

Experiences with the Development and Use of Poverty Maps

Case Study Note for SOUTH AFRICA*

1. Background information on the poverty mapping initiative

The development of poverty maps in South Africa was originally initiated due to an interest in exploring their possible use in facilitating the allocation of municipal grants. Since 1998, the Division of Revenue Act (#28) has required the equitable distribution of nationally raised revenue to municipalities based on poverty levels. Under this act, unrestricted municipal grants are allotted based on the number of poor households and costs associated with providing household-level basic services. Originally, census data on income were used to determine the number of poor households in each municipality. However, the use of these data raised concerns, as the South African census, unlike most income surveys, did not use a detailed module, but rather relied on one brief question on income (Alderman et al. 2001).

In 1999, Harold Alderman, resident World Bank staff in South Africa, approached the then Deputy Director General of Statistics South Africa (Statistics SA) about using a new methodology combining census and survey data to estimate the number of poor households and generate highly disaggregated poverty maps (Hentschel et al. 2000). The process would involve two stages: 1) determining whether poverty estimates based on census data were comparable to those based on the Income and Expenditure Survey (IES) data (the best available data on income in South Africa at the time, but limited to provincial aggregates only), and 2) producing a highly disaggregated poverty map based on the better measure of poverty. If the outcome of the first stage revealed that census income data were a poor measure of household welfare compared to IES income data, then a highly disaggregated poverty map would be created by imputing expenditure from the census data using IES data. (In general, consumption expenditure produces more reliable household welfare descriptions than household income.) Initially, there was some reluctance to conduct this assessment, because of data compatibility concerns (e.g., between the 1991 and 1996 censuses) and data access issues (e.g., releasing census data to an external organization) (see Section 2). However, senior-level support was eventually obtained.

* This study note includes contributions from Miriam Babita, Statistics South Africa (miriamb@statssa.pwv.gov.za) and Berk Özler, World Bank (bozler@worldbank.org) and was edited by Mathilde Snel, Miriam Babita, and Norbert Henninger. A summary of all case studies can be found at: <http://population.wri.org/> or <http://www.povertymap.net/pub.htm>

2. Process of poverty mapping

Comparing poverty estimates generated from census income data to those based on the IES showed that census data produced unreliable estimates of welfare. The census income data were found to differ substantially from the IES income data and to heavily understate poverty in rural areas. Because census income data are a weak proxy for poverty rates, a poverty map was developed based on 1995 IES and October Household Survey (OHS) data combined with 1996 census data. With technical assistance from the World Bank, a team of four individuals at Statistics SA developed the poverty map.¹ Activities included: development and application of statistical estimations; producing poverty rates based on imputed expenditure of census households; creating the final poverty map; and co-authoring papers (Alderman et al. 2001, Statistics SA 2000). The assessment took approximately one year to complete (from March 1999 to March 2000). Emphasis was placed throughout on developing skills (such as development and application of statistical estimation techniques, data exploration, editing and handling large statistical data sets, and writing technical reports) and building ownership of data results. This was particularly important since there had initially been some senior-level concern over data ownership, particularly in a context in which a large international organization (i.e., the World Bank) would be handling in-country data. The use of this capacity development approach helped build trust between the two organizations and reassure senior-level South African staff that the research was intended to respond to country needs.

Development of the poverty map posed some unexpected challenges. The 1995 OHS and IES survey data were based on apartheid administrative units used in the 1991 census. Linking the OHS and IES survey with the new 1996 census data, which was based on post-apartheid administrative areas, required comparing and matching different geographic units; for example, various homeland areas were no longer used as of the 1996 census. Furthermore, the 1991 census had not been conducted uniformly, leading to a controversy over the actual population count. While there was some skepticism about the ability to match the different administrative units, the poverty mapping initiative gave impetus to an effort to make these spatial data sets compatible. The Statistics SA team succeeded in matching the different geographic areas by relying on geographic technologies and techniques. This exercise built capacity within Statistics SA to conduct a number of subsequent poverty assessments based on other geographical configurations (e.g., for police areas, municipalities, and health districts; see Section 3). In addition, the effort gave Statistics SA an opportunity to organize and improve its spatial databases. The matched 1991 and 1996 geographic areas have subsequently been used in several other assessments (e.g., in the development of the South African census time-series database at the University of Pennsylvania for Pan African Census Explorer (PACE)).

¹ Miriam Babita, Nthabiseng Makhatha, Amina Mohammed, and Olivia Qaba from the Statistics SA were involved in conducting the assessment and developing the poverty maps. Miriam Babita was involved primarily with the census data and poverty map production, while Nthabiseng Makhatha conducted most of the survey-related work. The World Bank's Harold Alderman and Berk Özler provided technical assistance.

After cleaning and matching the data sets, small-area estimation methodology was used to develop a prediction model for expenditure using OHS, IES, and 1996 census data (Elbers et al. 2000, Hentschel et al. 2000).² Initially selected were variables in the OHS and IES that were also found in the census.³ A regression model was run on the OHS and IES (exogenous) variables and consumption expenditure. In turn, the model's parameters were applied to census data to impute expenditure for all South African households covered by the 1996 census. Poverty rates were subsequently estimated using poverty lines.⁴ The calculated poverty statistics were disaggregated to province, district council, and magisterial district levels.⁵ Poverty statistics were based on the headcount index; work is underway to develop other poverty measures, such as poverty gap and inequality measures.

To raise awareness of the poverty map results, several papers were written (Alderman et al. 2001, Statistics SA 2000) and presentations were made to various national, international, and local agencies. These agencies included the staff of Statistics SA, the President's office, Health Ministry, Department of Provincial and Local Government, U.S. Agency for International Development, various academic institutions, and numerous provincial-level government agencies. In addition to in-country presentations, briefings were given at the request of various international agencies and regional organizations, including in Ethiopia (ECA/CODI II, September 2001), Kenya (ILRI/Rockefeller/IFPRI/AERC Poverty Mapping Workshop for Kenya, Malawi, Mozambique, Tanzania, and Uganda, January 2001), Uganda (PARIS21 for East Africa and the Horn, July 2001), and Zambia (SADC/PARIS21, December 2000). Furthermore, a presentation will be given at a SADC/EASTC workshop on poverty mapping. Miriam Babita, a Statistics SA staff member who has been integrally involved in the development of South Africa's poverty map, was an instructor at the AERC/WB poverty mapping training course in Nairobi (December 2001).

Aside from geo-data compatibility concerns (e.g., matching the apartheid and post-apartheid administrative units) and having to add geographic codes to over nine million households in the census (i.e., province, district council, magisterial district, place name, transitional local council, and municipality codes), few challenges were faced in developing the South Africa poverty maps. Statistics SA had sufficient computer facilities and expertise to conduct the statistical estimations and to develop the poverty maps. A small group (three individuals at the head office and one at the provincial level) was trained to develop the statistical estimations and poverty maps; this may become a concern in the future, especially as staff are promoted or leave the agency. This concern is being addressed by training additional provincial-level staff to handle information requests from provincial-level users.

² When combined, the 1995 OHS and IES surveys include approximately 28,585 households, while the 1996 census covered over nine million households.

³ Note that results of the IES and OHS were designed to be merged. While the IES was conducted slightly later, the same households were interviewed for both surveys.

⁴ Two poverty lines were used to estimate household and individual poverty rates. The household-level poverty line was 800 rand; households with incomes below this level were considered poor for the purposes of the municipal grants program. The per capita poverty line was set at 250 rand.

⁵ South Africa contains nine provinces, 45 district councils, and 354 magisterial districts.

3. Use and impact

Poverty maps have been used in several applications in South Africa, ranging from allocating municipal grants to containing a cholera outbreak. Described below are the most notable uses that have produced the greatest impact. These by no means form a complete list: other uses not reported here include poverty profiles for NGOs (such as the Women's Development Bank) as well as private-sector uses (e.g., in commercial banks).

First, the poverty map has been used to allocate municipal grants; an inquiry concerning this program sparked development of the poverty maps in the first place (see Section 1). The equitable shares grant is a system of intergovernmental transfers based on an objective formula. The program is intended to embody the principles of equity, efficiency, and democracy. It is specifically provided for by sections 214(1)(a) and 227(1)(a) of the South African Constitution, which state that:

- (i) an Act of Parliament must provide for the equitable division of revenue raised nationally among the national, provincial, and local spheres of government; and
- (ii) local government is entitled to an equitable share of revenue raised nationally to enable it to provide basic services and perform the functions allocated to it.⁶

The formula used to distribute grants among individual municipalities takes into account several factors, including the number of poor households, average household size, number of households without access to basic services (e.g., sanitation, safe water), and the estimated cost of providing such services in each municipality.⁷ The poverty map results were used for the first time in the 2001-2002 fiscal year to improve information on the number of poor households, replacing previous estimates based on census income.⁸ The total allocation for the 2001-2002 fiscal year amounted to approximately SA Rand 2.6 billion (US\$305 million, based on the June 2001 exchange rate).⁹ In addition to use for the 2001-02 fiscal year, poverty maps provided the municipal grants program with a basis for the program's first ever medium-term, three-year budget (2001-04).¹⁰ The current use of poverty map data has led to better targeting and budgetary planning at the municipal level.

Another notable use of the South Africa poverty map has been to help contain the spread of cholera in Kwazulu-Natal province in early 2001. In formulating a disease control strategy, the Department of Health (DOH) worked with Statistics SA and other government departments in the so-called Social (sector) Cluster to acquire the necessary

⁶ For more information on the equitable municipal grants program see <http://www.local.gov.za/DCD/dcindex.html>

⁷ This distribution of grants is determined by the Department of Provincial and Local Government.

⁸ Note, however, that census and other data were used to obtain baseline demographic and socioeconomic information, such as average household size, number of households without access to basic services, and the estimated cost of providing services.

⁹ Although allocations are determined annually, municipal grant transfers are made on a quarterly basis.

¹⁰ There are plans to revise and update this provisional budget as more information becomes available.

information for targeted intervention. The DOH provided disease data, Statistics SA provided poverty map data and information on sanitation, and the Department of Water Affairs (DWA) provided information on safe and clean water in the country. The DWA combined the various data sets and produced maps of high-risk areas. The combined poverty and cholera outbreak maps were very revealing. First, it was evident that the cholera outbreak was following a river flood plain and moving through and toward poor areas. Second, the combination of variables (e.g., illiteracy, informal/shack dwelling type, lack of basic services like sanitation, clean water, electricity, etc.) provided a good mechanism for targeting health education.

The integrated information and maps were used by the DOH, other Social Cluster departments, and local government authorities to develop a collaborative strategy to help stop the spread of cholera. The strategy included: provision of portable toilets and tankers of safe water to affected areas; refresher epidemiological training and redeployment of health personnel to affected areas; health education and awareness of good hygiene practices in affected and potentially high-risk areas; and provision of health promotion materials and additional health services in affected areas. The collation and use of information from diverse research and administrative sources encouraged the collaboration of various institutions, providing an opportunity to offer integrated services. The DOH's speedy and well-coordinated response led to effective containment of the cholera within three months, resulting in a very low fatality rate of 0.22% (among approximately 100,000 cases). This work helped prevent an outbreak of epidemic proportions across the country. This particular case study prompted calls by various service providers for further research on and provision of vulnerability and natural disaster maps to help in planning and responding to floods, fires, drought, and other natural disasters.

Another known use of the poverty map results is in an ongoing study of the socioeconomic factors correlated with crime. This information will be used to help develop crime prevention strategies in South Africa. The poverty map has also been used as a major input in the formulation of nodal areas for priority work under the Integrated Sustainable Rural Development Programme (ISRDP) and for the Urban Renewal Programme (involving integrated and fast-track provision of services such as education, health, and infrastructure). Furthermore, communities and their political representatives are making use of poverty profiles and maps to assess and evaluate their development status. Planners and researchers in both the public and private sectors and NGOs continue to use the poverty map data to plan interventions and to help ensure the efficient and effective use of resources. In general, the poverty map data have helped fill a gap for development information and are being directly used in policy, program planning and design, and monitoring and evaluation. Current trends show that, as poverty maps are updated and improved, their use will continue to grow.

The poverty map results have had a significant impact on decision-making in South Africa. Various government departments have indicated that their use of the poverty maps has helped highlight poor areas that had previously gone unnoticed as well as helping to substantiate intervention in areas previously assumed to be poor but for which

there was no supporting evidence. The poverty maps provide an easily understandable format and are an important communication tool (one that is easier to interpret than spreadsheets or tabular data) to focus attention on poor groups and to encourage integration of the issue of poverty in policy and program design.

Moreover, the development of poverty maps has had tremendous institutional impact on Statistics SA. The agency's involvement in the development and provision of the poverty map data has improved its institutional credibility. Traditionally, Statistics SA was considered a *data* provider; however, the use of the poverty maps and data has broadened and enhanced Statistics SA expertise to include analyses. Increasingly, the institution is being viewed as a *knowledge* provider. Since the development of the poverty map, Statistics SA has been asked to contribute to the development of numerous strategies (e.g., a crime prevention strategy; see above). The production and utilization of poverty map data has contributed to a change in the Statistics SA's image, from an agency that prior to 1994 provided finely disaggregated information for selected, often urban areas, to an institution committed to contributing to the socioeconomic development of South African society as a whole. The institution's success in matching the geographic areas in the 1991 and 1996 censuses has led to other collaborative projects (e.g., the development of a time-series database on the South African census; see Section 2). Furthermore, the development and wide utilization of poverty map data have enhanced the skills and capacity of Statistics SA staff, who are undertaking progressively more challenging tasks.

Aside from in-country impacts, the South Africa poverty mapping initiative has influenced the development of poverty mapping initiatives elsewhere. Several presentations—including in Ethiopia, Kenya, Malawi, Mozambique, Tanzania, and Uganda (see Section 2)—have been given on South Africa's experiences in poverty mapping. Due in part to such awareness building, the International Food Policy Research Institute (IFPRI) became involved in developing poverty mapping initiatives in Malawi and Mozambique. Owing to an approach that has emphasized genuinely working as partners, building in-country capacity, and developing national ownership of the poverty map and data results, the use of the poverty maps in South Africa is widespread and its impact substantial.

Bibliography

- Alderman, H., M. Babita, G. Demombynes, N. Makhatha, and B. Özler. 2001. *How Low Can You Go? Combining Census and Survey Data for Mapping Poverty in South Africa*. mimeo, DECRG. The World Bank.
- Elbers, C., P. Lanjouw, and J. Lanjouw. 2002. "Micro-Level Estimation of Poverty and Inequality" *Econometrica*, forthcoming.
- Statistics SA. 2000. *Measuring Poverty in South Africa*. Pretoria: Statistics South Africa.