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Review of Poverty Assessment Tools

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Report submitted to IRIS and USAID as part of the
Developing Poverty Assessment Tools Project

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1. Introduction

1.1 Developing Low-Cost, Objective and Quantitative Poverty Assessment Methods

As part of a Congressional mandate in the 2003 Amendment of the *Microenterprise for Self-Reliance Act* of 2000, USAID is responsible for developing low-cost methods for poverty assessment to be used by microenterprise programs. This Congressional mandate is timely, corresponding to a growing concern in the microenterprise industry about its success in reaching the poor. USAID wants to ensure that support for microenterprise programs conforms to their poverty alleviation priorities. Practitioners want to know whether they are achieving their program objectives and how to improve their services. The challenge is to develop a tool that can serve both purposes in a practical and cost-effective manner.

1.1.1. Three criteria

The mandate from the United States Congress specifically calls for methods that can be used by microenterprise practitioners to assess to what extent they reach the poor.

The methods certified by USAID should be

- objective
- quantitative, and
- low-cost.

Objective means that the criteria for measuring poverty are clearly spelled out. In this respect, the legal text by Congress refers to measured living standards – implicitly based on income or expenditures -- as the objective benchmark.[1] This implies that any tool to be certified will therefore have to be tested to the extent to which it correctly identifies people as being poor as defined by that benchmark.

The legal text does, however, implicitly recognize the complexity of applying an objective benchmark for poverty. The text recognizes national poverty standards that may differ from the internationally set "one dollar per day" poverty line. Most developed and developing countries measure poverty and establish a national poverty line by using a combination of income and expenditure data, obtained through sample surveys, tax filings (mainly in developed countries), or other means of information gathering.

Quantitative refers to the two poverty lines related to the income/expenditure benchmark that are specified in the legal text of Congress, and people falling **below either of these**

[1] The legislative language does not specify whether income or expenditure should be used to measure living standards. As emphasized in this and the following section, efforts to measure living standards in developing countries normally rely on data on household consumption expenditures derived from household surveys, in part because expenditures are usually more reliably measurable than income in settings where many households rely on agriculture and informal employment for a large share of their income.

two poverty lines are categorized as poor according to the text of Congress. The two poverty lines are identified as follows in the legal text:

> The term very poor means individuals —
> (A) living in the bottom 50% below the poverty line established by the national government of the country in which those people live; or
> (B) living on the equivalent of less than $1/day.

These standard definitions of poverty are discussed in greater detail in the next section.

The natural and legal interpretation of the term "or" in the legislation is that a person would be considered very poor if he/she was *either* living on less than a dollar a day, *or* was in the bottom half of the distribution of those below the national poverty line. In the field testing that IRIS will conduct, the approach will be to apply the higher of the two criteria as the definition of very poor.

Low-cost is not further specified in the legal text. It will be one of the tasks of the USAID-funded project to calculate the costs (including time and skills) required for various Poverty Assessment Tools (PAs) and to highlight the trade-offs between costs and accuracy for each of the tools.

1.1.2. Standard poverty benchmarks

As indicated in the legal text quoted above, there are two standard approaches to defining poverty, an internationally defined "dollar-a-day" standard and the national poverty line established by individual countries.

International Poverty Line: one dollar income per day per capita (equal to $1.08 per day in purchasing power parity (PPP) dollars at 1993 prices[2])

National Poverty Line: the bottom 50 percent of those classified as poor by any national poverty line. The national poverty line is expressed in local currency and converted to the US-dollar equivalent (using current official/market exchange rates). It is updated as needed to reflect current purchasing levels, according to the national Consumer Price Index.

1.2 Organization of the Paper

Section 2 reviews potential benchmarks for the design, testing and certification of poverty assessment tools. Section 3 presents a typology of existing poverty assessment tools. In Section 4, selected poverty assessment tools (PAs) are reviewed, noting advantages and disadvantages for the present purpose. The PAs under consideration for detailed testing were identified through an extensive literature review, through input by the SEEP Network and its Poverty Assessment Working Group (SEEP, 2003), and by the ME and BDS practitioners who submitted tools for testing to IRIS by November 15, 2003. A summary is given in Section 5.

[2] For the method to compute present-day poverty lines at PPP dollars and taking into account inflation since 1993, see Sillers (2003).

2. Benchmarks for Design, Test, and Certification of Poverty Assessment Tools

For purposes of evaluating the accuracy of assessment tools, it is necessary to refer to a standard benchmark of reliable accuracy. For poverty assessment, standard international practice has established two widely used approaches – LSMS and SDA – as discussed below. Both make use of income and expenditure data, and both define poverty in terms of household (or individual) income level, i.e., in essentially monetary terms. Alternative approaches that also have merit are discussed at the end of this section.

2.1 Choice of Benchmark

2.1.1. The income/expenditure benchmark

The internationally accepted method of measuring household living standards in developing and transitioning countries is the Living Standard Measurement Survey (LSMS, discussed more fully in Section 2.2). Since the early 1980s, LSMS surveys have been widely carried out by national authorities in cooperation with the World Bank. The LSMS measures household expenditures and income, in addition to other variables (Grosh and Glewwe, 1998; Grootaert 1983, 1986). It is generally agreed among poverty analysts that expenditures (as an income proxy) are a more robust measure of poverty than income itself (Deaton 1997). Thus, poverty lines are typically defined based on expenditure data.

Based on the LSMS experience, and to increase the scope for policy analysis regarding the social dimensions of adjustment (SDA), many countries (with the support of the World Bank) have developed and implemented so-called Integrated Household Surveys (IS) (e.g., Malawi in 1997/98). These surveys similarly collect information on income and expenditures on a nationally representative sample, but they also reflect policy variables such as access to services and programs. These SDA-IS thus yield useful data to define and quantify the poverty benchmark. However, the Social Dimensions of Adjustment Priority Surveys (SDA-PS) lack detailed measures on expenditures and income, and therefore cannot provide data on the poverty benchmark. While the SDA-PS Plus does have expenditure data, it is collected without a bounded recall.[3] Hence, there are serious quality concerns about its expenditure measure.

The international one-dollar-per-day poverty line was selected by the World Bank as a global benchmark because it corresponded to the average poverty line of the 10 poorest countries (see World Bank, 1990 *World Development Report).* These international poverty lines are based on purchasing power parity (PPP). The original $1/day poverty line was constructed based on 1985 PPP estimates. Since its inception, the international poverty line has been updated and is currently defined as the mean of the 10 lowest

[3] A "bounded recall" uses a specific time period that can be easily remembered by the respondent. LSMS surveys are implemented in two interview visits with the survey household, exactly 14 days apart. In the second visit, the LSMS expenditure module is implemented using a bounded recall: e.g., "Since our last visit, how much did you consume (etc.)."

national poverty lines using 1993 PPP exchange rates. Therefore, the "$1/day" poverty line actually equals $1.08/day in 1993 PPP terms. The upper international poverty line, or "$2/day" poverty line, is simply twice the $1/day poverty line.

Individual or household level. Most, if not all, countries use **income** as the benchmark measure for poverty, and they measure income (or expenditures as its proxy) at the household level and not at the individual level. Most people – apart from situations of extreme crises such as wars and natural catastrophes – live in households. A household is commonly defined as a group of people sharing the same roof and cooking pot (including the possibility that group size is one). Individual, i.e., per person, poverty lines are then computed by dividing household income either by household size or by number of adult equivalents. There is no globally accepted standard for equivalence scales, but agreed standards for regions exist (e.g., for OECD countries).

2.1.2. Critique of the proposed benchmark

There are several drawbacks to the accepted international practice of poverty measurement through expenditure-based poverty lines reflecting basic needs. Two points of criticism are discussed here.

First, the LSMS and SDA-IS surveys measure only income-defined poverty, despite the widespread agreement among social scientists (including many but not all economists) that poverty (or ill-being) includes many other dimensions, such as health, education, rights, nutrition, housing, intra-household distribution, and so on.

Second, to measure at the household level means that gender and other intra-household distribution issues are largely ignored. Many studies demonstrate that there is discrimination by gender, age, kinship, political and social status within households. Affection between household members also affects how resources are distributed within households. In order to assess individual income and poverty status, analysts would need to explore in detail who in the household earns the income, who in the household appropriates it (either for himself or herself or for the common pool), and who in the household decides on how to allocate it. The latter component, i.e., the amount of income with decision authority, is perhaps the best index of individual poverty status. While research during the past fifteen years has made major advances in analyzing intra-household distribution issues, it is clear that so far there has not been a breakthrough in measuring disposable income of individual household members or disentangling individual from household income. While this is an extremely important and cutting-edge field of research, it requires further in-depth research before it can be considered as a component of standardized low-cost poverty assessment tools, and none of the practitioners' tools reviewed below aim to measure individual living standards. Furthermore, since there is no accepted method of collecting benchmark data on individuals' living standards, it would not be possible to test a tool that assessed individual living standards. For all these reasons, the attempt to accurately determine individual poverty (or wealth) by quantifying intra-household distribution issues is likely to increase costs to a significant extent.[4]

[4] The project will however sponsor a continued discussion on this issue as a way of assisting future efforts to integrate gender dimensions in poverty assessment.

The fact that individual level living standards cannot be measured does not, however, preclude the use of individual level indicators for assessing the household's living standards. Variables such as gender of household head, dependency ratio, or the number of children can be used as predictors of living standards.

2.1.3. Conclusion

Given the above three criteria (objective, quantitative, low-cost) along with the measurement requirements specified in U.S. law, and given the internationally accepted practice in measurement of poverty, it seems appropriate to accept **household expenditures per capita** (i.e., total household expenditures divided by household size) as the relevant benchmark for the purpose of developing and testing low-cost and effective poverty assessment tools. While this benchmark is not perfect, there appears to be no better operational alternative.

What follows is a description of the two internationally applied methods that can provide reliable and valid data for the poverty benchmark: the Living Standards Measurement Survey (LSMS) and the Social Dimensions of Adjustment surveys (SDA). They are described in more detail below.

2.2. Living Standard Measurement Surveys (LSMS)

The World Bank's Living Standards Measurement Survey (LSMS) program was launched in 1985 in an effort to strengthen the empirical underpinning of poverty analysis and poverty alleviation policies. The first surveys were undertaken in Cote d'Ivoire and Peru in 1985. Since then, 50 LSMS have been undertaken in 30 countries.[5]

2.2.1 Brief description of the LSMS

The typical LSMS consists of an integrated household questionnaire designed to collect data on multiple aspects of household welfare. In some cases, a price survey and a community survey complement data collection at the household level. The core LSMS questionnaire covers the following topics: household roster; housing; education; employment and wage income; health; agriculture; transfers and other non-labor income; and access to credit. Many LSMS cover additional topics as well, such as migration, fertility, anthropometric measures, assets, savings, and time use. A full-scale LSMS is a lengthy questionnaire, containing well over a thousand questions and requiring six to eight hours of interview time. Most of the interview time is devoted to the *income module*. The *expenditure module* requires only about one hour of interview time. Negative effects on respondent cooperation and fatigue are minimized by spreading the interview over two visits and by addressing different modules to different household members.

From the first, extensive quality-control features were designed into the LSMS. This includes careful design of the questionnaires, making extensive use of screening questions so that the skip pattern is automatic and requires very little decision-making by

[5] For more information on LSMS, see http://www.worldbank.org/html/prdph/lsms

the interviewer. All questions are printed exactly as they are to be asked, and the answers are fully pre-coded. In addition, several modules contain explicit suggestions to the enumerator for further probing. These features ensure that high-quality data can be collected even by limited-skill interviewers, thus reducing the potential variation among them. In addition, a custom-designed data entry program performs automated range and consistency checks within and across modules.

Of critical importance for the purposes of testing and developing proxy tools for poverty assessment is the module on household consumption and expenditure. It was recognized early on that the quality of expenditure data is highly improved if recall is "bounded" in time. For that reason, the application of the LSMS questionnaires is divided over two visits to the household, usually two weeks apart. The consumption and expenditure modules are part of the second visit, and for the majority of consumption and expenditure items, the questioning explicitly refers to the enumerator's first visit as the start of the recall period. (The main exceptions are infrequently purchased items, for which a 3 to 12 months recall period is used.) This design has two additional benefits, each of which contributes to data quality: first, it spreads the interview over two separate days, thus reducing respondent fatigue; and second, it makes it possible to undertake immediate checks for the consistency and quality of initial-visit data while the team is still in the field, as errors or missing items can be dealt with during the second visit.

This attention to quality control does come at a price, of course. The application in the field of a lengthy questionnaire over two visits is time consuming, and the custom-built data-entry program is expensive to put in place. Thus the administration of an LSMS tends to be a costly undertaking, and sample sizes have typically been rather limited. Most LSMS consist of nationally representative samples of 1500 to 5000 households. Calculated cost figures have varied from $78 per household for a 2000-household survey in Jamaica, to over $700 per household for a 4,480-household survey in Brazil. In the majority of cases, the cost per household falls between $150 and $250. These historical cost figures can be a bit misleading, however, for predicting the cost of future applications. On the one hand, some of the cost estimates are artificially high because they include the full cost of providing transportation for field teams (including the purchase of vehicles). On the other hand, the figures are biased downwards because they exclude the cost of the often extensive technical assistance provided by World Bank staff.

The LSMS makes significant demands on a statistical office's infrastructure and requires sophisticated organization and management capacity, as well as good data entry equipment and a reliable travel infrastructure. Depending upon the experience of the statistical office, preparation can take between 6 and 18 months. In order to fully capture seasonality, the field work is spread out over a year. While some statistical offices have succeeded in bringing out reports in a matter of months after the field work was completed, in many cases initial analysis can take 6 to 12 months. The typical administration of an LSMS thus takes between two and three years.

Nevertheless, the LSMS has been applied in 30 countries and in all regions of the world. The questionnaires show a remarkable consistency across these countries, highlighting the wide applicability of the LSMS in different geographic and cultural settings. Local adaptation of the instruments primarily affects individual questions and answer codes that may need to be tailored to local conditions.

While the LSMS data have been used for a wide range of economic analyses of household welfare and household behavior, perhaps the primary application is the measurement of the incidence of poverty and the construction of poverty profiles. The LSMS is a very flexible instrument for this purpose, since the data can accommodate many definitions of poverty and poverty lines. The most common application has been the calculation of the incidence of poverty below the local currency equivalents of the $1-per-day and $2-per-day poverty lines used by the World Bank to calculate the global incidence of poverty. The LSMS data have also been used as the basis for many World Bank poverty assessments, in which case both relative and absolute poverty lines have been constructed from the data.

2.2.2. Using the LSMS expenditure and consumption module as benchmark

The most important strengths of the LSMS are its comprehensiveness and attention to the collection of high-quality data. Its major disadvantage is its high cost. For use as a benchmark for testing and developing proxy tools, however, it is not necessary that the LSMS be implemented in its entirety.

Indeed, the core of an LSMS benchmark survey can be reduced to a household roster plus the expenditure and consumption modules. IRIS can collect data on the household roster and the expenditure module in one to two hours per household. At the same time, IRIS would also collect data from the same households on various indicators – assets, education, dwelling – that have been proposed as good proxy variables for assessing poverty.

While this approach can lead to major cost savings, it retains one of the important quality control features of the LSMS, namely the use of a bounded recall period implemented through two visits to each household. We propose that, during the first visit, IRIS collect all information on the household roster and the indicators of poverty (as suggested by PAs currently used by practitioners). The second visit, to be scheduled exactly 14 days after the first visit, would be entirely devoted to the LSMS expenditure and consumption module.

Further, IRIS should use existing LSMS data sets for statistical analysis so as to test poverty indicators contained in the LSMS data sets against the benchmark. The World Bank has made a concerted effort to make most LSMS data sets available for public use. Access levels are defined by the following categories:

1. No prior permission from government is required to use the data.
2. Prior government permission is required, but the track record for a timely and positive response is good.
3. Prior government permission is required; a substantial proportion of data requests have been denied, left unanswered, or were answered affirmatively only after substantial delays.

The majority of LSMS (32 data sets) fall in the first category. Access to these datasets is free, but a request form, outlining the purpose of the intended research, must be submitted to the World Bank. Categories 2 and 3 contain nine data sets each. To acquire these datasets, the same request form has to be submitted to the World Bank, but there is also a $200 processing fee.

In all cases, the data sets that are made available contain the full set of raw data files after basic cleaning (i.e., eliminating internal inconsistencies and missing data). The data have not been checked for outliers. The data sets usually contain an aggregate household expenditure variable (the main exceptions are the India and China LSMS), and sometimes also an aggregate household income variable. The quality of LSMS data is generally good, with individual variations. In general, it is thought that the quality of the more recent LSMS is better than that of the early ones.

2.3. The Social Dimensions of Adjustment Integrated Surveys (SDA-IS)

In 1987, the World Bank launched the Social Dimensions of Adjustment program in the Africa region, in an effort to better integrate social and poverty concerns in the structural adjustment process.[6] It was recognized that this effort could only be successful if the social and poverty data base in the region were improved. To that end, the SDA program designed a hierarchical information system which included as key elements the Integrated Survey (IS), the Priority Survey (PS) and the Community Survey (Grootaert and Marchant 1991, Delaine et al. 1992).

The two household surveys were seen as complementary to each other. The Priority Survey (SDA-PS, discussed in the next section) aims to identify target groups within the larger population, and therefore collects information through a large sample. The SDA-PS is a survey designed to provide information on *what* is occurring, without necessarily concerning itself with *why*. When repeated in subsequent years, the SDA-PS serves a monitoring function and is used to measure changes in key indicators over time.

The Integrated Survey (SDA-IS) has a primarily diagnostic role. The focus is on explaining *how* and *why* households respond to policy incentives and policy change. (The Integrated Survey was implemented for the first time in 1993 in Madagascar; since then, about a dozen African countries have undertaken the survey.) As a diagnostic tool, the IS collects information on a wide array of topics, over a more restricted household sample. The SDA Integrated Survey is thus similar in scope to the LSMS, and its costs are comparable.

The SDA-IS contains a detailed expenditure module, using bounded recall for data collection, and thus yields expenditure data of the required quality to be used as a benchmark tool. The SDA-PS Plus, by contrast, does not use bounded recall in collecting expenditure data, so it cannot be used as a benchmark (see discussion below).

2.4. Alternative Nationally Representative Benchmarks for Measuring Relative Poverty

This section highlights other data sources that obtain information on household welfare on a nation-wide scale. Among the accessible, nationally representative data sets are the **Social Dimensions of Adjustment Priority Survey (SDA-PS)**, the **Demographic and Health Survey (DHS)** and the **Core Welfare Indicator Questionnaire (CWIQ).** The data in these three surveys contain information on indicators for several dimensions of

[6] For more information on SDA-IS, see http://www.worldbank.org/afr/poverty/databank.

poverty. With respect to richness and diversity of poverty indicators, SDA-PS would rank highest, followed in order by CWIQ and DHS.

These data sets can potentially be used to estimate a nationally representative measure of relative poverty, for countries where LSMS and SDA-IS data are unavailable or outdated. This is a second-best option, as these data sets do not yield expenditure data similar in quality to the LSMS or SDA-IS.

Based on principal component analysis (PCA)[7], a poverty index can be computed to provide a nationally representative benchmark measure of relative poverty. For example, Filmer and Pritchett (1998) have successfully used PCA to calculate a poverty index from DHS data. One would still need to obtain secondary data on the percentage of the population falling below the national poverty line.[8] Assuming that the national poverty index, as a measure of relative poverty, has the same distribution as the index for absolute poverty, one can then identify the bottom 50 % percent of households below the national poverty line.[9] However, the assumption of equality of the two distributions may not hold, leading to estimation error.

2.4.1 Social Dimensions of Adjustment Priority Survey (SDA-PS)

The SDA Priority Survey was administered for the first time in 1989, in Chad. Since then, fifty-one Priority Surveys have been undertaken in twenty-six African countries. Sample sizes are large, often exceeding 10,000 households. (These large sample sizes are necessary in order to do disaggregated analysis at the level of different target groups, and to have sufficiently small sampling errors to allow for monitoring over time.)

The SDA-PS survey does not collect income information, and it has a reduced set of questions on education, health, and other correlates of poverty. The basic version of the SDA-PS relies on asset information to determine poverty status. Although the Priority Survey is a multi-topic instrument, it collects only the essential information on each topic. The questionnaire is thus fairly short (typically fewer than 200 questions) and can be administered in 45 to 60 minutes per household. Since the survey does not attempt to collect data on expenditures and income, which are subject to significant seasonal effects, the data collection for the PS can be completed in a short period, typically one or two months.

For assessing poverty status, the survey relies on the collection of asset information. While collecting data on assets is much easier than the collection of income and expenditure information, it must be recognized that assets often correlate only weakly with total household income or expenditure, and thus the Priority Survey will lead to greater classification error than either the LSMS or the Integrated Survey.

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[7] See section 3.2.2. for more information on principal component and multivariate regression analysis.

[8] The World Bank has developed a software tool called POVCAL. This tool allows researchers to calculate the Lorenz curve of income distribution, and the headcount index. The input data are selected points on the Lorenz curve that are usually published by national statistical offices. Hence, with POVCAL it is possible to estimate the income cut-off value for the bottom 50 percent of the poor (i.e. those below the national poverty line). For more information on POVCAL, see http://www.worldbank.org/.

[9] In fact a much weaker assumption, on a monotonic relationship between the indicator and expenditures may be sufficient, if data were available on a nationally representative sample.

While there is no systematic cost information available for the Priority Survey, but given the fairly short questionnaire and the fact that data collection typically occurs only over one to two months, costs are significantly lower than those of the LSMS (as described in section 2.2).

To meet the need for income- or expenditure-based poverty assessment, the SDA-PS was eventually combined with a standard expenditure module, creating an instrument that became known as the Priority Survey PLUS. The PS PLUS retains the advantage of a relatively light and inexpensive survey (although the addition of the expenditure module doubles the interview time per household), while making possible fairly extensive poverty analysis. Nevertheless, the quality of expenditure data from a PS Plus is not as good as that from an IS or LSMS, because the data collection does not cover a full year and because bounded recall is not used. Therefore, the SDA-PS PLUS cannot be considered a good benchmark, although it provides a much richer data set than the SDA-PS, and contains poverty indicators related to expenditures comparable to those used in existing tools.[10]

2.4.2 Core Welfare Indicators Questionnaire (CWIQ)

The CWIQ has been implemented in many African countries in cooperation with The World Bank. The CWIQ relies on social indicators as a measure of welfare. A website document defines it "as a market research tool designed to enable countries to generate key leading indicators rapidly and to help them strengthen their capacity to use such indicators in designing and monitoring programs and projects." The CWIQ leading indicators not only provide a snapshot of current living conditions, but, more important, indicate which population groups are benefiting from development programs and actions – and which are not.

The CWIQ survey collects neither income nor expenditure information. Its modules encompass:

- household access, usage and satisfaction with public services (e.g., water, electricity)
- demographics of household members
- employment, education and health of each member
- household assets (very similar to practitioners' tools)
- poverty predictors (adapted to the specific country characteristics)
- child-mother information, and anthropometric data for children under five.

For more information on the CWIQ, see http://www4.worldbank.org/afr/stats/cwiq.cfm.

2.4.3 Demographic and Health Survey (DHS)

The Demographic and Health Surveys are applied periodically in many developing and transitioning countries. The principal goal is to measure changes in the health and

[10] For example, FFH and the CGAP Microfinance Poverty Assessment Tool enumerates education expenditures, and the FINCA tool enumerates expenditures for all major expenditure types.

nutrition status of populations. The core module of the DHS includes a household roster, plus questions on housing, health, and sanitary conditions of sample households. Other core modules cover health and nutrition. The DHS surveys are implemented as a nationally representative survey, and sample size usually ranges between 5000 to 30000 households.[11]

The core modules yield information that can be used as indicators of poverty. To compensate for the lack of income and expenditure data, Filmer and Pritchett (2000) and Sahn and Stifel (2000) have used principal component analysis (PCA) to analyze data from the Demographic and Health Surveys (for India, Pakistan, Indonesia, and Nepal and for a number of African countries). Filmer and Pritchett (2000) estimate the relationship between household wealth and the probability that a child is enrolled in school. As a proxy for household wealth, they construct a linear asset index from a set of asset indicators using the principal component technique. They conclude that this index is robust, produces internally coherent results, and provides a close correspondence with available economic data at higher aggregation levels. Filmer and Pritchett (1998) validate this method with other data sets from Nepal, Indonesia, and Pakistan that contain both asset indicators and consumption expenditures. They find that the asset index has reasonable coherence with current consumption expenditures and work as well, or better than, traditional expenditure measures in predicting enrollment status.

2.5. Availability of Poverty Benchmark Data Sets

Both the LSMS and the SDA-IS surveys are valid data sources for the poverty benchmark. In some cases, a national income and expenditure survey may also be used for the benchmark.

Access to such data sets is crucial for each of the 52 USAID countries where microenterprise and business development projects are currently implemented (especially for middle-income countries, for which the higher national poverty line is more appropriate instead of the international poverty line of $1 a day).[12] Table 1 and 2 (see Appendix) summarizes information on poverty level and availability of nationally representative data sets for 65 countries.

3. Overview of Poverty Assessment Tools

As neither the LSMS nor the SDA-IS meets the low-cost constraint for a poverty assessment tool, their usefulness for the USAID/IRIS project is essentially to provide the benchmark for testing the robustness of a PA (and gauging its margin of error) in classifying households as poor or not. The tests can be done either using existing secondary data (including data on the poverty benchmark and on poverty indicators), or through field research that collects primary data on poverty (as with LSMS) and on

[11] For more information on DHS, see *http://www.measuredhs.com/*

[12] In order to quantify the value of the median income of those 50% of the poor living below any nationally defined poverty line, it is imperative to have access to nationally representative income and expenditure data such as that provided by LSMS, SDA-IS, or any suitable national income and expenditure survey.

poverty indicators (as with practitioners' tools). We suggest that IRIS use both these approaches.

Existing poverty assessment tools used by practitioners share some commonalities but also exhibit some differences. Before we describe the different tools in Section 4, it is useful to provide a typology of the tools.

3.1 Commonalities Among Existing Poverty Assessment Tools

Many poverty assessment tools have been developed during the last twenty years or so, initially with a view to poverty targeting. With increasing calls for accountability – of NGOs, government agencies, and for-profit firms expending public funds earmarked for poverty reduction – as well as donors' increasing attention to documenting impact, new assessment tools are being created in greater numbers.

Designed by or for donors and practitioners, the new tools seek to reduce the costs, time, and complexity entailed in data collection and analysis. Their designers are nevertheless aware of the trade-offs between accuracy and cost (although these trade-offs have not been systematically studied and documented). In recent years, alternative methods have been compared for consistency of results.[13]

There are several commonalities among the existing PAs: the measurement of relative (rather than absolute) poverty; the use of multiple indicators to arrive at a measure of relative poverty; and the use of a weighting method (implicit or explicit) to arrive at a broad measure of relative poverty.

Measurement of relative instead of absolute poverty. Common to most (but not all) PAs is that they measure *relative* poverty (or wealth or well-being), that is, they generate a ranking among a group of people with respect to poverty.[14] Also, PAs use neither expenditures nor income as the basis for such a ranking. They therefore do not provide a simple classification based (for example) on 1 dollar per day cut-offs, or belonging to a certain (national) quintile of expenditure.[15] A problem inherent in this approach is that it is likely to "penalize" (by overstating income levels) interventions operating in an area where poverty is more widespread, since a certain percentage of households will be classified as "better-off" within that area even though they may fall below an absolute poverty line (MkNelly and Dunford 2002). Assistance programs differ in their geographical targeting: some work mainly in urban and/or better-off areas, while others deliberately select below-average or very poor areas.[16] Thus, if the relative poverty assessment is conducted entirely in a poor community or poor district, clients may be

[13] See, e.g,. Simanowitz (2000) on a comparison of relative poverty assessments by participatory wealth ranking and visual methods and van de Ruit et al. (2003) on a comparison of participatory wealth ranking and the CGAP Poverty Assessment Tool. In both cases, the results have been encouraging in so far that the rankings produced by the two methods were reasonably consistent.

[14] The exception is the approach taken by ACCION that directly asks respondents to provide figures on annual income. The FINCA approach also uses direct questions on expenditures in its PA tool. ACCION is currently validating its own tools through research in Haiti and Peru. FINCA's tool is yet to be tested.

[15] Again, with the exception of the tools by ACCION and FINCA.

[16] An analysis of poverty outreach of major group-based micro-finance institutions in Bangladesh (Grameen Bank, BRAC, ASA, and Proshika) is contained in Sharma and Zeller (1999).

rated as less poor compared to the general population *of that locality*, even though they may in fact be poor when compared to the national population (Zeller et al. 2001; Henry et al. 2003).

Multiple indicators. A second commonality of these tools is that they use a range of indicators, and most of them (though not all) avoid asking about income of the respondent or his or her household. At least two reasons can be given for this.[17]

Difficulties in measuring income. First, most practitioners and social scientists recognize the inherent difficulty of getting a reliable income estimate within a short time. "What is your income?" is not considered a useful question in a developing or transitioning country, especially for poor people who have multiple sources of income, much of it derived from the informal sector. Especially in rural areas, the problems of seasonality – not only in agriculture – make the income measurement problem even more pronounced. Moreover, much of the income of subsistence households is derived from own production of food and from forest products that are home-consumed by the household. It is exactly for this reason that the LSMS income module contains many pages of questions, focusing on different sources of income and using different recall methods directed to different household members.

Multidimensionality of poverty. Second, many practitioners recognize that poverty is multidimensional, that is, it encompasses not only income but also capital (mainly human and physical, but sometimes also environmental, social and even political capital). These forms of capital are important means of raising income. Many operational PAs use indicators of these forms of capital. Moreover, operational PAs also use indicators of outcomes of income generation and time allocation – the outcomes being conditioned by the socio-economic, cultural and institutional environment. These types of indicators could be generally referred to as *impact indicators*, like those relating to food security, rights, clothing, housing, and so on, and they are measured either at the household level or at the individual level. (The latter provides better information on differences within households along lines of gender, age, kinship, and so forth.) The spheres of consumption, production and investment tend to be blurred for low-income individuals and households: for example, a healthy housing environment can be seen both as an *investment* in a home-based micro-enterprise as well as an *outcome variable* reflecting living standard. There are thus many feedback loops in the causal chain of poverty (or welfare generation):[18]

Capital → (Disposable) Income → Consumption and Investment → Impact variables[19]

The distinction between exogenous and endogenous variables in the causal chain of poverty is difficult to make in practice: feedback loops and endogeneity issues can be conceptualized virtually everywhere in this chain.[20] But since the purpose of a poverty

[17] Others reasons include high fluctuations of income (not a good proxy for long-run income or wealth), the need to calculate regional price differences in countries with imperfectly and poorly integrated markets, and resulting analytical difficulties requiring significant skills and resources for their resolution).
[18] The causal chain is conditioned by the socio-economic, political, natural, and cultural environment.
[19] Impact refers to changes in poverty or ill-/well-being, e.g. measured by achievement of basic needs in the areas of e.g. health, leisure, political space/social inclusion, nutrition, sense of self-confidence and self-achievement, either at the individual or household level or the community and higher levels
[20] See for example Appleton (1995), cited in Grootaert and Braithwaite (1998).

assessment is to measure poverty and not to analyze causal relationships, it is analytically permissible to measure intermediate outcome variables in the consumption and investment sphere (as well as final impact variables) as possible indicators of poverty.

Common to most but not all operational poverty assessment methods is that they exclude income as a measure of poverty. Some obtain information on expenditures, whether on particular classes of items, such as luxury or inferior foods, or on easily recallable expenditure groups, such as education and clothing. Operational PAs frequently also report various forms of capital, and many measure "right-hand-side" intermediate outcome variables in consumption and investment, in addition to final welfare (impact) variables relating to satisfaction of basic needs

Thus, rather than direct measures of income, PA tools collect information on various indicators that are correlated with poverty. These indicators could be food security, clothing, assets, or dwelling, selected for presumptive reasons that suggest it might be a good proxy. Food security is the basis for many of the national poverty lines, and consequently also of the $1.08/day figure (which is based on national poverty lines). Clothing signals status and hence is likely to be related to living standards. Economic theory suggests that assets can be a good measure of permanent income, and a similar point could be made for housing, though perhaps with less force. Furthermore clothing, assets and housing are observable and verifiable.

Weighting system. Because operational poverty assessment tools use multiple indicators of poverty, they normally apply a weighting system to arrive at a composite measure of poverty (or well-being).

3.2 Differences among Existing Poverty Assessment Tools

There are two major differences among PAs that suggest a basic typology. The first difference relates to the *objective* of designing and using the operational tool. The second difference – more important for our project – relates to the *weighting* system.

3.2.1 Prime objective of the tool

PAs are used by practitioners for a variety of reasons:

Poverty assessment. The objective of these tools is to determine whether the program (ex-post) has reached relatively poor people (within a community or region). Moreover, some systems seek to identify particular groups within the poor (e.g., the very poor or poorest). Such tools can be designed either for internal evaluations (carried out by beneficiaries and/or by practitioners) or for external purposes (evaluation by a donor/funding agency).

Poverty targeting. Here the prime objective of the tool is to identify in advance poorer households in order to deliver services to them rather than to the relatively better-off or non-poor. The Housing Index and other forms of net worth tests are mainly designed for this purpose.

Impact assessment and other uses: Several existing poverty assessment tools seek explicitly to include impact indicators, or indicators useful for marketing research. Also

common is the combination of different tools, so that the original poverty assessment tool is complemented by an impact or marketing research module. These additional modules add questions on service uptake, perceptions regarding services, and facts or perceptions about outcome or impact variables.[21]

Discussion. For both poverty assessment and poverty targeting, the indicators used should ideally meet several standards: they should be *verifiable* by other investigators, *visible* (such as the condition of a house), and obtainable at *low cost*. A good poverty assessment tool – one that minimizes cost and effort for a certain level of accuracy – may also, therefore, be useful for poverty targeting.

In contrast to poverty assessment and poverty targeting indicators, which must be verifiable, many outcome or impact indicators (measuring, for example, income or food consumption) rely on self-declarations by respondents, and thus cannot easily be verified.[22]

While poverty assessment and poverty targeting tools have similar requirements, there is a key difference between them: poverty targeting tools can be used by the practitioners themselves in order to improve poverty outreach; poverty assessment tools, however, are required to be externally verifiable, and the results must relate to the definition of the poor as provided in the Congressional mandate. That is, the results of the PA – however derived – need to be calibrated to the benchmark, and the method of obtaining the results must be clearly documented and verifiable.

For all three types of analysis, indicators refer either to individual persons or to the households to which these persons belong. Rarely do we see indicators that relate to the community or higher levels of analysis (other than geographic poverty assessment and targeting tools).[23]

Finally, to be useful for poverty targeting, a tool must take the possibility of respondent misstatements very seriously. For this reason, tools that are certified for poverty assessments may not be appropriate for poverty targeting. Manipulation at various levels is a possibility even for poverty assessment, and, even though such an outcome is unlikely, the possibility may undermine the credibility of the evaluation unless cross checks are in place. Recommendations for such cross-checks will be included in IRIS's final report to USAID.

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[21] See Baker (2000) for an excellent presentation and review of cutting-edge impact evaluation tools.

[22] Cross-checks or "triangulations" are possible, but are time-consuming and therefore costly.

[23] Geographic poverty assessment tools are not further discussed in this document. However, IRIS will explore the usefulness of this approach, especially for countries and areas within countries that are characterized by a large share of absolute poor people as defined by the national poverty line. In such cases, it might be sufficient to rate a ME program as meeting the congressional target simply on locational characteristics serving an area that is overwhelmingly populated by absolute poor people and information on one basic indicator like food insecurity. Furthermore, in these areas, relatively simple tools (including those that document relative poverty) may be sufficient to adequately assess whether a large percentage of the clients reached is among the very poor or not.

3.2.2. Differences in weighting systems

In general, all existing poverty assessment tools employ multiple indicators of poverty. (The exception is the tool developed by ACCION International, which aims to obtain an estimate of per-capita income comparable with national and international poverty lines.)

All PAs aim to establish a ranking among people with respect to poverty, or at least to derive a classification of people as belonging to a poorer or a less poor group. Thus, using multiple indicators requires an aggregation of the different indicators into one measure of poverty. Aggregation analytically implies that the different indicators must be *weighted* when they are added up (aggregated) to obtain a combined measure of relative poverty.

The existing PAs employ one of the following weighting types:

- Type 1: No weights; income and/or expenditures are directly enumerated.
- Type 2: Externally set and fixed weights for indicators.
- Type 3: Internally set (but sometimes not disclosed) weights and indicators that can vary in principle across communities.
- Type 4: Flexible, statistically derived weights.

Type 1: **No weights (income and/or expenditures directly enumerated)**
Few practitioners' tools attempt to determine income and/or expenditures with such simple and direct questions as, "What were your food expenditures in the past month?" or, "What was the household's income derived from micro-enterprises?" Many poverty experts believe that these types of questions will yield figures with a larger error of measurement compared to the LSMS expenditure module.

Conclusion: As we are not aware of any scientific studies that compare the degree of accuracy obtained through such direct questions against the benchmark LSMS tool; these types of practitioner tools should be tested by IRIS.

Type 2: **Tools with externally set and fixed weights**
These tools obtain information on various indicators, measured as nominal, ordinal, or ratio variables. The first two types of variables are most frequently used, as they can typically be more easily asked and answered. An example of a weighting system is shown in Box 1.

Box 1: PA with externally set weights (Example with four indicators)

Education of client (Ordinal variable):

1= never gone to school (0 points)

2= primary school not completed (1 point)

3= primary school completed (2 points)

4= more than primary school (3 points)

Type of Roof (Ordinal variable):

1= straw, others, leaking roof etc. (0 points)

2= plastic (1 point)

3= wood (5 points)

4= tiles, metal or similar robustness (7 points)

Did you and your household members eat meat during the last seven days? (Nominal variable):

1= no (0 points)

2= yes (2 points)

What is the total value of your electric appliances? (Ratio variable)

Answer: 4,000 currency units (Point system: For each thousand units, one point)

Classification:

below 10 points - the individual/household is categorized as poor

10 points or more - not poor/less poor

→ Ranking by point system with respect to relative poverty is feasible

The weights (or points) are usually set by the program seeking to use the tool. Thus, they are decided not by the clients or subjects (unlike participatory wealth rankings) but by an external evaluator. The housing index and the net worth test are the two main examples of this type.

There are a number of advantages of an externally fixed weighting system:

- Weights are disclosed (i.e., objective and verifiable).
- Indicators and weights can be chosen specific to the environment. The choice of indicators (and the weights/points) can be enhanced by participatory tools that involve subjects, experts, and practitioners.

- A rating of whether an individual or household is relatively poor or less poor can be quickly obtained, and at low cost, as analytical skills are not required.
- Most, if not all, of the indicators used in PAs are verifiable (housing can be seen, education cross-checked, etc.). This reduces moral hazard in the poverty assessment process.
- The housing index and the net worth test are extensively used by practitioners in many Asian countries (e.g., Grameen Network, CASHPOR, CARD) for targeting the very poor.

There are also some disadvantages associated with this approach:

- Weights are fixed for a specific region. It is probably impossible to set up a weighting system that allows comparability across countries (or even across regions of a very heterogenous country such as India, China, or Sudan).
- Weights are chosen in an arbitrary fashion, mainly by the operants themselves based on experience (guided to some extent by participatory appraisals and by information derived from qualitative and quantitative research studies).
- The classification into poor and less poor is similarly arbitrary.
- Many of the indicators used in such systems relate to housing. Many analysts consider, however, that housing may be a good indicator of poverty in Asia but less so in Africa. Programs located in Latin America and Eastern Europe/NIS do not tend to use either the housing or the net worth index.

In a nutshell, a disadvantage of this weighting system is that the indicators and weights assigned to individual indicators in the aggregation process are somewhat arbitrarily chosen by the development institution that applies the index. Moreover, precisely because of the arbitrarily set indicators and weights, comparisons across countries are often impossible. A further disadvantage of the housing index is that it only focuses on a single dimension of poverty, neglecting other important dimensions such as food security, vulnerability, and human capital.

It seems more likely that indicators that directly measure various dimensions of poverty will more closely reflect living standards than indicators based on only one measure. The net worth test expands the list of indicators, and includes other assets such as land or production assets. However, the general criticism of externally set weights applies to the net worth test as well.

Conclusion: These disadvantages could be potentially overcome if PAs using externally set weights are tested and calibrated against the benchmark so as to determine the critical cut-off points indicated by the "dollar per day" or by a national poverty line. But these country-specific tests would need to be undertaken for each practitioner's tool that uses a unique set of indicators and weights.

***Type 3*: Tools with internally set weights (participatory wealth ranking, PWR)**

These tools can be subsumed under the heading of wealth ranking (PWR), as described in Bilsborrow (1994), Mayoux (2003), Narayan et al. (2000 and 2002), in the World Bank (1999) Voices of the Poor Program, and Gibbons et al (1999). The participants

jointly identify the criteria (indicators), and also discuss the relative importance of different indicators. An external facilitator guides and documents the process.

The outcome is a classification of community members (or the participants) into various poverty groups. Of course, the PWR tools also address many other issues and aspects – especially processes, institutional and impact issues. They are therefore extensively used in development practice. Participants in PWR usually belong to a single community or urban ward. If this locality is large, a sub-sample of members is usually chosen, to arrive at the critical maximum group size of 100 households.

There are a number of techniques and diagrams used to undertake participatory wealth rankings, extensively described in Mayoux (2003). The techniques and diagrams are flexible, and can be easily adjusted to the local situation.

There are a number of advantages with the PWR methods, but also disadvantages.

Advantages:

- PWR can arrive at a ranking of community members by poverty status. A few studies so far have sought to validate the ranking obtained through PWR by comparing it with the ranking obtained through other tools. Van de Ruit and May (2003) find that 70 percent of survey households in the Northern Province of South Africa were classified in the same poverty tercile by both the PWR and the CGAP microfinance poverty assessment tool.
- Excluding the time of participants, the cost of ranking per person ranked is quite low.
- PWR methods are well-received and widely applied methods for poverty targeting within the boundaries of a given community (Gibbons et al. 1998 and 1999). At the same time, they fulfil many other purposes. Mayoux (2003) stresses the potential for participants and program agents to learn from the PWR exercise. Other proponents of PWR stress its usefulness for promotion/marketing of the MFI (reducing costs); increased operational understanding of poverty (resulting in better designed products); increased loan officer understanding and motivation (resulting in better staff productivity); and increased transparency and community buy-in (resulting in better community relations). Yet, some or all of these advantages can also be realized (as additional benefits) through use of other poverty assessment methods reviewed in this document.

The **disadvantages** include the following:

- There is a risk of sampling and respondent bias. To avoid these biases, well-trained personnel are needed to carry out PWR. The skill requirements for the personnel implementing PWR appear to be higher compared to enumerators who are trained for quantitative surveys. Mayoux (2003) argues that PWR may not work well in areas where there are high levels of suspicion and conflict or where people do not know each other sufficiently. Such environments may especially challenge PWR facilitators.
- It is difficult to obtain the attendance of those with high opportunity cost of time. It is also difficult to ensure that that those with less voice (i.e., the poor, women, certain ethnic and religious groups, migrants, etc.) are equally heard in the determination of

what the poverty indicators for the ranking should be. While experienced PWR specialists are aware of these problems and know how to deal with them, the average staff member of a ME program may not have the necessary skills even after having received training on PWR.[24] Depending on the perceived benefits and costs associated with such a meeting, there may be a large (and unknown) sample and respondent bias.

- The frame of reference is the community. Indicators as well as weights reflect the local poverty situation. Yet the results are not comparable to other communities, as each community uses its own indicators and cut-off definitions for ranking themselves.[25] As these weights differ, a person who would rate in the poorest quintile in one community might be rated as belonging to the third quintile in another community, even in communities of similar income distributions – simply because different communities chose different indicators! The problems of comparison are likely to get much worse in communities of different living standards. People in Southeast Washington, D.C. will use very different criteria and point systems than people living in McLean, Virginia.
- The indicators and the weights can be documented through various tools and diagrams as described by Mayoux (2003) and Narayan (2000 and 2002). However, as indicators and weights differ between communities, calibrating these indicators against the benchmark would require, in essence, to do a calibration for each community reached by USAID's microenterprise programs. This is clearly incompatible with the need to certify poverty measurement tools that are cost-effective to implement.[26]

Conclusion. Based on the use of community-specific local indicators and weights, and assuming that these indicators and their related weights (or cut-off criteria[27]) differ between communities, PWR methods could not determine consistent relative poverty rankings in larger (and especially heterogeneous) geographical areas, or in a whole nation overall. Comparability requires that the indicators and weights are similar across communities. PWR yields a ranking of households living in a certain community, and a

[24] The average ME staff member may also not be suited as an enumerator for poverty assessment surveys (even after training). Yet, it appears that the requirements with respect to listening, people and social skills are lower for survey enumerators than for PWR facilitators.

[25] Elbers et al. (2003) find large differences in poverty even among neighboring communities. The geographic characteristics of communities, even after controlling for demographic and economic conditions, explain to a significant extent the spatial variations in poverty. These results suggest that localized indicators of poverty and their (subjective) weights of cut-off criteria for defining poverty as determined by PRA are not comparable to neighboring communities. According to Anton Simanowitz, the practical experience of using PWR shows that there is in fact much greater similarity between communities with respect to poverty indicators and related cut-off criteria for defining a person to be poor (Source: e-mail correspondence, January 2004).

[26] This, of course, is a valid point of criticism for all relative poverty measurement tools. However, other tools (such as the housing index or FFH food security scales) have a larger, and potentially even a national scale so that testing/calibration needs to be done only once.

[27] An example of a poverty indicator generated by PWR could be the number of rooms or the possession of a wooden dish rack. The cut-off criteria for defining those who are (relatively) poor in the view of the community members could be for example having only one room in the house, or not possessing a dish rack.

valid comparison with the national poverty line would require calibration of the community-specific ranking and its indicators against that poverty line. This would need to be repeated for every community, as the indicators and weights could be different in each community. Calibration for each community therefore appears to be an infeasible proposition if PWR-derived indicators would vary across communities. However, the published empirical evidence on whether or not PWR-derived poverty indicators vary much across communities appears to be scant, and some proponents of the PWR approach argue that indicators do not vary much between communities. In recognition of this, one may argue for testing PWR with a potential view of deriving indicators that then can be calibrated through statistical regression analysis against the benchmark of absolute poverty. Another, somewhat stronger argument for testing PWR as well as other tools establishing consistent relative rankings within communities or within larger areas is the case of operational areas of micro-enterprise (ME) programs that are characterized by extreme poverty (or extreme wealth) compared to the average poverty (or wealth) in the nation.[28]

Considering its widespread use among practitioners, and its potential usefulness as a low-cost poverty assessment tool together with geographic targeting, it is therefore recommended to test the PWR approach. It is further recommended to test a standardized version of Participatory Wealth Ranking by using the training manual designed by SEF, a method that has been used to train many practitioner organizations.

Type 4: **Tools with statistically derived selection of indicators and weights**

In the literature on poverty research, two statistical methods have been used to identify statistically significant indicators of poverty (or any other social construct) and to determine weights for aggregation. They are multivariate regression analysis and principal component analysis.

Multivariate regression analysis. Grootaert and Braithwaite (1998) use this method for the identification of significant and strong correlates of poverty in several Eastern European and Central Asian countries. More narrowly, a number of recent research studies apply multivariate regression to identify correlates of a specific welfare outcome, such as for example food security and nutrition (Chung et al. 1997; Habicht and Pelletier 1990) or health (Morris et al. 1999), or to determine whether micro-finance and other development programs reach out to less advantaged and poorer areas (Bigman and Fofack 2000; Sharma and Zeller 1999 and 2000).

The main motivation of these studies is to improve the targeting of public services or transfers to the poor, malnourished or sick by identifying useful and operational indicators of poverty and related selected welfare outcomes. For example, based on the

[28] Consider the following example. In country X, 40 percent of the population live below the international poverty line. The ME program exclusively targets areas that are known to have 70 percent of the population living below the poverty line. A tool yielding a relative ranking (such as PWR or the CGAP tool, see Type 4 tools) finds that a large majority of the clients (say 80 percent) are poorer than the wealthiest 30 percent living in the areas where the ME program operates. In other words, one can deduce from this that 80 percent of the clients live below the international poverty line. This deduction is valid if the distribution of poverty in the community (in the case of PWR) or in the sample of non-client households (in the case of CGAP tool) is the same as the distribution of poverty in the area for which the head-count index was calculated.

work by Grootaert and Braithwaite (1998), an operational tool for the identification of beneficiaries of transfer programs in certain parts of Russia was developed.

A more recent and equally interesting approach is represented by several spatially explicit multivariate regressions that use Geographic Information Systems to geo-reference socio-economic and geo-physical data. A general introduction is provided in Anselin (2002). Spatial regression models have been used, for example, to explain observed land use changes as a function of geo-physical and socio-economic factors. Recent applications of spatial regression include also the spatial analysis of poverty (Henninger 1998; Ghosh and Rao 1994).[29]

Hentschel and Lanjouw (forthcoming) combine household level sample data from LSMS with unit record data from a census. Their approach is to run a multivariate analysis of expenditures per capita as a function of a set of poverty indicators, using the LSMS sample data for Ecuador. Hentschel and Lanjouw only use regressors for which information can also be retrieved in the census data for Ecuador. They then use the estimated regression to predict expenditures for all census households. Using GIS techniques, they produce a poverty map of Ecuador that specifies the estimated headcount indices by geographical area. (This method is potentially useful, for example, to determine whether a ME or BDS program works in an above- or below-average area.) Similar analyses have been done for Brazil, Madagascar, Panama, South Africa, and Nicaragua, again yielding promising results; see Alderman et al. (2002), Elbers et al. (2002), and Elbers et al. (2003).

Principal component analysis (PCA). Generally speaking, Principal Component Analysis is a statistical technique to identify commonalities among different variables, and to aggregate these variables into various components (Basilevsky 1994; Sharma 1996). The PCA method is applied to determine which subset of indicators can, in combination, most effectively measure a household's relative poverty. The end result of PCA is the creation of a single index of relative poverty that assigns to each sample case a specific value representing that household's poverty status in relation to all other households in the sample. The index is created from the combination of individual indicators that have been found to be significantly correlated with one another, on the basis of the shared underlying poverty component.

The PCA method in essence identifies important indicators and calculates appropriate weights. Specifically, PCA isolates and measures the poverty component embedded in the various poverty indicators and creates a household-specific poverty score or index. Relative poverty comparisons are then made between client and non-client households based on this index.

PCA is thus used to provide "orderly simplification" of a number of interrelated measures. In this assessment, we use it to combine a number of intercorrelated poverty indicators into a relatively small number of underlying components. Each component is assumed to capture a unique attribute shared by households. Not all revealed components will reflect aspects of relative poverty. For example, components underlying the data collected in this study may also relate to the rural or urban setting of households; to

[29] For more information, see for example http://www.worldbank.org/poverty/inequal/abstracts/geog_map/read.htm

specific regional conditions; and to other commonalities, such as education, occupation, or cultural practices. Among the components created by PCA, the component that correlates associates most consistently and strongly with what the analyst expects to closely measure relative poverty can be selected as a "poverty index."

The PCA method, when used as an aggregation procedure for the computation of a poverty or wealth index, identifies important indicators and calculates the weights. Specifically, PC analysis isolates and measures the poverty component embedded in the various poverty indicators and creates a household-specific poverty score or index. Relative poverty comparisons are then made between client and non-client households based on this index. Basically, the principal component technique slices information contained in the *set* of indicators into several components. Each component is constructed as a unique index based on the values of all the indicators. The main idea is to formulate a new variable X^* that is the linear combination of the original indicators such that it accounts for the maximum of the total variance in the original indicators. That is, X^* is computed as

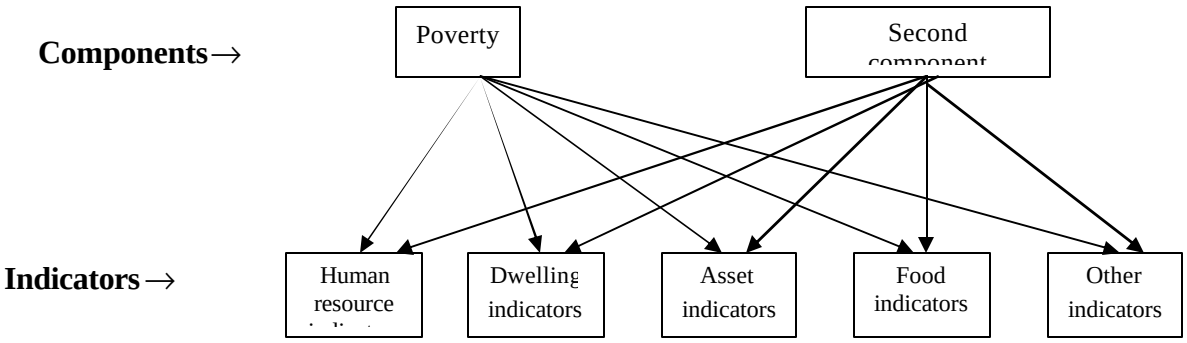
$$X^* = w_1 X_1 + w_2 X_2 + w_3 X_3 \ ,$$

where the weights (the *w*s) are specified such that X^* accounts for the maximum variances in X_1, X_2, and X_3. This index has a zero mean and a standard deviation equal to one (Basilevsky 1994; Sharma 1996).

The PC analysis thus extracts underlying components from a set of information provided by summary indicators. In the case of a poverty assessment tool, information collected from the questionnaires make up the "indicators," while the underlying component that is isolated and measured is "poverty." The first principal component accounts for the largest proportion of the total variability in the set of indicators used. The second component accounts for the next largest amount of variability not accounted by the first component, and so on for the higher order components.

In the example presented in Figure 1, PC analysis uses information on the co-movement among the indicators to isolate and quantify the underlying common components, i.e., poverty and demography. The poverty component is expected to account for most of the movement in the indicators and will thus be the "strongest" of all the components. The poverty component can be easily identified by analyzing the signs and size of the indicators in relation to the new component variable. For example, according to theory, education level should contribute positively – not negatively – to wealth.

Figure 1. Indicators and underlying components



Source: Zeller et al. (2001), Henry et al (2003).

PC analysis can be used to compute a series of weights that mark each indicator's relative contribution to the overall poverty component. Using these weights, a household-specific poverty index (or poverty score) can be computed based on each household's indicator values. Principal component analysis is the statistical technique used by the CGAP PAT to identify and aggregate various poverty indicators into a multidimensional index of relative poverty. PCA has also been used independently by Temple and Johnson (1998) and Filmer and Pritchett (1998, 2000) to create a wealth index using DHS or LSMS data.[30]

Conclusion: There are two statistical methods that can be used to identify important poverty indicators and their weights. The first method, multivariate regression analysis, requires access to information both on expenditures per capita (as the dependent variable) and on the various independent variables to be tested as indicators of poverty. The major advantage of the second method, PCA, is that it does not require information on the dependent variable, and alternative benchmarks as described in section 2.4 can be used. However, the result of PCA is a normally distributed new poverty index variable that only measures relative poverty and not absolute poverty, whereas multivariate regression analysis identifies the statistically significant poverty indicators and their weights in predicting expenditures as the poverty benchmark. Hence, if the analyst has access to expenditure data, the multivariate regression approach appears the more useful testing approach.

[30] Because of a lack of income and expenditure data, Filmer and Pritchett (1998) and Sahn and Stifel (2000) use principal component analysis and apply it to national household data for India and other countries, and for data from the Demographic and Health Surveys of many African countries, respectively.

4. Tools for Assessing Poverty

In the following, we discuss the existing tools for poverty assessment, and structure the discussion along the categories of tools as given in the previous section. This should not lead to the impression that the poverty indicators selected for future accuracy tests would only be sourced from tools submitted by practitioners.[31]

4.1 Tools with No Weighting System

By November 15, 2003, IRIS received the following tools in this category for testing:

- Income and Expenditure Tool by ACCION International
- Client Impact Monitoring System (CIMS) by Opportunity International
- Simple Approach by Dr. Gary Woller

4.1.1 Income and expenditure tool by ACCION International

The ACCION Poverty Assessment Tool uses household-level income and expenditure data to assess the poverty level of microfinance clients in comparison with national and international poverty lines. It does not use indicators of poverty that are aggregated with weights, but rather seeks directly to measure income and expenditures (Horn-Welch 2002).

The questionnaire covers six pages and uses simple and direct questions on different components of income and expenditures. ACCION affiliates apply this survey to all incoming clients as part of the loan application process. Thus, the data is part of the Management Information System of ACCION affiliates.

ACCION applied and tested this approach in Peru (Horn-Welch 2003) and in Haiti (Dewez et al. 2003), using national expenditure surveys (in the case of Haiti) or LSMS (in the case of Lima, Peru) as the benchmark. The results of these two studies are well documented. A key concern is the measurement of income in rural areas, especially income derived from home-produced and home-consumed food, as the questionnaire does not include detailed questions on these sources of income.

Recommendation: The ACCION PA is a relatively elaborate but nonetheless practical PA whose components ought to be tested by IRIS.

4.1.2 Client Impact Monitoring System (CIMS) by Opportunity International

CIMS uses a combination of socio-economic indicators to provide both poverty targeting and client impact information, including client satisfaction and exit. The CIMS survey is applied by MFI staff to a statistically representative sample of clients (around 350). On such a sample, it is estimated that the implementation costs of the tool is equal to approximately 45 person days per year (Opportunity International 2003).

[31] Other sources include the CWIQ survey, recent research by IRIS on social capital, and indicators contained in the CGAP microfinance poverty assessment tool.

The two-page questionnaire of the CIMS tool contains useful indicators of poverty, related to housing, demography, children's education, savings, and so forth. CIMS does not suggest any weighting system for these indicators, and it is unclear how clients are ranked with respect to relative poverty. The CIMS tool appears most useful for analysis and cross-tabulation of client impact and client satisfaction in comparison with different levels of certain poverty indicators.

Recommendation: The poverty indicators used in the CIMS tool ought to be tested by IRIS (as far as they are not already contained in the other practitioners' tools).

4.1.3 The simple approach

Dr. Gary Woller of the Marriott School at Brigham Young University proposes a straightforward tool that he used in Nigeria, Malawi, and Haiti. It consists of the simple question:

> "In a typical month, how much does your household spend for all goods and services?"

FINCA also suggests this question, but follows up with additional questions by expenditure group, presumably to increase accuracy. Dr. Woller also provides instructions on how to relate this information to the international poverty line.

However, most statisticians and economists would agree that this question is overly simple and will result in large margins of error. Significantly, the question omits to address (imputed) expenditures for home-produced food and other goods and services. This omission can be serious in rural areas, especially among farm households.

Nonetheless, it would be interesting to test this direct question. We are aware that by including it in the composite testing questionnaire we may create conditioning bias for other practitioners' questions related to expenditures (e.g., FINCA tool, FFH education expenditures, ACCION expenditures), which may lead to lower data quality on these expenditure data. IRIS will try to minimize this conditioning bias by appropriately placing related expenditure questions in the composite testing questionnaire, and by eliminating repetitive questions.

Recommendation: We recommend testing the simple and direct single question on expenditures, including the collection of information on the value of home-produced consumption.

4.2 Tools with Externally Set Weights

Most practitioners' tools belong to this category. By November 15, 2003, IRIS had received the following tools in this category for testing:

- Housing Index: Submitted by AIM, ASA, CASHPOR
- Net worth test: Submitted by Grameen Network
- Food Security Scales: Freedom from Hunger

- Composite tools encompassing several dimensions of poverty: Submitted by PRIZMA, CAM (Micro-enterprise support center), KMBI, FINCA and South Pacific Development (SPD)
- Trickle-Up Program.

4.2.1 The Housing Index (CASHPOR, AIM, ASA)

The Housing Index focuses on housing conditions as a subset of basic needs. CASHPOR, Amanh Ikhtiar Malaysia (AIM), and ASA have submitted proposals for housing indices that differ with respect to indicator variables and weights to be used. It is generally agreed among the users of the housing index that indicator variables and weights need to be adjusted to local conditions.

Housing information is quite easy to collect accurately, as most aspects of the quality of housing can be directly observed without the need to actually interview households, and thus can be accomplished quickly and in a low-cost fashion. However, the authors are not aware of any research studies that analyze the correlation between housing quality and overall level of living; speed and low cost might be offset by a lower ability to correctly identify poor households.

In fact, because of differing housing conditions (or assets) across and even within countries, proponents of this approach call for adjusting the weights for different countries or areas, as well as including alternative indicators of poverty (see Hatch and Frederick 1998; Gibbons and DeWit 1998). Nevertheless, precisely because of the arbitrarily set weights, comparisons within and across countries are questionable. Another major disadvantage of the housing index is that the index only focuses on a single dimension of poverty (e.g., housing), neglecting other important dimensions such as food security, vulnerability, and human capital.

Recommendation: The housing index provides apparently useful indicators of poverty that should be tested as proxies of poverty.

4.2.2 Net Worth Test (Grameen Network)

The Net Worth Test (applied by the Grameen Bank and by Grameen replicators in other countries) measures poverty by the value of the household's main assets, adjusted for debt. Net worth is thus the difference between value of assets owned and debt of household. Land and key production and consumption assets are enumerated, and are also valued in cooperation with the respondent. In cases where such assets can be assumed to consist primarily of easily observable physical assets, this method is likely to yield substantial savings in data collection costs. The drawback is that these assets (similar to housing) might correlate only weakly with poverty status. However, assets fluctuate less than expenditures (and much less than income), and therefore may correlate well with long-term wealth or poverty status.

A drawback is that the questions used to estimate the current value of assets and debts may be difficult for respondents. Especially in areas where there is less market exchange, and especially for assets that are seldom bought or sold, estimating current values of assets may be difficult without additional probing on the acquisition price of the asset, its age, and its depreciation.

Recommendation: The advantage of the Net Worth Test compared to the housing index is that assets other than housing are included, as well as debt. Asset variables have been found to be good predictors of poverty in many studies. IRIS should test the value of asset variables as poverty indicators, as suggested by Grameen Network. However, IRIS should also test whether number of assets, or even dichotomous variables of possession of key assets, yield the same accuracy while offering time and costs savings for survey and data analysis.

4.2.3 Food Security Scales (Freedom From Hunger)

In their 2002 paper, MkNelly and Dunford propose two approaches that are currently being tested by Freedom from Hunger and its Credit for Education affiliates in a number of countries.[32]

Freedom from Hunger currently tests the validity of simple food-security scales (a one-item and a six-item scale) for identifying *poor* and *very poor* households in various *Credit with Education* sites. The following excerpt from MkNelly and Dunford (2002) summarizes the approaches.

> This work will be based on the food-security scales used nationally in the United States and refined by University of California, Davis researchers for application in rural Mexico for classifying households into three groups—food-secure, food-insecure without hunger and food-insecure with hunger. First, the validity of the scales will be assessed through focus group discussion to explore how the questions and concepts are understood by clients and how well they reflect the experience of food insecurity. This step will help refine the wording for the scale items that is applicable to rural and urban developing world settings.

Then, the external validity and "accuracy" of the food-security scale as a measure of poverty will be tested through comparison to the international poverty line of US$1 a day (very poor) and US$2 a day (poor). Here, FFH proposes to use a short-cut expenditure module to arrive at a per-capita estimate of income so as to calibrate the food security scales to the income figure. They propose correlation analysis so as to determine whether the food-security scales offer a promising low-cost alternative for identifying poor and very poor households as compared to the more difficult household expenditure surveys. The self-reported food security and detailed expenditure information will be collected and compared for approximately 300 client households per site.

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[32] The other approach mentioned by MkNelly and Dunford is the CGAP Poverty Assessment Tool. "In recent years, two independent poverty assessments, each with hundreds of households, were conducted with our partner organization in Bolivia—Credito con Educación Rural (CRECER). One assessment applied the national poverty line and the other the CGAP Poverty Assessment Tool (PAT). These studies generated valuable data sets that can be further analyzed to identify whether a limited number of indicators (ideally 4–5) could provide similar poverty-level classifications at a lower cost of implementation. A shorter index based on the national poverty line would be very useful to MFIs like CRECER operating in Bolivia. And, a short form based on the CGAP PAT results would potentially be very useful to the myriad of MFIs around the world applying the CGAP PAT." (cited from MkNelly and Dunford, 2002).

Recommendation: The proposed method of Food Security Scales appears to be a good poverty assessment approach for poorer populations in poorer LDCs. In general, however, food security indicators are less reliably associated with relative poverty in higher-income populations, where assets (especially consumption assets, such as electric appliances) become relatively more important (Zeller et al. 2001). While the method may be appropriate for the poor countries – and the poor areas within those poor countries – that FFH is working in, focusing on food security scales alone would not be advisable for all developing or transitioning countries.[33] Nonetheless, the questions related to the food security scale (and other possible indicators of food security) have substantial merit. We therefore recommend that IRIS test indicators from the FFH tool.

4.2.4 Proposal by FINCA for a multidimensional PA

FINCA proposes a PA that includes many dimensions. The following is an excerpt of the paper by Hatch (2002).

> Imagine the most complex version of the questionnaire consisting of eleven variables—seven qualitative and four quantitative. The *qualitative* variables (none of which require numerical estimates) include (1) food security, (2) health, (3) housing, (4) education, (5) empowerment, (6) social capital, and (11) customer satisfaction. The four *quantitative* variables (requiring simple arithmetic only) include (7) total household monthly expenditures (used as a proxy for household income), (8) total household members, (9) an estimate of the household's daily per-capita expenditures (i.e., 7 divided by 8), and (10) a parallel estimate of the household's expenditures as expressed in terms of daily minimum wage equivalents. Furthermore, the host affiliate using this methodology need not utilize all eleven variables. For example, it could shrink its choice of variables from ten to six (say, four qualitative and two quantitative) or it could substitute up to four of the qualitative variables with new ones of its own design. Finally, the way each poverty variable's question is phrased can also be modified in order to better reflect local realities of the affiliate and the context in which it operates. In sum, the proposed methodology is less a rigid model than it is a prototype for guiding, testing, and gradually improving the design of FINCA's social performance measurement systems in the future.

Recommendation: Again, for each of the indicators, an externally set weighting system is proposed. The proposal by FINCA is ambitious but interesting. The few questions allowed on expenditure and minimum wage may not be sufficient to enumerate expenditures with a reasonable margin of error. However, this is a question that can only be answered through field-testing, which we recommend. (We note that the minimum wage equivalent, in many LDCs, is an illusionary concept that people may not be able to refer to.)

[33] 800 million are estimated to be undernourished and about 2 billion malnourished, but malnourishment is much more difficult to identify than undernutrition using indicators alone.

4.2.5 Bottom-up multidimensional system by Trickle-Up Program (TUP)

In contrast to the above methods, the Trickle-Up program is a bottom-up approach that allows participating programs both to identify the indicators (using, if possible, PWR methods as well) and to determine the weights with respect to the local socio-economic context.

Similar to the FINCA tool, indicators proposed by the Trickle-Up Program are related to multiple dimensions of poverty, rather than just housing or assets. TUP provides a guide for its programs on how to come up with indicators and weights. Each program affiliated with TUP can identify its own weights and indicators, whereas in the FINCA proposal, each participating village bank (irrespective of the country) should adhere to the same weights and indicators. Fixing weights across countries does not appear to be optimal, however, as conditions and local socio-economic context (and therefore the relative role and weight of a poverty indicator) vary from country to country.

The great advantage of the TUP approach is that indicators and weights are flexible in general, and are determined by local implementers (possibly derived with the help of PWR methods). However, herein lies also its greatest disadvantage. It is impossible to test all local indicators and weighting systems that TUP-supported programs have produced. It will be impossible to calibrate all existing local rating systems against the national poverty benchmark. Therefore, the TUP approach lacks scope for generalization, even within a country.

Recommendation: While we recognize the lack of general applicability and the infeasibility of calibrating all existing bottom-up indicators and weights, we recommend applying the TUP guide to derive local-level indicators, and including these in the test. It will then be feasible to see how much accuracy is gained when these local specific indicators are included, compared to a situation where they are omitted.

4.2.6 Scorecard by PRIZMA and South Pacific Development

PRIZMA also submitted its scorecard for testing. The scorecard contains indicators of several dimensions of poverty, such as education, residence, employment status, family size, consumption of meat and sweets, as well as possession of a TV or transport vehicle. All of the indicators appear straightforward. The weighting system is fine-tuned to the socio-economic context of Bosnia-Herzegovina and Poland.

The tool proposed by South Pacific Development similarly contains a set of indicators reflecting multiple dimensions of poverty. We consider the two tools equally useful.

Recommendation: The indicators of PRIZMA and SPD should be included in the composite testing tool of IRIS, provided that they are unique and add to the list of indicators of all PA tools.

4.3 Tools with Statistically Derived Weights

4.3.1 Productive Asset Index (TUP)

Jan Maes, Program Officer for Asia of TUP, proposes that IRIS test the following three approaches that use assets, including family labor, as a measure of poverty:

- Approach 1: Simple sum of PPP-adjusted values of productive assets owned by households
- Approach 2: To avoid the time-consuming enumeration of asset values, a second approach is to aggregate the different assets through principal component analysis into a single productive asset index.
- Approach 3: This is similar to approach 2, but simplifies the survey further by allowing dichotomous variables on asset possession.

Focusing on productive assets (land, animals, business appliances, family labor, and so forth) is a useful pathway for assessing the income capacity of a household. However, the distinction between productive and consumptive assets is sometimes difficult to make in practice. For example, a motorcycle can be used not only for leisure and consumption, but also to sell handicrafts in the market or to run a local taxi business. Moreover, the possession of consumer assets (such as a CD player) can also indicate the poverty level of a household. Approach 1 is therefore related to existing PAs that enumerate specific assets or their value. The main difference, however, is that the values are added up to one PPP-adjusted summation value, whereas the other methods use a scoring or point system to value different types of assets.

Approaches 2 and 3 in essence use the logic of the CGAP Poverty Assessment Tool (discussed below). Asset indices have been previously computed by Filmer and Pritchett (1998), using DHS data. They found that the asset index performs well in comparison with other poverty measures, such as expenditures.

Recommendation: The construction of an asset index via principal component analysis should be tested by IRIS.

4.3.2 Microfinance Poverty Assessment Tool by CGAP

The following description is based on a citation on the CGAP website (CGAP, 2003).

> The CGAP Poverty Assessment Tool (developed in conjunction with the International Food and Policy Research Institute - IFPRI) provides transparency on the depth of poverty outreach of micro-finance institutions (MFIs). It provides rigorous data on the levels of poverty of clients relative to people within the same community through the construction of a multidimensional poverty index that allows for comparisons between MFIs within countries. It has been primarily designed for donors and investors who would require a more standardized, globally applicable and rigorous set of indicators than what conventional targeting tools provide, to make poverty focused funding decisions. It has been successfully tested in seven countries

during 1999 and 2001, and has been used by about 20 MFIs since then (Personal communication with Syed Hashemi, May 02).

The tool involves surveys of 200 randomly selected client households of specific MFIs and 300 non-client households in the operational area of the MFI. The analysis could, of course, also be done at the national level.

The questionnaire includes a variety of indicators to capture the multidimensionality of poverty and to provide a better approximation of poverty levels. The initial compilation of indicators for this approach was based on a detailed review of results of large, in-depth surveys on household economics, as well as of indicators and methods used by MFIs, famine early warning systems, and national monitoring systems for food security, nutrition, and vulnerability (see, for example, Wratten 1995; Microcredit Summit Campaign 1999; Radimer et al. 1992). The survey collects information on the demographic structure and economic activities of households, on their footwear and clothing expenditure, on food security and vulnerability, on housing indicators, land ownership and on ownership of assets. The manual (Henry et al. 2003) provides guidelines on how to adapt the recommended questionnaire to country conditions, including the possibility of adding local indicators to account for context specificity.

Bivariate analysis of the data provides immediate comparisons of clients and non-clients in terms of different indicators. However, the key feature of the Poverty Assessment tool is the Poverty Index. The Index is constructed through the application of principal component analysis (PCA). The PCA method is applied to determine how information from various indicators can be most effectively combined to measure a household's relative poverty status. The particular combinations of indicators that prove most instrumental in measuring relative poverty within a given survey area (or between countries) will differ, and often in ways that are somewhat predictable. In countries where poverty is extreme, indicators signaling chronic hunger tend to more strongly differentiate the relative poverty of households. In densely populated countries, ownership of land and dwellings may better signal differences in relative poverty. The end result of PCA is the creation of a single index of relative poverty that assigns to each sample household a specific value, called a score, representing that household's poverty status in relation to all other households in the sample. The lower the score, the poorer the household relative to all others with higher scores. The scores of MFI client households and non-client households are then compared to indicate the extent to which the MFI reaches the poor. Each assessment study includes a random sample of 300 non-client households and 200 client households.

To use the Poverty Index for making comparisons, the non-client sample is first sorted in an ascending order according to its index score. Once sorted, non-client households are divided in terciles based on their poverty index score: the top third of the non-client households are grouped in the "higher" ranked group, followed by the "middle" ranked group, and finally the bottom third in the "lowest" ranked group. Since there are 300 non-clients, each group contains 100 households each. The cutoff scores for each tercile define the limits of each poverty group. Client households are then categorized into the three groups based on their household scores.[34]

[34] Any other grouping is of course also feasible (quintiles, etc.)

If the pattern of client households' poverty matches that of the non-client households, client households would also divide equally among the three poverty groupings, with 33 percent falling in each group. Hence any deviation from this equal proportion signals a difference between the client and the non-client population. For instance, if 60 percent of the client households fall into the first tercile or lowest poverty category, the MFI reaches a disproportionate number of very poor clients relative to the general population. It would suggest that the MFI is deliberately targeting the very poor. On the other hand if the majority of MFI clients fall into the least poor tercile, one would know that the MFI is not reaching the very poor.

A manual explains how to implement the Poverty Assessment Tool (Henry et al. 2003). Some of the results of the tool are highlighted at the CGAP website, or are contained in Zeller et al (2001, 2002). The tool has been also applied to the analysis of safety net programs in Indonesia and micro-finance programs in Mexico (Zeller, Wollni and Shaban 2003). The tool is currently being used, with support from IFAD and CGAP, to assess the poverty outreach of about 10 MFIs operating in Ghana.

Recommendation: We recommend including indicators from the CGAP generic questionnaire insofar as they are not already contained in other tools. Moreover, the PCA technique will be used to test whether the weights defined by different PAs (as reviewed in section 4.2.) are optimal in accurately predicting the poverty status of a household. PCA will be used to derive the weights statistically, and we can then test how much these "optimal" weights improve – if at all – the accuracy of the existing practitioners tools.

5. Summary

This paper explores the usefulness of various benchmarks for poverty analysis, and reviews existing practitioners' tools. It further reviews statistical methods that are useful for identifying significant indicators of poverty (as contained in practitioners' tools) and for deriving weights of these indicators for purposes of aggregation.

5.1. Statistical Methods

There are two methods that can be used to statistically identify poverty indicators and their weights. The first method is multivariate regression analysis. This method requires that information is available both on expenditures per capita as the dependent variable and on independent variables being indicators of poverty to be tested. The major advantage of the second method, Principal Component Analysis, is that it does not require information on the dependent variable. However, the result of PCA is a new poverty index variable that is only a measure of relative poverty and not of absolute poverty. In comparison, multivariate regression analysis identifies the statistically significant poverty indicators and their weights in predicting expenditures as the poverty benchmark. Hence, if the analyst has access to expenditure data, the multivariate regression approach appears to be the more suitable calibrating approach.

5.2. Choice of Benchmark

With respect to the benchmark, the following recommendations are made:

IRIS should use the LSMS and the SDA-IS survey data accessible from the World Bank to test the accuracy of various poverty assessment tools.

Using these data sets for a limited number of countries, IRIS will explore the relationships between potential poverty indicators (as contained in the World Bank data sets) and the benchmark, using multivariate regression analysis and principal component analysis.

Moreover, the LSMS expenditure module will serve as the benchmark tool for the field research test. The field research test allows for more flexibility in testing different indicators, as contained in the practitioner tools.

For some countries, where LSMS and SDA-IS survey data is not available, there is a need for alternative national poverty benchmarks. The paper identified three potential alternative benchmarks: The Demographic and Health Survey (DHS), the SDA Priority Survey (and the SDA PS PLUS), and the CWIQ survey. With these benchmarks, an index of relative poverty can be computed that, under some assumptions, can be used to map relative poverty into absolute poverty using POVCAL, a software program developed by the World Bank.

5.3. Testing Practitioner Tools

Generally speaking, a tool is comprised of a set of indicators and a functional rule of how to aggregate single indicators into a composite variable or index of absolute or relative poverty by using some form of weighting scheme.

With respect to the practitioner tools, we distinguish four types of tools. The main distinctive criteria is whether or not weights are used to aggregate different indicators into a single measure of poverty, and – if weights are used – how these weights are derived. These types are:

- Type 1: No weights; income and/or expenditures are directly enumerated (ACCION)
- Type 2: Externally set and fixed weights (FINCA, Freedom from Hunger, Grameen Network, PRIZMA, etc.)
- Type 3: Internally set weights (Participatory wealth ranking)
- Type 4: Flexible, statistically derived weights (TUP proposal for Productive Asset Index, CGAP poverty assessment tool).

All the practitioners' tools that were submitted to IRIS include indicators or weighting schemes that merit testing. None of them can be excluded on a-priori-arguments.

It is therefore recommended that IRIS designs a composite questionnaire that includes the indicators from the above-reviewed tools. However, it will not be possible to replicate each tool in its entirety as this would essentially require separately conducting an accuracy test on a different household sample for each and every tool. This composite

questionnaire should not be viewed as “the tool” to be tested, but as an attempt to test many poverty indicators from different tools simultaneously at the lowest cost and in the least amount of time possible.

In addition, the composite questionnaire should include findings on poverty indicators from other sources, especially recent research on indicators of social capital and voice, a field of research that has rapidly expanded in recent years and that appears to not fully be reflected in existing practitioners’ tools. The practitioner tools mostly focus on household-level indicators although community or geographic characteristics such as infrastructure, access to public services, and climate may also influence the poverty level of the population. Hence, geographic and administrative characteristics can be powerful predictors of poverty. Therefore, it is further recommended that the composite questionnaire include a section that obtains indicators used to predict household poverty partly by including community (or higher administrative or geographic level) characteristics. In a sense, those practitioners that use geographic targeting for selecting poor clients (e.g. TUP or SEF), already use the community-level predictors of poverty. It is further recommended to geo-reference all survey households and communities during the accuracy field tests using low-cost GPS systems. This would enable the inclusion of geo-referenced secondary data containing potential predictors of poverty.

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Appendix: USAID Funding, Poverty Levels. and Survey Data Availability

Table 1. USAID Microenterprise Funding and Poverty Levels, by Country

Country	Region	USAID Micro-enterprise Funding Level 2002 ($US thousand)	% of Total USAID Micro-enterprise Funding (2002)	Population (millions)[1]	GNI/ Capita[1] ($US)	Income Distri-bution (Gini)	National Poverty Line ($US)	% of pop. below NPL	Bottom ½ below NPL	Percent pop. <$1/day[2]
Albania	EE	0	0.00	3.2	1,380					
Azerbaijan	EE	5,644	3.32	8.2	710	36.0	319.55	68.1	34.05	0.04
Bangladesh	Asia	1,744	1.03	135.7	360	33.6		33.7	16.85	0.36
Benin	Africa	1,973	1.16	6.6	380			33.0	16.5	
Bolivia	LAC	2,500	1.47	8.7	900	44.7	658.06	63.2	31.6	0.14
Bosnia	EE	750	0.44	4.1	1,270				9.75	
Bulgaria	EE	2,710	1.60	7.9	1,790	26.4	385.99		0	0.05
Cambodia	Asia	0	0.00	12.5	280	40.4		36.1	18.05	
Columbia	LAC	0	0.00	43.7	1,830	57.1		17.7	8.85	
Croatia	EE	864	0.51	4.4	4,640	29.0	1,782.72			0.02
DR Congo	Africa	1,187	0.70	53.8	90					
Ecuador	LAC	4,492	2.64	13.1	1,450	43.7		35.0	17.5	0.20
Egypt	NearEast	21,000	12.36	66.4	1,470	28.9	1,552.28	16.7	8.35	0.03
El Salvador	LAC	7,180	4.23	6.5	2,080	52.2	613.20	48.3	24.15	0.21
Eritrea	Africa	900	0.53	4.3	160			53.0	26.5	
Ethiopia	Africa	1,481	0.87	67.3	100	40.0		44.2	22.1	0.82
Georgia	EE	0	0.00	5.2	650	37.1	512.00	11.1	5.55	
Ghana	Africa	3,241	1.91	20.1	270	40.7		31.4	15.7	0.45
Guatemala	LAC	2,501	1.47	12	1,750	56.0	560.91	57.9	28.95	0.16
Guinea	Africa	953	0.56	7.7	410	40.0		40.0	20	

Table 1 (cont.). USAID Microenterprise Funding and Poverty Levels, by Country

Country	Region	USAID Micro-enterprise Funding Level 2002 ($US thousand)	% of Total USAID Micro-enterprise Funding (2002)	Population (millions)[1]	GNI/ Capita[1] ($US)	Income Distri-bution (Gini)	National Poverty Line ($US)	% of pop. below NPL	Bottom ½ below NPL	Percent pop. <$1/day[2]
Guyana	LAC	1,600	0.94	1	840	40.2	380.00	43.2	21.6	
Haiti	LAC	3,000	1.77	8.3	440			65.0	32.5	
Honduras	LAC	832	0.49	6.8	920	56.3	337.03	53.0	26.5	
India	Asia	1,300	0.77	1,000	480	37.8		28.6	14.3	0.35
Indonesia	Asia	1,884	1.11	211.7	710	31.7	104.41	27.1	13.55	0.07
Jamaica	LAC	1,500	0.88	2.6	2,820	37.9			0	0.02
Jordan	Near East	3,150	1.85	5.2	1,760	36.4	992.17	18.7	9.35	0.02
Kazakhstan	EE	3,332	1.96	14.8	1,510	35.4	370.00	11.7	5.85	0.02
Kenya	Africa	2,306	1.36	31.3	360	57.5	452.93	34.6	17.3	0.23
Kosovo	EE	692	0.41					42.0	21	
Kyrgyzstan	EE	2,802	1.65	5	290	34.6			0	0.02
Lebanon	Near East	0	0.00	4.4	3,990				0	
Liberia	Africa	0	0.00	3.3	150				0	
Macedonia	EE	0	0.00	2	1,700				0	
Madagascar	Africa	0	0.00	16.4	240	38.1			0	0.49
Malawi	Africa	541	0.32	10.7	160	49.5		71.3	35.65	
Mali	Africa	1,514	0.89	11.3	240	50.5		65.3	32.65	0.73
Mexico	LAC	3,500	2.06	100.9	5,910	52.4			0	
Moldova	EE	1,528	0.90	4.3	460	40.6	220.00			0.22
Mongolia	Asia	2,120	1.25	2.4	440	33.2	172.50	10.1	5.05	0.14
Morocco	Near East	696	0.41	29.6	1,190	39.1	200.00	36.3	18.15	0.02
Mozambique	Africa	3,264	1.92	18.4	210	39.6	270.61	19.0	9.5	
Namibia	Africa	3,300	1.94	1.8	1,780					0.35
Nepal	Asia	600	0.35	24.1	230	36.7		69.4	34.7	0.38

Table 1 (cont.). USAID Microenterprise Funding and Poverty Levels, by Country

Country	Region	USAID Micro-enterprise Funding Level 2002 ($US thousand)	% of Total USAID Micro-enterprise Funding (2002)	Population (millions)[1]	GNI/ Capita[1] ($US)	Income Distri-bution (Gini)	National Poverty Line ($US)	% of pop. below NPL	Bottom ½ below NPL	Percent pop. <$1/day[2]
Nicaragua	LAC	1,400	0.82	5.3		60.3		42.0	21	
Nigeria	Africa	3,300	1.94	132.8	290	51.1		47.9	23.95	0.70
Peru	LAC	13,394	7.89	26.7	2,050	46.2		34.1	17.05	0.16
Philippines	Asia	4,634	2.73	79.9	1,090	46.2		49.0	24.5	0.15
Poland	EE	31	0.02	38.6	4,570	31.6	852.00			
Romania	EE	959	0.56	22.4	1,850	31.1	1,441.76	36.8	18.4	0.02
Russia	EE	7,652	4.50	144.1	2,140	48.7	1,204.50	21.5	10.75	0.06
Rwanda	Africa	0	0.00	8.2		28.9	885.32	30.9	15.45	
Senegal	Africa	4,460	2.63	10	470	41.3		51.2	25.6	0.26
South Africa	Africa	2,823	1.66	43.6	2,600	59.3		33.4	16.7	0.07
Tajikistan	EE	2,214	1.30	6.3	180				0	
Tanzania	Africa	2,544	1.50	35.2	280	38.2			0	0.20
Trinidad	LAC	97	0.06	1.3	6,490	40.3	2,420.00			0.12
Turkmenistan	EE	520	0.31	5.5	1,200					
Uganda	Africa	1,632	0.96	23.4	250	37.4	203.18	41.6	20.8	0.82
Ukraine	EE	7,539	4.44	48.7	770	29.0			0	
Uzbekistan	EE	3,025	1.78	25.4	450	44.7	288.00	31.7	15.85	
Vietnam	Asia	350	0.21	80.5	430	36.1	98.10		25.45	
West Bank/Gaza	Near East	650	0.38	3.2	930				0	
Zambia	Africa	1,021	0.60	10.5	330	52.6		72.9	36.45	
Zimbabwe	Africa	1,800	1.06	13	470	50.1		34.9	17.45	0.36

Table 2. Survey Data Availability, by Country

Country	Region	Presence of LSMS (Category, date)[4]	SDA-IS[3] Date, Type of access	SDAPS[3]	CWIQ[3]	DHS[5]
Albania	EE	Category 1 2002				
Azerbaijan	EE	Category 1 1995				
Bangladesh	Asia					2000, Public Domain
Benin	Africa		1994, ND		2002, GPR; Data not available at World Bank	2001, Public Domain
Bolivia	LAC					1998, Public Domain
Bosnia	EE	Category 1 2001				
Bulgaria	EE	Category 1 2001				
Cambodia	Asia					2000, Restricted Data
Columbia	LAC					2000, Public Domain
Croatia	EE					
DR Congo	Africa					
Ecuador	LAC	Category 1 1998				1987, No I/E Module
Egypt	Near East					2000, Public Domain
El Salvador	LAC					1985, No I/E Module
Eritrea	Africa			1997 – content not available		2002, no I/E module, Access Not Established
Ethiopia	Africa			1998 – includes I/E module; GPR		2000, Public Domain
Georgia	EE					
Ghana	Africa	Category 2-3 1998/99	1998, GPR		2002, GPR	1998, Public Domain, (2003 data collection in progress)

Table 2 (cont.). Survey Data Availability, by Country

Country	Region	Presence of LSMS (Category, date)[4]	SDA-IS[3] Date, Type of access	SDAPS[3]	CWIQ[3]	DHS[5]
Guatemala	LAC	Category 2 2000				1999, Public Domain
Guinea	Africa		1994, GPR	1991 – includes I/E module; GPR	2002, Pending Release	1999, Public Domain
Guyana	LAC	Category 3 1992/93				
Haiti	LAC					2000, Public Domain
Honduras	LAC					
India	Asia	Category 1 (Uttar Pradesh and Bihar) 1997/98				1999, Public Domain
Indonesia	Asia					1997, Public Domain
Jamaica	LAC	Category 2 1998-2000				
Jordan	Near East					
Kazakhstan	EE	Category 1 1996				1995, Public Domain
Kenya	Africa			1997– includes I/E module; GPR		1998, Public Domain
Kosovo	EE	Category 1 2000				
Kyrgyzstan	EE	Category 1-2 1993				1997, Public Domain
Lebanon	Near East					
Liberia	Africa					1986, Public Domain
Macedonia	EE					

Table 2 (cont.). Survey Data Availability, by Country

Country	Region	Presence of LSMS (Category, date)[4]	SDA-IS[3] Date, Type of access	SDAPS[3]	CWIQ[3]	DHS[5]
Madagascar	Africa		1993, GPR	1999 includes I/E module; GPR		1997, Public Domain, (2003 data collection ongoing)
Malawi	Africa		1997, GPR		2002, Data Collection in Progress	2000, Public Domain
Mali	Africa			1994– includes I/E module; GPR	2001, Pending Release	2001, Public Domain
Mexico	LAC					1987, Public Domain
Moldova	EE					
Mongolia	Asia					
Morocco	Near East	Category 3 1991				1995, Public Domain
Mozambique	Africa		1996, ND	1991– content not available; ND	2002, Pending Release	1997, Public Domain
Namibia	Africa					1992, Public Domain 2000, Not Yet Available
Nepal	Asia	Category 2 1996				2001, Public Domain
Nicaragua	LAC	Category 1 1993				2001, Public Domain
Nigeria	Africa		2003, NE		2002, Pending Release	1999, Public Domain (2003 data collection in progress)
Peru	LAC	Category 1 1994				2000, Public Domain
Philippines	Asia					1998, Public Domain
Poland	EE					

Table 2 (cont.). Survey Data Availability, by Country

Country	Region	Presence of LSMS (Category, date)[4]	SDA-IS[3] Date, Type of access	SDAPS[3]	CWIQ[3]	DHS[5]
Romania	EE	Category 3 1994/95				
Russia	EE	Category 1 1992				
Rwanda	Africa		1998, GPR , No CD ROM	1993– content not available; ND	2001, Pending Release	2000, Public Domain
Senegal	Africa			1991– includes I/E module; GPR	2001, Data collection in progress	1999, Public Domain
South Africa	Africa	Category 1 1993	1999, ND			1998, Public Domain
Tajikistan	EE	Category 1 1999				
Tanzania	Africa	Category 1 1993	1993, PD, No CD-ROM	2000 – includes I/E module; GPR		1999, Public Domain (2003 data collection in progress)
Trinidad	LAC					1987 Public Domain
Turkmenistan	EE					2000, Restricted Data
Uganda	Africa		1992, GPR, No CD-ROM	2002 – content not available; ND		1995, Public Domain
Ukraine	EE					
Uzbekistan	EE					1996, Public Domain
Vietnam	Asia	Category 2 1997/98				2002, Restricted Data
West Bank/Gaza	Near East					
Zambia	Africa		2002, NE	1998– includes I/E module; GPR		2001, Public Domain
Zimbabwe	Africa			1993 – content not available; ND		1999, Public Domain

NOTES TO TABLES:

1 Information in these tables is available in the World Bank's 2001 World Development Indicators : http://www.worldbank.org/data/countrydata/countrydata.html WDI Data profile tables.

2 Information in these columns is available at the Millennium Development Goals web site: http://www.developmentgoals.org/Data.htm#CT.

3 Information in these columns is available at the World Bank Group, Africa Databank, Survey Navigator web site: http://www4.worldbank.org/afr/poverty/databank/survnav/default.cfm.

Survey access is classified in the following categories: Public Domain (**PD**), Government Permission Required (**GPR**; permission is typically granted), No Access (**NA**), Not Established (**NE**), Not Defined (**ND**).

4 LSMS data is available at the World Bank's LSMS web site: http://www.worldbank.org/lsms/guide/select.html.
Survey access is classified in the following categories:

1. No prior permission from government is required to use the data.

2. Prior government permission is required, but the track record for a timely, positive response is good.

3. According to our best information, a substantial proportion of data requests have been denied, left unanswered, or answered affirmatively only after substantial delays, or there is not yet an established track record.

5 Information in this column is available at the Demographic and Health Surveys web site: http://www.measuredhs.com/accesssurveys/search/search_surv_std.cfm?Action=region Demographic and Health Surveys

6 Definition: “Poverty gap” is the mean shortfall from the poverty line (counting the nonpoor as having zero shortfall), expressed as a percentage of the poverty line. This measure reflects the depth of poverty as well as its incidence. Data showing as 0.5 signifies a poverty gap of less than 0.5 percent.