create employment opportunities and income generation among the poor. This led to a renewed focus on production and income-generation policies in sectors supported by the general economic policy, known as *Bolivia Productiva*, established through the law on national dialogue. However, while some voiced alarm at the inequities in the UBN-based formula for intermunicipal transfers (particularly in municipalities with moderate poverty levels), those localities that stood to lose from the new allocation criteria opposed changing the existing criteria the most fiercely. Moreover, there was clear evidence that the UBN-based allocation formula of the law on national dialogue had enabled improvements in the access to basic services among the neediest municipalities. Hence, policy makers saw no urgency to change the criteria.

UDAPE and the INE, the two institutions that championed the development of the monetary poverty maps, lacked the support to promote the use of the maps. In early 2003, UDAPE, which had been part of the Ministry of Sustainable Development and Planning, was attached to the Ministry of the Presidency. At the end of 2003, it was placed under the Ministry of Economic Development, and it recently became part of the Ministry of Planning and Development. During these shifts, UDAPE was transformed from a technical unit with responsibilities in planning and analysis, to an entity responsible for interministerial coordination. Meanwhile, the INE was underfunded and experienced significant turnover in personnel. These factors severely limited the ability of these organizations to assume ownership and engage in the proactive diffusion of the mapping tool.

In January 2006, Evo Morales became Bolivia’s first indigenous president, and the country regained some political stability. The government has faced numerous, more urgent, and overarching concerns involving the constitutional assembly and the reassessment of the economic policy framework and use of natural gas resources. Government policy is constrained by the need to avoid social and political polarization and reconcile
diverging priorities among the multicultural populations of the country. However, the creation of opportunities for income generation among the poor, particularly the indigenous population, remains one of the main goals of the new government. The use of monetary poverty maps is being considered in several of the proposed initiatives. In particular, the 2006 Plan Nacional de Desarrollo (National Development Plan) includes the programs Comunidades en Acción (Communities in Action) and Comunidades Recíprocas (Reciprocal Communities) that are said to rely on the consumption poverty map to identify municipalities for priority intervention.

Weak Effort in Dissemination and Outreach

One of the most obvious reasons for the modest impact of the monetary poverty maps, corroborated in the interviews, has been an inadequate, underfunded dissemination strategy. Dissemination and the promotion of the application of the monetary poverty maps were not provided for in the initial project of collaboration between UDAPE, the INE, and the World Bank or in the individual plans of the three institutions. There was no involvement of other institutions or potential users at the beginning or during the development of the maps. Outside the team members, few knew about the initiative. No resources were contemplated for the timely publication and dissemination of the results.

The mapping publication has been substantially underfunded. The distribution of the publication was launched during a seminar at the INE in July 2003. The participants included the directors of the INE and UDAPE and representatives of many public and private institutions that were considered potential users. However, there was no serious planning behind the distribution effort. The first printing of the mapping document—300 copies financed by the U.K. Department for International Development—was quickly distributed among high-level officials concerned with social policy and representatives of international cooperation agencies. The second printing, a run of 250 copies in January-March 2006 financed by the Japan International Cooperation Agency, was also exhausted within a few weeks. Further dissemination efforts were curtailed by the country’s social and political instability. As a result, the publication has been distributed among only a few local entities, mainly in the municipalities of Chuquisaca, El Alto, and La Paz.

Moreover, the format and limited distribution of the results of the poverty mapping exercise are not amenable to access by a wide audience. Many of the institutions that reported using or knowing about the maps find the publication too dry and academic. They complain that it contains too many complicated tables, which makes it difficult for nonspecialists, particularly policy makers. The methodology remains obscure for many; the main concepts and the various indicators of poverty and inequality are not explained in lay terms. This undermines the usefulness of the results. In addition, there is no interface to render the data results accessible for easy consultation by users. The mapping publication is currently available on the Web sites of both UDAPE and the INE (see http://www.ine.gov.bo and http://www.udape.gov.bo). Meanwhile, the data are only available, upon request, as spreadsheets as a component of the geographic information system on UDAPE’s Web site; there is little documentation or guidance on their use.
Thus, intermediate technical staff in and outside government who may want to use the tool are not likely to be able to do so. Both UDAPE and the INE have lacked sufficient support to make these tools more friendly to users.

The limited dissemination that has taken place has been traditional and has not effectively emphasized the innovative aspects of the work. For example, characteristics that make the poverty mapping tool especially relevant for Bolivia—such as the measurement of the extent of monetary poverty in some areas where UBN poverty has not been so severe, as well as the availability of municipal indicators of inequality and the intensity and severity of poverty—have not been widely publicized. Little is known about the contribution of the monetary poverty maps to decision making or more effective resource allocation among local governments.

However, there is a latent unsatisfied demand for the maps. The majority of the institutions that participated in the interviews, but had not known of the maps, found the results of great interest for their work and were therefore surprised and disappointed at the limited distribution. Many, including staff at the Ministry of Public Works, the Ministry of Agriculture and Rural Development, and the Ministry of Health, indicated that, if they had been aware of the maps, they would have used them in targeting through ongoing programs and activities. Nonetheless, there are currently no other plans for additional distribution of the maps.

**Lack of Broad, Sustained Capacity Building**

While local capacities have been created for updating or developing new maps, this has not been sufficiently broad to be sustained and generate demand for the mapping tool among potential users. This is related to the lack of an effective distribution plan from the start of the project and to the high turnover among technical staff because of the weak civil service, which is a common feature in most of Latin America.

The direct responsibility of UDAPE for the actual production of the maps means that the methodologies have been acquired by the local team and might still be applied today with little technical guidance from specialists from the World Bank or elsewhere. This is certainly a positive accomplishment. However, this has involved only a small number of local people, several of whom are no longer with UDAPE or the INE. Indeed, some of the institutions that participated in the interviews and that had been unaware of the existence of the mapping tool had requested municipal data on poverty from the INE, but were only given data from the UBN poverty maps, even though the monetary poverty mapping results have been available on the INE Web site since late 2003. Most prominently, this reportedly happened to the Division of Local Economic Development in the Undersecretariat of Decentralization.

There has been no systematic attempt by the poverty mapping team to train other local staff, researchers, or potential users on the main methodological underpinnings and possible uses of the maps. Most of the interviewees remarked that there was no training being offered in the application of the tool and that the publication offered no examples of how the tool might be applied to help solve problems in development policy. Many
of the interviewees showed a lack of understanding of fundamental concepts, such as the differences between UBN and monetary poverty measures, the reason for the differences in estimates based on different poverty lines, the suitability of different poverty lines for different purposes, and the reason for statistical errors in estimates derived from population census data. None of the interviewees knew the poverty maps also covered indicators of inequality that greatly expanded the potential application of the maps to the design of local development policies and programs.

There were also two significant criticisms of the monetary poverty maps themselves that related to applications. First, a number of institutions participating in the interviews indicated that the aggregation level of the mapping data was insufficient to be useful in certain, specific activities. For example, the World Food Programme, the German Agency for Technical Cooperation, and the Ministry of Indigenous Affairs all reported on initiatives at a community rather than municipal level and called for the development of a targeting tool disaggregated at the community level. Second, several interviewees criticized the UBN and monetary poverty maps because they are not periodically updated. If regularly updated maps were available, they would be able to track changes in indicators of poverty and social inequality in the localities in which they operate.

Conclusions and Lessons Learned

Poverty maps effectively reveal the heterogeneity of poverty in its multiple dimensions and the contrasting inequality levels in a country. In the case of Bolivia, the UBN poverty maps have effectively influenced the investment allocation process, facilitated the redirection of resources to the neediest municipalities, and helped these municipalities close gaps in access to basic services. Developed in 2003 using the small area estimation method to enable more effective targeting of interventions aimed at improving income opportunities among the poor, the monetary poverty maps have not lived up to their promise. Interviews with experts at a significant number of entities in and outside the government show that over half the potential users were still unaware of this tool, while those who were aware were not exploiting it fully in the formulation and targeting of their strategies and programs.

Three main factors have hindered monetary poverty maps from having a bigger impact. First, the social and political turmoil in Bolivia in recent years and the weak institutions in the country have caused public policy horizons to be limited to the short term, have stalled reform, and have contributed to high turnover among technical staff in public institutions. Second, there has not been an adequate program of dissemination and outreach to spread awareness of the maps. Third, the initiative did not contemplate broad capacity building and the training of potential users to ensure the sustained application of the tool to real development policy problems. While some of these factors are common elsewhere in Latin America and the developing world, other countries have been more effective in overcoming them to take advantage of poverty maps to improve public policy.12

The interviews with stakeholders suggest that there is significant latent demand in Bolivia for the monetary poverty mapping tool. While the country’s political situation
imposes numerous challenges and short-term imperatives, the creation of opportunities for income generation among the poor remains a critical issue for the government and international cooperation agencies. The experience so far points to a few lessons that might help Bolivia and other countries tap more effectively into the potential offered by poverty maps to improve the design and impact of poverty reduction policies:

- The development of poverty maps should be viewed as part of a broader reform agenda, not as a narrow technical exercise. Maps may be effective tools to enhance the planning, targeting, and evaluation of public policies. Hurdles common to other reforms or policy innovation must be overcome in the application of these tools. These hurdles include short-term planning horizons, weak institutional capacities, and capture by special interests. Thus, it is critical to adapt the development of these tools according to the country context and political economy considerations and to approach them as building blocks of broader incremental reforms.

- Seek to build effective dissemination, outreach, and capacity-building objectives and strategies at the onset. Without effective means to convey findings, encourage applications, and establish a broad base of trained staff and competent users, poverty maps are likely to represent a significant untapped potential to improve public policy. They will remain merely pretty pictures of a sad reality. Beginning with the effort to develop the maps, one should therefore contemplate the creation of the institutional means necessary to achieve sustained country ownership, identify the intended audience, and devise effective ways to attract interest and enable potential users to apply the tools.

  For instance, offering training to academics and graduate students, independent researchers, and technical staff in selected government institutions may help form a broader base of skilled practitioners and users of the tool. It is essential to ensure accuracy and credibility by fostering transparency and exercising methodological rigor in the publication of results, but it is also essential to supply clear, careful explanations of methods, findings, and applications suited to potential users. This requires reliance on numerous avenues for distribution, including nontechnical pamphlets, computer-based presentations, and data sheets, as well as an electronic interface that allows agile data search and cross-tabulation with other disaggregated data on the multiple determinants of poverty (for example, agroclimatic conditions, road infrastructure, and the supply of education and health services). It is particularly important to reach out to local government bodies in these efforts.

- Continue to work on the development of methodologies to enable periodic updating of the maps. The updating of UBN poverty maps is certainly restricted by the need to be tied to population censuses. However, ways to track changes in monetary poverty regularly at the local level through extensions of small area estimation map applications is a current area of research at the World Bank. Since regular updating would enhance the value of the maps for users, including in the local monitoring of the Millennium Development Goals, the development of the related methodologies should be supported.
## Annex 4.1 Use of the Monetary Poverty Maps by Governmental and International Institutions, Bolivia

<table>
<thead>
<tr>
<th>Institution</th>
<th>Indicator</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Economic Development, Vice-Ministry of Urban Development and Housing</td>
<td>Was unaware of the poverty maps</td>
<td>UBN maps and maps based on human development indexes are used to allocate resources to urban and rural settlements</td>
</tr>
<tr>
<td>Ministry of Sustainable Development and Planning, Vice-Ministry of Planning and Territorial Development</td>
<td>As above</td>
<td>Develops its own maps and uses them in the selecting of municipalities for various purposes</td>
</tr>
<tr>
<td>Ministry of Public Works, Vice-Ministry of Basic Services</td>
<td>As above</td>
<td>The food vulnerability index map was used to select high-poverty areas</td>
</tr>
<tr>
<td>Ministry of Popular Participation, Directorate for Social Development</td>
<td>As above</td>
<td>The monetary poverty maps might have been used for interventions to provide health care, education, school feeding, and so on</td>
</tr>
<tr>
<td>Ministry of Health, National Program for Health Coverage Extension</td>
<td>As above</td>
<td>The UBN maps were used to target interventions</td>
</tr>
<tr>
<td>Ministry of Agriculture and Rural Development, General Directorate for Agriculture</td>
<td>As above</td>
<td>The food vulnerability index map has been used to select areas of intervention</td>
</tr>
<tr>
<td>Ministry of Agriculture and Rural Development, Vice-Ministry of Microenterprises and Rural Development</td>
<td>As above</td>
<td>The monetary poverty maps will be used to transfer resources within the National Strategy for Agriculture and Rural Development</td>
</tr>
<tr>
<td>Ministry of Popular Participation, Vice-Ministry of Decentralization</td>
<td>As above</td>
<td>The UBN maps have been used as a reference</td>
</tr>
<tr>
<td>Ministry of Indigenous Affairs</td>
<td>As above</td>
<td>The UBN maps have been used in the identification of local needs</td>
</tr>
<tr>
<td>Ministry of Labor</td>
<td>As above</td>
<td>Has shown no interest in the mapping results</td>
</tr>
<tr>
<td>UDAPE</td>
<td>Consumption and extreme poverty</td>
<td>Infant, child, and adolescent development index in municipalities, local booklets, dissemination results on the Web site</td>
</tr>
<tr>
<td>Ministry of Popular Participation, Unified Directorate of Funds</td>
<td>High poverty rates</td>
<td>The monetary poverty maps have been used to select beneficiary municipalities for the Program against Poverty and for Social Investment and to establish budget limits on selected municipalities</td>
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</tr>
<tr>
<td>Ministry of Health, Division of Health Reform Planning</td>
<td>Extreme poverty rates</td>
<td>The monetary poverty maps have been used to check a map of municipalities identified as priorities for health interventions that were part of the effort to achieve the Millennium Development Goals on health</td>
</tr>
<tr>
<td>Ministry of Education, Planning Division</td>
<td>Full document</td>
<td>The monetary poverty maps have been used as a reference during the development of the multiannual operations program, 2004–08</td>
</tr>
</tbody>
</table>

**International institutions**

<table>
<thead>
<tr>
<th>German Agency for Technical Cooperation, Decentralized Governance to Support the National Poverty Reduction Strategy Programme</th>
<th>The map document was known only as a reference</th>
<th>The monetary poverty maps were not used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan International Cooperation Agency</td>
<td>The map document was known only as a reference</td>
<td>The monetary poverty maps have not been used; however, the organization financed the second printing of the mapping publication</td>
</tr>
<tr>
<td>United Nations Development Programme</td>
<td>Consumption</td>
<td>Development of municipal human development indexes</td>
</tr>
<tr>
<td>United Nations Children’s Fund</td>
<td>Extreme poverty</td>
<td>Development of the municipal infant, child, and adolescent development index</td>
</tr>
<tr>
<td>World Food Programme</td>
<td>Consumption</td>
<td>The monetary poverty maps have been used to validate the food vulnerability index</td>
</tr>
<tr>
<td>Swiss Agency for Development and Cooperation, Program to Support Municipal Democracy</td>
<td>Consumption and extreme poverty</td>
<td>The monetary poverty maps have been used to add information to the municipal database for use by local governments</td>
</tr>
<tr>
<td>Food and Agriculture Organization of the United Nations</td>
<td>Was unaware of the mapping document and the maps</td>
<td>The food vulnerability index and human development index maps have been used to select intervention areas</td>
</tr>
</tbody>
</table>

Source: Based on field interviews by Figueroa 2006.
Notes

1. In this chapter, monetary poverty and consumption poverty are used interchangeably. The terms refer to the inadequacy of resources (both cash expenditures and home produced goods consumed by the household) relative to a poverty line that is specified in monetary terms. This is in contrast to the UBN approach to poverty measurement, which uses an index based on the possession of specific assets and the access to specific services.

2. The team included Wilson Jiménez and Susana Lizarraga from UDAPE, Gustavo Canavire and Javier Monterrey from the INE, and Werner Hernani, Peter Lanjouw, and Quentin Wodon from the World Bank.

3. See INE and UDAPE (2003). By 2004, three poverty maps had been developed, all using data from the 2001 census and the latest household surveys. The first followed on the methodology of the 1994 UBN poverty map. The second relied on the small area estimation method, and the third used the human development index of the United Nations Development Programme. Only the small area estimation method explicitly emphasizes the monetary dimension of poverty.

4. Consumption is proxied by expenditures on goods and services acquired by the household for consumption purposes (per family member, excluding domestic employees). These cover household production for personal consumption, durables, and the implicit rental of housing. The independent variables include the characteristics of the household (number of members, type of household, number of children under 6 years old, and so on), the dwelling (number of rooms, quality of walls and floors, electricity, water, sanitation, cooking fuel), durable assets (televisions, stereos, cars), the household head (schooling, mother tongue, migration status, employment, occupation, age, gender), and the surrounding community (basic infrastructure and services).

5. The single survey sample sizes were 3,247, 4,994, and 5,845 dwellings, respectively. In the end, the pooled sample contained 1,501 primary sampling units and 13,328 dwellings.

6. The low and high poverty lines are, on average, 32 and 68 percent higher, respectively, than the extreme poverty line.

7. The variation in poverty levels is actually larger than depicted in figures 4.1 and 4.5, where municipalities have been grouped according to only four poverty categories.

8. The complete results are described in World Bank (2005), annex 1.2.

9. The divergence and variation in UBN and consumption poverty levels are larger if one compares the concentration of the poor (that is, the absolute number of the poor rather than poverty rates) and, also, if one contrasts individual municipal indicators rather than grouped data.

10. This occurred particularly with the Ministry of Justice, the Vice-Ministry of Women’s Affairs, the Pan American Health Organization–World Health Organization, the United Nations Population Fund, and the European Union. See Figueroa (2006) for details on the institutions and interviewees.

11. UDAPE staff have told us that there are many technical (equipment) barriers to the development of an online interface that allows users to obtain poverty map statistics tailored to their specific needs.

12. See, for example, the experience of Brazil and Ecuador elucidated in Henninger and Snel (2002) and the experience of other countries discussed in this volume.

References


