Experiences with the Development and Use of Poverty Maps

Case Study Note for MALAWI*

1. Background information on the poverty mapping initiative

Recognizing the growing demand for high-resolution poverty data[1] and with increased awareness of the possibilities of poverty mapping, the International Food Policy Research Institute (IFPRI) in 1999 developed a proposal soliciting funds to support the creation of poverty maps in Malawi and Mozambique. At the time, IFPRI was already involved in a Danish (DANIDA)-funded project in Malawi focused on providing technical assistance to develop a poverty monitoring system. As part of this project, IFPRI worked jointly with Malawi's National Statistics Office (NSO), National Economic Council (NEC), and Center for Social Research (CSR) to conduct a poverty analysis of the 1997-1998 Integrated Household Survey (IHS) data. Funds earmarked for poverty mapping were successfully obtained from the Rockefeller Foundation. Development of the poverty map began in earnest in January 2001 and is due for completion in March 2002.

While poverty mapping is new to Malawi, the country did conduct Vulnerability Assessment and Mapping (VAM) in 1996 as part of a USAID-funded Famine Early Warning Systems (FEWS) project. The VAM developed three vulnerability maps—on poverty, food deficiency, and malnutrition—based on a principal components analysis using numerous variables (such as agricultural yields, percentage children enrolled in school, and access to safe water).[2] A composite vulnerability map was also developed at an Extension Planning Area (EPA) level (Moriniere, Chimwaza, and Weiss 1996).[3] The VAM maps have been used by various agencies, particularly FEWS and the Ministry of Agriculture, to help identify areas in need of food security interventions.

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[1] There is considerable and growing demand for highly disaggregated poverty data in Malawi, particularly due to considering the country's current move toward decentralization. In 1998, the Local Government Act gave new responsibilities to district- and local-level government, ranging from infrastructure planning and development to making and enforcing local- and district-level policy.

[2] Various data sources were used in this analysis, including the 1991 census, UNICEF data, and NASA's Normalized Differentiated Vegetation Index (NDVI) data.

[3] In addition to principal components analysis, time-series analysis was used for variables for which data were available (e.g., on agricultural yields) to offer a greater understanding of the temporal patterns of vulnerability.

2. Process of poverty mapping

IFPRI has been working primarily with two staff at NSO to develop statistical estimations for the poverty maps.[4] In addition, the Department of Surveys (DOS) produced district, Traditional Authority (TA), and Enumeration Area (EA) boundary digital maps used to create the poverty maps[5]. The Malawi Electoral Commission furthermore provided boundary descriptions for local government wards by listing the EAs found in each ward (a geographic information systems (GIS) coverage of local government wards was built on this basis). Progress on developing the poverty maps has been relatively slow, as the project involves very large data sets (see below) and none of the staff mentioned above is working solely on poverty mapping.

The development of the Malawi poverty map relied on 1997-98 IHS survey data and 1998 Population and Housing Census data.[6] The poverty map was constructed using the Hentschel et al. (2000) methodology, with reference to Statistics SA (2000), Minot (2000), and Bigman and Fofack (2000). For rural and urban areas, a stepwise regression procedure was used on all candidate household-level variables. The development of the poverty map underwent three iterations. Due to the poor quality of IHS data, almost 50% of households sampled had to be removed from the survey data set.[7] Thus, the first iteration imputed consumption based on 22 districts/strata,[8] the second on 17 strata,[9] and the third for 23 strata.[10] To improve the predictive power of the consumption model and to eliminate some econometric problems, Enumeration Area (EA) variables were integrated to refine the consumption model. Such EA variables included distance to the nearest market center, health facility, urban center, *boma* (town), and primary or secondary road. Finally, the model's coefficients were applied to national census data to determine household-level poverty rates. Error (e.g., heteroscedasticity of the model) was estimated for each TA and local government ward in the third iteration. A fourth iteration of the poverty map is currently being developed in which additional analysis will be conducted on four or five districts that reflected slightly different poverty measures from the IHS poverty analysis in the third-iteration poverty map. This last iteration is due for completion by March 2002.

Three "poverty incidence" maps have been developed for each of the initial three iterations. The poverty maps have been developed using four spatial scales: district, TA,

[4] Technical assistance has been provided by Todd Benson, while Richmond Chinula and Shelton Kanyanda from the NSO are developing the statistical estimations.
[5] With Japanese (JICA) funding, Geoffrey Mzembe from the DOS developed the digital maps. DANIDA provided additional funds to clean the digital data.
[6] The Population and Housing census surveyed 2.4 million households (approximately 9.8 million persons). The IHS is a survey resembling the Living Standards Measurement Survey that provides detailed information on consumption and expenditure as well as other data. The IHS was administered in all districts and was carried out during the same period as the decennial 1998 census.
[7] Of the original 12,960 households, only 6,586 could be used to impute consumption.
[8] While the IHS was designed to provide data on 29 districts, due to unreliable consumption information, several sample households had to be removed from seven strata/districts. These seven strata were lumped with households in adjoining districts, leaving 22 strata.
[9] In this case, another five districts were "lumped" with districts showing similar characteristics.
[10] This involved 22 strata used in the first iteration plus separate strata for urban areas in rural zones (*bomas* (towns) and rural trading centers).

local government ward, and EA.[11] The EA poverty map results should be viewed with caution since the number of households surveyed at the EA level is about 250; some economists involved in poverty mapping argue that reliable poverty estimates can only be generated for groupings of 500 households or more. A range of poverty and inequality measures has recently been generated for each TA and local government ward (including poverty headcount, depth of poverty, poverty severity, and ultra-poverty). Most widely distributed and referred to have been poverty headcount measures. Preliminary results (based on the second iteration) show that poverty is widespread throughout Malawi. Highest poverty rates are found in the northern districts of Mzimba, Rumphi, and Chitipa; the central districts of Ntcheu and Nkhotakota; and the southern districts of Phalombe and Chiradzulu.[12]

Preparation of an *Atlas of Social Statistics*—including poverty maps, census results, and sector-specific information (e.g., education and health facilities)—is underway. The atlas is slated for wide dissemination so that this information may be incorporated in planning and policymaking. To encourage effective dissemination of the atlas, both digital (CD) and hard-copy versions of the atlas are to be produced, possibly including poverty and poverty-related time-series data sets (based on 1978, 1988, and 1998 census data). A draft atlas is scheduled for completion by March 2002. Furthermore, the poverty mapping results will also be posted on the National Statistical Office website.[13]

While a final poverty map is still in development, current challenges may help redirect future efforts. Data quality, especially with respect to the IHS, has been a major concern. As noted above, poor data quality necessitated the elimination of approximately 50% of households sampled in the IHS from the consumption model. Concerted efforts will need to be made to provide sufficient logistic support so that future IHS data collection in the field is thorough and reliable. Lessons learned are already being applied in developing the second IHS; a pilot IHS-2 survey is planned for March/April 2002.

Data access has been another source of unease. Access has been obtained to digital files containing data at the district, TA, and EA levels that were being developed for a different project. However, the government currently has no policies concerning tabular release of spatial data. The development of such policies is vital to help ensure continued access to data.

Analytical capacity, particularly at the NSO, also is a concern. It will be important for academic and related institutions (e.g., the Center for Social Research) with stronger analytical capacities and mandates to participate in future analysis of poverty map results.

[11] Malawi contains 27 districts (excluding four urban centers), 368 TAs and urban wards, 851 local government wards, and 9,218 EAs.
[12] IHS survey results, including from the poverty analysis, can be found at the National Statistical Office website (http://www.nso.malawi.net). The poverty mapping results will eventually be posted at this site.
[13] http://www.nso.malawi.net.

3. Use and impact

Since the Malawi poverty map is still in development, no current uses of the poverty map exist. There are, however, a number of anticipated uses. In particular, the poverty map may help target Malawi's "starter pack" program. The program was initiated in 1998 as a poverty alleviation effort with a goal of universal distribution of fertilizer and seeds to all of Malawi's rural households. In the 1998-1999 and 1999-2000 fiscal years, the program successfully distributed fertilizer and seeds to approximately 2.8 million rural households, albeit at a high cost. The program cost about US$30 million, most of which was covered by donors. While the "starter pack" program has been looked upon favorably, donors have expressed concerns that the program is currently too expensive. It is anticipated that the poverty maps could be used to improve the targeting of this program, for example, by identifying poor areas (e.g., districts or TAs) in which the "starter packs" could be distributed.

There has been concern, however, that the poverty maps may not ultimately be used to influence decision-making in the "starter pack" and/or other programs, especially since Malawi does have a more limited track record on emphasizing the use of technical information to support its decision-making. While information has influenced some decisions (e.g., food security initiatives that have used FEWS data; see Section 1), political motivations have often been unduly emphasized. In the "starter pack" program, various decision-makers have already indicated that, given budget constraints, they would rather the "starter pack" be distributed universally (i.e., to all rural households) but less frequently rather than target distribution only to poorer households. (Note that the former strategy holds the potential for greater electoral gains than the latter.)

Aside from potential use in the "starter pack" program, the poverty map may be used by government, NGO, and donor agencies to help target various programs, especially poverty reduction initiatives. However, the poverty map will likely not be developed in time to be integrated in Malawi's Poverty Reduction Strategy Program (PRSP), due for completion in September 2001.

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