What are poverty maps telling us? An exploration of Latin American poverty small area estimates

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Extended abstract

Place and location are increasingly addressed as factors influencing the individuals' and regional well being. In this line, the most recent World Development Report states "*place is the most important correlate of a person's welfare*" (World Bank, 2009, pp.1). Whether this statement is true or not in practical terms, it reflects the shift towards a more geographically conscious perspective in development analyses.

Following this trend, the study of the geographic dimension and distribution of poverty has gained considerable attention in the last years. Messner and Anselin (in Goodchild and Janelle, 2004) suggest that the examination of the spatial patterns of social phenomena can provide useful insights into their causal factors. Consequently, the incorporation of the geographic dimension in the analysis of poverty is helpful for identifying and explaining the presence of "pockets of poverty" (Bigman and Fofack, 2000).

Traditional poverty analyses have relied on household survey data; therefore, reliable and representative poverty estimates can only be produced for the areas or regions for which the survey is representative of the underlying population. In some cases, only the urban – rural differentiation is possible. From this situation, it is evident that data from a household survey alone do not suffice for exploring regional and subregional differences and patterns.

In face of this limitation, alternative approaches have been developed and used in different countries with the aim of producing disaggregated (subregional) poverty estimates (mainly focused on poverty incidence). These approaches differ in the measure of poverty, the type of data, and the estimation method used, as well as the degree of disaggregation reached. For example, some Latin American countries have constructed poverty incidence estimates based on i) the proportion of persons with unsatisfied basic needs (using census information), and/or ii) the proportion of persons with imputed consumption estimates below a certain poverty line (using survey and census information).

Independently from the methodology and the measure used for estimating the poverty incidence, all approaches have the common objective of producing a visual display of the results in the form of maps. These so called "poverty maps" display various degrees of poverty incidence and can serve as a mean of identifying the poorest areas

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in a country. They can be used as supporting material for decision making processes related to poverty reduction initiatives, expenditure on social development, or policy making at the national and subnational levels.

Countries such as Bolivia, Brazil, Ecuador, Guatemala, Honduras, Nicaragua, Panama, and Paraguay have joined the poverty analysis efforts for producing disaggregated poverty estimates via imputed consumption. This approach, referred as "small area estimation", was formally proposed by Elbers et al (2002) and has been implemented in many countries worldwide for creating updated poverty maps.

Specifically, the Elbers et al method uses household survey data for the creation of a prediction model of consumption (expenditures), which is then applied to the census information. The imputed expenditures are further compared against the corresponding poverty line and the poverty status (or alternatively, the probability of being poor) of the whole population is inferred. By aggregating the results at the desired level, the poverty incidence (and other poverty indicators such as the poverty gap, etc.) can be calculated for all the small areas. Replications are usually performed in order to derive more robust poverty estimates. The final poverty (point) estimate of each small area in the country is determined by the average of the poverty indicator across all replications. As well, a prediction error estimate (standard error of the mean) is produced.

In order to build the poverty incidence map, the different small areas are classified into 4 to 6 groups depending on the level of their estimated incidence. In the map display, each group is assigned a colour gradient so the poverty level of each area can be visually identified.

Poverty map readers are usually unaware of the processes related to the estimation and the map display. Most often, the prediction models used for the estimation differ across the main country regions (and/or strata). Not only the fit of the model varies across models, but also the prediction error associated to each small area incidence estimate. Furthermore, several classification approaches are available for creating the poverty level groups displayed in the map, which very often produce different geographic profiles. In face of these considerations, it is valid to question and discuss the message that poverty maps can potentially transmit. This is necessary for the creation of an adequate map display and for supporting users towards a more informed interpretation and use of the results.

The objective of the analysis is to explore the characteristics and map display of poverty small area estimates of Ecuador and Bolivia. The data was obtained from the SEDAC Global Poverty Mapping Project. The estimates for Ecuador were produced by the World Bank and are presented in the Ecuador Poverty Assessment Report 2004. For Bolivia, the estimates were produced by joint collaboration of the World Bank, the National Institute of Statistics and the Social and Economic Policy Analysis Unit and are presented in the 2003 report on Poverty and Inequality in the Municipalities of Bolivia.

The analysis begins with the examination of the spatial trend and general properties observed in the poverty estimates and related errors. Afterwards, alternative classification approaches are used for the creation of poverty profiles and compared for

consistency with the underlying trend. The analysis is strongly based on map visualization.

The results clearly show that the size of the confidence intervals of the poverty incidence estimates varies considerably across small areas, between urban and rural locations, and display geographic trends. In addition, large confidence intervals appear to be related to lower poverty incidence estimates.

With respect to the use of different classification approaches, it is observed that clusters of certain degrees of poverty appear or disappear depending on the approach used and that certain profiles deviate from the observed trend in the unclassed data.

Further research and discussion is needed for the identification of appropriate ways for presenting small area poverty estimates to final users. As well, it is strongly recommended that poverty map makers evaluate the consistency of their displays with the data trend in order to transmit their findings, and that proper documentation of the estimation and mapping processes be also included in the final reports, in order to facilitate the adequate map interpretation.

Keywords: poverty incidence, small area estimation, poverty map, classification method, Latin America.

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