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Indices Using the FIES and APIS Data**

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Construction of Unidimensional and Multidimensional Poverty Indices Using the FIES and APIS Data¹

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This paper concerns the use of the FIES and APIS data in identifying non-income dimensions of poverty, in constructing composite indices for these dimensions, and in determining which dimensions are well or poorly linked to income-based poverty status.

The research summarized in this paper uses a multidimensional non-income based conceptualization of poverty that has been adapted by researchers in conducting poverty analysis that broadly captures the construct of poverty (e.g., Chelliah & Sudarshan, 1999; Glewwe, 1990) and by institutions in constructing poverty indices (e.g., the Capability Poverty Measure and the Human Poverty Index; UNDP, 1997). To date, poverty indicators have been classified in various ways such as “means” indicators (e.g., food consumption, income, health services) and “ends” indicators (e.g., nutritional status, life expectancy, and literacy rates) (cf., Henninger, 1998; UNDP, 1997); and, the minimum basic needs indicators of “survival” (e.g., food, water, clothing), “security” (e.g., shelter, public safety, income), and “enabling needs” (e.g., education, people’s participation) (cf., Virola, Gañac, & Bacani, 2000). A multidimensional framework has been shown to be useful in assessing the situation in a region as regards poverty, in understanding the factors determining the situation, and in designing interventions best adapted to the situation (Coudouel, Hentschel, & Wodon, 2002).

The present study supports past studies concerning the relationship between non-income based poverty indicators and poor/nonpoor classifications as determined by (income-based) poverty thresholds (e.g., Kangas & Ritakallio, 1998; Virola, Gañac, & Bacani, 2000). Some studies have shown only weak relationships between income-based indicators and indicators of well-being (Chelliah & Sudarshan, 1999) and enabling needs (Orbeta & Hilario, 1995; Reyes & Ilarde, 1998), but strong relationships between income-based indicators and indicators of survival and security (Orbeta & Hilario, 1995). That some non-income based indicators are not strongly related to income-based indicators suggests that different methods of poor/nonpoor classifications would show, perhaps realistically, that different populations or sectors are poor or nonpoor in different ways (Kangas & Ritakallio, 1998).

The Survey Data Used and the Dimensions of Poverty Considered

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The present study used the data from the 1997 and 2000 Family Income and Expenditures Survey (FIES) and the 1998 and 1999 Annual Poverty Indicators Survey (APIS). The earlier surveys were used to construct the indices and the later surveys were used to validate the constructed indices.

For the FIES data, households classified as poor were those with *per capita* income below the official poverty threshold set by the National Statistics Coordination Board. For the APIS data where there was no official poverty threshold, households classified as poor were those with per capita income below the 30 percentile for the subsample belonging to the same region and urbanity.

The dimensions of poverty considered in the present study were: household head characteristics, education, employment, and health status of household members, housing necessities and structure, housing amenities, deployment of resources for basic consumption, access to social network and institutional services, and household characteristics. Education and health status of household members and social access were not measured in the FIES, however.

Unidimensional Poverty Indices

A unidimensional poverty index, which is the average of scores of indicators that belong to only one dimension of poverty, was constructed for each dimension and separately for the FIES and the APIS. Because indicators were measured on different scales, they were all first transformed to a scale from 0 to 1, with lower scores associated with “non-poor” and higher scores associated with “poor”.

The indicators included in an index were determined by running a series of logistic regression models with poverty status (“poor” = 1 and “non-poor” = 0) as the criterion and indicators under the pertinent dimension as the predictors. Tests of the fit of the final models indicated that the predictors, as a set, reliably predicted poverty status, suggesting the usefulness of constructing a poverty index for each dimension of poverty. Moreover, all indicators included in the final model for each dimension reliably contributed to the prediction of poverty status, suggesting that each indicator could be used in the pertinent unidimensional poverty index. Shown in Table 1 are the correct classification rates for the final models (or the percentage of sampled households who were poor/non-poor and were classified by the model as poor/non-poor). The FIES 1997 final models had higher classification rates than the APIS 1998 final models.

Table 1. Correct Classification Rates (%) for the Final Models

Dimension of Poverty	FIES 1997	APIS 1998
Household head characteristics	72	70

Education of household members	not measured	70
Employment of household members	75	70
Health status of household members	not measured	70
Housing necessities and structure	77	71
Housing amenities	76	70
Deployment of resources for basic consumption	79	75
Social access	not measured	70
Household characteristics	74	74

Unidimensional poverty indices for health and social access (APIS 1997) were not constructed because of the relatively poor goodness-of-fit and concordance of the final models.

Listed in Tables 2 - 8 are the indicators included in the final models and, consequently, in the unidimensional poverty index for the dimension. In these tables, the indicators are listed according to how well they predict poverty status, starting with the best predictors. The nature of the relationship between each indicator and poverty status is also described in these tables (e.g., poor households associated with houses with smaller floor areas). The indicators that best predicted poverty status within each dimension were largely the same for the FIES as for the APIS.

Table 2. Indicators for the Household Head Characteristics Indices

Indicator	Characteristic Associated with Poor Households (In General)
FIES	
Number of years of schooling	household head has lower educational attainment
Age	younger household head
Sex	female household head
APIS	
Number of years of schooling	household head has lower educational attainment
Age	younger household head
Marital status	female household head

Table 3. Indicators for the Education of Household Members Indices

Indicator	Characteristic Associated with Poor Households (In General)
FIES (not measured)	
APIS	

% of members aged 25-48, at least college graduates	proportionally fewer members aged 25-48 who are at least college graduates
% of members aged 7-14, currently attending school	proportionally more members aged 7-14 who are currently attending school
% of members aged 49-64, at least college graduates	proportionally fewer members aged 49-64 who are at least college graduates
% of members aged 65 or over, at least college graduates	proportionally fewer members aged 65 or over who are at least college graduates
% of members aged 25-48, elementary school graduates only	proportionally more members aged 25-48 who are elementary school graduates only
% of members who have attended school	proportionally fewer members who have attended school
% of members aged 15-25, currently attending school	proportionally fewer members aged 15-25 who are currently attending school
% of members aged 49-64, high school graduate only	proportionally fewer members aged 49-64 who are high school graduates only

Table 4. Indicators for the Employment of Household Members Indices

Indicator	Characteristic Associated with Poor Households (In General)
FIES	
Household head engaged in agricultural job or business	household head engaged in agricultural job or business
% of members aged 15 or above who are employed	Proportionally fewer members aged 15 or above who are employed
Household head's job indicator	household head has a job
APIS	
Household head engaged in agricultural job or business	household head engaged in agricultural job or business
% of members, women aged 15 or above who searched for jobs	proportionally more members aged 15 or above who searched for jobs
Household head's job permanency	household head does not have a permanent job
Household head's job indicator	household head has a job

Table 5. Indicators for the Housing Necessities and Structure Indices

Indicator	Characteristic Associated with Poor Households (In General)
FIES	
Electricity	does not have electricity
Water source	does not have own water source

Materials of walls	walls of residence not built of strong materials
FIES	
Materials of walls	walls of residence not built of strong materials
Floor area is 30 m ² or less	floor area of residence is 30 m ² or less
Electricity	does not have electricity
Water source	does not have own water source
Water-sealed toilet facility	does not have water-sealed toilet facility

Table 6. Indicators for the Housing Amenities Indices

Indicator	Characteristic Associated with Poor Households (In General)
FIES	
Refrigerator	does not have refrigerator
TV	does not have TV
Sala/sofa set	does not have sala set
APIS	
Refrigerator	does not have refrigerator
Sala/sofa set	does not have sala set
Dining set	does not have dining set
Radio	does not have radio

Table 7. Indicators for the Deployment of Resources Indices

Indicator	Characteristic Associated with Poor Households (In General)
FIES	
Fuel expenditure	annual fuel expenditure per member is below the 30 percentile for the sample households
Medical expenditure	annual medical expenditure per member is below the 30 percentile for the sample households
Whether household spends for recreation	household does not spend for recreation
Rice expenditure	annual rice expenditure per member is below the 30 percentile for the sample households
APIS	
Fuel, light, water expenditure	annual fuel, light, water expenditure per member is below the 30 percentile for the sample households
Cereal expenditure	annual cereal expenditure per member is below the 30 percentile for the sample households
Educational expenditure	annual educational expenditure per member is below the 30 percentile for the sample households
Whether household spends for recreation	household does not spend for recreation

Table 8. Indicators for the Household Characteristics Indices

Indicator	Characteristic Associated with Poor Households (In General)
FIES	
Family size	larger family size
% of members aged 65 or over	proportionally fewer members aged 65 years or over
% of members aged 15-24	proportionally fewer members between 15 and 24 years of age
% of members who are non-relatives	proportionally fewer non-relative members
Household type	Nuclear-family household
APIS	
Family size	larger family size
% of members aged 25-48	proportionally fewer members between 25 and 48 years of age
% of members aged 15-24	proportionally fewer members between 15 and 24 years of age
% of members aged 49-64	proportionally fewer members between 49 and 64 years of age
% of members aged 65 or over	proportionally fewer members aged 65 years or over

The FIES 2000 data were used in validating whether poverty status was reliably predicted by the indices generated from the FIES 1997 (except for “housing necessities and structure” and “housing amenities” which were not included in the FIES 2000). Likewise, the APIS 1999 data were used in validating the indices generated from the APIS 1998.

For the FIES 2000 data, the correlation coefficients between poverty status and the different unidimensional poverty indices were: 0.48 for deployment of resources for basic consumption, 0.38 for employment of household members, 0.30 for household head characteristics, and 0.15 for household characteristics. For the APIS 1999 data, the correlation coefficients between poverty status and the different unidimensional poverty indices were: 0.36 for housing amenities, 0.32 for housing necessities and structure, 0.31 for deployment of resources for basic consumption, 0.31 for education of household members, 0.23 for household head characteristics, and 0.22 for household characteristics. All these correlation coefficients were significantly different from zero.

A logistic regression model was run using the FIES 2000 data with poverty status as the criterion and the unidimensional poverty indices as the predictors. A similar model was run using the APIS 1999 data. Tests of the fit of both models indicated that the unidimensional indices, as a set, reliably predicted poverty status. The model for the FIES 2000 data had a correct classification rate of 78%, whereas the model for the APIS 1999 data had a correct classification rate of 76%. Moreover, for each model, each of the unidimensional index included in the model as a predictor reliably contributed to the prediction of poverty status.

Multidimensional Poverty Indices

A multidimensional poverty index, which is the average of scores of indicators that belong to different dimensions of poverty was constructed, one for the FIES and one for the APIS.

The indicators included in an index were determined by running a series of logistic regression models with poverty status as the criterion. From among the indicators that constituted the unidimensional poverty index for a dimension, the two indicators that best predicted poverty status were included as predictors in the initial model. Tests of the fit of the final models indicated that the predictors, as a set, reliably predicted poverty status. Moreover, all indicators included in the final model for each dimension reliably contributed to the prediction of poverty status. The correct classification rates for the final models were 83% for the FIES 1997 and 78% for the APIS 1998, which are higher than those for models based on only one dimension of poverty.

For the FIES 2000 data, the correlation between poverty status and the FIES-based multidimensional poverty index was 0.58. For the APIS 1999 data, the correlation coefficient between poverty status and the APIS-based multidimensional poverty index was 0.48. Both correlation coefficients were reliably different from zero.

The logistic regression model that was run using the FIES 2000 data, which had poverty status as the criterion and the FIES-based multidimensional poverty index as the predictor had a correct classification rate of 78%. The corresponding logistic regression model for the APIS 1999 data had a correct classification rate of 76%. Tests of the fit of both models indicated that the multidimensional poverty indices reliably predicted poverty status.

Discussion

This paper considered non-income based indicators of poverty belonging to different dimensions and described the composite indices constructed on the basis of these indicators' empirically established relationships to income-based indicators.

The performance of the indices in correctly classifying households as poor/nonpoor (according to some income-based indicator) is in the 70%-range; this range is similar to those reported in literature (e.g., Barrios, 1998; Glewwe, 1990). Using data sets different from those on which the indices were constructed, it was found that the correlations between the indices and poor/nonpoor classification were small to moderate for unidimensional indices and moderate for multidimensional indices.

That new or alternative poverty indices have to be pitted against income-based indicators appears unavoidable given that their validity and credibility will inevitably be assessed according to how they reflect poverty as traditionally measured, that is as measured in monetary terms.

Related work may assess official poverty thresholds vis-à-vis the different unidimensional indices (cf. Asra & Santos-Francisco, 2001). Also, poverty maps that reveal the spatial distributions of poverty according to the different indices may be constructed to reveal similarities and differences among regions (Henninger, 1998; Lamberte, Reyes, & Cabantog, 2003), thus showing how different regions are vulnerable to varying forms of poverty (Kangas & Ritakallio, 1998) and suggesting the types of assistance needed by the different populations, sectors, or regions. This is important given that different indicators of poverty may not be strongly correlated (Henninger, 1998).

Future work may focus on confirming the unidimensionality of the constructed indices, in determining the precision or variability of these indices, and in further refining the statistical models on which the indices have been based. A specific model refinement can be in terms of assuming some "economies of scale" thus clarifying the relationship between household size and membership to poverty status (Coudouel, Hentschel, & Wodon, 2002).

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