Simple Poverty Scorecard® Poverty-Assessment Tool Senegal

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Abstract

The Simple Poverty Scorecard-brand poverty-assessment tool uses 10 low-cost indicators from Senegal's 2005/6 Senegal Poverty Survey to estimate the likelihood that a household has consumption below a given poverty line. Field workers can collect responses in about ten minutes. The scorecard's accuracy is reported for a range of poverty lines. The scorecard is a practical way for pro-poor programs in Senegal to measure poverty rates, to track changes in poverty rates over time, and to segment clients for differentiated treatment.

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Simple Poverty Scorecard® Poverty-Assessment Tool

			Name	Identifier
Interview ID:				
Interview date:		Participant:		
Country:	SEN	Field agent:		
Scorecard:	001	Service point:		
Sampling wgt.:		Number of household members:		

Indicator	Response	Points	Score
1. What are the walls of the residence made of?	A. Other	0	
	B. Mud blocks or cinder blocks	11	
2. What is the main source of energy for lighting?	A. Lantern or homemade kerosene lamp	0	
	B. Candle, wood, or other	3	
	C. Generator, solar, gas lamp, or electricity (SENELEC)	8	
3. What is the main fuel used for cooking?	A. Other	0	
	B. Gas	7	
4. What is the main source of drinking water?	A. Other	0	
	B. Inside faucet	7	
5. What toilet arrangement does the household use?	A. Uncovered latrine, basin/bucket, other, or none	0	
	B. Covered latrine, improved ventilated latrine, or flush to septic tank	8	
	C. Flush to sewer	19	
6. Does the household own a refrigerator/freezer?	A. No	0	
	B. Yes	19	
7. Does the household own a television?	A. No	0	
	B. Yes	2	
8. Does the household own a fan?	A. No	0	
	B. Yes	15	
9. Does the household own an electronic iron?	A. No	0	
	B. Yes	5	
10. Does the female head/spouse know how to read and write in any language?	A. No female head/spouse	0	
	B. No	2	
	C. Yes	7	

Score:

Simple Poverty Scorecard® Poverty-Assessment Tool Senegal

1. Introduction

Pro-poor programs in Senegal can use the Simple Poverty Scorecard poverty-assessment tool to estimate the likelihood that a household has consumption below a given poverty line, to estimate a population's poverty rate at a point in time, to track changes in a population's poverty rate over time, and to segment participants for differentiated treatment.

The direct approach to poverty measurement via surveys is difficult and costly, asking households about a lengthy list of consumption items (such as "How much has the household spent on millet, sorghum, corn, and *fonio* in the past 30 days? In the past twelve months, how many times has the household had this expense? Now then, how much has the household spent on rice and broken rice . . .").

In contrast, the indirect approach via the scorecard is simple, quick, and inexpensive. It uses ten verifiable indicators (such as "What toilet arrangement does the household use?" or "Does the household own a television?") to get a score that is highly correlated with poverty status as measured by the exhaustive survey.

The scorecard differs from "proxy means tests" (Coady, Grosh, and Hoddinott, 2002) in that it is tailored to the capabilities and purposes not of national governments but rather of local, pro-poor organizations. The feasible poverty-measurement options

for these organizations are typically subjective and relative (such as participatory wealth ranking by skilled field workers) or blunt (such as rules based on land-ownership or housing quality). Measurements from these approaches are not comparable across organizations nor across countries, they may be costly, and their accuracy and precision are unknown.

Suppose an organization wants to know what share of its participants are below a poverty line, such as the Millennium Development Goals' $1.25/day poverty line at 2005 purchase-power parity. Or—as required of USAID microenterprise partners—an organization might want to report how many of its participants are among the poorest half of people below the national poverty line. Or an organization might want to measure movement across a poverty line (see, for example, Daley-Harris, 2009). In all these cases, what is needed is a consumption-based, objective tool with known accuracy. While consumption surveys are costly even for governments, many small, local organizations may be able to implement an inexpensive poverty-assessment tool that can serve for monitoring, management, and targeting.

The statistical approach here aims to be understood by non-specialists. After all, if managers are to adopt the scorecard on their own and apply it to inform their decisions, they must first trust that it works. Transparency and simplicity build trust. Getting "buy-in" matters; proxy means tests and regressions on the "determinants of poverty" have been around for three decades, but they are rarely used to inform decisions, not because they do not work, but because they are presented (when they are

presented at all) as tables of regression coefficients incomprehensible to non-specialists (with cryptic indicator names such as "`LGHHSZ_2`", negative values, and many decimal places). Thanks to the predictive-modeling phenomenon known as the "flat maximum", simple scorecards are usually about as accurate as complex ones.

The technical approach here is also innovative in how it associates scores with poverty likelihoods, in the extent of its accuracy tests, and in how it derives formulas for standard errors. Although these techniques are simple, they have rarely or never been applied to poverty-assessment tools.

The scorecard is based on Senegal's 2005/6 *Enquête de Suivi de la Pauvreté au Sénégal* (ESPS, the Senegal Poverty Survey) conducted by the Ministére de l'Economie et des Finances. Indicators are selected to be:

- Inexpensive to collect, easy to answer quickly, and simple to verify
- Strongly correlated with poverty
- Liable to change over time as poverty status changes

All points in the scorecard are non-negative integers, and total scores range from 0 (most likely below a poverty line) to 100 (least likely below a poverty line). Non-specialists can collect data and tally scores on paper in the field in five to ten minutes.

The scorecard can be used to estimate three basic quantities. First, it can estimate a particular household's "poverty likelihood", that is, the probability that the household has per-adult-equivalent or per-capita consumption below a given poverty line.

Second, the scorecard can be used to estimate the poverty rate of a group of households at a point in time. This estimate is the average poverty likelihood among the households in the group.

Third, the scorecard can be used to estimate changes in the poverty rate for a group of households (or for two independent samples of households that are representative of the same population) between two points in time. This estimate is the change in the average poverty likelihood of the group(s) of households over time.

The scorecard can also be used for targeting. To help managers choose the most appropriate targeting cut-off for their purposes, this paper reports several measures of targeting accuracy for a range of possible cut-offs.

This paper presents a single scorecard whose indicators and points are derived from household consumption data and Senegal's national poverty line. Scores from this one scorecard are calibrated to poverty likelihoods for ten poverty lines.

The scorecard is constructed and calibrated using some of the data from the 2005/6 ESPS, and its accuracy is validated on the rest of the data.

While all three scoring estimators are unbiased when applied to the population from which they were derived (that is, they match the true value on average in repeated samples from the same population from which the scorecard was built), they are—like all predictive models—biased to some extent when applied to a different population.[1]

[1] Examples include nationally representative samples at a different point in time or non-nationally representative sub-groups (Tarozzi and Deaton, 2007).

Thus, while the indirect scoring approach is less costly than the direct survey approach, it is also biased. (The survey approach is unbiased by assumption.) There is bias because scoring must assume that the future relationship between indicators and poverty will be the same as in the data used to build the scorecard.[2] Of course, this assumption—ubiquitous and inevitable in predictive modeling—holds only partly.

When applied to the validation sample with bootstrap samples of $n = 16{,}384$, the difference between scorecard estimates of groups' poverty rates and the true rates at a point in time is +2.8 percentage points for the national line, and the average difference is +2.4 percentage points across all ten lines. These differences are due to sampling variation and not bias; the average of each difference would be zero if the whole 2005/6 ESPS were to be repeatedly redrawn and divided into sub-samples before repeating the entire process of building and calibrating scorecards.

The 90-percent confidence intervals for these estimates are ±0.7 percentage points or less. For $n = 1{,}024$, the 90-percent intervals are ±3.1 percentage points or less.

[2] Bias may also result from changes in the quality of data collection, from changes over time to poverty lines, from imperfect adjustment of poverty lines to account for differences in cost-of-living across time or regions, or from sampling variation.

Section 2 below describes data and poverty lines. Sections 3 and 4 describe scorecard construction and offer guidelines for use in practice. Sections 5 and 6 detail the estimation of households' poverty likelihoods and of groups' poverty rates at a point in time. Section 7 discusses estimating changes in poverty rates through time, Section 8 covers targeting, and Section 9 is a summary.

2. Data and poverty lines

This section discusses the data used to construct and test the scorecard. It also presents the poverty lines to which scores are calibrated.

2.1 Data

The scorecard is based on data from 13,503 households in the 2005/6 ESPS conducted from 12 January 2005 to 15 April 2006. This is Senegal's most recent available national consumption survey.

For the purposes of the scorecard, the households in the 2005/6 ESPS are randomly divided into three sub-samples (Figure 2):

- *Construction* for selecting indicators and points
- *Calibration* for associating scores with poverty likelihoods
- *Validation* for measuring accuracy with data not used in construction or calibration

2.2 Poverty rates and poverty lines

2.2.1 Rates

As a general definition, the *poverty rate* is the share of people in a group who live in households whose total household consumption (divided by the number of household members or by the adult equivalents) is below a given poverty line.

Beyond this general definition, there two special cases, *household-level poverty rates* and *person-level poverty rates*. With household-level rates, each household is

counted as if it had only one person, regardless of true household size, so all households are counted equally. With person-level rates (the "head-count index"), each household is weighted by the number of people in it or by the number of adult equivalents in it, so larger households count more.

For example, consider a group of two households, the first with one member and the second with two members. Suppose further that the first household has per-capita or per-adult-equivalent consumption above a poverty line (it is "non-poor") and that the second household has per-capita or per-adult-equivalent consumption below a poverty line (it is "poor"). The household-level rate counts both households as if they had only one person and so gives a poverty rate of $1 \div (1 + 1) = 50$ percent. In contrast, the person-level rate weighs each household by the number of people in it and so gives a poverty rate of $2 \div (1 + 2) = 67$ percent.

Whether the household-level rate or the person-level rate is relevant depends on the situation. If an organization's "participants" include all the people in a household, then the person-level rate is relevant. Governments, for example, are concerned with the well-being of people, regardless of how those people are arranged in households, so governments typically report person-level poverty rates.

If an organization has only one "participant" per household, however, then the household-level rate may be relevant. For example, if a microlender has only one borrower in a household, then it might prefer to report household-level poverty rates.

Figure 2 reports poverty rates and poverty lines for Senegal at both the household-level and the person-level for the regions of Dakar, other urban, and rural, as well as for Senegal as a whole. The scorecard is constructed using the 2005/6 ESPS and household-level lines, scores are calibrated to household-level poverty likelihoods, and accuracy is measured for household-level rates. This use of household-level rates reflects the belief that they are relevant for most pro-poor organizations.

Organizations can estimate person-level poverty rates by taking a household-size-weighted average of the household-level poverty likelihoods. It is also possible to construct a scorecard based on person-level lines, calibrate scores to person-level likelihoods, and measure accuracy for person-level rates, but it is not done here.

2.2.2 Poverty lines

Senegal's national poverty line for use with the 2005/6 ESPS was derived in the same way as the World Bank (2004) derived a line using the 2000/1 *Enquête Sénégalaise Auprès des Ménages*. This cost-of-basic-needs approach assumes a standard of 2,400 kilocalories per day per adult equivalent (Mesple-Somps, 2007), where children 14-years-old and younger count as half an adult. The food line is then defined as the observed cost of a bundle of food items that provides the caloric requirement.[3] For the 2005/6 ESPS, the food line is XOF377.56 per adult equivalent per day in Dakar, XOF352.01 in other urban areas, and XOF340.24 in rural areas (Figure 2).

[3] World Bank (2004) does not adjust for changes in prices during survey field work.

The national line is then defined as the food line, plus the average non-food consumption observed for households whose caloric achievement was within ±5 percent of the assumed requirement. For the 2005/6 ESPS, the national line is XOF923.71 per adult equivalent per day in Dakar, XOF661.76 in other urban areas, and 561.22 in rural areas (Figure 2). For Senegal as a whole, the average national poverty line is XOF664.32 per adult equivalent per day, implying a household-level poverty rate of 42.8 percent and a person-level rate of 51.0 percent.

Because local pro-poor organizations may want to use different or various poverty lines, this paper calibrates scores from its single scorecard to poverty likelihoods for ten lines:

- National
- Food
- 75% of national
- 125% of national
- 150% of national
- 200% of national
- USAID "extreme"
- USD1.25/day 2005 PPP
- USD2.50/day 2005 PPP
- USD3.75/day 2005 PPP

The USAID "extreme" line is defined as the median consumption of people (not households) below the national line (U.S. Congress, 2002).

The USD1.25/day 2005 PPP line is derived from:

- 2005 PPP exchange rate for "individual consumption expenditure by households" (International Comparison Project, 2008): XOF298.24 per USD1.00
- National Monthly Consumer Price Index in Agence Nationale de la Statistique et de la Démographie (2008). The average CPI in 2005 is 112.3750, and the average end-of-month CPI in the survey period of January 2005 to April 2006 is 112.5625.

Given this, the USD1.25/day 2005 PPP line for Senegal as a whole during the 2005/6 ESPS is (Sillers, 2006):

$$(\text{2005 PPP exchange rate}) \cdot \text{USD1.25} \cdot \left(\frac{\text{CPI}_{\text{Jan. 05-Apr. 06}}}{\text{CPI}_{\text{2005 average}}} \right) =$$

$$\left(\frac{\text{XOF298.24}}{\text{USD1.00}} \right) \cdot \text{USD1.25} \cdot \left(\frac{112.5625}{112.3750} \right) = \text{XOF373.42}.$$

The USD2.50/day and USD3.75/day 2005 PPP lines are multiples of the USD1.25/day line.

The 2005 PPP lines just discussed apply to Senegal as a whole. They are adjusted for cost-of-living differences across regions using:

- L, a given all-Senegal 2005 PPP poverty line
- π_i, the national poverty line for region i (Dakar, other urban, or rural)
- w_i, person-level population weight for region i (0.24131 for Dakar, 0.17531 for other urban, and 0.58338 for rural)
- N, number of regions (3)

The cost-of-living-adjusted 2005 PPP poverty line L_i for region i is then:

$$L_i = \frac{L \cdot \pi_i}{\left(\sum_{i=1}^{N} \pi_i \cdot w_i\right) / \sum_{i=1}^{N} w_i}.$$

For each of the ten poverty lines, Figure 2 shows the all-Senegal lines as well as the regional lines for Dakar, other urban, and rural. This paper uses the national line to construct the scorecard.

3. Scorecard construction

For Senegal, about 90 potential indicators are initially prepared in the areas of:

- Family composition (such as household size)
- Education (such as literacy of the female head/spouse)
- Housing (such as wall material)
- Ownership of durable goods (such as televisions and fans)

Each indicator is first reviewed with the entropy-based "uncertainty coefficient" (Goodman and Kruskal, 1979) that measures how well the indicator predicts poverty on its own. Figure 3 lists all the candidate indicators, ranked by uncertainty coefficient. Responses for each indicator in Figure 3 are ordered starting with those most strongly linked with higher poverty likelihoods.

The scorecard also aims to measure *changes* in poverty through time. This means that, when selecting indicators and holding other considerations constant, preference is given to more sensitive indicators. For example, ownership of a television is probably more likely to change in response to changes in poverty than is the education of the male head/spouse.

The scorecard itself is built using the national poverty line and Logit regression on the construction sub-sample. Indicator selection uses both judgment and statistics. The first step is to use Logit to build one scorecard for each candidate indicator. Each scorecard's accuracy is taken as "c", a measure of ability to rank by poverty status (SAS Institute Inc., 2004).

One of these one-indicator scorecards is then selected based on several factors (Schreiner *et al.*, 2004; Zeller, 2004), including improvement in accuracy, likelihood of acceptance by users (determined by simplicity, cost of collection, and "face validity" in terms of experience, theory, and common sense), sensitivity to changes in poverty status, variety among indicators, and verifiability.

A series of two-indicator scorecards are then built, each based on the one-indicator scorecard selected from the first step, with a second candidate indicator added. The best two-indicator scorecard is then selected, again based on "c" and judgment. These steps are repeated until the scorecard has 10 indicators.

The final step is to transform the Logit coefficients into non-negative integers such that total scores range from 0 (most likely below a poverty line) to 100 (least likely below a poverty line).

This algorithm is the Logit analogue to the common R^2-based stepwise least-squares regression. It differs from naïve stepwise in that the criteria for selecting indicators include not only statistical accuracy but also judgment and non-statistical factors. The use of non-statistical criteria can improve robustness through time and helps ensure that indicators are simple and make sense to users.

The single scorecard here applies to all of Senegal. Evidence from India and Mexico (Schreiner, 2006 and 2005a), Sri Lanka (Narayan and Yoshida, 2005), and Jamaica (Grosh and Baker, 1995) suggests that segmenting poverty-assessment tools by urban/rural does not improve targeting accuracy much, although it may improve estimates of poverty rates (Tarozzi and Deaton, 2007).

4. Practical guidelines for scorecard use

The main challenge of scorecard design is not to maximize statistical accuracy but rather to improve the chances that scoring is actually used in practice (Schreiner, 2005b). When scoring projects fail, the reason is not usually statistical inaccuracy but rather the failure of an organization to decide to do what is needed to integrate scoring in its processes and to learn to use it properly (Schreiner, 2002). After all, most reasonable scorecards predict about the same, thanks to the empirical phenomenon known as the "flat maximum" (Hand, 2006; Baesens *et al.*, 2003; Lovie and Lovie, 1986; Kolesar and Showers, 1985; Stillwell, Barron, and Edwards, 1983; Dawes, 1979; Wainer, 1976; Myers and Forgy, 1963). The bottleneck is less technical and more human, not statistics but organizational change management. Accuracy is easier to achieve than adoption.

The scorecard here is designed to encourage understanding and trust so that users will adopt it and use it properly. Of course, accuracy matters, but it is balanced against simplicity, ease-of-use, and "face validity". Programs are more likely to collect data, compute scores, and pay attention to the results if, in their view, scoring does not make a lot of "extra" work and if the whole process generally seems to make sense.

To this end, the scorecard here fits on one page. The construction process, indicators, and points are simple and transparent. "Extra" work is minimized; non-specialists can compute scores by hand in the field because the scorecard has:

- Only 10 indicators
- Only categorical indicators
- Simple weights (non-negative integers, no arithmetic beyond addition)

The scorecard in is ready to be photocopied. A field worker using the paper scorecard would:

- Record participant identifiers and household size
- Read each question from the scorecard
- Circle the response and its points
- Write the points in the far-right column
- Add up the points to get the total score
- Implement targeting policy (if any)
- Deliver the paper scorecard to a central office for filing or data entry

Of course, field workers must be trained. Quality outputs depend on quality inputs. If organizations or field workers gather their own data and have an incentive to exaggerate poverty rates (for example, if funders reward them for higher poverty rates), then it is wise to do on-going quality control via data review and random audits (Matul and Kline, 2003).[4] IRIS Center (2007a) and Toohig (2008) are useful nuts-and-bolts guides for budgeting, training field workers and supervisors, logistics, sampling, interviewing, piloting, recording data, and controlling quality.

[4] If an organization does not want field workers to know the points associated with indicators, then they can use the version of the scorecard without points and apply the points later in a spreadsheet or database at the central office.

In particular, while collecting scorecard indicators is relatively easier than alternatives, it is still absolutely difficult. Training and explicit definitions of terms and concepts in the scorecard is essential (Appendix A). For the example of Nigeria, Onwujekwe, Hanson, and Fox-Rushby (2006) found distressingly low inter-rater and test-retest correlations for indicators as seemingly simple and obvious as whether the household owns an automobile. At the same time, Grosh and Baker (1995) find that gross underreporting of assets does not affect targeting. For the first stage of targeting in Mexico's *Oportunidades* conditional cash-transfer program, Martinelli and Parker (2007) find that "underreporting [of asset ownership] is widespread but not overwhelming, except for a few goods . . . [and] overreporting is common for a few goods, which implies that self-reporting may lead to the exclusion of deserving households" (pp. 24–25). Still, as is the practice of *Oportunidades* itself in the second stage of its targeting process, most false self-reports can be corrected by field agents who verify responses with a home visit, and this is the suggested procedure for the scorecard in Senegal.

In terms of sampling design, an organization must make choices about:

- Who will do the scoring
- How scores will be recorded
- What participants will be scored
- How many participants will be scored
- How frequently participants will be scored
- Whether scoring will be applied at more than one point in time
- Whether the same participants will be scored at more than one point in time

In general, the sampling design should follow from the organization's goals for the exercise.

The non-specialists who apply the scorecard with participants in the field can be:

- Employees of the organization
- Third-party contractors

Responses, scores, and poverty likelihoods can be recorded:

- On paper in the field and then filed at an office
- On paper in the field and then keyed into a database or spreadsheet at an office
- On portable electronic devices in the field and downloaded to a database

The subjects to be scored can be:

- All participants (or all new participants)
- A representative sample of all participants (or of all new participants)
- All participants (or all new participants) in a representative sample of branches
- A representative sample of all participants (or of all new participants) in a representative sample of branches

If not determined by other factors, the number of participants to be scored can be derived from sample-size formulas (presented later) for a desired level of confidence and a desired confidence interval.

Frequency of application can be:

- At in-take of new clients only (precluding measuring change in poverty rates)
- As a once-off project for current participants (precluding measuring change)
- Once a year (or at some other fixed time interval, allowing measuring change)
- Each time a field worker visits a participant at home (allowing measuring change)

When the scorecard is applied more than once in order to measure change in poverty rates, it can be applied:

- With a different set of participants
- With the same set of participants

An example set of choices were made by BRAC and ASA, two microlenders in Bangladesh who each have more than 7 million participants and who are applying the Simple Poverty Scorecard tool for Bangladesh (Schreiner, 2013). Their design is that loan officers in a random sample of branches will score all participants each time they visit a homestead (about once a year) as part of their standard due diligence prior to loan disbursement. Responses are recorded on paper in the field before being sent to a central office to be entered into a database. ASA's and BRAC's sampling plans cover 50,000–100,000 participants each.

5. Estimates of household poverty likelihoods

The sum of scorecard points for a household is called the *score*. For Senegal, scores range from 0 (most likely below a poverty line) to 100 (least likely below a poverty line). While higher scores indicate less likelihood of being below a line, the scores themselves have only relative units. For example, doubling the score increases the likelihood of being above a given poverty line, but it does not double the likelihood.

To get absolute units, scores must be converted to *poverty likelihoods*, that is, probabilities of being below a poverty line. This is done via simple look-up tables. For the example of the national line, scores of 20–24 have a poverty likelihood of 56.0 percent, and scores of 25–29 have a poverty likelihood of 46.9 percent (Figure 4).

The poverty likelihood associated with a score varies by poverty line. For example, scores of 20–24 are associated with a poverty likelihood of 56.0 percent for the national line but 16.4 percent for the food line.[5]

5.1 Calibrating scores with poverty likelihoods

A given score is non-parametrically associated ("calibrated") with a poverty likelihood by defining the poverty likelihood as the share of households in the calibration sub-sample who have the score and who are below a given poverty line.

[5] Starting with Figure 4, many figures have ten versions, one for each of ten poverty lines. To keep them straight, they are grouped by poverty line. Single tables that pertain to all poverty lines are placed with the first group of tables for the national line.

For the example of the national line (Figure 5), there are 7,666 (normalized) households in the calibration sub-sample with a score of 20–24, of whom 4,289 (normalized) are below the poverty line. The estimated poverty likelihood associated with a score of 20–24 is then 56.0 percent, because 4,289 ÷ 7,666 = 56.0 percent.

To illustrate with the national line and a score of 25–29, there are 5,766 (normalized) households in the calibration sample, of whom 2,705 (normalized) are below the line (Figure 5). Thus, the poverty likelihood for this score is 2,705 ÷ 5,766 = 46.9 percent.

The same method is used to calibrate scores with estimated poverty likelihoods for the other ten poverty lines.

Figure 6 shows, for all scores, the likelihood that consumption falls in a range demarcated by two adjacent poverty lines.[6] For example, the daily consumption of someone with a score of 20–24 falls in the following ranges with probability:

- 16.4 percent below the food line
- 13.5 percent between the food and 75% national lines
- 26.0 percent between the 75% and 100% national lines
- 18.4 percent between the 100% and 125% national lines
- 8.5 percent between the 125% and 150% national lines
- 8.4 percent between the 150% and 200% national lines
- 8.8 percent above 200% of the national line

Even though the scorecard is constructed partly based on judgment, the calibration process produces poverty likelihoods that are objective, that is, derived from

[6] There are two versions of Figure 6, one for the per-adult-equivalent national lines, and one for the per-person international lines.

survey data on consumption and quantitative poverty lines. The poverty likelihoods would be objective even if indicators and/or points were selected without any data at all. In fact, objective scorecards of proven accuracy are often constructed using only expert judgment (Fuller, 2006; Caire, 2004; Schreiner *et al.*, 2004). Of course, the scorecard here is constructed with both data and judgment. The fact that this paper acknowledges that some choices in scorecard construction—as in any statistical analysis—are informed by judgment in no way impugns the objectivity of the poverty likelihoods, as this depends on using data in score calibration, not on using data (and nothing else) in scorecard construction.

Although the points in the Senegal scorecard are transformed coefficients from a Logit regression, scores are not converted to poverty likelihoods via the Logit formula of 2.718281828^{score} x $(1+ 2.718281828^{score})^{-1}$. This is because the Logit formula is esoteric and difficult to compute by hand. Non-specialists find it more intuitive to define the poverty likelihood as the share of households with a given score in the calibration sample who are below a poverty line. In the field, going from scores to poverty likelihoods in this way requires no arithmetic at all, just a look-up table. This non-parametric calibration can also improve accuracy, especially with large samples.

5.2 Accuracy of estimates of households' poverty likelihoods

As long as the relationship between indicators and poverty does not change and as long as the scorecard is applied to households that are representative of the same population from which the scorecard was constructed, then this calibration process produces unbiased estimates of poverty likelihoods. *Unbiased* means that in repeated samples from the same population, the average estimate matches the true poverty likelihood. The scorecard also produces unbiased estimates of poverty rates at a point in time, as well as unbiased estimates of changes in poverty rates between two points in time.[7]

Of course, the relationship between indicators and poverty does change to some unknown extent with time and also across sub-groups in Senegal's population, so the scorecard will generally be biased when applied after April 2006 (the end date of fieldwork for the 2005/6 ESPS) or when applied with non-nationally representative sub-groups.

[7] This follows because these estimates of groups' poverty rates are linear functions of the unbiased estimates of households' poverty likelihoods.

How accurate are estimates of households' poverty likelihoods? To measure, the scorecard is applied to 1,000 bootstrap samples of size $n = 16{,}384$ from the validation sub-sample. Bootstrapping entails (Efron and Tibshirani, 1993):

- Score each household in the validation sample
- Draw a new bootstrap sample *with replacement* from the validation sample
- For each score, compute the true poverty likelihood in the bootstrap sample, that is, the share of households with the score and consumption below a poverty line
- For each score, record the difference between the estimated poverty likelihood (Figure 4) and the true poverty likelihood in the bootstrap sample
- Repeat the previous three steps 1,000 times
- For each score, report the average difference between estimated and true poverty likelihoods across the 1,000 bootstrap samples
- For each score, report the two-sided interval containing the central 900, 950, or 990 differences between estimated and true poverty likelihoods

For each score range and for $n = 16{,}384$, Figure 7 shows the average difference between estimated and true poverty likelihoods, as well as confidence intervals for the differences.

For the national line, the average poverty likelihood across bootstrap samples for scores of 20–24 in the validation sample is too high by 20.7 percentage points. For scores of 25–29, the estimate is too low by 2.4 percentage points.[8]

The 90-percent confidence interval for the differences for scores of 20–24 is ±2.7 percentage points (Figure 7). This means that in 900 of 1,000 bootstraps, the difference between the estimate and the true value is between +18.0 and +23.4 percentage points

[8] These differences are not zero, in spite of the estimator's unbiasedness, because the scorecard comes from a single sample. The average difference by score would be zero if samples were repeatedly drawn from the population and split into sub-samples before repeating the entire process of scorecard building and calibration.

(because 20.7 – 2.7 = +18.0, and 20.7 + 2.7 = +23.4). In 950 of 1,000 bootstraps (95 percent), the difference is 20.7 ±3.2 percentage points, and in 990 of 1,000 bootstraps (99 percent), the difference is 20.7 ±3.8 percentage points.

For all scores, Figure 7 shows differences—often large ones—between estimated poverty likelihoods and true values. This is because the validation sub-sample is a single sample that—thanks to sampling variation—differs in distribution from the construction/calibration sub-samples and from Senegal's population. For targeting, however, what matters is less the difference in all score ranges and more the difference in score ranges just above and below the targeting cut-off. This mitigates the effects of bias and sampling variation on targeting (Friedman, 1997). Section 8 below looks at targeting accuracy in detail.

In addition, if estimates of groups' poverty rates are to be usefully accurate, then errors for individual households must largely cancel out. This is generally the case, as discussed in the next section.

Another possible source of differences between estimates and true values is overfitting. By construction, the scorecard here is unbiased, but it may still be *overfit* when applied after the end of the ESPS fieldwork in April 2006. That is, it may fit the 2005/6 ESPS data so closely that it captures not only some timeless patterns but also some random patterns that, due to sampling variation, show up only in the 2005/6 ESPS. Or the scorecard may be overfit in the sense that it is not robust to changes in

the relationships between indicators and poverty over time or when it is applied to non-nationally representative samples.

Overfitting can be mitigated by simplifying the scorecard and by not relying only on data but rather also considering experience, judgment, and theory. Of course, the scorecard here does this. Combining scorecards can also help, at the cost of greater complexity.

Most errors in individual households' likelihoods, however, cancel out in the estimates of groups' poverty rates (see later sections). Furthermore, at least some of the differences come from non-scorecard sources such as changes in the relationship between indicators and poverty, sampling variation, changes in poverty lines, inconsistencies in data quality across time, and imperfections in cost-of-living adjustments across time and geography. These factors can be addressed only by improving data quantity and quality (which is beyond the scope of the scorecard) or by reducing overfitting (which likely has limited returns, given the scorecard's parsimony).

6. Estimates of a group's poverty rate at a point in time

A group's estimated poverty rate at a point in time is the average of the estimated poverty likelihoods of the individual households in the group.

To illustrate, suppose a program samples three households on Jan. 1, 2009 and that they have scores of 20, 30, and 40, corresponding to poverty likelihoods of 56.0, 51.3, and 34.8 percent (national line, Figure 4). The group's estimated poverty rate is the households' average poverty likelihood of (56.0 + 51.3 + 34.8) ÷ 3 = 47.4 percent.[9]

6.1 Accuracy of estimated poverty rates at a point in time

For the Senegal scorecard applied to the validation sample with n = 16,384, the absolute differences between the estimated poverty rate at a point in time and the true rate are 4.7 percentage points or less (Figure 9, summarizing Figure 8 across poverty lines). The average difference across the ten poverty lines is +2.4 percentage points. At least part of these differences is due to sampling variation in the validation sample and in the division of the 2005/6 ESPS into three sub-samples.

In terms of precision, the 90-percent confidence interval for a group's estimated poverty rate at a point in time with n = 16,384 is ±0.7 percentage points or less (Figure 9). This means that in 900 of 1,000 bootstraps of this size, the difference between the

[9] The group's poverty rate is *not* the poverty likelihood associated with the average score. Here, the poverty likelihood associated with the average score of 30 is 51.3 percent. This is not the 47.4 percent found as the average of the three poverty likelihoods associated with each of the three scores.

estimate and the true value is within 0.7 percentage points of the average difference. In the specific case of the national line and the validation sample, 90 percent of all samples of $n = 16{,}384$ produce estimates that differ from the true value in the range of 2.8 – 0.7 = +2.1 to 2.8 + 0.7 = 3.5 percentage points. This is because +2.8 is the average difference, and ±0.7 is its 90-percent confidence interval. The average difference is +2.8 because the average scorecard estimate is too high by 2.8 percentage points; it estimates a poverty rate of 44.9 percent for the validation sample, but the true value is 42.1 percent (Figure 2).

6.2 Formula for standard errors for estimates of poverty rates

How precise are the point-in-time estimates? Because they are averages of binary (0/1, or poor/non-poor) variables, the estimates (in "large" samples) have a Normal distribution and can be characterized by their average difference vis-à-vis true values together with the standard error of the average difference.

To derive a formula for the standard errors of estimated poverty rates at a point in time from indirect measurement via poverty-assessment tools (Schreiner, 2008a), note that the textbook formula (Cochran, 1977) that relates confidence intervals with standard errors in the case of direct measurement of poverty status is $c = +/- z \cdot \sigma$, where:

c is a confidence interval as a proportion (*e.g.*, 0.02 for ±2 percentage points),

z is from the Normal distribution and is $\begin{cases} 1.64 \text{ for confidence levels of 90 percent} \\ 1.96 \text{ for confidence levels of 95 percent} \\ 2.58 \text{ for confidence levels of 99 percent} \end{cases}$,

σ is the standard error of the estimated poverty rate, that is, $\sqrt{\frac{p \cdot (1-p)}{n}}$,

p is the proportion of households below the poverty line in the sample, and

n is the sample size.

For example, this implies that for a sample n of 16,384 with 90-percent confidence ($z = 1.64$) and a poverty rate p of 43.2 percent (the average poverty rate in the construction and calibration samples in Figure 2 for the national line), the confidence interval c is $+/- z \cdot \sqrt{\frac{p \cdot (1-p)}{n}} = +/- 1.64 \cdot \sqrt{\frac{0.432 \cdot (1-0.432)}{16{,}384}} = \pm 0.00634$, or ±0.634 percentage points.

The scorecard, however, does not measure poverty directly, so this formula is not immediately applicable. To derive a formula for the Senegal scorecard, consider Figure 8, which reports empirical confidence intervals c for the differences for the scorecard

applied to 1,000 bootstrap samples of various sample sizes from the validation sample. For $n = 16{,}384$ and the national line, the 90-percent confidence interval is 0.740 percentage points.[10]

Thus, the 90-percent confidence interval with $n = 16{,}384$ is 0.740 percentage points for the Senegal scorecard and 0.634 percentage points for direct measurement. The ratio of the two intervals is $0.740 \div 0.634 = 1.17$.

Now consider the same case, but with $n = 8{,}192$. The confidence interval under direct measurement is $+/-1.64 \cdot \sqrt{\frac{0.432 \cdot (1 - 0.432)}{8{,}192}} = \pm 0.00898$, or about ± 0.898 percentage points. The empirical confidence interval with the Senegal scorecard (Figure 8) is 0.01020, or 1.020 percentage points. Thus for $n = 8{,}192$, the ratio of the two intervals is $1.020 \div 0.898 = 1.14$.

This ratio of 1.14 for $n = 8{,}182$ is not far from the ratio of 1.17 for $n = 16{,}384$. Across all sample sizes of 256 or more in Figure 8, the average ratio turns out to be 1.17, implying that confidence intervals for indirect estimates of poverty rates via the Senegal scorecard and this poverty line are about 17 percent wider than confidence intervals for direct estimates via the 2005/6 ESPS. This 1.17 appears in Figure 9 as the "α factor" because if $\alpha = 1.17$, then the formula relating confidence intervals c and standard errors σ for the Senegal scorecard is $c = +/- z \cdot \alpha \cdot \sigma$. That is, formula for the

[10] Due to rounding, Figure 8 displays 0.7, not 0.740.

standard error σ for point-in-time estimates of poverty rates via scoring is

$$\alpha \cdot \sqrt{\frac{p \cdot (1-p)}{n}}.$$

In general, α can be more or less than 1.00. When α is more than 1.00, it means that the scorecard is less precise than direct measurement. This occurs for nine of ten poverty lines in Figure 9.

The formula relating confidence intervals with standard errors for the scorecard can be rearranged to give a formula for determining sample size before measurement.[11] If $\hat{p}$ is the expected poverty rate before measurement, then the formula for sample size n based on the desired confidence level that corresponds to z and the desired confidence interval $\pm c$ is $n = \left(\frac{\alpha \cdot z}{c}\right)^2 \cdot \hat{p} \cdot (1-\hat{p})$.

To illustrate how to use this, suppose $c = 0.05940$ and $z = 1.64$ (90-percent confidence). Then the formula gives $n = \left(\frac{1.17 \cdot 1.64}{0.05940}\right)^2 \cdot 0.432 \cdot (1-0.432) = 256$, the same as the sample size of 256 observed for these parameters in Figure 8 for the national line.

[11] IRIS Center (2007a and 2007b) says that a sample size of $n = 300$ is sufficient for USAID reporting. If a poverty-assessment tool is as precise as direct measurement, if the expected (before measurement) poverty rate is 50 percent, and if the confidence level is 90 percent, then $n = 300$ implies a confidence interval of ±2.2 percentage points. In fact, USAID has not specified confidence levels or intervals. Furthermore, the expected poverty rate may not be 50 percent, and the poverty-assessment tool could be more or less precise than direct measurement.

Of course, the α factors in Figure 9 are specific to Senegal, its poverty lines, its poverty rates, and this scorecard. The derivation of the formulas, however, is valid for any poverty-assessment tool following the approach in this paper.

In practice after the end of fieldwork for the ESPS in April 2006, an organization would select a poverty line (say, the national line), select a desired confidence level (say, 90 percent, or $z = 1.64$), select a desired confidence interval (say, ±2.0 percentage points, or $c = 0.02$), make an assumption about $\hat{p}$ (perhaps based on a previous measurement such as the 42.8 percent national average in the 2005/6 ESPS in Figure 2), look up α (here, 1.17), assume that the scorecard will still work in the future and/or for non-nationally representative sub-groups,[12] and then compute the required sample size. In this illustration, $n = \left(\frac{1.17 \cdot 1.64}{0.02}\right)^2 \cdot 0.428 \cdot (1 - 0.428) = 2{,}254$.

[12] This paper reports accuracy for the scorecard applied to the validation sample, but it cannot test accuracy for later years or for other groups. Performance after April 2006 will resemble that in the 2005/6 ESPS with deterioration to the extent that the relationships between indicators and poverty status change over time.

7. Estimates of changes in group poverty rates over time

The change in a group's poverty rate between two points in time is estimated as the change in the average poverty likelihood of the households in the group. With data only from the 2005/6 ESPS, this paper cannot test estimates of change over time for Senegal, and it can only suggest approximate formulas for standard errors. Nevertheless, the relevant concepts are presented here because, in practice, pro-poor organizations can apply the scorecard to collect their own data and measure change through time.

7.1 Warning: Change is not impact

Scoring can estimate change. Of course, poverty could get better or worse, and scoring does not indicate what caused change. This point is often forgotten or confused, so it bears repeating: the scorecard simply estimates change, and it does not, in and of itself, indicate the reason for the change. In particular, estimating the impact of program participation requires knowing what would have happened to participants if they had not been participants. Knowing this requires either strong assumptions or a control group that resembles participants in all ways except participation. To belabor the point, the scorecard can help estimate program impact only if there is some way to know what would have happened in the absence of the program. And that information must come from somewhere beyond the scorecard.

7.2 Calculating estimated changes in poverty rates over time

Consider the illustration begun in the previous section. On Jan. 1, 2009, a program samples three households who score 20, 30, and 40 and so have poverty likelihoods of 56.0, 51.3, and 34.8 percent (national line, Figure 4). The group's baseline estimated poverty rate is the households' average poverty likelihood of (56.0 + 51.3 + 34.8) ÷ 3 = 47.4 percent.

After baseline, two sampling approaches are possible for the follow-up round:

- Score a new, independent sample, measuring change by cohort across samples
- Score the same sample at follow-up as at baseline

By way of illustration, suppose that a year later on Jan. 1, 2010, the program samples three additional households who are in the same cohort as the three households originally sampled (or suppose that the program scores the same three original households a second time) and finds that their scores are 25, 35, and 45 (poverty likelihoods of 46.9, 42.3, and 27.9 percent, national line, Figure 4). Their average poverty likelihood at follow-up is now (46.9 + 42.3 + 27.9) ÷ 3 = 39.0 percent, an improvement of 47.4 – 39.0 = 8.4 percentage points.[13]

This suggests that about one in twelve participants in this hypothetical example crossed the poverty line in 2009.[14] Among those who started below the line, one in five (8.4 ÷ 47.4 = 17.7 percent) on net ended up above the line.[15]

[13] Of course, such a huge reduction in poverty in one year is unlikely, but this is just an example to show how the scorecard can be used to estimate change.
[14] This is a net figure; some people start above the line and end below it, and vice versa.

7.3 Accuracy for estimated change in two independent samples

With only the 2005/6 ESPS, it is not possible to measure the accuracy of scorecard estimates of changes in groups' poverty rates over time. In practice, of course, local pro-poor organizations can still apply the Senegal scorecard to estimate change. The rest of this section suggests approximate formulas for standard errors and sample sizes that may be used until there is additional data.

For two equal-sized independent samples, the same logic as above can be used to derive a formula relating the confidence interval c with the standard error σ of a scorecard's estimate of the change in poverty rates over time:

$$c = +/- z \cdot \sigma = +/- z \cdot \alpha \cdot \sqrt{\frac{2 \cdot p \cdot (1-p)}{n}} \, .$$

z, c, and p are defined as above, n is the sample size at both baseline and follow-up,[16] and α is the average (across a range of bootstrapped sample sizes) of the ratio of the observed confidence interval from a scorecard and the theoretical confidence interval under direct measurement.

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[15] The scorecard does not reveal the reasons for this change.

[16] This means that, for a given precision and with direct measurement, estimating the change in a poverty rate between two points in time requires four times as many measurements (not twice as many) as does estimating a poverty rate at a point in time.

As before, the formula for standard errors can be rearranged to give a formula for sample sizes before indirect measurement via a scorecard, where $\hat{p}$ is based on previous measurements and is assumed equal at both baseline and follow-up:

$$n = 2 \cdot \left(\frac{\alpha \cdot z}{c} \right)^2 \cdot \hat{p} \cdot (1 - \hat{p}) .$$

For the countries for which this α has been measured (Peru, the Philippines, India, Mexico, Pakistan, Vietnam, and Bangladesh, see Schreiner, 2009a, 2009b, 2009c, 2009d, and 2008b and Chen and Schreiner, 2009), the average α across poverty lines and years is 0.77, 0.77, 1.40, 1.48, 1.16, 0.68, and 1.03. The average across countries (1.04) is as reasonable a figure as any for Senegal.

To illustrate the use of the formula above to determine sample size for estimating changes in poverty rates across two independent samples, suppose the desired confidence level is 90 percent ($z = 1.64$), the desired confidence interval is 2 percentage points ($c = 0.02$), the poverty line is the national line, $\alpha = 1.04$, and $\hat{p} = 0.428$ (from Figure 2). Then the baseline sample size is $n = 2 \cdot \left(\frac{1.04 \cdot 1.64}{0.02} \right)^2 \cdot 0.428 \cdot (1 - 0.428) =$ 3,561, and the follow-up sample size is also 3,561.

7.4 Accuracy for estimated change for one sample, scored twice

Analogous to previous derivations, the general formula relating the confidence interval c to the standard error σ when using a scorecard to estimate change for a single group of households, all of whom are scored at two points in time, is:[17]

$$c = +/- z \cdot \sigma = +/- z \cdot \alpha \cdot \sqrt{\frac{p_{12} \cdot (1 - p_{12}) + p_{21} \cdot (1 - p_{21}) + 2 \cdot p_{12} \cdot p_{21}}{n}},$$

where z, c, and α are defined as usual, p_{12} is the share of all sampled households that move from below the poverty line to above it, and p_{21} is the share of all sampled households that move from above the line to below it.

The formula for standard errors can be rearranged to give a formula for sample size before measurement. This requires an estimate (based on information available before measurement) of the expected shares of all households who cross the poverty line $\hat{p}_{12}$ and $\hat{p}_{21}$. Before measurement, it is reasonable to assume that the change in the poverty rate will be zero, which implies $\hat{p}_{12} = \hat{p}_{21} = \hat{p}_*$, giving:

$$n = 2 \cdot \left(\frac{\alpha \cdot z}{c} \right)^2 \cdot \hat{p}_* .$$

[17] See McNemar (1947) and Johnson (2007). John Pezzullo helped find this formula.

Because $\hat{p}_*$ could be anything between 0–1, more information is needed to apply this formula. Suppose that the observed relationship between $\hat{p}_*$, the number of years y between baseline and follow-up, and $p_{\text{baseline}} \cdot (1 - p_{\text{baseline}})$ is—as in Peru (Schreiner, 2009a)—close to:

$$\hat{p}_* = -0.02 + 0.016 \cdot y + 0.47 \cdot [p_{\text{baseline}} \cdot (1 - p_{\text{baseline}})] .$$

Given this, a sample-size formula for a group of households to whom the Senegal scorecard is applied twice (once after April 2006 and then again later) is

$$n = 2 \cdot \left(\frac{\alpha \cdot z}{c} \right)^2 \cdot \{ -0.02 + 0.016 \cdot y + 0.47 \cdot [p_{\text{baseline}} \cdot (1 - p_{\text{baseline}})] \}.$$

In Peru (the only other country for which there is an estimate, Schreiner 2009a), the average α across years and poverty lines is about 1.30.

To illustrate the use of this formula, suppose the desired confidence level is 90 percent ($z = 1.64$), the desired confidence interval is 2.0 percentage points ($c = 0.02$), the poverty line is the national line, and the sample will first be scored in 2009 and then again in 2012 ($y = 3$). The before-baseline poverty rate is 42.8 percent ($p_{2005/6} = 0.428$, Figure 2), and suppose $\alpha = 1.30$. Then the baseline sample size is $n = 2 \cdot \left(\frac{1.30 \cdot 1.64}{0.02} \right)^2 \cdot \{ -0.02 + 0.016 \cdot 3 + 0.47 \cdot [0.428 \cdot (1 - 0.428)] \} = 3{,}252$. The same group of 3,252 households is scored at follow-up as well.

8. Targeting

When a program uses the scorecard for targeting, households with scores at or below a cut-off are labeled *targeted* and treated—for program purposes—as if they are below a given poverty line. Households with scores above a cut-off are labeled *non-targeted* and treated—for program purposes—as if they are above a given poverty line.

There is a distinction between *targeting status* (scoring at or below a targeting cut-off) and *poverty status* (consumption below a poverty line). Poverty status is a fact that depends on whether consumption is below a poverty line as directly measured by a survey. In contrast, targeting status is a program's policy choice that depends on a cut-off and on an indirect estimate from a scorecard.

Targeting is successful when households truly below a poverty line are targeted (*inclusion*) and when households truly above a poverty line are not targeted (*exclusion*). Of course, no scorecard is perfect, and targeting is unsuccessful when households truly below a poverty line are not targeted (*undercoverage*) or when households truly above a poverty line are targeted (*leakage*). Figure 10 depicts these four possible targeting outcomes. Targeting accuracy varies by the cut-off score; a higher cut-off has better inclusion (but greater leakage), while a lower cut-off has better exclusion (but higher undercoverage).

Programs should weigh these trade-offs when setting a cut-off. A formal way to do this is to assign net benefits—based on a program's values and mission—to each of

the four possible targeting outcomes and then to choose the cut-off that maximizes total net benefits (Adams and Hand, 2000; Hoadley and Oliver, 1998).

Figure 11 shows the distribution of households by targeting outcome. For an example cut-off of 20–24, outcomes for the national line in the validation sample are:

- Inclusion: 27.9 percent are below the line and correctly targeted
- Undercoverage: 14.2 percent are below the line and mistakenly not targeted
- Leakage: 17.7 percent are above the line and mistakenly targeted
- Exclusion: 40.2 percent are above the line and correctly not targeted

Increasing the cut-off to 25–29 improves inclusion and undercoverage but worsens leakage and exclusion:

- Inclusion: 30.9 percent are below the line and correctly targeted
- Undercoverage: 11.2 percent are below the line and mistakenly not targeted
- Leakage: 20.5 percent are above the line and mistakenly targeted
- Exclusion: 37.4 percent are above the line and correctly not targeted

Which cut-off is preferred depends on total net benefit. If each targeting outcome has a per-household benefit or cost, then total net benefit for a given cut-off is:

Benefit per household correctly included	x	Households correctly included	–
Cost per household mistakenly not covered	x	Households mistakenly not covered	–
Cost per household mistakenly leaked	x	Households mistakenly leaked	+
Benefit per household correctly excluded	x	Households correctly excluded.	

To set an optimal cut-off, a program would:

- Assign benefits and costs to possible outcomes, based on its values and mission
- Tally total net benefits for each cut-off using Figure 11 for a given poverty line
- Select the cut-off with the highest total net benefit

The most difficult step is assigning benefits and costs to targeting outcomes. A program that uses targeting—with or without scoring—should thoughtfully consider how it values successful inclusion or exclusion versus errors of undercoverage and

leakage. It is healthy to go through a process of thinking explicitly and intentionally about how possible targeting outcomes are valued.

A common choice of benefits and costs is "Total Accuracy" (IRIS Center, 2005; Grootaert and Braithwaite, 1998). With "Total Accuracy", total net benefit is the number of households correctly included or correctly excluded:

Total Accuracy =	1	x	Households correctly included	–
	0	x	Households mistakenly undercovered	–
	0	x	Households mistakenly leaked	+
	1	x	Households correctly excluded.	

Figure 11 shows "Total Accuracy" for all cut-offs for the Senegal scorecard. For the national line in the validation sample, total net benefit is greatest (68.3) for a cut-off of 25–29, with about two in three households in Senegal correctly classified.

"Total Accuracy" weighs successful inclusion of households below the line the same as successful exclusion of households above the line. If a program valued inclusion more (say, twice as much) than exclusion, it could reflect this by setting the benefit for inclusion to 2 and the benefit for exclusion to 1. Then the chosen cut-off would maximize (2 x Households correctly included) + (1 x Households correctly excluded).[18]

As an alternative to assigning benefits and costs to targeting outcomes and then choosing a cut-off to maximize total net benefit, a program could set a cut-off to

[18] Figure 11 also reports "BPAC", the Balanced Poverty Accuracy Criteria adopted by USAID for certifying poverty-assessment tools. IRIS Center (2005) says that BPAC considers accuracy both in terms of the estimated poverty rate and in terms of targeting inclusion. After normalizing by the number of people below the poverty line, BPAC is (Inclusion – |Undercoverage – Leakage|) x [100 ÷ (Inclusion + Undercoverage)].

achieve a desired poverty rate among targeted households. The third column of Figure 12 ("% targeted who are poor") shows, for the Senegal scorecard applied to the validation sample, the expected poverty rate among households who score at or below a given cut-off. For the example of the national line, targeting households who score 24 or less would target 45.6 percent of all households (second column) and produce a poverty rate among those targeted of 61.2 percent (third column).

Figure 12 also reports two other measures of targeting accuracy. The first is a version of coverage ("% of poor who are targeted"). For the example of the national line in the validation sample and a cut-off of 24 or less, 66.2 percent of all poor households are covered.

The final targeting measure in Figure 12 is the number of successfully targeted poor households for each non-poor household mistakenly targeted (right-most column). For the national line in the validation sample and a cut-off of 24 or less, covering 1.6 poor households means leaking to 1 non-poor household.

9. Conclusion

Pro-poor programs in Senegal can use the scorecard to segment clients for differentiated treatment as well as to estimate:

- The likelihood that a household has consumption below a given poverty line
- The poverty rate of a population at a point in time
- The change in the poverty rate of a population over time

The scorecard is inexpensive to use and can be understood by non-specialists. It is designed to be practical for pro-poor organizations in Senegal that want to improve how they monitor and manage their social performance.

The scorecard is built with part of the data from the Senegal's 2005/6 ESPS, tested on a different part of the 2005/6 ESPS, and calibrated to ten poverty lines (national, food, 75% of national, 125% of national, 150% of national, 200% of national, USAID "extreme", USD1.25/day 2005 PPP, USD2.50/day 2005 PPP, and USD3.75/day 2005 PPP).

Accuracy and precision are reported for estimates of households' poverty likelihoods, groups' poverty rates at a point in time, and changes in groups' poverty rates over time. Of course, the scorecard's estimates of changes are not the same as estimates of program impact. Targeting accuracy is also reported.

When the scorecard is applied to the validation sample with $n = 16{,}384$, the difference between estimates versus true poverty rates for groups of households at a point in time is less than 4.7 percentage points and averages—across the ten poverty

lines—about 2.4 percentage points. For $n = 16{,}384$ and 90-percent confidence, the precision of these differences is ± 0.7 percentage points or better.

If a program wants to use the scorecard for targeting, then the results here provide the information needed to select a cut-off that fits its values and mission.

Although the statistical technique is innovative, and although technical accuracy is important, the design of the scorecard here focuses on transparency and ease-of-use. After all, a perfectly accurate scorecard is worthless if programs feel so daunted by its complexity or its cost that they do not even try to use it. For this reason, the scorecard is kept simple, using ten indicators that are inexpensive to collect and that are straightforward to verify. Points are all zeros or positive integers, and scores range from 0 (most likely below a poverty line) to 100 (least likely below a poverty line). Scores are related to poverty likelihoods via simple look-up tables, and targeting cut-offs are likewise simple to apply. The design attempts to facilitate adoption by helping managers understand and trust scoring and by allowing non-specialists to generate scores quickly in the field.

In sum, the scorecard is a practical, objective way for pro-poor programs in Senegal to monitor poverty rates, track changes in poverty rates over time, and target services. The same approach can be applied to any country with similar data.

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Interview Guidelines

The following is based on:

Direction de la Prévision et de la Statistique. (2005) « Manuel de l'Enquêteur » Dakar : Ministère de l'Economie et des Finances.

1. What are the walls of the residence made of?

According to p. 29: "If more than one material has been used in the walls, the enumerator should record the main material."

2. What is the main source of energy for lighting?

According to p. 30: "Most households in Senegal who have electricity are connected to the SENELEC grid. Some households use a generator or from solar panels. In rural areas, households usually use gas lamps, lanterns, homemade oil lamps, or candles. A *homemade oil lamp* might be made out of a coffee can, a bottle, a food tin, etc., which holds the oil used for lighting. A *lantern* is a manufactured oil lamp."

3. What is the main fuel used for cooking?

According to page 29: "If the respondent mentions more than one type of fuel, record the one that is most frequently used. Some households use charcoal for cooking the main meal but also use gas to reheat leftovers, to make breakfast, or to boil tea. Other households usually use gas but also use charcoal to make tea and to cook specific dishes. Record the main fuel."

4. What is the main source of drinking water?

According to p. 29: "If the household uses more than one source of drinking water, record the main source, that is, the source most frequently used. If the source of water changes with the season of the year, then record the source being used at the time of the interview."

5. What toilet arrangement does the household use?

According to page 29: "The option *other* applies to households without toilet arrangements, that is, households that deposit waste directly on the ground or in the fields. The enumerator should record "other" for all households that do not have a toilet arrangement within their residence.

Flush toilets are those in which water is used to rinse waste away via pipes. The water used for flushing may be supplied to the toilet via pipes or carried in with pails. For flush toilets, the wastes are washed into a sewer or to a pit which is emptied after it fills up. The enumerator should record "Flush to sewer" if the waste is washed directly to a sewer and "flush to septic tank" if the waste is deposited in a pit via pipes or drains that connect to the toilet.

Basins/buckets or other types of chamber pots refer to portable recipients of waste. The wastes are then dumped in a river, ocean, or otherwise in the environment.

Latrines or closed pits refer to holes that have been dug to directly receive waste deposits; latrines may be covered or non-covered.

Improved ventilated latrines have additional features (such as tubes) that allow gases to escape.

The enumerator should record the response correspondin to the toilet arrangement used by the household. If the respondent says that the household members use a corner of the property or any other place not specifically listed as an option, the enumerator should record "other".

6. Does the household own a refrigerator/freezer?

According to p. 28: "It does not matter which household member owns the asset. The enumerator should only record assets that are in working condition."

7. Does the household own a television?

According to p. 28: "It does not matter which household member owns the asset. The enumerator should only record assets that are in working condition."

8. Does the household own a fan?

According to p. 28: "It does not matter which household member owns the asset. The enumerator should only record assets that are in working condition."

9. Does the household own an electronic iron?

According to p. 28: "It does not matter which household member owns the asset. The enumerator should only record assets that are in working condition."

10. Does the female head/spouse know how to read and write in any language?

According to p. 13: "*Literacy* is to be interpreted broadly. It is the ability of a person 15-years-old or older to read, write, and understand in any language whatsoever (including local languages) a short and simple text extract that deals with daily life, such as a newspaper article. People who do not meet all these criteria are considered *illiterate*.

To be clear, a person can be literate in any language, including local languages. Literacy is not limited only to the main language nor to the official language; all that is required is that the language be used in written form by some group.

If a person knows how to read in some language but does not know how to write in that language, then the person is considered illiterate.

The 2005 Senegal Poverty Survey does not define specific tests to determine people's level of literacy. Therefore, enumerators should rely on the respondents' answers as well as their own judgment.

Figure 2: Sample sizes and household poverty rates by sub-sample and poverty line, and poverty lines by region

			Poverty rates (% with expenditure below a poverty line) and poverty lines (XOF/person or adult equivalent/day)									
			National line (per adult equivalent)						USAID	Intl. 2005 PPP (per person)		
Sub-sample	Level	Sample size	100%	Food	75%	125%	150%	200%	'Extreme'	$1.25/day	$2.50/day	$3.75/day
Poverty Rates:												
All Senegal	Households	13,503	42.8	12.8	24.1	58.9	69.9	84.0	20.0	22.1	65.9	84.9
	People		51.0	16.0	30.2	68.0	78.5	90.3	25.5	28.5	75.6	91.5
Construction												
Selecting indicators	Households	4,508	43.2	13.1	24.6	59.2	70.2	84.8	20.5	22.5	66.1	85.9
and points	People		52.5	17.0	31.6	69.1	79.2	91.5	26.8	29.6	76.7	92.8
Calibration												
Associating scores	Households	4,501	43.2	13.1	24.2	59.6	70.4	84.2	20.8	22.2	66.3	85.6
with likelihoods	People		50.6	16.2	29.7	68.0	78.1	90.0	26.3	28.0	75.2	91.4
Validation												
Measuring accuracy	Households	4,494	42.1	12.3	23.7	57.9	69.1	83.0	18.8	21.8	65.3	83.3
	People		50.0	14.8	29.2	66.8	78.1	89.3	23.3	27.8	74.9	90.4
	Poverty lines:											
	Dakar		923.71	377.56	692.78	1,154.64	1,385.57	1,847.42	574.40	517.67	1,035.34	1,553.01
	Other urban		661.76	352.01	496.32	827.20	992.64	1,323.53	381.78	370.86	741.72	1,112.58
	Rural		561.22	340.24	420.91	701.52	841.83	1,122.44	279.07	314.52	629.04	943.56
	All-Senegal		664.32	351.11	498.24	830.41	996.49	1,328.65	366.75	372.30	744.60	1,116.91

Source: 2005/6 ESPS. The USAID "extreme" line is per person.

Figure 3: Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Answers ordered starting with those most strongly linked with higher poverty likelihoods)
1035	What toilet arrangement does the household use? (Uncovered latrine, basin/bucket, none, or other; Covered latrine, improved ventilated latrine, or flush to septic tank; Flush to sewer)
1024	What is the main source of energy for lighting? (Lantern or homemade kerosene lamp; Candle, wood, or other; Generator, solar, gas lamp, or electricity (SENELEC))
915	Does the household own a fan? (No; Yes)
911	Does the household have electricity? (No; Yes)
904	Does the household own a refrigerator/freezer? (No; Yes)
892	What is the main fuel used for cooking? (Other; Gas)
883	What is the roof of the residence made of? (Thatch/straw or other; Tin; Tile/slate; Concrete or cement)
862	What is the main source of drinking water? (Other; Inside faucet)
751	If the household owns or uses any land, how many cattle or other large animals does it currently own? (Three or four; Four to nine; Two; One; Ten or more; Zero; Does not own nor use land)
748	Does the household own a television? (No; Yes)
725	If the household owns or uses any land, does it own any cattle, other large animals, sheep, goats, or other medium animals? (Large animals as well as medium animals, or large animals, but no medium animals; Medium animals, but no large animals; No; Does not own nor use land)
724	If the household owns or uses any land, how many sheep, goats, and other small animals does it currently own? (Ten or more; Three or four; Four to nine; One or two; Zero; Does not own nor use land)
718	How many hectares of land does the household use or own (to the nearest decimal place, for example, 24.7)? (Six or more; 3 to 5.9; 1.6 to 2.9; More than zero but less than 1.5; Zero)
707	If the household owns or uses any land, does it own a plow or a cart? (No; Plow but no cart; Cart but no plow; Both plow and cart; Does not own nor use land)
706	If the household owns or uses any land, does it own a cart? (No; Yes; Does not own nor use land)
704	If the household owns or uses any land, does it own a plow? (No; Yes; Does not own nor use land)
701	Does the household own or use any land? (No; Yes)

Figure 3 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Answers ordered starting with those most strongly linked with higher poverty likelihoods)
676	How many hectares of land does the household own (to the nearest decimal place, for example, 24.7)? (1.6 or more; More than zero but less than 1.5; Zero)
650	Does the household own a land-line or cellular telephone? (No; Yes)
561	Does the household own a cellular telephone? (No; Yes)
412	Does the household own a land-line telephone? (No; Yes)
307	Does the household own a plow, cart, dugout canoe, fishing boat, or fishing net? (No; Yes)
274	What are the walls of the residence made of? (Other; Mud blocks or cinder blocks)
215	How old is the male head/spouse? (31 to 44 years; 45 to 59 years; No male head/spouse; 31 years or younger; 60 years or older)
207	What is the tenancy status of the household in its residence? (Other; Renter/Co-renter)
204	Does the household own an alarm clock? (No; Yes)
196	Does the household own a motorcycle, car, or truck? (No; Yes)
195	Does the household own a car or truck? (No; Yes)
153	How many rooms does your residence have? (Six or more; Five; Four; Three; One or two)
146	Does the household own a personal computer? (No; Yes)
126	What is the main activity of the business or place of work of the male head/spouse? (Manufacturing; Public or private management; Other trade; No male head/spouse; Hotels and restaurants, transportation and communication, banking, insurance, and other finance; Trade and sales; Agriculture, animal husbandry, or forestry, fishing, mining or quarrying, processing of food, beverages, or tobacco products; Domestic service; Water, electricity, and gas, construction and public works, consulting, or does not know; Did not work)
105	Does the household own an electric iron? (No; Yes)
102	Does the household own an air conditioner? (No; Yes)
92	Under what arrangement was the male head/spouse paid in his main line of work? (Salary or in-kind; No male head/spouse; Self-employed; By the task/hour/day; Works in family business or as a non-paid apprentice; Did not work)

Figure 3 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Answers ordered starting with those most strongly linked with higher poverty likelihoods)
90	Did the male head/spouse do any work in the past seven days? (Yes; No male head/spouse; No)
88	Does the household own a modern cook stove? (No; Yes)
87	How many hectares of land does the household use that it does not own (to the nearest decimal place, for example, 24.7)? (3.5 or more; More than zero but less than 3.5; Zero)
83	How old is the female head/spouse? (36 to 41 years; 24 to 35 years; 42 to 50 years; No female head/spouse; 23 years or younger; 51 years or older)
60	Does the household own a motorcycle? (No; Yes)
58	How many household members are there? (One, two, or three; Four; Five; Six; Seven; Eight; Nine; Ten or more)
57	Does the household own a sewing machine? (No; Yes)
51	How many household members are 0 to 18 years old? (Zero; One; Two; Three; Four; Five; Six; Seven; Eight; Nine; Ten; Eleven or more)
50	Does the household own a radio or a radio/cassette player? (No; Yes)
42	If the male head/spouse has gone to school, what is the highest grade in school that he has passed? (Terminal, or first to fourth year or more of superior; CI, CP, CE1, CE2, CM1, CM2, other, or does not know; No male head/spouse; Sixth to first; Never attended school, none, or pre-school)
42	How many household members did any work in the past seven days? (Five; Two; One; Three; Four; Zero; Six or more)
38	How many household members are 0 to 14 years old? (Zero; One; Two; Three; Four; Five; Six; Seven or more)
35	How many household members are 0 to 17 years old? (Zero; One; Two; Three; Four; Five; Six; Seven; Eight or more)
33	What is the marital status of the male head/spouse? (Single; No male head/spouse; Married, monogamous; Married, polygamous, two wives; Married, polygamous, three or more wives; Widowed or divorced)

Figure 3 (cont.): Poverty indicators by uncertainty coefficient

33	What is the main activity of the business or place of work of the female head/spouse? (Other; Trade and sales; Did not work; No female head/spouse; Agriculture, animal husbandry, or forestry)
28	What is the highest grade a family member has passed in school? (CM1; First to fourth year or more of superior, other, or does not know; Fourth to first, or terminal; Never attended school, none, pre-school, or CI; CM2, sixth, or fifth; CP, CE1, or CE2)
27	How many family members work, but not in agriculture, animal husbandry, forestry, fishing, mining, quarrying or in processing food, beverages, or tobacco? (None; One; Three or more; Two)
26	How many household members are 0 to 13 years old? (Zero; One; Two; Three; Four; Five; Six or more)
25	How many household members are 0 to 12 years old? (Zero; One; Two; Three; Four; Five; Six or more)
22	Does the male head/spouse know how to read and write in any language? (No male head/spouse ; Yes; No)
22	How many household members are 0 to 15 years old? (Zero; One; Two; Three; Four; Five; Six; Seven or more)
22	Does the household own a mattress or bed? (No; Yes)
21	How many household members are 0 to 16 years old? (Zero; One; Two; Three; Four; Five; Six; Seven; Eight or more)
20	Does the household own a plow, cart, dugout canoe, fishing boat, or fishing net? (Yes; No)
18	How many household members can read and write in any language? (Five; Three; One; Four; Two; Six or more)
16	What is the marital status of the female head/spouse? (Married, polygamous, first wife; Widowed; Married, monogamous; Married, polygamous, second wife; No female head/spouse; Single, divorced, or other; Married, polygamous, third wife or more)
14	Does the household own a bicycle? (No; Yes)
14	Does the household own a tractor? (No; Yes)
14	How many household members receive a salary or in-kind payment in their main line of work? (Two or more; One; None)
10	How many family members work in trade and sales or in other merchant trades? (None; Three or more; One; Two)
9	How many household members work as day laborers? (None; One or more)

Figure 3 (cont.): Poverty indicators by uncertainty coefficient

9	How many household members ages 7 to 11 are attending school? (All; Not all; No children in this age range)
8	How many household members ages 7 to 12 are attending school? (All; Not all; No children in this age range)
8	How many household members are 0 to 11 years old? (Zero; One; Two; Three; Four; Five or more)
7	Under what arrangement was the female head/spouse paid in her main line of work? (Salary or in-kind; Self-employed; By the task/hour/day, works in family business or as a non-paid apprentice, did not work, or no female head/spouse)
7	How many household members are self-employed? (None, one, or two; Three or more)
6	If the female head/spouse has gone to school, what is the highest grade in school that she has passed? (Other; No female head/spouse; Never attended school)
6	How many household members ages 7 to 13 are attending school? (All; Not all; No children in this age range)
6	How many family members work in agriculture, animal husbandry, forestry, fishing, mining, quarrying, processing food, beverages, or tobacco, trade and sales, or in other merchant trades? (Two; Three; One; None; Four or more)
5	What is the structure of household headship? (Female head/spouse only; Male head/spouse only; Both male and female heads/spouses)
5	How many family members work, but not in agriculture, animal husbandry, forestry, fishing, mining, quarrying, processing food, beverages, or tobacco, trade and sales, or in other merchant trades? (Two; None; One; Three or more)
3	How many household members ages 7 to 14 are attending school? (All; Not all; No children in this age range)
2	Does the female head/spouse know how to read and write in any language? (No female head/spouse; No; Yes)

Figure 3 (cont.): Poverty indicators by uncertainty coefficient

2	How many household members ages 7 to 16 are attending school? (All; Not all; No children in this age range)
2	How many household members are 0 to 5 years old? (Zero; One; Two; Three or more)
2	How many household members ages 7 to 17 are attending school? (All; Not all; No children in this age range)
2	How many family members work in agriculture, animal husbandry, forestry, fishing, mining, quarrying or in processing food, beverages, or tobacco? (One; None; Two; Three or more)
1	How many household members ages 7 to 15 are attending school? (All; Not all; No children in this age range)
0.7	Did the female head/spouse do any work in the past seven days? (Yes; No; No female head/spouse)
0.5	How many household members ages 7 to 18 are attending school? (All; Not all; No children in this age range)

Source: 2005/6 ESPS and the national poverty line

National Poverty Line Tables

(and Tables Pertaining to All Ten Poverty Lines)

Figure 4 (National poverty line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	58.2
5–9	65.0
10–14	68.3
15–19	58.6
20–24	56.0
25–29	46.9
30–34	51.3
35–39	42.3
40–44	34.8
45–49	27.9
50–54	37.4
55–59	22.2
60–64	21.9
65–69	19.9
70–74	20.3
75–79	17.7
80–84	8.6
85–89	4.3
90–94	12.2
95–100	1.9

Figure 5 (National poverty line): Derivation of estimated poverty likelihoods associated with scores

Score	Households below poverty line		All households at score		Poverty likelihood (estimated, %)
0–4	3,926	÷	6,746	=	58.2
5–9	2,478	÷	3,813	=	65.0
10–14	11,866	÷	17,379	=	68.3
15–19	5,874	÷	10,017	=	58.6
20–24	4,289	÷	7,666	=	56.0
25–29	2,705	÷	5,766	=	46.9
30–34	1,902	÷	3,711	=	51.3
35–39	1,957	÷	4,624	=	42.3
40–44	1,341	÷	3,858	=	34.8
45–49	961	÷	3,446	=	27.9
50–54	1,293	÷	3,460	=	37.4
55–59	746	÷	3,359	=	22.2
60–64	1,205	÷	5,502	=	21.9
65–69	391	÷	1,969	=	19.9
70–74	470	÷	2,313	=	20.3
75–79	1,261	÷	7,117	=	17.7
80–84	246	÷	2,855	=	8.6
85–89	48	÷	1,115	=	4.3
90–94	380	÷	3,124	=	12.2
95–100	41	÷	2,160	=	1.9

Number of all households normalized to sum to 100,000.

Figure 6: Distribution of household poverty likelihoods across consumption ranges demarcated by per-adult-equivalent poverty lines

	Likelihood of having expenditure in range demarcated by poverty lines per day per adult equivalent						
Score	<Food line <XOF351.11	=>Food line and <75% Natl. =>XOF351.11 and <XOF498.24	=>75% Natl. and <100% Natl. =>XOF498.24 and <XOF664.32	=>100% Natl. and <125% Natl. =>XOF664.32 and <XOF830.41	=>125% Natl. and <150% Natl. =>XOF830.41 and <XOF996.49	=>150% Natl. and <200% Natl. =>XOF996.49 and <XOF1,328.65	=>200% Natl. =>XOF1,328.65
0–4	24.2	14.7	19.4	18.9	11.9	6.7	4.3
5–9	24.9	10.0	30.0	14.1	3.7	13.6	3.6
10–14	30.8	14.5	23.0	12.9	7.4	7.4	4.1
15–19	23.6	11.4	23.6	16.7	7.9	9.1	7.7
20–24	16.4	13.5	26.0	18.4	8.5	8.4	8.8
25–29	15.5	14.2	17.2	10.1	12.7	11.3	19.0
30–34	7.8	20.3	23.1	20.9	6.3	17.0	4.5
35–39	7.7	10.8	23.8	23.0	7.6	17.0	10.2
40–44	1.5	13.5	19.7	23.6	14.3	12.5	14.9
45–49	1.5	10.9	15.5	28.1	23.6	11.4	9.1
50–54	1.1	14.6	21.7	8.9	15.0	19.1	19.7
55–59	0.2	8.0	14.0	24.1	16.1	27.5	10.1
60–64	0.1	8.7	13.1	25.0	15.5	17.2	20.5
65–69	0.7	7.7	11.5	20.1	14.4	20.5	25.2
70–74	0.6	15.7	4.0	12.7	7.9	33.1	26.0
75–79	0.0	3.8	13.9	14.5	12.5	22.5	32.9
80–84	3.4	0.6	4.6	4.9	11.8	28.9	45.8
85–89	0.0	0.0	4.3	12.3	26.4	11.7	45.3
90–94	0.2	0.2	11.8	5.4	6.7	10.9	64.9
95–100	0.0	1.9	0.0	9.5	9.9	27.3	51.3

All poverty likelihoods in percentage units.

Figure 6 (cont.): Distribution of household poverty likelihoods across consumption ranges demarcated by per-person poverty lines

	Likelihood of having expenditure in range demarcated by poverty lines per			
	<$1.25/day	**=>$1.25/day and <$2.50/day**	**=>$2.50/day and <$3.75/day**	**=>$3.75/day**
Score	**<XOF372.30**	**=>XOF372.30 and <XOF744.60**	**=>XOF744.60 and <XOF1,116.91**	**=>XOF1,116.91**
0–4	36.4	47.5	13.9	2.2
5–9	39.8	45.9	9.8	4.6
10–14	43.9	44.4	8.3	3.4
15–19	33.5	49.2	10.8	6.5
20–24	30.4	49.6	11.7	8.3
25–29	27.6	35.9	19.0	17.5
30–34	19.3	58.0	19.9	2.8
35–39	16.1	56.0	17.1	10.8
40–44	14.5	47.4	26.2	11.9
45–49	6.5	61.3	24.0	8.3
50–54	12.3	45.4	24.3	18.0
55–59	5.5	50.9	32.1	11.5
60–64	4.9	50.4	25.4	19.2
65–69	3.5	45.3	29.7	21.5
70–74	5.3	29.2	37.8	27.7
75–79	2.0	32.6	35.8	29.6
80–84	3.4	14.2	50.3	32.0
85–89	0.0	42.4	21.4	36.2
90–94	0.4	17.9	17.6	64.1
95–100	1.9	9.5	28.7	59.9

All poverty likelihoods in percentage units.

The USAID "extreme" line is almost the same as the $1.25/day 2005 PPP line.

Figure 7 (National poverty line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	–18.0	10.2	10.5	11.0
5–9	+6.8	4.6	5.4	7.1
10–14	+8.6	2.1	2.6	3.4
15–19	+9.2	2.7	3.2	4.4
20–24	+20.7	2.7	3.2	3.8
25–29	–2.4	3.7	4.5	5.8
30–34	+17.4	3.9	4.7	5.8
35–39	–14.3	9.0	9.4	10.2
40–44	–20.5	12.2	12.7	13.4
45–49	+7.8	3.5	4.0	5.6
50–54	+4.3	4.2	5.1	7.0
55–59	–5.0	4.4	4.7	5.8
60–64	+2.4	2.4	2.9	3.7
65–69	–4.8	4.7	5.7	7.2
70–74	+4.9	3.0	3.7	5.2
75–79	+1.8	2.4	2.9	3.7
80–84	–0.2	2.1	2.6	3.3
85–89	+4.2	0.1	0.1	0.2
90–94	+11.9	0.2	0.2	0.3
95–100	+1.7	0.2	0.2	0.3

Figure 8 (National poverty line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/− percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+0.2	66.8	74.0	75.3
4	+3.3	40.3	46.2	56.0
8	+3.6	30.4	36.4	43.2
16	+3.1	23.5	27.2	33.3
32	+2.8	16.4	19.1	24.6
64	+2.9	11.8	13.9	16.9
128	+2.9	8.5	9.8	12.9
256	+2.7	5.9	7.1	9.2
512	+2.9	4.2	4.9	6.6
1,024	+2.8	3.0	3.6	4.6
2,048	+2.8	2.1	2.6	3.5
4,096	+2.8	1.5	1.8	2.5
8,192	+2.8	1.0	1.3	1.7
16,384	+2.8	0.7	0.9	1.2

Figure 9 (All poverty lines): Differences, precision of differences, and the α factor for bootstrapped estimates of poverty rates for groups of households at a point in time, scorecard applied to the validation sample

	Poverty line									
	National line (per adult equivalent)						USAID	Intl. 2005 PPP (per person)		
	100%	Food	75%	125%	150%	200%	'Extreme'	$1.25/day	$2.50/day	$3.75/day
Estimate minus true value										
Scorecard applied to validation sample	+2.8	+3.7	+2.3	+2.1	+1.1	+1.5	+4.7	+2.0	+0.7	+2.9
Precision of difference										
Scorecard applied to validation sample	0.7	0.4	0.7	0.7	0.7	0.5	0.5	0.6	0.7	0.6
α for sample size										
Scorecard applied to validation sample	1.17	0.97	1.16	1.20	1.14	1.11	1.09	1.16	1.11	1.13
Precision is measured as 90-percent confidence intervals in units of +/– percentage points.										
Differences and precision estimated from 500 bootstraps of size n = 16,384.										
α is estimated from 1,000 bootstrap samples of n = 256, 512, 1,024, 2,048, 4,096, 8,192, and 16,384.										
The USAID "extreme" line is in per-person units.										

Figure 10 (All poverty lines): Possible types of outcomes from targeting by poverty score

True poverty status	Targeting segment: Targeted	Targeting segment: Non-targeted
Below poverty line	**Inclusion** Under poverty line Correctly Targeted	**Undercoverage** Under poverty line Mistakenly Non-targeted
Above poverty line	**Leakage** Above poverty line Mistakenly Targeted	**Exclusion** Above poverty line Correctly Non-targeted

Figure 11 (National poverty line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	4.8	37.4	2.0	55.9	60.7	–72.7
5–9	7.5	34.7	3.1	54.8	62.3	–57.2
10–14	18.5	23.6	9.4	48.5	67.0	+10.3
15–19	24.2	18.0	13.8	44.1	68.2	+47.4
20–24	27.9	14.2	17.7	40.2	68.1	+58.0
25–29	30.9	11.2	20.5	37.4	68.3	+51.4
30–34	32.3	9.9	22.8	35.0	67.3	+45.8
35–39	34.4	7.7	25.3	32.6	67.0	+39.9
40–44	36.1	6.1	27.5	30.3	66.4	+34.7
45–49	36.8	5.3	30.2	27.7	64.5	+28.4
50–54	37.8	4.3	32.7	25.2	63.0	+22.4
55–59	38.8	3.3	35.1	22.8	61.6	+16.8
60–64	40.0	2.1	39.4	18.5	58.5	+6.6
65–69	40.4	1.7	40.9	17.0	57.4	+2.9
70–74	40.9	1.2	42.7	15.1	56.0	–1.5
75–79	41.7	0.4	49.0	8.8	50.6	–16.4
80–84	42.1	0.1	51.5	6.3	48.4	–22.3
85–89	42.1	0.1	52.6	5.2	47.3	–25.0
90–94	42.1	0.0	55.7	2.1	44.2	–32.3
95–100	42.1	0.0	57.9	0.0	42.1	–37.4

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 (National poverty line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	70.7	11.3	2.4:1
5–9	10.6	70.8	17.7	2.4:1
10–14	27.9	66.3	44.0	2.0:1
15–19	38.0	63.6	57.3	1.7:1
20–24	45.6	61.2	66.2	1.6:1
25–29	51.4	60.1	73.4	1.5:1
30–34	55.1	58.6	76.6	1.4:1
35–39	59.7	57.6	81.7	1.4:1
40–44	63.6	56.7	85.6	1.3:1
45–49	67.0	55.0	87.5	1.2:1
50–54	70.5	53.6	89.7	1.2:1
55–59	73.8	52.5	92.1	1.1:1
60–64	79.3	50.4	94.9	1.0:1
65–69	81.3	49.7	96.0	1.0:1
70–74	83.6	48.9	97.0	1.0:1
75–79	90.7	46.0	99.0	0.9:1
80–84	93.6	44.9	99.8	0.8:1
85–89	94.7	44.4	99.9	0.8:1
90–94	97.8	43.0	99.9	0.8:1
95–100	100.0	42.1	100.0	0.7:1

National Food Poverty Line Tables

Figure 4 (Food line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	24.2
5–9	24.9
10–14	30.8
15–19	23.6
20–24	16.4
25–29	15.5
30–34	7.8
35–39	7.7
40–44	1.5
45–49	1.5
50–54	1.1
55–59	0.2
60–64	0.1
65–69	0.7
70–74	0.6
75–79	0.0
80–84	3.4
85–89	0.0
90–94	0.2
95–100	0.0

Figure 7 (Food poverty line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/− percentage points)		
Score	**Diff.**	**90-percent**	**95-percent**	**99-percent**
0–4	+6.5	2.0	2.4	3.1
5–9	+10.1	2.2	2.7	3.5
10–14	+7.5	1.7	2.0	2.8
15–19	+7.2	1.6	2.0	2.5
20–24	+6.4	1.3	1.6	2.0
25–29	+0.9	2.3	2.7	3.4
30–34	+5.9	0.8	0.9	1.2
35–39	+6.1	0.7	0.8	1.0
40–44	+0.1	0.7	0.8	1.0
45–49	+1.2	0.3	0.3	0.4
50–54	+0.4	0.5	0.5	0.7
55–59	–0.6	0.6	0.6	0.8
60–64	–0.3	0.3	0.3	0.4
65–69	+0.7	0.1	0.1	0.1
70–74	–4.7	3.4	3.6	4.0
75–79	+0.0	0.0	0.0	0.0
80–84	+3.4	0.0	0.0	0.0
85–89	+0.0	0.0	0.0	0.0
90–94	+0.2	0.0	0.0	0.0
95–100	+0.0	0.0	0.0	0.0

Figure 8 (Food line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/− percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+1.1	53.3	53.6	57.6
4	+2.3	25.0	30.4	40.1
8	+2.9	19.4	22.8	29.3
16	+3.6	12.8	14.8	18.5
32	+3.3	8.9	10.9	15.0
64	+3.6	6.5	7.9	10.0
128	+3.8	4.4	5.5	7.5
256	+3.8	3.2	3.8	5.6
512	+3.8	2.3	2.7	3.8
1,024	+3.8	1.7	2.0	2.7
2,048	+3.7	1.2	1.3	1.8
4,096	+3.7	0.8	1.0	1.3
8,192	+3.7	0.6	0.7	0.9
16,384	+3.7	0.4	0.5	0.6

Figure 11 (Food line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	2.0	10.2	4.7	83.0	85.0	–28.5
5–9	3.1	9.2	7.5	80.3	83.3	+11.2
10–14	7.5	4.8	20.4	67.3	74.8	–66.6
15–19	9.5	2.7	28.4	59.3	68.9	–131.6
20–24	10.7	1.5	34.9	52.9	63.6	–184.3
25–29	11.7	0.6	39.7	48.0	59.7	–223.8
30–34	11.8	0.5	43.3	44.4	56.2	–253.0
35–39	11.9	0.4	47.8	39.9	51.8	–289.7
40–44	12.0	0.3	51.6	36.1	48.1	–320.5
45–49	12.0	0.2	55.0	32.7	44.8	–348.3
50–54	12.1	0.2	58.4	29.3	41.4	–376.2
55–59	12.1	0.2	61.7	26.0	38.1	–403.3
60–64	12.1	0.1	67.2	20.5	32.7	–447.8
65–69	12.1	0.1	69.2	18.6	30.7	–463.8
70–74	12.3	0.0	71.4	16.4	28.6	–481.7
75–79	12.3	0.0	78.5	9.3	21.5	–539.7
80–84	12.3	0.0	81.3	6.4	18.7	–563.0
85–89	12.3	0.0	82.4	5.3	17.6	–572.1
90–94	12.3	0.0	85.6	2.2	14.4	–597.5
95–100	12.3	0.0	87.7	0.0	12.3	–615.1

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 (Food line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	30.1	16.5	0.4:1
5–9	10.6	29.2	25.1	0.4:1
10–14	27.9	26.9	61.2	0.4:1
15–19	38.0	25.1	77.8	0.3:1
20–24	45.6	23.6	87.6	0.3:1
25–29	51.4	22.7	95.1	0.3:1
30–34	55.1	21.4	96.1	0.3:1
35–39	59.7	19.9	97.1	0.2:1
40–44	63.6	18.9	97.8	0.2:1
45–49	67.0	18.0	98.1	0.2:1
50–54	70.5	17.1	98.4	0.2:1
55–59	73.8	16.4	98.7	0.2:1
60–64	79.3	15.3	99.0	0.2:1
65–69	81.3	14.9	99.0	0.2:1
70–74	83.6	14.7	100.0	0.2:1
75–79	90.7	13.5	100.0	0.2:1
80–84	93.6	13.1	100.0	0.2:1
85–89	94.7	13.0	100.0	0.1:1
90–94	97.8	12.5	100.0	0.1:1
95–100	100.0	12.3	100.0	0.1:1

75% of the National Poverty Line Tables

Figure 4 (75% of the national line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	38.8
5–9	35.0
10–14	45.3
15–19	35.0
20–24	29.9
25–29	29.7
30–34	28.2
35–39	18.5
40–44	15.1
45–49	12.4
50–54	15.7
55–59	8.2
60–64	8.8
65–69	8.4
70–74	16.3
75–79	3.8
80–84	4.1
85–89	0.0
90–94	0.4
95–100	1.9

Figure 7 (75% of the national line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/− percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	+13.5	2.4	2.9	3.7
5–9	–5.9	5.2	5.5	7.5
10–14	+0.9	2.2	2.6	3.5
15–19	+0.3	2.5	3.1	3.9
20–24	+11.4	1.9	2.3	2.8
25–29	–8.8	6.3	6.7	7.8
30–34	+13.8	2.6	3.1	4.1
35–39	–1.1	2.9	3.4	4.4
40–44	–9.1	6.5	6.8	7.2
45–49	+7.7	1.5	1.8	2.3
50–54	+11.3	1.4	1.6	2.2
55–59	+1.1	2.2	2.5	3.2
60–64	+0.8	1.6	1.9	2.3
65–69	+0.8	2.5	3.1	4.1
70–74	+6.8	2.5	2.9	4.0
75–79	+2.1	0.7	0.9	1.1
80–84	+1.2	1.3	1.6	1.9
85–89	+0.0	0.0	0.0	0.0
90–94	+0.2	0.2	0.2	0.3
95–100	+1.9	0.0	0.0	0.0

Figure 8 (75% of the national line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/− percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+1.5	57.8	63.4	68.4
4	+2.1	33.9	39.9	50.3
8	+2.9	25.9	29.3	37.4
16	+2.8	18.2	22.2	27.7
32	+2.2	13.2	14.9	19.7
64	+2.2	9.7	11.3	14.4
128	+2.4	7.1	8.2	10.9
256	+2.3	5.0	6.0	8.2
512	+2.4	3.4	4.0	5.4
1,024	+2.3	2.5	3.0	4.0
2,048	+2.3	1.9	2.2	2.7
4,096	+2.3	1.3	1.5	2.2
8,192	+2.3	0.9	1.1	1.4
16,384	+2.3	0.7	0.8	1.0

Figure 11 (75% of the national line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	2.8	20.9	4.0	72.3	75.1	–59.9
5–9	4.6	19.2	6.0	70.3	74.8	–36.3
10–14	11.9	11.8	16.0	60.3	72.2	+32.5
15–19	15.6	8.1	22.4	53.9	69.5	+5.6
20–24	17.7	6.0	27.9	48.4	66.1	–17.6
25–29	19.6	4.1	31.8	44.5	64.2	–33.9
30–34	20.3	3.4	34.8	41.5	61.8	–46.8
35–39	21.2	2.6	38.6	37.7	58.9	–62.6
40–44	21.9	1.9	41.7	34.6	56.4	–75.9
45–49	22.1	1.6	44.9	31.3	53.4	–89.5
50–54	22.3	1.4	48.2	28.1	50.4	–103.2
55–59	22.5	1.2	51.3	25.0	47.5	–116.3
60–64	23.0	0.7	56.3	20.0	43.0	–137.4
65–69	23.2	0.5	58.1	18.2	41.4	–145.0
70–74	23.5	0.2	60.1	16.1	39.6	–153.6
75–79	23.6	0.1	67.2	9.1	32.7	–183.1
80–84	23.7	0.0	69.9	6.4	30.1	–194.8
85–89	23.7	0.0	71.0	5.3	29.0	–199.5
90–94	23.7	0.0	74.1	2.2	25.9	–212.5
95–100	23.7	0.0	76.3	0.0	23.7	–221.6

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 (75% of the national line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	41.0	11.7	0.7:1
5–9	10.6	43.2	19.2	0.8:1
10–14	27.9	42.7	50.3	0.7:1
15–19	38.0	41.0	65.6	0.7:1
20–24	45.6	38.9	74.8	0.6:1
25–29	51.4	38.2	82.8	0.6:1
30–34	55.1	36.8	85.5	0.6:1
35–39	59.7	35.4	89.2	0.5:1
40–44	63.6	34.4	92.2	0.5:1
45–49	67.0	33.0	93.1	0.5:1
50–54	70.5	31.6	94.0	0.5:1
55–59	73.8	30.5	95.1	0.4:1
60–64	79.3	29.0	97.1	0.4:1
65–69	81.3	28.5	97.9	0.4:1
70–74	83.6	28.1	99.1	0.4:1
75–79	90.7	26.0	99.5	0.4:1
80–84	93.6	25.3	99.9	0.3:1
85–89	94.7	25.0	99.9	0.3:1
90–94	97.8	24.2	100.0	0.3:1
95–100	100.0	23.7	100.0	0.3:1

125% of the National Poverty Line Tables

Figure 4 (125% of the national line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	77.1
5–9	79.1
10–14	81.2
15–19	75.3
20–24	74.3
25–29	57.0
30–34	72.1
35–39	65.3
40–44	58.4
45–49	56.0
50–54	46.2
55–59	46.3
60–64	46.9
65–69	40.0
70–74	33.0
75–79	32.2
80–84	13.5
85–89	16.6
90–94	17.5
95–100	11.4

Figure 7 (125% of the national line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	–5.2	3.8	3.9	4.2
5–9	+15.6	4.7	5.3	7.3
10–14	–4.9	3.1	3.2	3.5
15–19	+14.3	2.8	3.4	4.6
20–24	+17.7	3.2	3.9	5.2
25–29	–19.1	10.9	11.3	11.7
30–34	+12.7	4.5	5.3	6.9
35–39	–7.3	5.3	5.6	6.1
40–44	–14.3	8.9	9.2	9.8
45–49	+12.1	4.8	5.6	7.1
50–54	–3.9	4.1	4.9	6.4
55–59	+6.8	3.8	4.6	6.2
60–64	–8.3	5.9	6.2	6.7
65–69	+11.8	4.9	5.8	7.8
70–74	+13.7	3.4	4.2	5.6
75–79	+7.1	2.6	3.1	4.3
80–84	–3.4	3.3	3.8	4.8
85–89	+16.0	0.5	0.6	0.8
90–94	+4.1	2.5	3.0	4.0
95–100	+11.0	0.3	0.3	0.4

Figure 8 (125% of the national line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+0.9	64.5	73.0	81.8
4	+4.3	43.1	47.8	58.8
8	+3.3	30.7	37.5	46.0
16	+2.7	22.9	26.6	32.0
32	+2.4	15.9	18.6	24.4
64	+2.4	11.3	14.3	18.5
128	+2.3	8.2	9.8	13.3
256	+2.1	5.9	7.0	9.0
512	+2.1	4.2	5.0	6.3
1,024	+2.1	3.1	3.7	4.7
2,048	+2.1	2.2	2.6	3.3
4,096	+2.1	1.6	1.9	2.5
8,192	+2.1	1.1	1.3	1.7
16,384	+2.1	0.7	0.9	1.2

Figure 11 (125% of the national line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	5.5	52.4	1.3	40.8	46.3	–78.9
5–9	8.5	49.4	2.0	40.0	48.6	–67.0
10–14	23.0	35.0	5.0	37.1	60.0	–12.1
15–19	29.9	28.0	8.0	34.0	64.0	+17.2
20–24	35.0	23.0	10.7	31.4	66.4	+39.1
25–29	39.1	18.8	12.2	29.8	69.0	+56.3
30–34	41.5	16.5	13.6	28.5	69.9	+66.7
35–39	44.5	13.4	15.2	26.8	71.3	+73.7
40–44	47.0	11.0	16.6	25.5	72.4	+71.3
45–49	48.4	9.6	18.7	23.4	71.8	+67.8
50–54	50.0	7.9	20.5	21.6	71.6	+64.7
55–59	51.4	6.5	22.5	19.6	71.0	+61.2
60–64	54.0	4.0	25.4	16.7	70.6	+56.2
65–69	54.5	3.4	26.8	15.3	69.8	+53.8
70–74	55.2	2.8	28.5	13.6	68.8	+50.8
75–79	56.8	1.2	34.0	8.1	64.9	+41.3
80–84	57.3	0.6	36.3	5.8	63.1	+37.4
85–89	57.4	0.6	37.4	4.7	62.1	+35.5
90–94	57.9	0.0	40.0	2.1	60.0	+31.0
95–100	57.9	0.0	42.1	0.0	57.9	+27.4

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 (125% of the national line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	81.3	9.5	4.3:1
5–9	10.6	80.8	14.7	4.2:1
10–14	27.9	82.2	39.6	4.6:1
15–19	38.0	78.8	51.7	3.7:1
20–24	45.6	76.6	60.4	3.3:1
25–29	51.4	76.2	67.6	3.2:1
30–34	55.1	75.3	71.6	3.0:1
35–39	59.7	74.5	76.8	2.9:1
40–44	63.6	73.9	81.1	2.8:1
45–49	67.0	72.1	83.5	2.6:1
50–54	70.5	71.0	86.4	2.4:1
55–59	73.8	69.6	88.7	2.3:1
60–64	79.3	68.0	93.2	2.1:1
65–69	81.3	67.1	94.2	2.0:1
70–74	83.6	66.0	95.2	1.9:1
75–79	90.7	62.6	98.0	1.7:1
80–84	93.6	61.2	99.0	1.6:1
85–89	94.7	60.6	99.0	1.5:1
90–94	97.8	59.2	99.9	1.4:1
95–100	100.0	57.9	100.0	1.4:1

150% of the National Poverty Line Tables

Figure 4 (150% of the national line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	89.0
5–9	82.8
10–14	88.6
15–19	83.2
20–24	82.8
25–29	69.8
30–34	78.5
35–39	72.8
40–44	72.6
45–49	79.5
50–54	61.2
55–59	62.4
60–64	62.4
65–69	54.3
70–74	40.9
75–79	44.6
80–84	25.3
85–89	43.0
90–94	24.2
95–100	21.4

Figure 7 (150% of the national line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	+5.2	2.2	2.7	3.4
5–9	–3.1	3.0	3.6	4.9
10–14	–4.4	2.6	2.7	2.8
15–19	+8.2	2.3	2.7	3.7
20–24	+8.9	2.8	3.5	4.6
25–29	–15.7	9.0	9.2	9.6
30–34	+11.1	4.7	5.5	7.6
35–39	–9.6	6.2	6.5	6.9
40–44	–15.4	8.7	8.9	9.1
45–49	+20.8	4.5	5.2	7.1
50–54	–6.3	5.0	5.4	5.9
55–59	+2.0	4.1	5.0	6.6
60–64	–7.7	5.3	5.6	6.2
65–69	+20.0	4.9	6.2	8.3
70–74	+4.7	4.8	5.7	7.3
75–79	+10.1	2.9	3.3	4.1
80–84	–2.9	3.7	4.4	6.0
85–89	+42.4	0.5	0.6	0.8
90–94	–5.9	4.6	5.0	5.8
95–100	+10.6	2.7	3.2	3.9

Figure 8 (150% of the national line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+1.3	69.3	73.8	82.4
4	+3.1	40.9	47.5	60.3
8	+2.0	29.1	34.5	42.8
16	+1.4	20.8	25.4	32.5
32	+1.4	15.4	18.2	22.5
64	+1.3	10.2	12.7	16.8
128	+1.3	7.5	8.7	11.2
256	+1.2	5.2	6.3	8.4
512	+1.2	3.9	4.5	5.7
1,024	+1.1	2.6	3.1	3.9
2,048	+1.2	1.9	2.4	3.0
4,096	+1.1	1.4	1.6	2.2
8,192	+1.1	1.0	1.2	1.5
16,384	+1.1	0.7	0.8	1.0

Figure 11 (150% of the national line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	5.7	63.4	1.0	29.8	35.5	–82.0
5–9	9.1	60.0	1.4	29.4	38.5	–71.5
10–14	24.9	44.2	3.1	27.8	52.7	–23.6
15–19	32.9	36.3	5.1	25.8	58.6	+2.4
20–24	38.8	30.3	6.8	24.1	62.9	+22.2
25–29	43.6	25.5	7.7	23.1	66.8	+37.5
30–34	46.5	22.7	8.6	22.2	68.7	+46.9
35–39	50.1	19.0	9.6	21.2	71.3	+58.8
40–44	53.0	16.1	10.5	20.3	73.4	+68.7
45–49	55.1	14.1	12.0	18.9	74.0	+76.6
50–54	57.3	11.8	13.2	17.7	75.0	+80.9
55–59	59.3	9.8	14.5	16.4	75.7	+79.0
60–64	62.8	6.3	16.5	14.3	77.2	+76.1
65–69	63.6	5.6	17.8	13.1	76.7	+74.3
70–74	64.4	4.7	19.2	11.7	76.1	+72.2
75–79	66.9	2.2	23.9	7.0	73.9	+65.5
80–84	67.8	1.3	25.8	5.1	72.8	+62.7
85–89	67.8	1.3	26.9	4.0	71.8	+61.1
90–94	68.8	0.3	29.0	1.9	70.7	+58.1
95–100	69.1	0.0	30.9	0.0	69.1	+55.4

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 (150% of the national line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	84.6	8.3	5.5:1
5–9	10.6	86.3	13.2	6.3:1
10–14	27.9	89.1	36.0	8.2:1
15–19	38.0	86.6	47.5	6.5:1
20–24	45.6	85.1	56.2	5.7:1
25–29	51.4	84.9	63.1	5.6:1
30–34	55.1	84.3	67.2	5.4:1
35–39	59.7	83.9	72.5	5.2:1
40–44	63.6	83.4	76.7	5.0:1
45–49	67.0	82.1	79.6	4.6:1
50–54	70.5	81.3	82.9	4.3:1
55–59	73.8	80.4	85.8	4.1:1
60–64	79.3	79.2	90.9	3.8:1
65–69	81.3	78.2	91.9	3.6:1
70–74	83.6	77.1	93.2	3.4:1
75–79	90.7	73.7	96.8	2.8:1
80–84	93.6	72.4	98.1	2.6:1
85–89	94.7	71.6	98.1	2.5:1
90–94	97.8	70.4	99.6	2.4:1
95–100	100.0	69.1	100.0	2.2:1

200% of the National Poverty Line Tables

Figure 4 (200% of the national line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	95.7
5–9	96.4
10–14	96.0
15–19	92.3
20–24	91.2
25–29	81.1
30–34	95.5
35–39	89.8
40–44	85.1
45–49	90.9
50–54	80.3
55–59	89.9
60–64	79.5
65–69	74.8
70–74	74.0
75–79	67.1
80–84	54.2
85–89	54.7
90–94	35.1
95–100	48.7

Figure 7 (200% of the national line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	–1.2	1.0	1.1	1.4
5–9	–2.2	1.4	1.5	1.6
10–14	–0.7	0.7	0.8	1.1
15–19	–4.3	2.5	2.5	2.6
20–24	+10.8	2.8	3.3	4.5
25–29	–16.7	8.7	8.7	8.8
30–34	+2.7	2.0	2.4	2.9
35–39	–2.7	2.3	2.5	3.1
40–44	–10.9	5.9	6.0	6.2
45–49	+11.4	3.7	4.4	5.4
50–54	–7.2	4.8	5.1	5.6
55–59	+10.6	3.3	4.0	5.3
60–64	–3.3	2.7	2.9	3.7
65–69	+15.6	5.3	6.2	7.9
70–74	+30.4	4.9	5.9	7.8
75–79	+6.6	2.7	3.4	4.5
80–84	+16.2	3.9	4.9	6.2
85–89	+52.8	1.0	1.1	1.4
90–94	–20.8	12.3	12.8	13.6
95–100	+26.6	3.4	4.0	5.3

Figure 8 (200% of the national line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+3.2	58.0	68.8	80.4
4	+3.2	35.6	43.6	54.2
8	+2.6	25.3	29.7	40.5
16	+2.0	17.8	21.2	27.7
32	+1.9	12.8	15.3	19.5
64	+1.6	8.9	10.5	13.4
128	+1.6	6.3	7.5	9.8
256	+1.6	4.4	5.3	6.9
512	+1.7	3.1	3.7	4.9
1,024	+1.6	2.0	2.5	3.4
2,048	+1.6	1.5	1.8	2.5
4,096	+1.6	1.1	1.3	1.6
8,192	+1.5	0.8	0.9	1.2
16,384	+1.5	0.5	0.7	0.9

Figure 11 (200% of the national line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	6.5	76.5	0.3	16.7	23.2	–84.1
5–9	10.2	72.8	0.4	16.6	26.8	–75.0
10–14	26.9	56.1	1.0	16.0	42.9	–33.9
15–19	36.5	46.5	1.5	15.5	52.0	–10.3
20–24	43.2	39.8	2.4	14.6	57.8	+7.0
25–29	48.7	34.3	2.7	14.3	63.0	+20.6
30–34	52.1	30.9	3.0	14.0	66.1	+29.2
35–39	56.4	26.6	3.3	13.7	70.0	+39.9
40–44	59.8	23.2	3.7	13.3	73.1	+48.7
45–49	62.7	20.3	4.3	12.7	75.4	+56.3
50–54	65.6	17.4	4.9	12.2	77.8	+64.0
55–59	68.3	14.7	5.5	11.5	79.8	+71.3
60–64	72.6	10.4	6.7	10.3	82.9	+83.1
65–69	73.8	9.2	7.5	9.5	83.3	+86.9
70–74	75.0	8.0	8.6	8.4	83.4	+89.6
75–79	79.4	3.6	11.4	5.6	85.0	+86.3
80–84	80.6	2.4	13.0	4.0	84.6	+84.3
85–89	80.7	2.3	14.0	3.0	83.6	+83.1
90–94	82.5	0.5	15.4	1.6	84.1	+81.5
95–100	83.0	0.0	17.0	0.0	83.0	+79.5

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 (200% of the national line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	95.8	7.8	22.7:1
5–9	10.6	96.5	12.3	27.5:1
10–14	27.9	96.4	32.4	26.6:1
15–19	38.0	96.1	43.9	24.5:1
20–24	45.6	94.7	52.0	17.8:1
25–29	51.4	94.8	58.7	18.2:1
30–34	55.1	94.6	62.8	17.5:1
35–39	59.7	94.4	67.9	16.9:1
40–44	63.6	94.1	72.1	16.0:1
45–49	67.0	93.5	75.5	14.5:1
50–54	70.5	93.1	79.1	13.5:1
55–59	73.8	92.5	82.3	12.3:1
60–64	79.3	91.5	87.5	10.8:1
65–69	81.3	90.8	88.9	9.8:1
70–74	83.6	89.7	90.4	8.7:1
75–79	90.7	87.5	95.6	7.0:1
80–84	93.6	86.1	97.1	6.2:1
85–89	94.7	85.2	97.2	5.7:1
90–94	97.8	84.3	99.4	5.4:1
95–100	100.0	83.0	100.0	4.9:1

USAID "Extreme" Poverty Line Tables

Figure 4 (USAID "extreme" line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	28.5
5–9	28.5
10–14	37.7
15–19	28.9
20–24	26.2
25–29	25.2
30–34	21.4
35–39	16.9
40–44	18.5
45–49	12.0
50–54	12.9
55–59	9.2
60–64	10.8
65–69	7.6
70–74	13.5
75–79	5.5
80–84	5.6
85–89	0.0
90–94	0.4
95–100	1.9

Figure 7 (USAID "extreme" line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	+8.3	2.1	2.6	3.3
5–9	+10.5	2.7	3.1	3.9
10–14	+6.3	1.9	2.2	3.1
15–19	–0.8	2.5	3.0	3.9
20–24	+13.9	1.5	1.8	2.2
25–29	+5.7	2.4	2.9	3.9
30–34	+9.5	2.5	2.9	4.0
35–39	+1.7	2.6	3.1	4.0
40–44	–5.3	4.5	4.8	5.5
45–49	+4.3	2.0	2.3	3.2
50–54	+8.5	1.4	1.6	2.2
55–59	+6.8	0.9	1.0	1.4
60–64	+2.0	1.6	1.9	2.6
65–69	+3.5	1.8	2.1	2.8
70–74	+4.0	2.5	2.9	4.0
75–79	+5.3	0.1	0.1	0.2
80–84	+0.6	1.7	2.0	2.6
85–89	+0.0	0.0	0.0	0.0
90–94	+0.2	0.2	0.2	0.3
95–100	+1.9	0.0	0.0	0.0

Figure 8 (USAID "extreme" line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+2.6	55.7	59.6	63.4
4	+4.1	31.2	35.5	48.3
8	+4.7	22.8	27.5	37.9
16	+4.6	16.7	20.8	26.9
32	+4.5	12.4	14.4	18.0
64	+4.7	8.6	9.9	12.1
128	+4.9	6.1	7.3	9.7
256	+4.7	4.4	5.2	6.8
512	+4.8	3.1	3.6	4.9
1,024	+4.7	2.2	2.7	3.5
2,048	+4.7	1.6	1.9	2.4
4,096	+4.7	1.1	1.3	1.7
8,192	+4.7	0.8	0.9	1.2
16,384	+4.7	0.5	0.7	0.9

Figure 11 (USAID "extreme" line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	2.3	16.5	4.4	76.8	79.1	–51.8
5–9	3.6	15.2	7.0	74.3	77.9	–24.6
10–14	9.1	9.7	18.8	62.4	71.5	–0.2
15–19	12.0	6.7	25.9	55.3	67.3	–37.9
20–24	13.7	5.1	32.0	49.2	62.9	–70.1
25–29	15.1	3.7	36.3	44.9	60.0	–93.2
30–34	15.6	3.2	39.5	41.7	57.4	–110.0
35–39	16.3	2.4	43.4	37.8	54.2	–130.9
40–44	17.0	1.8	46.6	34.6	51.6	–147.9
45–49	17.3	1.5	49.7	31.5	48.8	–164.6
50–54	17.5	1.3	53.0	28.2	45.7	–182.0
55–59	17.7	1.1	56.2	25.0	42.7	–199.0
60–64	18.2	0.6	61.2	20.0	38.2	–225.6
65–69	18.3	0.5	63.0	18.2	36.5	–235.5
70–74	18.6	0.2	65.1	16.1	34.7	–246.3
75–79	18.6	0.2	72.2	9.1	27.6	–284.0
80–84	18.8	0.0	74.8	6.4	25.1	–298.3
85–89	18.8	0.0	76.0	5.3	24.0	–304.2
90–94	18.8	0.0	79.1	2.2	20.9	–320.7
95–100	18.8	0.0	81.2	0.0	18.8	–332.2

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 (USAID "extreme" line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	34.3	12.3	0.5:1
5–9	10.6	34.2	19.2	0.5:1
10–14	27.9	32.6	48.5	0.5:1
15–19	38.0	31.7	64.1	0.5:1
20–24	45.6	29.9	72.7	0.4:1
25–29	51.4	29.3	80.3	0.4:1
30–34	55.1	28.4	83.2	0.4:1
35–39	59.7	27.4	87.0	0.4:1
40–44	63.6	26.7	90.5	0.4:1
45–49	67.0	25.8	92.1	0.3:1
50–54	70.5	24.8	93.2	0.3:1
55–59	73.8	23.9	94.0	0.3:1
60–64	79.3	22.9	96.7	0.3:1
65–69	81.3	22.5	97.3	0.3:1
70–74	83.6	22.2	98.8	0.3:1
75–79	90.7	20.5	98.9	0.3:1
80–84	93.6	20.0	99.9	0.3:1
85–89	94.7	19.8	99.9	0.2:1
90–94	97.8	19.2	100.0	0.2:1
95–100	100.0	18.8	100.0	0.2:1

$1.25/day 2005 PPP Poverty Line Tables

Figure 4 ($1.25/day 2005 PPP line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	36.4
5–9	39.8
10–14	43.9
15–19	33.5
20–24	30.4
25–29	27.6
30–34	19.3
35–39	16.1
40–44	14.5
45–49	6.5
50–54	12.3
55–59	5.5
60–64	4.9
65–69	3.5
70–74	5.3
75–79	2.0
80–84	3.4
85–89	0.0
90–94	0.4
95–100	1.9

Figure 7 ($1.25/day 2005 PPP line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	+9.5	2.5	3.0	4.0
5–9	–1.1	4.5	5.3	7.5
10–14	+0.6	2.1	2.6	3.7
15–19	–0.3	2.5	3.0	3.7
20–24	+14.5	1.8	2.1	2.7
25–29	–11.0	7.4	7.8	8.7
30–34	+6.0	2.6	3.1	3.9
35–39	+4.9	2.1	2.6	3.4
40–44	–1.5	3.5	4.1	5.3
45–49	+2.2	1.5	1.7	2.2
50–54	+8.1	1.4	1.6	2.2
55–59	+4.2	0.6	0.8	1.0
60–64	–1.1	1.4	1.6	2.2
65–69	–0.7	1.8	2.1	2.8
70–74	–1.6	2.1	2.5	3.4
75–79	+1.9	0.1	0.1	0.2
80–84	+0.5	1.3	1.6	1.9
85–89	+0.0	0.0	0.0	0.0
90–94	+0.2	0.2	0.2	0.3
95–100	+1.9	0.0	0.0	0.0

Figure 8 ($1.25/day 2005 PPP line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/− percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+0.6	57.5	62.3	69.5
4	+1.7	33.5	39.1	50.8
8	+2.3	25.0	28.8	38.1
16	+2.4	18.0	22.2	29.2
32	+2.0	12.7	15.3	20.0
64	+1.9	9.3	11.1	14.0
128	+2.1	6.8	8.2	10.2
256	+1.9	4.9	5.9	8.3
512	+2.1	3.4	3.9	5.3
1,024	+2.0	2.5	2.9	3.8
2,048	+2.0	1.8	2.1	2.7
4,096	+1.9	1.3	1.5	2.0
8,192	+1.9	0.9	1.1	1.4
16,384	+2.0	0.6	0.7	0.9

Figure 11 ($1.25/day 2005 PPP line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	2.8	19.0	4.0	74.2	77.0	–56.3
5–9	4.5	17.3	6.1	72.1	76.7	–30.9
10–14	11.5	10.3	16.4	61.8	73.3	+24.8
15–19	15.0	6.8	22.9	55.3	70.3	–5.1
20–24	16.9	4.9	28.7	49.5	66.5	–31.6
25–29	18.8	3.0	32.6	45.6	64.5	–49.3
30–34	19.5	2.4	35.6	42.5	62.0	–63.5
35–39	20.1	1.7	39.7	38.5	58.6	–81.9
40–44	20.5	1.3	43.1	35.1	55.7	–97.5
45–49	20.7	1.1	46.3	31.9	52.6	–112.4
50–54	20.9	0.9	49.6	28.6	49.5	–127.5
55–59	21.0	0.8	52.9	25.3	46.3	–142.5
60–64	21.3	0.5	58.0	20.2	41.5	–166.1
65–69	21.4	0.4	59.9	18.3	39.8	–174.6
70–74	21.7	0.1	62.0	16.2	37.9	–184.3
75–79	21.7	0.1	69.1	9.1	30.8	–216.8
80–84	21.8	0.0	71.8	6.4	28.2	–229.4
85–89	21.8	0.0	72.9	5.3	27.0	–234.5
90–94	21.8	0.0	76.0	2.2	24.0	–248.8
95–100	21.8	0.0	78.2	0.0	21.8	–258.7

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 ($1.25/day 2005 PPP line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	41.3	12.8	0.7:1
5–9	10.6	42.7	20.7	0.7:1
10–14	27.9	41.3	52.9	0.7:1
15–19	38.0	39.6	69.0	0.7:1
20–24	45.6	37.1	77.7	0.6:1
25–29	51.4	36.6	86.4	0.6:1
30–34	55.1	35.3	89.2	0.5:1
35–39	59.7	33.6	92.1	0.5:1
40–44	63.6	32.3	94.1	0.5:1
45–49	67.0	30.9	95.0	0.4:1
50–54	70.5	29.6	95.8	0.4:1
55–59	73.8	28.4	96.2	0.4:1
60–64	79.3	26.9	97.8	0.4:1
65–69	81.3	26.4	98.3	0.4:1
70–74	83.6	25.9	99.3	0.3:1
75–79	90.7	23.9	99.4	0.3:1
80–84	93.6	23.3	99.9	0.3:1
85–89	94.7	23.0	99.9	0.3:1
90–94	97.8	22.3	100.0	0.3:1
95–100	100.0	21.8	100.0	0.3:1

$2.50/day 2005 PPP Poverty Line Tables

Figure 4 ($2.50/day 2005 PPP line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	83.9
5–9	85.6
10–14	88.3
15–19	82.7
20–24	80.0
25–29	63.4
30–34	77.2
35–39	72.1
40–44	61.9
45–49	67.7
50–54	57.7
55–59	56.4
60–64	55.3
65–69	48.8
70–74	34.5
75–79	34.6
80–84	17.6
85–89	42.4
90–94	18.3
95–100	11.4

Figure 7 ($2.50/day 2005 PPP line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	+0.3	2.2	2.6	3.4
5–9	–0.4	3.0	3.6	4.9
10–14	–2.0	1.5	1.6	1.8
15–19	+7.8	2.3	2.7	3.7
20–24	+7.9	2.8	3.5	4.7
25–29	–16.1	9.3	9.5	10.2
30–34	+12.0	4.7	5.7	7.0
35–39	–7.6	5.3	5.6	6.0
40–44	–21.2	11.8	12.0	12.6
45–49	+11.1	4.5	5.4	7.2
50–54	–4.0	4.1	4.7	6.2
55–59	+9.7	4.0	5.0	6.5
60–64	–7.5	5.3	5.6	6.2
65–69	+19.2	4.9	5.6	7.8
70–74	+2.4	4.8	5.5	7.5
75–79	+4.1	2.8	3.2	4.3
80–84	–4.7	4.1	4.4	5.2
85–89	+41.8	0.5	0.6	0.8
90–94	+0.2	2.9	3.4	4.5
95–100	+5.1	2.0	2.3	3.2

Figure 8 ($2.50/day 2005 PPP line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/− percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+0.0	66.9	74.7	85.3
4	+2.4	41.4	47.0	59.7
8	+1.6	29.4	34.7	44.2
16	+1.0	21.6	25.9	34.7
32	+0.8	15.2	17.7	23.0
64	+0.8	10.4	13.1	17.3
128	+0.8	7.4	8.9	11.7
256	+0.7	4.9	5.9	8.4
512	+0.7	3.7	4.5	6.0
1,024	+0.7	2.7	3.1	4.2
2,048	+0.7	2.0	2.4	3.0
4,096	+0.7	1.4	1.7	2.3
8,192	+0.7	1.0	1.2	1.6
16,384	+0.7	0.7	0.8	1.1

Figure 11 ($2.50/day 2005 PPP line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	5.7	59.7	1.1	33.6	39.3	–81.0
5–9	9.1	56.3	1.5	33.2	42.3	–69.9
10–14	24.4	40.9	3.5	31.1	55.5	–19.9
15–19	32.3	33.0	5.6	29.0	61.4	+7.6
20–24	38.1	27.3	7.6	27.1	65.2	+28.1
25–29	42.6	22.7	8.8	25.9	68.5	+43.9
30–34	45.3	20.0	9.8	24.9	70.2	+53.7
35–39	48.8	16.6	11.0	23.7	72.4	+66.0
40–44	51.5	13.9	12.1	22.6	74.0	+76.1
45–49	53.3	12.0	13.7	21.0	74.3	+79.1
50–54	55.4	10.0	15.1	19.5	74.9	+76.9
55–59	57.1	8.3	16.8	17.9	74.9	+74.3
60–64	60.2	5.2	19.2	15.5	75.6	+70.6
65–69	60.8	4.5	20.5	14.1	74.9	+68.6
70–74	61.6	3.7	22.0	12.6	74.2	+66.3
75–79	63.7	1.6	27.0	7.6	71.3	+58.6
80–84	64.5	0.9	29.1	5.5	70.0	+55.4
85–89	64.5	0.8	30.2	4.4	68.9	+53.8
90–94	65.2	0.2	32.7	2.0	67.2	+50.0
95–100	65.3	0.0	34.7	0.0	65.3	+46.9

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 ($2.50/day 2005 PPP line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	84.1	8.7	5.3:1
5–9	10.6	86.0	13.9	6.2:1
10–14	27.9	87.3	37.3	6.9:1
15–19	38.0	85.2	49.5	5.7:1
20–24	45.6	83.4	58.3	5.0:1
25–29	51.4	82.9	65.2	4.9:1
30–34	55.1	82.2	69.3	4.6:1
35–39	59.7	81.6	74.6	4.4:1
40–44	63.6	81.0	78.8	4.3:1
45–49	67.0	79.6	81.6	3.9:1
50–54	70.5	78.6	84.7	3.7:1
55–59	73.8	77.3	87.3	3.4:1
60–64	79.3	75.8	92.1	3.1:1
65–69	81.3	74.8	93.1	3.0:1
70–74	83.6	73.7	94.3	2.8:1
75–79	90.7	70.2	97.5	2.4:1
80–84	93.6	68.9	98.7	2.2:1
85–89	94.7	68.1	98.7	2.1:1
90–94	97.8	66.6	99.7	2.0:1
95–100	100.0	65.3	100.0	1.9:1

$3.75/day 2005 PPP Poverty Line Tables

Figure 4 ($3.75/day 2005 PPP line): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	97.8
5–9	95.4
10–14	96.6
15–19	93.5
20–24	91.7
25–29	82.5
30–34	97.2
35–39	89.2
40–44	88.1
45–49	91.7
50–54	82.0
55–59	88.5
60–64	80.8
65–69	78.5
70–74	72.3
75–79	70.4
80–84	68.0
85–89	63.8
90–94	35.9
95–100	40.1

Figure 7 ($3.75/day 2005 PPP line): Bootstrapped differences between estimated and true poverty likelihoods for households in a large sample (n = 16,384) with confidence intervals, scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (+/– percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	+3.7	1.4	1.8	2.3
5–9	–4.2	2.2	2.2	2.3
10–14	–0.4	0.6	0.8	1.0
15–19	–2.4	1.6	1.7	1.8
20–24	+5.8	2.2	2.7	3.8
25–29	–13.6	7.3	7.4	7.5
30–34	+4.3	2.0	2.4	3.0
35–39	–1.6	2.1	2.5	3.4
40–44	–6.2	3.8	3.9	4.2
45–49	+12.9	3.8	4.5	5.6
50–54	–2.5	2.9	3.5	4.6
55–59	+10.8	3.5	4.2	5.5
60–64	–1.9	2.4	2.8	3.8
65–69	+21.7	5.5	6.5	8.3
70–74	+27.0	5.0	6.0	7.9
75–79	+12.7	2.8	3.4	4.4
80–84	+23.9	4.3	5.1	6.3
85–89	+60.7	1.3	1.6	2.1
90–94	–22.0	12.9	13.2	14.0
95–100	+14.6	3.6	4.4	5.7

Figure 8 ($3.75/day 2005 PPP line): Differences and precision of differences for bootstrapped estimates of poverty rates for groups of households at a point in time, by sample size, scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (+/− percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+3.6	55.8	61.9	81.0
4	+3.9	35.1	44.9	57.3
8	+3.5	26.6	30.7	42.3
16	+3.2	18.3	21.9	27.7
32	+3.2	12.9	15.2	20.5
64	+3.0	9.3	10.7	13.9
128	+2.9	6.5	7.8	10.7
256	+2.9	4.6	5.2	7.1
512	+3.0	3.1	3.7	4.9
1,024	+2.9	2.1	2.5	3.5
2,048	+2.9	1.5	1.8	2.4
4,096	+2.9	1.1	1.3	1.6
8,192	+2.9	0.8	0.9	1.2
16,384	+2.9	0.6	0.7	0.9

Figure 11 ($3.75/day 2005 PPP line): Households by targeting classification and score, along with "Total Accuracy" and BPAC, scorecard applied to the validation sample

Score	Inclusion: < poverty line correctly targeted	Undercoverage: < poverty line mistakenly non-targeted	Leakage: => poverty line mistakenly targeted	Exclusion: => poverty line correctly non-targeted	Total Accuracy Inclusion + Exclusion	BPAC See text
0–4	6.4	76.9	0.3	16.3	22.7	–84.2
5–9	10.2	73.2	0.4	16.3	26.5	–75.1
10–14	27.0	56.3	1.0	15.7	42.7	–34.1
15–19	36.5	46.8	1.5	15.2	51.7	–10.7
20–24	43.4	39.9	2.2	14.5	57.9	+6.9
25–29	48.9	34.5	2.5	14.2	63.0	+20.3
30–34	52.3	31.1	2.8	13.9	66.1	+28.9
35–39	56.5	26.8	3.2	13.4	69.9	+39.5
40–44	59.9	23.4	3.7	13.0	72.9	+48.2
45–49	62.7	20.6	4.3	12.4	75.1	+55.7
50–54	65.6	17.7	4.9	11.8	77.4	+63.4
55–59	68.2	15.1	5.6	11.1	79.3	+70.5
60–64	72.5	10.8	6.8	9.9	82.4	+82.3
65–69	73.7	9.6	7.6	9.1	82.8	+86.1
70–74	75.0	8.3	8.6	8.1	83.1	+89.7
75–79	79.4	4.0	11.4	5.3	84.6	+86.3
80–84	80.8	2.6	12.9	3.8	84.6	+84.6
85–89	80.9	2.5	13.9	2.8	83.7	+83.4
90–94	82.7	0.6	15.1	1.6	84.3	+81.8
95–100	83.3	0.0	16.7	0.0	83.3	+80.0

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.

Figure 12 ($3.75/day 2005 PPP line): For a given score cut-off, the percentage of all households who are targeted (that is, have a score equal to or less than the cut-off), the percentage of targeted households who are poor (that is, below the poverty line), the percentage of poor households who are targeted, and the number of poor households who are successful targeted (coverage) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all households who are targeted	% targeted who are poor	% of poor who are targeted	Poor households targeted per non-poor household targeted
0–4	6.7	95.0	7.7	19.0:1
5–9	10.6	96.3	12.2	25.9:1
10–14	27.9	96.6	32.4	28.2:1
15–19	38.0	96.1	43.8	24.8:1
20–24	45.6	95.2	52.1	19.9:1
25–29	51.4	95.1	58.7	19.4:1
30–34	55.1	94.9	62.7	18.5:1
35–39	59.7	94.6	67.8	17.4:1
40–44	63.6	94.2	71.9	16.3:1
45–49	67.0	93.6	75.3	14.6:1
50–54	70.5	93.1	78.8	13.5:1
55–59	73.8	92.4	81.9	12.2:1
60–64	79.3	91.4	87.1	10.6:1
65–69	81.3	90.7	88.5	9.7:1
70–74	83.6	89.7	90.0	8.7:1
75–79	90.7	87.4	95.2	7.0:1
80–84	93.6	86.3	96.9	6.3:1
85–89	94.7	85.4	97.0	5.8:1
90–94	97.8	84.5	99.3	5.5:1
95–100	100.0	83.3	100.0	5.0:1