Simple Poverty Scorecard® Poverty-Assessment Tool Niger

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This document in English is at `SimplePovertyScorecard.com`.

Abstract

The Simple Poverty Scorecard-brand poverty-assesment tool uses 10 low-cost indicators from Niger's 2007/8 National Household Budget and Expenditure 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 Niger 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:	NER	Field agent:		
Scorecard:	001	Service point:		
Sampling wgt.:		Number of household members:		

Indicator	Response	Points	Score
1. How many members does the household have?	A. Nine or more	0	
	B. Eight	7	
	C. Seven	11	
	D. Six	15	
	E. Five	19	
	F. One to four	32	
2. Do all household members ages 7 to 12 currently go to school (government, community, or private)?	A. No	0	
	B. No one is 7- to 12-years-old	2	
	C. Yes, and all go to a govt. or community school	2	
	D. Yes, and at least one goes to a private school	5	
3. Can the male head/spouse read a short passage in some language?	A. No male head/spouse	0	
	B. No	0	
	C. Yes	5	
4. What is the highest grade that the (eldest) female head/spouse has completed?	A. None	0	
	B. No (eldest) female head/spouse	5	
	C. Pre-school to CM2	5	
	D. *Sixième* or higher	9	
5. What is the main material of the roof?	A. Straw, earth, or hide	0	
	B. Wood, corrugated metal sheets, tile, concrete/cement, or other	5	
6. What type of toilet arrangement does the household use?	A. None	0	
	B. Open hole, crude latrine, improved latrine, or flush toilet	2	
7. What is the main type of cooking fuel used by the household?	A. Collected firewood, biomass, or other	0	
	B. Purchased firewood, charcoal, coal, LPG, electricity, paraffin/kerosene/petroleum, or does not cook	6	
8. How many working chairs do household members have?	A. None, one, or two	0	
	B. Three or more	7	
9. Do any household members have a working television?	A. No	0	
	B. Yes	15	
10. Do any household members have cattle, donkey/mule/ass, horse, camel, or a working bicycle, motorcycle/scooter, or car?	A. No	0	
	B. Only cattle	5	
	C. Donkey/mule/ass, horse, camel, or bicycle (regardless of cattle, and without others)	7	
	D. Motorcycle/scooter, or car (regardless of others)	14	

Score:

Back-page Worksheet:
Household Members, Age, and School Attendance

Write down the name and identification number of the client and of yourself as the enumerator, as well as the service point that the client uses and the service point from which you work. Record the date of the interview and the date when the client first participated with the organization. Then read to the respondent: *Please tell me the first name and the age of each member of your household. The* household *is a group of people—regardless of blood or marital relationship—who have lived together in the same residence for at least six months (or who intend to do so for at least six months), who share meals from a common pot, who together manage all or part of their resources, and who recognize a single head. For each member, please tell me whether he/she currently attends school, and whether the school is government, community, or private.*

Write down the first name and the age of each household member. Then write the total number of members in the scorecard header next to "# Household members:" and circle the response to the first indicator. Then count the members ages 7 to 12 who do not attend school, count the members ages 7 to 12 who attend a private school, and circle the response to the second indicator ("A" if there is a "No" in the third column of the table below; "B" if no one is ages 7 to 12; "C" if someone is ages 7 to 12, and there is not a "No" in the third column, and there is not a "Yes" in the fourth column; and "D" otherwise).

Keep in mind the full definition of *household* and *school* in the "Guidelines for the Interpretation of Scorecard Indicators".

First name (or nickname)	Age	If <name> is 7- to 12-years-old, does he/she currently go to school ?			If Yes, is the school private?	
1.		Not 7 to 12	No	Yes	No	Yes
2.		Not 7 to 12	No	Yes	No	Yes
3.		Not 7 to 12	No	Yes	No	Yes
4.		Not 7 to 12	No	Yes	No	Yes
5.		Not 7 to 12	No	Yes	No	Yes
6.		Not 7 to 12	No	Yes	No	Yes
7.		Not 7 to 12	No	Yes	No	Yes
8.		Not 7 to 12	No	Yes	No	Yes
9.		Not 7 to 12	No	Yes	No	Yes
10.		Not 7 to 12	No	Yes	No	Yes
11.		Not 7 to 12	No	Yes	No	Yes
12.		Not 7 to 12	No	Yes	No	Yes
13.		Not 7 to 12	No	Yes	No	Yes
14.		Not 7 to 12	No	Yes	No	Yes
15.		Not 7 to 12	No	Yes	No	Yes
14.		Not 7 to 12	No	Yes	No	Yes
15.		Not 7 to 12	No	Yes	No	Yes
No. members:	—	Number "No":			Number "Yes":	

Look-up table to convert scores to poverty likelihoods

	Poverty likelihood (%)							
		National			USAID	Intl. 2005 PPP		
Score	Food	100%	150%	200%	'Extreme'	$1.25	$2.00	$2.50
0–4	40.2	90.4	99.1	100.0	72.2	92.0	100.0	100.0
5–9	36.0	89.7	98.6	99.6	54.1	90.9	99.4	99.8
10–14	25.1	78.7	96.6	99.1	41.7	85.6	98.4	99.2
15–19	20.1	76.0	96.6	99.1	35.6	83.8	98.4	99.2
20–24	15.0	67.9	96.6	99.1	33.2	74.6	98.4	99.2
25–29	10.7	53.9	84.3	97.5	19.4	63.4	95.4	98.0
30–34	4.9	40.0	73.0	92.6	12.5	50.2	88.2	94.4
35–39	3.5	32.3	64.6	84.3	10.1	38.8	74.2	89.5
40–44	2.9	32.3	60.7	79.8	10.1	36.4	70.6	83.0
45–49	1.9	25.3	59.9	75.0	6.3	30.0	70.3	77.8
50–54	0.6	11.4	54.4	73.4	1.4	16.8	67.4	76.9
55–59	0.2	5.3	24.2	44.4	0.3	9.0	36.3	51.2
60–64	0.0	1.7	17.2	39.6	0.2	5.4	33.1	47.5
65–69	0.0	1.7	9.9	32.3	0.0	2.9	21.6	37.2
70–74	0.0	0.0	5.7	14.0	0.0	0.7	7.8	19.7
75–79	0.0	0.0	4.4	11.0	0.0	0.7	6.7	18.1
80–84	0.0	0.0	4.4	11.0	0.0	0.7	6.7	16.6
85–89	0.0	0.0	4.4	11.0	0.0	0.0	6.7	15.7
90–94	0.0	0.0	0.0	3.5	0.0	0.0	0.0	8.4
95–100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Simple Poverty Scorecard® Poverty-Assessment Tool Niger

1. Introduction

Pro-poor programs in Niger 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 consumption surveys is difficult and costly. As a case in point, Niger's 2007/8 *Enquête Nationale sur le Budget et la Consommation des Ménages* (ENBCM, National Household Budget and Expenditure Survey) runs more than 100 pages. Enumerators completed interviews at a rate of about three households every 10 days, visiting each household nine times over the course of two weeks. In addition, respondents kept a diary of all their expenses for seven days, including the weight of all ingredients in their meals. Enumerators also asked about hundreds of non-consumption items.

In comparison, the indirect approach via the scorecard is simple, quick, and inexpensive. It uses ten verifiable indicators (such as "What is the main material of the roof?" and "Do any household members have a working television?") to get a score that is highly correlated with poverty status as measured by the exhaustive ENBCM survey.

The scorecard differs from "proxy means tests" (Coady, Grosh, and Hoddinott, 2004) in that it is transparent, it is freely available,[1] and 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 local organizations are typically blunt (such as rules based on land-ownership or housing quality) or subjective and relative (such as participatory wealth ranking facilitated by skilled field workers). Estimates from these approaches may be costly, their accuracy is unknown, and they are not comparable across places, organizations, nor time.

The scorecard can be used to measure the share of a program's participants who are below a given poverty line, for example, the Millennium Development Goals' $1.25/day line at 2005 purchase-power parity (PPP). USAID microenterprise partners in Niger can use scoring with the $1.25/day line to report how many of their participants are "very poor".[2] Scoring can also be used to measure net movement across a poverty line over time. In all these cases, the scorecard provides a consumption-based, objective tool with known accuracy. While consumption surveys are costly even for governments, some local pro-poor organizations may be able to implement an

[1] The Simple Poverty Scorecard tool for Niger is not, however, in the public domain. Copyright is held the sponsor and by Microfinance Risk Management, L.L.C.
[2] USAID defines a household as *very poor* if its daily per-capita consumption is less than the highest of the $1.25/day line (XOF456 in urban areas and XOF333 in rural areas, Figure 1) or the USAID "extreme" line that divides people in households below the national line into two equal-size groups (XOF296 urban and XOF204 rural).

inexpensive poverty-assessment tool to help with poverty monitoring and (if desired) 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, then 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 by local, pro-poor organizations. This is 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`" and with points with negative values and many decimal places). Thanks to the predictive-modeling phenomenon known as the "flat maximum", simple scoring approaches can be about as accurate as complex ones (Schreiner, 2012a; Caire and Schreiner, 2012).

Beyond its simplicity and transparency, the scorecard's technical approach is 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 the accuracy tests are simple and commonplace in statistical practice and in the for-profit field of credit-risk scoring, they have rarely been applied to poverty-assessment tools.

The scorecard is based on data from the 2007/8 ENBCM done by Niger's *Institut National de la Statistique* (INS). 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
- Applicable in all regions of Niger

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 about 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-capita consumption below a given poverty line.

Second, the scorecard can 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 estimate changes in the poverty rate for a group of households (or for two independent samples of households, both of which are representative of the same population) between two points in time. This estimate is the baseline/follow-up change in the average poverty likelihood of the group(s).

The scorecard can also be used to target services to different client segments. To help managers choose an appropriate targeting cut-off for their purposes, this paper reports several measures of targeting accuracy for a range of possible cut-offs.

The scorecard's indicators and points are derived from household consumption data and Niger's national poverty line. Scores from this one scorecard are calibrated to poverty likelihoods for eight poverty lines.

The scorecard is constructed and calibrated using half of the data from the 2007/8 ENBCM. The other half is used to validate the scorecard's accuracy for estimating households' poverty likelihoods, for estimating groups' poverty rates at a point in time, and for targeting.

All three scoring estimators are *unbiased*. That is, they match the true value on average in repeated samples when constructed from (and applied to) a single, unchanging population. Like all predictive models, the scorecard here is constructed from a single sample and so misses the mark to some unknown extent when applied to a different population or when applied after 2007/8.[3]

Thus, while the indirect scoring approach is less costly than the direct survey approach, it is also biased when applied in practice. (The survey approach is unbiased by definition.) There is bias because the scorecard necessarily assumes that the future relationships between indicators and poverty in all possible groups of households will be the same as in the construction data. Of course, this assumption—inevitable in predictive modeling—holds only partly.

[3] Important examples include nationally representative samples at a later point in time or sub-groups that are not nationally representative (Tarozzi and Deaton, 2009).

On average when applied to the validation sample with 1,000 bootstraps of $n =$ 16,384, the difference between scorecard estimates of groups' poverty rates and the true rates at a point in time for the national poverty line is +2.9 percentage points. The average absolute difference across all eight poverty lines is 2.2 percentage points, and the maximum absolute difference for any poverty line is 4.9 percentage points. These differences are due to sampling variation, not bias; the average difference would be zero if the whole 2007/8 ENBCM were to be repeatedly re-fielded and divided into sub-samples before repeating the entire process of constructing and validating scorecards.

The 90-percent confidence intervals for these estimates are ±0.8 percentage points or less. For $n =$ 1,024, the 90-percent intervals are ±2.9 percentage points or less.

Section 2 below documents data and poverty lines. Sections 3 and 4 describe scorecard construction and offer guidelines for use in practice. Sections 5 and 6 tell how to estimate households' poverty likelihoods and groups' poverty rates at a point in time. Section 7 discusses estimating changes in poverty rates over time, and Section 8 covers targeting. Section 9 places the scorecard here in the context of a related exercise for Niger. The last section is a summary.

2. Data and poverty lines

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

2.1 Data

The scorecard is based on data from the 4,000 households in the 2007/8 ENBCM. This is Niger's most recent national consumption survey.

For the purposes of the scorecard, the households in the 2007/8 ENBCM are randomly divided into two sub-samples:

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

2.2 Poverty rates

A *poverty rate* is the share of units in households in which total household consumption (divided by the number of household members) is below a given poverty line. The unit is either the household itself or a person in the household. Each household member is defined to have the same poverty status (or estimated poverty likelihood) as does the household as a whole.

Suppose a program serves two households. The first household is poor (its per-capita consumption is less than a given poverty line), and it has three members, one of

whom is a program participant. The second household is non-poor, and it has four members, two of whom are program participants.

Poverty rates are at the level of either households or people. If the program defines its *participants* as households, then the household level is relevant. The estimated household-level poverty rate is the equal-weighted average of poverty statuses (or estimated poverty likelihoods) across participants' households. In the example here, this is $\frac{1 \cdot 1 + 1 \cdot 0}{1 + 1} = \frac{1}{2} = 0.5 = 50$ percent. In the "$1 \cdot 1$" term in the numerator, the first "1" is the first household's weight, and the second "1" is the first household's poverty status (poor). In the "$1 \cdot 0$" term in the numerator, the "1" is the second household's weight, and the "0" is the second household's poverty status (non-poor). The "$1 + 1$" in the denominator is the sum of the weights of the two households. Each household has a weight of one (1) because the unit of analysis is the household.

Alternatively, a person-level rate is relevant if a program defines all people in households that benefit from its services as *participants*. In the example here, the person-level rate is the household-size-weighted average of poverty statuses for households with participants, or $\frac{3 \cdot 1 + 4 \cdot 0}{3 + 4} = \frac{3}{7} = 0.43 = 43$ percent. In the "$3 \cdot 1$" term in the numerator, the "3" is the first household's weight because it has three members, and the "1" is its poverty status (poor). In the "$4 \cdot 0$" term in the numerator, the "4" is the second household's weight because it has four members, and the zero is its poverty status (non-poor). The "$3 + 4$" in the denominator is the sum of the weights of the two

households. A household's weight is its number of members because the unit of analysis is the household member.

As a final example—one that pertains to what is likely the most common situation in practice—a program counts as *participants* only those household members with whom it deals with directly. For the example here, this means that some—but not all—household members are counted. The person-level rate is now the participant-weighted average of the poverty statuses of households with participants, or $\frac{1 \cdot 1 + 2 \cdot 0}{1 + 2} = \frac{1}{3} = 0.33 = 33$ percent. The first "1" in the "$1 \cdot 1$" in the numerator is the first household's weight because it has one participant, and the second "1" is its poverty status (poor). In the "$2 \cdot 0$" term in the numerator, the "2" is the second household's weight because it has two participants, and the zero is its poverty status (non-poor). The "$1 + 2$" in the denominator is the sum of the weights of the two households. Each household's weight is its number of participants because the unit of analysis is the participant.

To sum up, estimated poverty rates are weighted averages of households' poverty statuses (or estimated poverty likelihoods), where the weights are the number of relevant units in the household. When reporting, programs should explain who is counted as a *participant* and why.

Figure 1 reports poverty rates for eight poverty lines at the levels of households and people for Niger as a whole in 2007/8, for urban and rural areas, and for the construction and validation samples. Person-level poverty rates are included in Figure 1

because these are the rates reported by governments and used in most policy discussions. Household-level poverty rates are also reported because—as shown above—household-level poverty likelihoods can be straightforwardly converted into poverty rates for other units of analysis. This is also why the scorecard is constructed, calibrated, and validated with household weights.

2.3 Poverty lines

According to INS (2009), the derivation of Niger's national poverty line (sometimes called here "100% of the national line") follows the "cost-of-basic-needs" method of Ravaillon (1998). It begins with a food-poverty line defined as the cost of an 18-item food basket with 2,100 Calories, with distinct lines reflecting food prices in urban and rural areas. The food lines of XOF225 per person per day (urban) and XOF172 (rural) lead to person-level poverty rates of 8.8 percent (urban), 18.8 percent (rural), and 17.1 percent (all Niger, Figure 1).

The national poverty line is then derived as this food line, plus the average non-food consumption observed in the 2007/8 ENBCM for households (separately by urban and rural) whose food consumption is within ±10 percent of the food line.

For Niger overall, the resulting national (food-plus-non-food) poverty line (in urban prices as of April 2008) is XOF414 per person per day (urban) and XOF302 (rural, Figure 1). The corresponding person-level poverty rates are 36.7 percent (urban),

63.9 percent (rural), and 59.5 percent (all Niger, Figure 1). These person-level rates match those reported in INS (2009, p. 21).

The scorecard is constructed using the national poverty line. Because local, pro-poor programs in Niger may want to use different or various poverty lines, this paper calibrates scores from its single scorecard to poverty likelihoods for eight poverty lines:

- Food
- 100% of national
- 150% of national
- 200% of national
- USAID "extreme"
- $1.25/day 2005 PPP
- $2.00/day 2005 PPP
- $2.50/day 2005 PPP

The USAID "extreme" line is defined (for urban and rural separately) as the median per-capita consumption of people (not households) who are below 100% of the national line (United States Congress, 2004).

The $1.25/day 2005 PPP poverty line is derived from:

- 2005 PPP exchange rate of XOF267.331 per $1.00 (World Bank, 2008)
- Consumer Price Index for Niger:[4]
  - Average in 2005: 123.2958
  - Value in April 2008: 130.2
- Average all-Niger national line: XOF320.1637
- The relevant value of the national line in urban and rural areas (Figure 1)

[4] Monthly price indexes are from various issues of "Indice Harmonisé des Prix à la Consommation : Niamey".

Using the formula from Sillers (2006), the all-Niger $1.25/day 2005 PPP line is:

$$(\text{2005 PPP exchange rate}) \cdot \$1.25 \cdot \left(\frac{\text{CPI}_{\text{April 2008}}}{\text{CPI}_{2005}} \right) =$$

$$\left(\frac{\text{XAF267.331}}{\$1.00} \right) \cdot \$1.25 \cdot \left(\frac{130.2}{123.2958} \right) = \text{XOF352.88}.$$

This line applies to Niger on average. In an urban or rural area, the $1.25/day line is the all-Niger $1.25/day line, multiplied by value of the national line in that particular area, and then divided by Niger's average national line.

For example, the urban $1.25/day 2005 PPP line is the all-Niger line of XOF352.88, multiplied by the value of the urban national line XOF414 (Figure 1), and divided by the average all-Niger national line of XOF320.1637. This gives an urban $1.25/day line of XOF456 (Figure 1). The rural $1.25/day line is XOF333. The corresponding $1.25/day person-level poverty rates are 43.4 percent (urban), 69.8 percent (rural), and 65.6 percent (all-Niger, Figure 1).[5]

USAID microenterprise partners in Niger who use the scorecard to report poverty rates to USAID should use the $1.25/day 2005 PPP line. This is because USAID defines the "very poor" as those people in households whose per-capita consumption is below the highest of two lines:

- $1.25/day 2005 PPP (XOF456 urban, XOF333 rural, Figure 1)
- USAID "extreme" line (XOF296 urban, XOF204 rural).

[5] The person-level poverty rate reported by the World Bank's PovCalNet (`iresearch.worldbank.org/PovcalNet/index.htm`, retrieved 13 September 2013) for the 2007/8 ENBCM is 43.6 percent, which is far from the 65.6 percent in Figure 1. The reason for the discrepancy is not known.

3. Scorecard construction

For Niger, about 110 candidate indicators are initially prepared in the areas of:

- Household composition (such as number of members)
- Education (such as school attendance)
- Housing (such as the type of roof)
- Ownership of durable assets (such as chairs or televisions)
- Employment (such as the number of household members with salaried jobs)
- Agriculture (such as ownership of land or livestock)

Figure 2 lists the candidate indicators, ordered by the entropy-based "uncertainty coefficient" (Goodman and Kruskal, 1979) that measures how well a given indicator predicts poverty on its own.

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, the ownership of a chair or television is probably more likely to change in response to changes in poverty than is the age 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 power to rank households by poverty status is measured as "c" (SAS Institute Inc., 2004).

One of these one-indicator scorecards is then selected based on several factors (Schreiner *et al.*, 2004; Zeller, 2004). These include 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, variety among indicators, applicability across regions, relevance for distinguishing among households at the poorer end of the distribution of consumption, and verifiability.

A series of two-indicator scorecards are then built, each based on the one-indicator scorecard selected from the first round, with a second candidate indicator added. The best two-indicator scorecard is then selected, again using judgment to balance "c" with the non-statistical criteria. These steps are repeated until the scorecard has 10 indicators that work well together.

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 similar to the common R^2-based stepwise least-squares regression. It differs from naïve stepwise in that the selection of indicators considers both statistical[6] and non-statistical criteria. The non-statistical criteria can improve robustness through time and help ensure that indicators are simple, sensible, and acceptable to users.

[6] The statistical criterion for selecting an indicator is not the p value of its coefficient but rather its contribution to the ranking of households by poverty status.

The single scorecard here applies to all of Niger. Tests for Indonesia (World Bank, 2012), Bangladesh (Sharif, 2009), India and Mexico (Schreiner, 2006 and 2005a), Sri Lanka (Narayan and Yoshida, 2005), and Jamaica (Grosh and Baker, 1995) suggest that segmenting poverty-assessment tools by urban/rural does not improve targeting accuracy much. In general, segmentation may improve the bias and precision of estimates of poverty rates (Tarozzi and Deaton, 2009) at the risk of overfitting (Haslett, 2012).

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 the scorecard is actually used (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 train and convince its employees to use the scorecard properly (Schreiner, 2002). After all, most reasonable scorecards have similar targeting accuracy, thanks to the empirical phenomenon known as the "flat maximum" (Caire and Schreiner, 2012; 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 want to adopt it on their own and use it properly. Of course, accuracy matters, but it must be balanced with 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 imply a lot of additional work and if the whole process generally seems to make sense.

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

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

The scorecard (and its back-page worksheet) is ready to be photocopied. It can be used with a simple spreadsheet database (Microfinance Risk Management, L.L.C., 2013) that records identifying information, dates, and indicator values and then computes (and stores) scores and poverty likelihoods.

A field worker using Niger's paper scorecard would:

- Record the names and identifiers of the participant, of the field worker, and of the relevant organizational service point
- Record the date that the participant first participated with the organization
- Record the date of the scorecard interview
- Complete the back-page worksheet with each household member's name, age, and school attendance
- Record household size in the scorecard header, and record the responses to the scorecard's first and second indicators based on the back-page worksheet
- Read each of the remaining eight questions one-by-one from the scorecard, drawing a circle around the relevant responses and their points, and writing each point value in the far right-hand column
- Add up the points to get a total score
- Implement targeting policy (if any)
- Deliver the paper scorecard to a central office for data entry and filing

Of course, field workers must be trained. The quality of outputs depends on the quality of inputs. If organizations or field workers gather their own data and believe that they 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).[7] 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.

In particular, while collecting scorecard indicators is relatively easier than alternative ways of measuring poverty, it is still absolutely difficult. Training and explicit definitions of terms and concepts in the scorecard are essential, and field workers should scrupulously study and follow the "Guidelines for the Interpretation of Indicators" found at the end of this paper, as they are an integral part of the Simple Poverty Scorecard tool.[8]

For the example of Nigeria, one study (Onwujekwe, Hanson, and Fox-Rushby, 2006) found distressingly low inter-rater and test-retest correlations for indicators as seemingly simple as whether the household owns an automobile. At the same time, Grosh and Baker (1995) suggest that gross underreporting of assets does not affect

[7] If a program does not want field workers to know the points associated with responses, then it can use a version of the scorecard that does not display the points and then apply the points and compute scores later at a central office. Schreiner (2012b) argues that hiding points in Colombia (Camacho and Conover, 2011) did little to deter cheating and that, in any case, cheating by the user's central office was more damaging than cheating by field workers and respondents. Even if points are hidden, field workers and respondents can apply common sense to guess which response options are linked with greater poverty.

[8] The guidelines here are the only ones that organizations should give to field workers. All other issues of interpretation should be left to the judgment of field workers and respondents, as this seems to be what Niger's *Institut National de la Statistique* did when it fielded the 2007/8 ENBCM.

targeting. For the first stage of targeting in a conditional cash-transfer program in Mexico, Martinelli and Parker (2007, pp. 24–25) 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". Still, as is done in Mexico in the second stage of its targeting process, most false self-reports can be corrected (or avoided in the first place) by field workers who make a home visit. This is the recommended procedure for local, pro-poor organizations in Niger.

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 questions to be answered, and the budget. The main goal should be to make sure that the sample is representative of a well-defined population and that the scorecard will inform an issue that matters to the organization.

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

- Employees of the organization
- Third parties

Responses, scores, and poverty likelihoods can be recorded on:

- Paper in the field, and then filed at a central office
- Paper in the field, and then keyed into a database or spreadsheet at a central office
- Portable electronic devices in the field, and then uploaded to a database

Given a population of participants relevant for a particular business question, the participants to be scored can be:

- All relevant participants (a census)
- A representative sample of relevant participants
- All relevant participants in a representative sample of relevant field offices
- A representative sample of relevant participants in a representative sample of relevant field offices

If not determined by other factors, the number of participants to be scored can be derived from sample-size formulas (presented later) to achieve a desired confidence level and a desired confidence interval. To be clear, however, the focus should not be on having a sample size large enough to achieve some arbitrary level of statistical significance but rather to get a representative sample from a well-defined population so that the analysis of the results can meaningfully inform questions that matter to the organization.

Frequency of application can be:

- As a once-off project (precluding measuring change)
- Every two years (or at any other fixed or variable time interval, allowing measuring change)
- Each time a field worker visits a participant at home (allowing measuring change)

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

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

An example set of choices is illustrated by BRAC and ASA, two microfinance organizations in Bangladesh who each have about 7 million participants and who apply the Simple Poverty Scorecard tool for Bangladesh (Schreiner, 2013a) with a sample of about 25,000. Their design is that all loan officers in a random sample of branches score all participants each time they visit a homestead (about once a year) as part of their standard due diligence prior to loan disbursement. They record responses on paper in the field before sending the forms to a central office to be entered into a database and converted to poverty likelihoods.

5. Estimates of household poverty likelihoods

The sum of scorecard points for a household is called the *score*. For Niger, 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 decreases the likelihood of being below a given poverty line, but it does not cut it in half.

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 35–39 have a poverty likelihood of 32.3 percent, and scores of 30–34 have a poverty likelihood of 40.0 percent (Figure 3).

The poverty likelihood associated with a score varies by poverty line. For example, scores of 35–39 are associated with a poverty likelihood of 32.3 percent for the national line but of 38.8 percent for the $1.25/day 2005 PPP line.[9]

[9] Starting with Figure 3, many figures have eight versions, one for each of the eight poverty lines. To keep them straight, they are grouped by poverty line. Single tables pertaining to all eight lines are placed with the tables for 100% of the national line.

5.1 Calibrating scores with poverty likelihoods

A given score is 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 have per-capita consumption below a given poverty line.

For the example of the national line (Figure 4), there are 9,776 (normalized) households in the calibration sub-sample with a score of 35–39. Of these, 3,157 (normalized) are below the poverty line. The estimated poverty likelihood associated with a score of 35–39 is then 32.3 percent, because 3,157 ÷ 9,776 = 32.3 percent.

To illustrate with the national line and a score of 30–34, there are 14,763 (normalized) households in the calibration sample, of whom 5,904 (normalized) are below the line (Figure 4). The poverty likelihood for this score range is then 5,904 ÷ 14,763 = 40.0 percent.

The same method is used to calibrate scores with estimated poverty likelihoods for the other seven poverty lines.[10]

Figure 5 shows, for all scores, the likelihood that a given household's per-capita consumption falls in a range demarcated by two adjacent poverty lines.

[10] To ensure that poverty likelihoods never increase as scores increase, likelihoods across series of adjacent scores are sometimes iteratively averaged before grouping scores into ranges. This preserves unbiasedness, and it keeps users from balking when sampling variation in score ranges with few households would otherwise lead to higher scores being linked with higher poverty likelihoods. This is why, for the national line, both the ranges 35–39 and 40–44 are associated with the same poverty likelihood.

For example, the probability that a household with a score of 35–39 falls between two adjacent poverty lines is:

- 3.5 percent below the food line
- 6.5 percent between the food line and the USAID "extreme" line
- 22.2 percent between the USAID "extreme" line and 100% of the national line
- 6.5 percent between 100% of the national line and $1.25/day
- 25.8 percent between $1.25/day and 150% of the national line
- 9.6 percent between 150% of the national line and $2.00/day
- 10.1 percent between $2.00/day and 200% of the national line
- 5.2 percent between 200% of the national line and $2.50/day
- 10.5 percent above $2.50/day

Even though the scorecard is constructed partly based on judgment related to non-statistical criteria, the calibration process produces poverty likelihoods that are objective, that is, derived from quantitative poverty lines and from survey data on consumption. The calibrated poverty likelihoods would be objective even if the process of selecting indicators and points did not use any data at all. In fact, objective scorecards of proven accuracy are often constructed using only expert judgment to select indicators and points (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 Niger scorecard are transformed coefficients from a Logit regression, (untransformed) 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. Going from scores to poverty likelihoods in this way requires no arithmetic at all, just a look-up table. This approach to calibration can also improve accuracy, especially with large samples.

5.2 Accuracy of estimates of households' poverty likelihoods

As long as the relationships between indicators and poverty do not change over time, and as long as the scorecard is applied to households that are representative of the same population from which the scorecard was originally 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 value. The scorecard also produces unbiased estimates of poverty rates at a point in time and unbiased estimates of changes in poverty rates between two points in time.[11]

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

Of course, the relationships between indicators and poverty do change to some unknown extent over time and also across sub-groups in Niger's population. Thus, the scorecard will generally be biased when applied after April 2008 (the last month of fieldwork for the 2007/8 ENBCM) or when applied with sub-groups that are not nationally representative.

How accurate are estimates of households' poverty likelihoods, given the assumption of unchanging relationships between indicators and poverty over time and the assumption of a sample that is representative of Niger as a whole? To find out, the scorecard is applied to 1,000 bootstrap samples of size $n = 16{,}384$ from the validation sample. Bootstrapping means to:

- Score each household in the validation sample
- Draw a 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 with consumption below a poverty line
- For each score, record the difference between the estimated poverty likelihood (Figure 3) 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 intervals containing the central 900, 950, and 990 differences between estimated and true poverty likelihoods

For each score range and for $n = 16{,}384$, Figure 6 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 35–39 in the validation sample is too low by 10.2 percentage points. For scores of 40–44, the estimate is too high by 9.8 percentage points.[12]

The 90-percent confidence interval for the differences for scores of 35–39 is ±6.2 percentage points (national line, Figure 6). This means that in 900 of 1,000 bootstraps, the difference between the estimate and the true value is between –16.4 and –4.0 percentage points (because –10.2 – 6.2 = –16.4, and –10.2 + 6.2 = –4.0). In 950 of 1,000 bootstraps (95 percent), the difference is –10.2 ± 6.4 percentage points, and in 990 of 1,000 bootstraps (99 percent), the difference is –10.2 ± 6.8 percentage points.

The differences between estimated poverty likelihoods and true values in Figure 6 are often large. There are differences because the validation sample is a single sample that—thanks to sampling variation—differs in distribution from the construction/calibration sub-samples and from Niger'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.

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

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

Another possible source of differences between estimates and true values is overfitting. The scorecard here is unbiased, but it may still be *overfit* when applied after the end of the ENBCM fieldwork in April 2008. That is, it may fit the data from the 2007/8 ENBCM so closely that it captures not only some real patterns but also some random patterns that, due to sampling variation, show up only in the 2007/8 ENBCM but not in the overall population of Niger. Or the scorecard may be overfit in the sense that it is not robust when relationships between indicators and poverty change over time or when the scorecard 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 theory, experience, and judgment. Of course, the scorecard here does this. Combining scorecards can also reduce overfitting, at the cost of greater complexity.

Most errors in individual households' likelihoods do balance out in the estimates of groups' poverty rates (see the next section). Furthermore, at least some of the differences will come from non-scorecard sources such as changes in the relationships 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 across geographic regions. 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 an organization samples three households on 1 January 2013 and that they have scores of 20, 30, and 40, corresponding to poverty likelihoods of 67.9, 40.0, and 32.3 percent (national line, Figure 3). The group's estimated poverty rate is the households' average poverty likelihood of $(67.9 + 40.0 + 32.3) \div 3 = 46.7$ percent.

Be careful; the group's poverty rate is *not* the poverty likelihood associated with the average score. Here, the average score is 30, which corresponds to a poverty likelihood of 40.0 percent. This differs from the 46.7 percent found as the average of the three individual poverty likelihoods associated with each of the three scores. Unlike poverty likelihoods, scores are ordinal symbols, like letters in the alphabet or colors in the spectrum. Because scores are not cardinal numbers, they cannot be added up or averaged across households. Only three operations are valid for scores: conversion to poverty likelihoods, analysis of distributions (Schreiner, 2012a), or comparison—if desired—with a cut-off for targeting. The safest rule to follow is: Always use poverty likelihoods, never scores.

6.1 Accuracy of estimated poverty rates at a point in time

For the Niger scorecard applied to 1,000 bootstraps of $n = 16{,}384$ from the validation sample, the maximum absolute difference between the estimated poverty rate at a point in time and the true rate is 4.9 percentage points (Figure 8, summarizing Figure 7 across all eight poverty lines). The average absolute difference across poverty lines is 2.2 percentage points. At least part of these differences is due to sampling variation in the division of the 2007/8 ENBCM into two sub-samples.

When estimating poverty rates at a point in time, the bias reported in Figure 8 should be subtracted from the average poverty likelihood to make the estimate unbiased. For the Niger scorecard and the national line, bias is +2.9 percentage points, so the unbiased estimate in the three-household example above is 46.7 – (+2.9) = 43.8 percent.

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 ±0.8 percentage points or less (Figure 8). This means that in 900 of 1,000 bootstraps of this size, the estimate (after subtracting off bias) is within 0.8 percentage points of the true value.

For example, suppose that the average poverty likelihood in a sample of $n =$ 16,384 with the Niger scorecard and the national line is 46.7 percent. Then estimates in 90 percent of such samples would be expected to fall in the range of 46.7 – (+2.9) + 0.7 = 44.5 percent to 46.7 – (+2.9) – 0.7 = 43.1 percent, with the most likely true value being the unbiased estimate in the middle of this range (46.7 – (+2.9) = 43.8 percent). This is because the original (biased) estimate is 46.7 percent, bias is +2.9 percentage points, and the 90-percent confidence interval for the national line and this sample size is ±0.7 percentage points (Figure 8).

6.2 Formula for standard errors for estimates of poverty rates

How precise are the point-in-time estimates? Because these estimates are averages, they have (in "large" samples) 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, 2008), first note that the textbook formula (Cochran, 1977) that relates confidence intervals with standard errors in the case of direct measurement of ratios is $\pm c = \pm z \cdot \sigma$, where:

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

z is from the Normal distribution and is $\begin{cases} 1.04 \text{ for confidence levels of 70 percent} \\ 1.28 \text{ for confidence levels of 80 percent} \\ 1.64 \text{ for confidence levels of 90 percent} \end{cases}$,

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

$\hat{p}$ is the estimated proportion of households below the poverty line in the sample,

ϕ is the finite population correction factor $\sqrt{\frac{N - n}{N - 1}}$,

N is the population size, and

n is the sample size.

For example, Niger's 2007/8 ENBCM gives a direct-measurement estimate of the household-level poverty rate for the national line of $\hat{p} = 50.0$ percent (Figure 1). If this

estimate came from a sample of $n = 16{,}384$ households from a population N of 2,110,039 (the number of households in Niger in 2007/8), then the finite population correction ϕ is $\sqrt{\frac{2{,}110{,}039 - 16{,}384}{2{,}110{,}039 - 1}} = 0.9961$, which can be taken as $\phi = 1$. If the desired confidence level is 90-percent ($z = 1.64$), then the confidence interval $\pm c$ is

$$\pm z \cdot \sqrt{\frac{\hat{p} \cdot (1 - \hat{p})}{n}} \cdot \sqrt{\frac{N - n}{N - 1}} = \pm 1.64 \cdot \sqrt{\frac{0.500 \cdot (1 - 0.500)}{16{,}384}} \cdot 1 = \pm 0.641 \text{ percentage points.}$$

The scorecard, however, does not measure poverty directly, so this formula is not applicable. To derive a formula for the Niger scorecard, consider Figure 7, which reports empirical confidence intervals $\pm c$ for the differences for the scorecard applied to 1,000 bootstraps of various sizes from the validation sample. For example, with $n = 16{,}384$ and the national line, the 90-percent confidence interval is ± 0.703 percentage points.[13]

Thus, the 90-percent confidence interval with $n = 16{,}384$ is ± 0.703 percentage points for the Niger scorecard and ± 0.641 percentage points for direct measurement. The ratio of the two intervals is $0.703 \div 0.641 = 1.10$.

[13] Due to rounding, Figure 7 displays 0.7, not 0.703.

Now consider the same exercise, but with $n = 8{,}192$. The confidence interval under direct measurement and the national line is $\pm 1.64 \cdot \sqrt{\frac{0.500 \cdot (1 - 0.500)}{8{,}192}} \cdot 1 =$ ± 0.906 percentage points. The empirical confidence interval with the Niger scorecard (Figure 7) is ± 0.982 percentage points. Thus for $n = 8{,}192$, the ratio of the two intervals is $0.982 \div 0.906 = 1.08$.

This ratio of 1.08 for $n = 8{,}192$ is close to the ratio of 1.10 for $n = 16{,}384$. Across all sample sizes of 256 or more in Figure 7, the average ratio turns out to be 1.12, implying that confidence intervals for indirect estimates of poverty rates via the Niger scorecard and the national poverty line are—for a given sample size—about 12-percent wider than confidence intervals for direct estimates via the 2007/8 ENBCM. This 1.12 appears in Figure 8 as the "α factor" because if $\alpha = 1.12$, then the formula for confidence intervals c for the Niger scorecard is $\pm c = \pm z \cdot \alpha \cdot \sigma$. That is, the formula for the standard error σ for point-in-time estimates of poverty rates via scoring is

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

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 is the cases for all eight poverty lines in Figure 8.

The formula relating confidence intervals with standard errors for the scorecard can be rearranged to give a formula for determining sample size before measurement. If $\widetilde{p}$ is the expected poverty rate before measurement, then the formula for sample size n

from a population of size N that is based on the desired confidence level that corresponds to z and the desired confidence interval $\pm c$ is

$n = N \cdot \left(\frac{z^2 \cdot \alpha^2 \cdot \widetilde{p} \cdot (1 - \widetilde{p})}{z^2 \cdot \alpha^2 \cdot \widetilde{p} \cdot (1 - \widetilde{p}) + c^2 \cdot (N - 1)} \right)$. If the population N is "large" relative to the sample size n, then the finite population correction factor ϕ can be taken as one (1), and the formula becomes $n = \left(\frac{\alpha \cdot z}{c} \right)^2 \cdot \widetilde{p} \cdot (1 - \widetilde{p})$.

To illustrate how to use this, suppose the population N is 2,110,039 (the number of households in Niger in 2007/8), suppose $c = 0.05689$, $z = 1.64$ (90-percent confidence), and the relevant poverty line is the national line so that the most sensible expected poverty rate $\widetilde{p}$ is Niger's overall poverty rate for that line in 2007/8 (50.0 percent at the household level, Figure 1). The α factor is 1.12 (Figure 8). Then the sample-size formula gives

$n = 2{,}110{,}039 \cdot \left(\frac{1.64^2 \cdot 1.12^2 \cdot 0.500 \cdot (1 - 0.500)}{1.64^2 \cdot 1.12^2 \cdot 0.500 \cdot (1 - 0.500) + 0.05689^2 \cdot (2{,}110{,}039 - 1)} \right) = 261$, which is close to the sample size of 256 observed for these parameters in Figure 7 for the national line. Taking the finite population correction factor ϕ as one (1) gives the same answer, as $n = \left(\frac{1.12 \cdot 1.64}{0.05689} \right)^2 \cdot 0.500 \cdot (1 - 0.500) = 261$.[14]

[14] Although USAID has not specified confidence levels nor intervals, IRIS Center (2007a and 2007b) says that a sample size of $n = 300$ is sufficient for USAID reporting. USAID microenterprise partners in Niger should report using the \$1.25/day 2005 PPP line. Given the α factor of 1.14 for this line (Figure 8), an expected before-measurement household-level poverty rate of 56.1 percent (the all-Niger rate for 2007/8, Figure 1),

Of course, the α factors in Figure 8 are specific to Niger, its poverty lines, its poverty rates, and this scorecard. The derivation of the formulas for standard errors using the α factors, however, is valid for any poverty-assessment tool following the approach in this paper.

In practice after the end of fieldwork for the ENBCM in April 2008, a program would select a poverty line (say, the national line), note its participants' population size (for example, $N = 10{,}000$ participants), select a desired confidence level (say, 90 percent, or $z = 1.64$), select a desired confidence interval (say, ±2.0 percentage points, or $c = \pm 0.02$), make an assumption about $\widetilde{p}$ (perhaps based on a previous measurement such as the household-level poverty rate for the national line for Niger of 50.0 percent in the 2007/8 ENBCM in Figure 1), look up α (here, 1.12 in Figure 8), assume that the scorecard will still work in the future and for non-nationally representative sub-groups,[15] and then compute the required sample size. In this illustration, $n = 10{,}000 \cdot \left(\frac{1.64^2 \cdot 1.12^2 \cdot 0.500 \cdot (1 - 0.500)}{1.64^2 \cdot 1.12^2 \cdot 0.500 \cdot (1 - 0.500) + 0.02^2 \cdot (10{,}000 - 1)} \right) = 1{,}742.$

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and a confidence level of 90 percent, then $n = 300$ implies a confidence interval of $\pm 1.64 \cdot 1.14 \cdot \sqrt{\frac{0.561 \cdot (1 - 0.561)}{300}} = \pm 5.4$ percentage points.

[15] This paper reports accuracy for the scorecard applied to the validation sample, but it cannot test accuracy for later years or for sub-groups. Performance after April 2008 will resemble that in the 2007/8 ENBCM with deterioration over time to the extent that the relationships between indicators and poverty status change.

7. Estimates of changes in 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 2007/8 ENBCM, this paper cannot test estimates of change over time for Niger, and it can only suggest approximate formulas for standard errors. Nonetheless, the relevant concepts are presented here because, in practice, local 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 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 the impact of participation only if there is some way to know—or explicit assumptions about—what would have happened in the absence of participation. And that information must come from beyond the scorecard.

7.2 Estimating changes in poverty rates over time

Consider the illustration begun in the previous section. On 1 January 2013, an organization samples three households who score 20, 30, and 40 and so have poverty likelihoods of 67.9, 40.0, and 32.3 percent (national line, Figure 3). Adjusting for the known bias of +2.9 percentage points (Figure 8), the group's baseline estimated poverty rate is the households' average poverty likelihood of [(67.9 + 40.0 + 32.3) ÷ 3] – (+2.9) = 43.8 percent.

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

- Score a new, independent sample, measuring change across samples
- Score the same sample at both baseline and follow-up

By way of illustration, suppose that two years later on 1 January 2015, the organization samples three additional households who are in the same population as the three original households (or suppose that the same three original households are scored a second time) and finds that their scores are 25, 35, and 45 (poverty likelihoods of 53.9, 32.3, and 25.3 percent, national line, Figure 3). Adjusting for known bias, the average poverty likelihood at follow-up is [(53.9 + 32.3 + 25.3) ÷ 3] – (+2.9) = 34.3 percent, an improvement of 43.8 – 34.3 = 9.5 percentage points.[16]

[16] Of course, such a huge reduction in poverty in two years is highly unlikely, but this is just an example to show how the scorecard can be used to estimate change.

Thus, about one in 11 participants in this hypothetical example cross the poverty line in 2013/5.[17] Among those who start below the line, about one in five (9.5 ÷ 43.8 = 21.7 percent) on net end up above the line.[18]

7.3 Accuracy for estimated change in two independent samples

With only the 2007/8 ENBCM, 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 in Niger can still use the scorecard to estimate change. The rest of this section suggests approximate formulas for standard errors that may be used until there is additional data.

7.4 Precision for estimates of change in two samples

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

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

Here, z, c, $\hat{p}$ and N are defined as above, n is the sample size at both baseline and follow-up,[19] and α is the average (across a range of bootstrapped sample sizes) of

[17] This is a net figure; some start above the line and end below it, and vice versa.
[18] The scorecard does not reveal the reasons for this change.

the ratio of the observed confidence interval from a scorecard and the theoretical confidence interval under direct measurement.

As before, the formula for standard errors can be rearranged to give a formula for sample sizes before indirect measurement via a scorecard, where $\widetilde{p}$ is based on previous measurements and is assumed equal at both baseline and follow-up: $n = 2 \cdot N \cdot \left(\frac{z^2 \cdot \alpha^2 \cdot \widetilde{p} \cdot (1 - \widetilde{p})}{z^2 \cdot \alpha^2 \cdot \widetilde{p} \cdot (1 - \widetilde{p}) + c^2 \cdot (N - 1)} \right)$. If ϕ can be taken as one, then the formula becomes $n = 2 \cdot \left(\frac{\alpha \cdot z}{c} \right)^2 \cdot \widetilde{p} \cdot (1 - \widetilde{p})$.

This α has been measured for 11 countries (Schreiner, 2013a, 2013b, 2012c, 2010, 2009a, 2009b, 2009c, 2009d; Chen and Schreiner, 2009; and Schreiner and Woller, 2010a and 2010b). The simple average of α across countries—after averaging α across poverty lines and survey years within each country—is 1.15. This is as reasonable a figure as any to use for Niger.

To illustrate the use of this formula 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 ($\pm c = \pm 0.02$), the poverty line is the national line, $\alpha = 1.15$, $\hat{p} = 0.500$ (the household-level poverty rate in 2007/8 for the national line in Figure 1), and the population N is large enough relative to the expected sample size n that the finite

[19] This means that—given precision—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.

population correction ϕ can be taken as one. Then the baseline sample size is $n = 2 \cdot \left(\frac{1.15 \cdot 1.64}{0.02} \right)^2 \cdot 0.500 \cdot (1 - 0.500) \cdot 1 = 4{,}447$, and the follow-up sample size is also 4,447.

7.5 Precision for estimated change for one sample, scored twice

Analogous to previous derivations, the general formula relating the confidence interval $\pm c$ 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:[20]

$$\pm c = \pm z \cdot \sigma = \pm z \cdot \alpha \cdot \sqrt{\frac{\hat{p}_{12} \cdot (1 - \hat{p}_{12}) + \hat{p}_{21} \cdot (1 - \hat{p}_{21}) + 2 \cdot \hat{p}_{12} \cdot \hat{p}_{21}}{n}} \cdot \sqrt{\frac{N - n}{n - 1}},$$

where z, c, α, N, and n are defined as usual, $\hat{p}_{12}$ is the share of all sampled households that move from below the poverty line to above it, and $\hat{p}_{21}$ is the share of all sampled households that move from above the line to below it.

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

The formula for confidence intervals 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 $\widetilde{p}_{12}$ and $\widetilde{p}_{21}$. Before measurement, a conservative assumption is that the change in the poverty rate will be zero, which implies $\widetilde{p}_{12} = \widetilde{p}_{21} = \widetilde{p}_{*}$, giving:

$$n = 2 \cdot \left(\frac{\alpha \cdot z}{c} \right)^2 \cdot \widetilde{p}_{*} \cdot \sqrt{\frac{N - n}{n - 1}}.$$

Because $\widetilde{p}_{*}$ could be anything between 0 and 0.5, more information is needed to apply this formula. Suppose that the observed relationship between $\widetilde{p}_{*}$, the number of years y between baseline and follow-up, and $p_{\text{pre-baseline}} \cdot \left(1 - p_{\text{pre-baseline}}\right)$ is—as in Peru (Schreiner, 2009e)—close to:

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

Given this, a sample-size formula for a group of households to whom the Niger scorecard is applied twice (once after April 2008 and then again later) is

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

In Peru (the only source of a data-based estimate, Schreiner, 2009e), 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 ($\pm c = \pm 0.02$), the poverty line is the national line, the sample will first be scored in 2013 and then again in 2016 ($y = 3$), and the population N is so large relative to the expected

sample size n that the finite population correction ϕ can be taken as one. The pre-baseline poverty rate $p_{2007/8}$ is taken as 50.0 percent (Figure 1), and α is assumed to be 1.30. Then the baseline sample size is $n = 2 \cdot \left(\frac{1.30 \cdot 1.64}{0.02} \right)^2 \cdot \{-0.02 + 0.016 \cdot 3 + 0.47 \cdot [0.500 \cdot (1 - 0.500)]\} \cdot 1 = 3{,}307$. The same group of 3,307 households is scored at follow-up as well.

8. Targeting

When an organization 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* (having consumption below a poverty line). Poverty status is a fact that is defined by whether consumption is below a poverty line as directly measured by a survey. In contrast, targeting status is an organization'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 9 depicts these four possible targeting outcomes. Targeting accuracy varies by the cut-off score; a higher cut-off has better inclusion (but worse leakage), while a lower cut-off has better exclusion (but worse 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 10 shows the distribution of households by targeting outcome for Niger. For an example cut-off of 39 or less, outcomes for the national line in the validation sample are:

- Inclusion: 45.1 percent are below the line and correctly targeted
- Undercoverage: 4.9 percent are below the line and mistakenly not targeted
- Leakage: 28.6 percent are above the line and mistakenly targeted
- Exclusion: 21.5 percent are above the line and correctly not targeted

Increasing the cut-off to 44 or less improves inclusion and undercoverage but worsens leakage and exclusion:

- Inclusion: 48.0 percent are below the line and correctly targeted
- Undercoverage: 1.9 percent are below the line and mistakenly not targeted
- Leakage: 34.9 percent are above the line and mistakenly targeted
- Exclusion: 15.2 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 10 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 and 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 10 shows "Total Accuracy" for all cut-offs for the Niger scorecard. For the national line in the validation sample, total net benefit is greatest (71.1) for a cut-off of 29 or less, with about two in three households in Niger 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 values inclusion more (say, twice as much) than exclusion, it can reflect this by setting the benefit for inclusion to 2 and the benefit for exclusion to 1. Then the chosen cut-off will maximize (2 x Households correctly included) + (1 x Households correctly excluded).[21]

[21] Figure 10 also reports BPAC, the Balanced Poverty Accuracy Criteria adopted by USAID for certifying poverty-assessment tools. IRIS Center (2005) made BPAC to consider accuracy in terms of estimated poverty rates and in terms of targeting inclusion. BPAC = (Inclusion – |Undercoverage – Leakage|) x [100 ÷ (Inclusion + Undercoverage)].

As an alternative to assigning benefits and costs to targeting outcomes and then choosing a cut-off to maximize total net benefits, a program could set a cut-off to achieve a desired poverty rate among targeted households. The third column of Figure 11 ("% targeted HHs who are poor") shows, for the Niger 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 39 or less would target 73.6 percent of all households (second column) and produce a poverty rate among those targeted of 61.2 percent (third column).

Figure 11 also reports two other measures of targeting accuracy. The first is a version of coverage ("% poor HHs who are targeted"). For the example of the national line with the validation sample and a cut-off of 39 or less, 90.3 percent of all poor households are covered.

The final targeting measure in Figure 11 is the number of successfully targeted poor households for each non-poor household mistakenly targeted (right-most column). For the national line with the validation sample and a cut-off of 39 or less, covering 1.6 poor households means leaking to 1 non-poor household.

9. Context of poverty-assessment tools in Niger

This section discusses an existing poverty-assessment tool for Niger in terms of its goals, method, definition of *poverty*, data, indicators, cost, bias, and precision. In general, the advantages of the scorecard are its:

- Use of data from the latest nationally representative consumption survey
- Use of a definition of *poverty* that is simple to understand and used by government
- Reporting of bias and precision from out-of-sample tests, including formulas for standard errors
- Feasibility for local, pro-poor programs, due to its simplicity and transparency

9.1 Gwatkin *et al.*

Gwatkin *et al.* (2007) construct a poverty-assessment tool for Niger with an approach that they use in 56 countries with Demographic and Health Surveys (Rutstein and Johnson, 2004). They use Principal Components Analysis to make an asset index from simple, low-cost indicators available for the 5,928 households in Niger's 1998 DHS. The PCA index is like the scorecard here except that, because the DHS does not collect data on consumption, the index is based on a different conception of poverty, its accuracy vis-à-vis consumption-based poverty is unknown, and it can only be assumed to be a proxy for long-term wealth/economic status.[22] Well-known examples of the PCA

[22] Nevertheless, the indicators are similar and the "flat maximum" is important, so carefully built PCA indexes and consumption-based poverty-assessment tools may pick up the same underlying construct (perhaps "permanent income", see Bollen, Glanville, and Stecklov, 2007), and they may rank households much the same. Comparisons of rankings by PCA indexes and consumption-based poverty-assessment tools include

asset-index approach include Stifel and Christiaensen (2007), Zeller *et al.* (2006), Filmer and Pritchett (2001), and Sahn and Stifel (2000 and 2003).

The 14 indicators in Gwatkin *et al.* are similar to those in the scorecard here in terms of their simplicity, low cost, and verifiability:

- Characteristics of the residence:
  - Type of floor
  - Presence of electricity
  - Source of drinking water
  - Type of toilet arrangement
- Whether the household has a domestic worker not related to the head
- Ownership of consumer durables:
  - Radios
  - Televisions
  - Telephones
  - Refrigerators
  - Bicycles
  - Motorcycles
  - Cars
- Whether members of the household work their own or family's agricultural land
- Number of people per sleeping room

Gwatkin *et al.* suggest three possible uses for their index:

- Segmenting households by the quintile of their index to see how health, population, and nutrition vary with socio-economic status
- Monitoring (via exit surveys) how well local health-service posts reach the poor
- Measuring local coverage of health services via small-scale surveys

The first goal is akin to targeting, and the last two goals deal with performance monitoring, so the asset index would be used much like the scorecard here.

Filmer and Scott (2012), Lindelow (2006), Sahn and Stifel (2003), Wagstaff and Watanabe (2003), and Montgomery *et al.* (2000).

Still, the Gwatkin *et al.* index is more difficult and costly than the scorecard. While the scorecard requires adding up 10 integers, some of which are usually zero, Gwatkin *et al.*'s asset index requires adding up 65 numbers, each with five decimal places and half with negative signs.

Unlike the asset index, the scorecard here is linked directly to a consumption-based poverty line. Thus, while both approaches can rank households, only the scorecard estimates consumption-based poverty status.

In essence, Gwatkin *et al.*—like all asset indexes—define *poverty* in terms of the indicators and the points in the index itself. Thus, the index is not a proxy standing in for something else (such as consumption) but rather a direct measure of a non-consumption-based definition of *poverty*. There is nothing wrong—and a lot right—about defining *poverty* in this way, but it is not as common as a consumption-based definition.

The asset-index approach defines people as *poor* if their assets (physical, human, financial, and social) fall below a threshold. Arguments for an asset-based view of development include Carter and Barrett (2006), Schreiner and Sherraden (2006), Sahn and Stifel (2003), and Sherraden (1991). The main advantages of the asset-based view are that:

- Asset ownership is easier to measure accurately than consumption
- Access to resources in the long term—and thus capacity to produce income and to consume—depends on the control of assets
- Assets get at capability more directly, the difference between, say, "Does income permit adequate sanitation?" versus "Does the toilet drain to a septic tank?"

While the asset view and the income/consumption view are distinct, they are also tightly linked. After all, income and consumption are flows of resources received/consumed from the use of stocks of assets. Both views are low-dimensional simplifications—due to practical limits on definitions and measurement—of a higher-dimensional and more complete conception of the production of human well-being.

10. Conclusion

Pro-poor programs in Niger 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 Niger that want to improve how they monitor and manage their social performance.

The scorecard is constructed with half of the data from Niger's 2007/8 ENBCM, calibrated to eight poverty lines, and tested on data from the other half of the 2007/8 ENCBM. Bias 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 change are not the same as estimates of program impact. Targeting accuracy is also reported.

When the scorecard is applied to the validation sample, the maximum absolute difference between estimates versus true poverty rates for groups of households at a point in time is 4.9 percentage points. The average absolute bias across the eight poverty lines is about 2.2 percentage points. Unbiased estimates may be had by subtracting the known bias for a given poverty line from the original estimates. For $n =$ 16,384 and 90-percent confidence, the precision of these differences is ± 0.8 percentage points or better.

If an organization wants to use the scorecard for targeting, then the results here provide useful information for selecting 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 focuses on transparency and ease-of-use. After all, accuracy is irrelevant if an organization feels so daunted by a scorecard's complexity or its cost that it does not even try to use it.

For this reason, the scorecard is kept simple, using ten indicators that are straightforward, low-cost, and verifiable. 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 converted to poverty likelihoods via simple look-up tables, and targeting cut-offs are likewise straightforward to apply. The design attempts to facilitate voluntary adoption by helping managers to understand and trust scoring and by allowing non-specialists to add up scores quickly in the field.

In summary, the scorecard is a practical, objective way for pro-poor programs in Niger to estimate consumption-based 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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Guidelines for the Interpretation of Scorecard Indicators

The following comes from :

Institut National de la Statistique. (2007) « Manuel de l'Enquêteur : Troisième Enquête Nationale sur le Budget et la Consommation des Ménages au Niger ENBC-2007 », `www.stat-niger.org/Donnees/enquetes/ENBC/ENBC-manuel%20enqueteur.pdf`, retrieved 12 September 2013. [the *Manual*]

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Institut National de la Statistique. (2007) « Questionnaire Ménage : Enquête Nationale sur le Budget et la Consommation des Ménages 2007/8 », Niamey : Ministère de l'Economie et des Finances, `www.stat-niger.org/Donnees/enquetes/ENBC/ENBC-Q_MENAGE.pdf`, retrieved 12 September 2013. [the *Questionnaire*]

General advice for conducting the interview

According to p. 10 of the *Manual*, "As an enumerator, you should:

- Follow the guidelines provided in your training
- Master the rules in this *Guide* [including this one] and follow them
- Approach people in good faith and with tact so as to earn their trust
- Assure respondents that all data will be kept strictly confidential and will not be used for tax purposes
- Keep all data strictly confidential
- Do your best to promote peace, harmony, tranquility, and a positive attitude among your teammates, maintaining a high level of motivation
- Collect high-quality data, and correct the completed form as necessary
- Cooperate with your team, being friendly, polite, tolerant, dedicated, and respectful.
- Do not assume that you know how the respondent will answer
- Work around respondents' schedules, even if it means working early or late"

How to establish a good rapport with the respondent

According to pp. 13–17 of the *Manual*, « Interviewing is an art, not a mechanical process. Each interview is unique. Do your best to make the interview interesting and pleasant for the respondent. Developing the art of interviewing takes practice, and all good enumerators tend to follow a common set of broad principles.

"Your first contact with a sampled household will be when you fill out [the scorecard]. The respondent can be any adult member of the household. Make a list of all the members of the household.

"When you first meet the respondent, you will not know each other, so try to make a good first impression. This will affect the respondent's willingness to cooperate. Strike a proper tone and be friendly when you introduce yourself. . . . Carry a *Letter of Introduction* that attests that you work for [your organization].

Make a good first impression

"When you first meet the respondent, do your best to put him/her at ease. A few well-chosen words will encourage the respondent to take a positive view of the interview. Smile, say 'Good morning', and introduce yourself.

Always be positive

"Be polite but assertive, without making excuses. Avoid expressions such as 'Are you very busy?' This type of question risks encouraging refusal before the interview even starts. Instead, tell the respondent (for example), 'I would like to ask you some questions', or 'I would like to speak with you for a moment'.

If necessary, emphasize that all responses will be maintained strictly confidential

"If the respondent is reluctant to be interviewed, or if he/she wants to know what the data will be used for, then explain that all data will be kept strictly confidential, that no names of any individuals will be linked with any of their responses, and that only aggregated results will be reported. In the same vein, do not talk to anyone about interviews that you have completed, nor should you show completed questionnaires to other members of your team in front of a respondent or any other person.

Answer the respondent's questions frankly

"Before agreeing to start the interview, the respondent may ask why you are doing the survey, or why his/her household was selected. Respond politely and clearly.

"The respondent may also be worried about the length of the interview. If so, tell him/her that you would be happy to arrange to come back at another time, if the respondent is not available to answer questions now.

Avoid third parties' listening in during the interview

The presence of non-household member may make it difficult for the respondent to answer openly and frankly. Thus, do the interview in private, and make sure that all questions are answered by the respondent him/herself.

Additional general guidelines for interviewing

"Most people are polite, and they tend to try to give the answer that they think that you want to hear. Therefore, ask the questions in a completely neutral way. Do not give the impression that the respondent has given a 'correct' or 'incorrect' answer, whether by your tone of voice or by your facial expression. Do not seem to approve nor disapprove of a response.

"The questions are carefully worded to be neutral. If you change the question or do not read all of it, then it may no longer be neutral. If the response is ambiguous, try to probe in a neutral way, saying, for example, 'Would you mind explaining to me a little more?' or 'I beg your pardon, but I do not understand; would you mind repeating?' or 'There is no hurry. Please take all the time you need to think about it.'

Never suggest answers to the respondent

"If the respondent's answer does not address the question, do not try to prompt him/her by saying something like 'I suppose that what you mean to say is that . . . , is that right?' The respondent will often agree with your suggestion, even if it is not at all what he/she meant in the first place. Instead, probe in a way that leads the respondent to find the appropriate answer on his/her own. Do not read the list of pre-coded responses aloud, even if the respondent struggles to answer.

Do not change the order nor the wording of the questions

"Read the questions word-for-word as they appear in the questionnaire in the order that they appear. If the respondent does not understand a question, simply repeat it slowly and clearly. If he/she still does not understand, then reword the question, being careful to keep its original meaning. Make the smallest accomodations needed to get an appropriate response.

Treat reluctant respondents with tact

"Sometimes, the respondent will simply say, 'I don't know', give an irrelevant answer, act bored or uninterested, just chuckle a little bit without actually saying anything, contradict something that was said earlier, or go so far as to refuse to answer. When this happens, do what you can to revive the respondent's interest in the conversation. For example, if you suspect that the respondent is intimidated or scared, attempt to put him/her at ease before going on to the next question. Take a few moments to chat about things unrelated to the survey (for example, the place where the respondent lives or his/her daily chores).

"If the respondent gives irrelevant or long-winded answers, do not try to put a stop to it brusquely or impolitely; rather, listen to what he/she has to say. Then gently guide the conversation back to the survey question. Always be cordial. An interview's atmosphere is healthier when the respondent feels that the enumerator is receptive, empathic, and non-intimidating, a nice person to whom the respondent can talk without feeling shy or embarrassed.

"If the respondent balks at answering—or outright refuses—try to overcome this, explaining that these same questions are being asked of everyone in the survey sample and that reporting will involve only aggregated measures for the entire sample. If the respondent still refuses, write "REFUSED" next to the question and continue with the next question as if nothing unusual has happened. When you reach the end of the interview, try to go back to fill in the blanks, but do not insist too much. Remember, you cannot force the respondent to answer.

Do not have preconceived ideas

"Do not make assumptions about a respondent's abilities and knowledge. Remember that differences between the two of you can affect data quality. If the respondent feels that you disagree with him/her, he/she may become afraid or even defiant. Always act and speak in a way that encourages him/her to feel at ease talking with you.

Do not rush the interview

"Ask questions slowly, so that the respondent understands. After asking a question, wait: give the respondent time to think. If the respondent feels rushed, or that his/her opinion is not accepted and respected, then he/she may give a careless answer or just say, 'I don't know'. If you suspect that the respondent is answering without thinking just to get the interview over with, say, 'There is no rush. Your opinion is very important, so please think about your answers carefully'.

Review your work before leaving

"Once the interview is over—but before you take your leave from the respondent—review your work. Check that each question has a clearly marked answer."

Who should the respondent be?

According to p. 28 of the *Manual*, "If the head of the household or his/her spouse is absent, do not interview anyone except adult members of the household who are capable of responding because they truly know the household's living situation."

Guidelines relating to specific indicators in the scorecard

1. How many members does the household have?
    A. Nine or more
    B. Eight
    C. Seven
    D. Six
    E. Five
    F. One to four

According to pp. 20–21 of the *Manual*, a *household* "is a group people—regardless of blood or marital relationship—who normally live together in the same residence, who share meals from a common pot, who together manage all or part of their resources, and who recognize the authority of one person called the *head of the household*.

"A *household* may consist of a single person living alone or of more than one person. In multi-person households, the most common arrangement is a husband, his spouse(s) and their children, and perhaps others who recognize the same head (relatives, friends, domestic servants, visitors, etc.). A *household* may also consist entirely of people who live together but who do not have any blood or marital relationship.

"Be careful; do not confuse the *household* with the *family*. . . . All members of *families* have blood or marital relationships with each other. [In contrast, members of *households* may not have blood or marital relationships, even though they have an economic relationship based not on payment but on sharing.] For example :

- "An adult child (with or without a spouse or children) who lives in the same compound as his/her parents is a distinct household as long as he/she/they normally eat meals prepared in their own pot, even if the adult child's household and the parents' household sometimes eat meals together. If, however, the two groups normally eat their meals from the same pot, then they are a single household
- "If an adult child and his/her parents live in the same compound, and if the parents are fed by the adult child, then the parents are part of the adult child's household. If, however, several adult children (each with their own household) live in the same compound with their parents, and if the parents eat with more than one of their childrens' households, then the parents are counted as members of the household of the eldest adult child

- "If two or more siblings—each with his/her own spouse and children—live in the same compound, and if they do not pool resources when preparing meals but rather take turns preparing meals from their own resources that are then shared among all the people in the compound, then—even though they eat meals together—each group is a distinct household
- "Single people (except for soliders in barracks or students in dorms) who live together in the same residence and who eat food from the same pot are counted as a single household.
- "If students live with a teacher in the same residence, then they are all counted as members of a single household
- "A man who has more than one wife, some of whom do not live in the same compound where the interview is taking place, is counted only once, as the head of the household [in which he is living on the day of the interview]. The other spouses who live in other compounds are counted as the heads of distinct households"

According to p. 44 of the *Manual*, a person who fulfills all the requirements « counts as a *member of the household*—regardless of whether he/she is physically present in the residence at the moment of the interview—if he/she has usually lived with the household for the past six months, or if he/she has usually lived with the household for less than six months but intends to continue living with the household at least until six months have passed since his/her arrival. » Common examples include newborns and newly married people.

According to p. 47 of the *Manual*, « If a male member of the household has more than one wife, at least one of whom lives in a different compound, then be aware that he may mistakenly try to include this/these wife/wives and their children as members of his household. But they should not be counted as part of his household."

According to the INS, a domestic servant or a hired agricultural laborer (for example) who has lived with the employer's household in its compound for at least six months (or who intends to live there for at least six months) and who has eaten from the same pot as the employer's household should be counted as a member of the employer's household, even though he/she does not fulfill the criterion of sharing resources with the household. Such a domestic servant or agricultural laborer may, from time to time, leave the employer's household to visit his/her family in another household, but he/she is still a member of the employer's household as longs as he/she usually sleeps and eats with them. A domestic servant or a hired agricultural worker is not counted as a household member if he/she goes to a different residence to sleep at night or if he/she does not usually eat with the employer's household.

By definition, any given person must be a member of a household but cannot be a member of more than one household. That is, everyone is a member of one—and only one—household. This general concept is particularly helpful in the case of polygamous marriages in which one or more wives—applying the definition of *household* here—belong to households that are not the household in which their husband is a member. In this case, the polygamous husband is a member of only one of the households in which his wives are members. Wives who are members of households in which the husband is not also a member are considered to be the heads of their households.

According to p. 19 of the *Manual*, a *residence* « is a group of buildings (permanent houses, mud huts, shacks, tents, etc.) constructed by people as shelter for themselves and their belongings.

"A *compound* is a space (whether enclosed or not) inside of which are one or more habitable buildings (multi-residence buildings, connected residences around a common courtyard, modern villas, permanent houses, traditional huts, etc.). One or more households may live in a given compound."

2. Do all household members ages 7 to 12 currently go to school (government, community, or private)?
    A. No
    B. No one is 7- to 12-years-old
    C. Yes, and all go to a government or community school
    D. Yes, and at least one goes to a private school

See the guidelines for the first indicator for the definition of *household member*; those guideline apply to this indicator as well.

According to p. 52 of the *Manual*, "if the interview takes place during vacation, then ask whether the child attended school before vacation started."

According to p. 52 of the *Manual*, "*attendance* refers to French schools or Franco-Arab schools and *madrasas*. Other types of schools do not count."

A Koranic school may be classified as a public school, a community school, or as a private school, depending on the nature of its organization.

A private school may have a private owner or be run by a religious group.

According to p. 21 of the *Manual*, "*Age* is the number of years lived by the person since birth. . . . It may be determined by :

- Asking for the exact date of birth (day, month, and year)
- Checking with the birth certificate or birth card
- Asking how many years old the person was on his/her last birthday"

3. Can the male head/spouse read a short passage in some language?
    A. No male head/spouse
    B. No
    C. Yes

According to p. 21 of the *Manual*, to *read a short passage in some language* means "able to read a simple passage (in French, Arabic, or any other language) about topics related to daily life."

According to p. 35 of the *Manual*, "The *head of the household* is the person recognized as such. He/she generally makes decisions and is the main breadwinner."

For the purposes of the scorecard, the *male head/spouse* is defined as:

- The household head, if the head is male
- The spouse/partner/companion of the household head, if the head is female
- Non existent, if the head is female and if she does not have a spouse/partner/companion who is also a member of her household

4. What is the highest grade that the (eldest) female head/spouse has completed?
    A. None
    B. No (eldest) female head/spouse
    C. Pre-school to CM2
    D. *Sixième* or higher

"Pre-school to CM2" includes pre-school, koranic school, literacy classes, CI, CP, CE1, CE2, CM1, and CM2. "*Sixième* or higher" includes *sixième*, *cinqième*, *quatrième*, *troisième*, *seconde*, *primière*, *terminale*, *enseignement professionnel*, *enseignement technique*, et *enseignement supérieur*.

According to p. 53 of the *Manual*, "to *complete a class* means to qualify to advance to the next-highest grade or to receive the relevant diploma. For example, to complete CM2 means to be awarded the CFEPD diploma."

According to p. 35 of the *Manual*, "The *head of the household* is the person recognized as such. He/she generally makes decisions and is the main breadwinner."

For the purposes of the scorecard, the *(eldest) female head/spouse* is defined as:

- The household head, if the head is female
- The eldest spouse/partner/companion of the household head, if the head is male
- Non existent, if the head is male and if he does not have a spouse/partner/companion who is also a member of his household

5. What is the main material of the roof?
    A. Straw, earth, or hide
    B. Wood, corrugated metal sheets, tile, concrete/cement, or other

According to p. 98 of the *Manual*, ask the respondent to say what is the main material; do not mark a response based on what you observe without having asked.

6. What type of toilet arrangement does the household use?
    A. None
    B. Open hole, crude pit latrine, improved latrine, or flush toilet

According to p. 98 of the *Manual*, "Ask for the type of toilet arrangement most often used by the household."

According to the INS, an *improved latrine* is defined by its having a solid floor of cement or concrete. A *crude pit latrine* is then complementarily defined as a latrine with a non-solid floor made of something other than cement or concrete, such as wood or earth.

7. What is the main type of cooking fuel used by the household?
    A. Collected firewood, biomass, or other
    B. Purchased firewood, charcoal, coal, LPG, electricity, paraffin/kerosene/petroleum, or does not cook

According to p. 98 of the *Manual*, "For the purposes of [the scorecard], *biomass* means organic products of plants and animals used as fuels, for example, millet stalks, dry leaves, cow manure, etc."

8. How many working chairs do household members have?
    A. None, one, or two
    B. Three or more

According to the INS, *to have* an asset is the same as *to own* it. Thus, this question could be worded as "How many working chairs do household members own?" For example, a household that owns a chair is considered to have it, even if neighbors have borrowed it, and the neighbors are not considered to have the borrowed chair.

A household is considered to own a chair—that is, to have it—even if it was purchased with a loan that has yet to be paid-off.

Do not count chairs that are mainly used in a household business. Likewise, do not count chairs loaned to household members by employers for on-the-job use.

If a chair is broken but can still be repaired, then it should be counted as long as it has not been broken for too long and as long as it will be repaired soon enough. The enumerator is the judge of what is "too long" and "soon enough". If the enumerator thinks that the chair has been broken for too long or will not be repaired soon enough, then he/she should not count it.

9. Do any household members have a working television?
    A. No
    B. Yes

According to the INS, *to have* an asset is the same as *to own* it. Thus, this question could be worded as "Do any household members own a working television?" For example, a household that owns a television is considered to have it, even if neighbors have borrowed it, and the neighbors are not considered to have the borrowed television.

A household is considered to own a television—that is, to have it—even if it was purchased with a loan that has yet to be paid-off.

Do not count televisions that are mainly used in a household business. Likewise, do not count televisions loaned to household members by employers for on-the-job use.

If a television is broken but can still be repaired, then it should be counted as long as it has not been broken for too long and as long as it will be repaired soon enough. The enumerator is the judge of what is "too long" and "soon enough". If the enumerator thinks that the television has been broken for too long or will not be repaired soon enough, then he/she should not count it.

10. Do any household members have cattle, donkey/mule/ass, horse, camel, or a working bicycle, motorcycle/scooter, or car?
    A. No
    B. Only cattle
    C. Donkey/mule/ass, horse, camel, or bicycle (regardless of cattle, and without others)
    D. Motorcycle/scooter, or car (regardless of others)

Cattle, donkeys/mules/asses, horses, or camels are considering to be "working" as long as they are alive. Living cattle, donkeys/mules/asses, horses, or camels should be counted even if they are used in a business run by the household.

According to the INS, *to have* an asset is the same as *to own* it. Thus, this question could be worded as "Do any household members own cattle, donkey/mule/ass, horse, camel, or working bicycle, motorcycle/scooter, or car?" For example, a household that owns a bicycle is considered to have it, even if neighbors have borrowed it, and the neighbors are not considered to have the borrowed bicycle.

A household is considered to own cattle, donkey/mule/ass, horse, camel, or working bicycle, motorcycle/scooter, or car—that is, to have it—even if it was purchased with a loan that has yet to be paid-off.

Do not count bicycles, motorcycles/scooters, or cars that are mainly used in a household business. Likewise, do not count bicycles, motorcycles/scooters, or cars loaned to household members by employers for on-the-job use.

If a bicycle, motorcycle/scooter, or car is broken but can still be repaired, then it should be counted as long as it has not been broken for too long and as long as it will be repaired soon enough. The enumerator is the judge of what is "too long" and "soon enough". If the enumerator thinks that a bicycle, motorcycle/scooter, or car has been broken for too long or will not be repaired soon enough, then he/she should not count it.

Figure 1: Poverty lines and poverty rates for Niger by urban/rural/all, by construction/validation samples, by poverty line, and by households and people

				Poverty rates (% with expenditure less than a poverty line) and poverty lines (XOF per day per person)							
					National			USAID	Intl. 2005 PPP		
Sample	**Line or rate**	**Level**	***n***	**Food**	**100%**	**150%**	**200%**	**'Extreme'**	**$1.25**	**$2.00**	**$2.50**
Urban Niger	Line	People	1,916	225	414	620	827	296	456	729	912
	Rate	Households		7.0	31.1	54.4	67.0	14.6	37.2	61.3	70.5
		People		8.8	36.7	61.1	73.7	18.3	43.4	68.4	77.0
Rural Niger	Line	People	2,084	172	302	453	605	204	333	533	666
	Rate	Households		13.6	53.9	79.3	90.6	24.8	60.0	86.4	92.3
		People		18.8	63.9	86.5	94.7	32.0	69.8	91.8	95.9
All Niger	Rate	Households	4,000	12.5	50.0	75.0	86.6	23.0	56.1	82.1	88.5
		People		17.1	59.5	82.4	91.4	29.8	65.6	88.1	92.8
Construction and calibration											
Selecting indicators and points, and associating scores with likelihoods	Rate	Households	1,997	12.3	50.0	75.2	86.4	22.8	56.0	82.4	88.4
	Rate	People		17.4	59.8	82.3	91.2	30.1	65.7	88.2	92.7
Validation											
Measuring accuracy	Rate	Households	2,003	12.6	49.9	74.8	86.7	23.2	56.2	81.7	88.6
	Rate	People		16.9	59.3	82.5	91.5	29.5	65.5	87.9	93.0

Source: 2007 ECAM. Poverty lines in average prices for all of urban Niger in April 2008.

Figure 2: Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
1,175	How many members does the household have? (Nine or more; Eight; Seven; Six; Five; One to four)
1,075	How many household members are 18-years-old or younger? (Eight or more; Seven ; Six ; Five; Four; Three; Two; One; None)
1,052	How many household members are 17-years-old or younger? (Seven or more; Six ; Five; Four; Three; Two; One; None)
1,048	How many household members are 14-years-old or younger? (Seven or more; Six ; Five; Four; Three; Two; One; None)
1,042	How many household members are 16-years-old or younger? (Seven or more; Six ; Five; Four; Three; Two; One; None)
1,025	How many household members are 13-years-old or younger? (Six or more; Five; Four; Three; Two; One; None)
1,020	How many household members are 15-years-old or younger? (Seven or more; Six ; Five; Four; Three; Two; One; None)
1,015	How many household members are 12-years-old or younger? (Six or more; Five; Four; Three; Two; One; None)
921	How many household members are 11-years-old or younger? (Six or more; Five; Four; Three; Two; One; None)
686	Do all household members ages 7 to 12 currently go to school (government, community, or private)? (No; No one is 7- to 12-years-old; Yes, and all go to a government or community school; Yes, and at least one goes to a private school)
682	Do all household members ages 7 to 14 currently go to school (government, community, or private)? (No; No one is 7- to 14-years-old; Yes, and all go to a government or community school; Yes, and at least one goes to a private school)

Figure 2 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
670	Do all household members ages 7 to 13 currently go to school (government, community, or private)? (No; No one is 7- to 13-years-old; Yes, and all go to a government or community school; Yes, and at least one goes to a private school)
660	Do all household members ages 7 to 11 currently go to school (government, community, or private)? (No; No one is 7- to 11-years-old; Yes, and all go to a government or community school; Yes, and at least one goes to a private school)
632	Do all household members ages 7 to 12 currently go to school? (No; No one is 7- to 12-years-old; Yes)
625	How many household members are 6-years-old or younger? (Four or more; Three; Two; One; None)
620	Do all household members ages 7 to 15 currently go to school (government, community, or private)? (No; No one is 7- to 15-years-old; Yes, and all go to a government or community school; Yes, and at least one goes to a private school)
609	Do all household members ages 7 to 11 currently go to school? (No; No one is 7- to 11-years-old; Yes)
606	Do all household members ages 7 to 14 currently go to school? (No; No one is 7- to 14-years-old; Yes)
601	Do all household members ages 7 to 13 currently go to school? (No; No one is 7- to 13-years-old; Yes)
575	What is the highest grade that the male head/spouse has completed? (None; Pre-school, or koranic; Literacy classes, CI, CP, or CE1; CE2, or CM1; No male head/spouse; CM2, ou $6^{\text{ième}}$; $5^{\text{ième}}$ à $1^{\text{ère}}$; Terminale or higher)
556	Do all household members ages 7 to 15 currently go to school? (No; No one is 7- to 15-years-old; Yes)
539	What is the main source of energy for lighting for your residence? (Candles, or other; Kerosene; Electricity, or generator)
532	Do all household members ages 7 to 16 currently go to school (government, community, or private)? (No; No one is 7- to 16-years-old; Yes, and all go to a government or community school; Yes, and at least one goes to a private school)
517	How many working hoes/*daba*/machetes do household members have? (Seven or more; Six; Five; Four; Three; Two; One)

Figure 2 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
509	How does the household dispose of its sewage? (No toilet arrangement; In the street or on the ground, drying and collection, or other; Hole, push cart, or septic tank or sewer system; Vaccum truck)
508	What is the highest grade that the (eldest) female head/spouse has completed? (None; No (eldest) female head/spouse; Pre-school to CM2; Higher than CM2)
493	What is the main source of drinking water for the household? (Unprotected well; Protected well; Public standpipe or faucet outside the yard/compound; Borehole, or Mini AEP; Surface water or from a river/stream/lake/dam/rainwater; Water truck, or other; Tap inside the yard/compound, or bottled water; Tap inside the residence)
492	Do all household members ages 7 to 17 currently go to school (government, community, or private)? (No; No one is 7- to 17-years-old; Yes, and all go to a government or community school; Yes, and at least one goes to a private school)
484	Do all household members ages 7 to 16 currently go to school? (No; No one is 7- to 16-years-old; Yes)
472	Does a household member have a working fan? (No; Yes)
463	What is the main type of fuel used by the household for cooking? (Biomass, or other; Collected firewood; Purchased firewood, charcoal, coal, LPG, electricity, paraffin/kerosene/petroleum, or does not cook)
456	Do all household members ages 7 to 17 currently go to school? (No; No one is 7- to 17-years-old; Yes)
447	Do any household members have a working television? (No; Yes)
443	Does a household member have a working television, VCR/DVD, and/or satellite dish/decoder? (No; Only television; VCR/DVD, and/or satellite dish/decoder (regardless of television))
439	What type of toilet arrangement does the household use, and is it shared with other households? (No toilet arrangement; Crude pit latrine (shared with other households); Open hole (regardless of sharing), or improved latrine with two pits (regardless of sharing); Crude pit latrine (not shared); Improved latrine (shared with other households); Improved latrine (not shared), or Flush toilet (regardless of sharing))

Figure 2 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
433	If any household members have worked as a farmer or herder in the past 12 months, then does the household have any working hoes/*daba*/machetes? (Someone worked as a farmer or herder, and the household has hoes/*daba*/machetes; No one worked as a farmer or herder, but the household has hoes/*daba*/machetes; Someone worked as a farmer or herder, but the household does not have any hoes/*daba*/machetes; No)
430	What type of toilet arrangement does the household use? (None; Open hole, or crude pit latrine; Improved latrine, or flush toilet)
424	Do all household members ages 7 to 18 currently go to school? (No; No one is 7- to 12-years-old; Yes)
402	Do all household members ages 7 to 18 currently go to school (government, community, or private)? (No; No one is 7- to 18-years-old; Yes, and all go to a government or community school; Yes, and at least one goes to a private school)
387	Can the male head/spouse read a short passage in some language? (No male head/spouse; No; Yes)
379	What is the main material of the roof? (Straw, earth, or hide; Wood, corrugated metal sheets, tile, concrete/cement, or other)
372	Can the male head/spouse write a short message in any language and do a simple calculation? (Cannot write nor calculate; Only can calculate; No male head/spouse; Only can write; Both write and calculate)
360	Can the male head/spouse write a letter in some language? (Non; No male head/spouse; Yes)
360	Do any household members have a working telephone (land-line or cellular)? (No; Yes)
344	What is your tenancy status in the residence? (Co-owner/family-owned, or other; Owner without formal legal title or transfer deed; Owner with formal legal title or transfer deed; Renter, rent-to-own, or housed for free)

Figure 2 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
338	If any household members have worked as a farmer or herder in the past 12 months, then has the household had any fields, gardens, or orchards (including any located outside of this locality) in the past 12 months? (Someone worked as a farmer or herder, and the household had fields, gardens, or orchards; No one worked as a farmer or herder, but the household had fields, gardens, or orchards; Someone worked as a farmer or herder, but the household did not have any fields, gardens, or orchards; No)
331	In the past 12 months, has the male head/spouse worked for a salary or in employment where he was paid by the job? (No; Only an employment paid by the job; No male head/spouse; Only worked for salary, or worked for salary and was paid by the job)
314	What is the main material of the exterior walls? (Wood/straw; Dirt; Stone, corrugated metal sheets, baked bricks, or other; Packed dirt; Cement/concrete)
299	How many household members can do a simple calculation? (Four or more; Three; Two; One; None)
291	In the past 12 months, has the household had any fields, gardens, or orchards (including any located outside of this locality)? (Yes; No)
287	Can the (eldest) female head/spouse read a short message in any language and do a simple calculation? (Cannot read nor calculate; Only can calculate; Only both read and calculate; No (eldest) female head/spouse; Only can read)
286	Can the (eldest) female head/spouse read a short message in any language? (No; No (eldest) female head/spouse; Yes)
275	How many working chairs do household members have? (None or one; Two or three; Four or more)
265	Does a household member have a working bicycle, motorcycle/scooter, or private automobile (not counting company cars)? (No; Only bicycle; Motorcycle/scooter, without private automobile (regardless of bicycle); Private car (regardless of bicycle or motorcycle/scooter))

Figure 2 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
265	If any household members have worked as a farmer or herder in the past 12 months, then does the household currently have any goats? (Someone worked as a farmer or herder, and the household currently has goats; Someone worked as a farmer or herder, but the household does not currently have any goats; No one worked as a farmer or herder, but the household currently has goats; No)
262	Can the male head/spouse read a short message in any language and do a simple calculation? (Cannot read nor calculate, only can calculate, or No male head/spouse; Only can read; Only both read and calculate)
258	In the past 12 months, how many household members have had a salaried job? (None; One or more)
257	Does a household member have a working chair and/or table? (No; Only table; Only chair; Both)
255	How does your household dispose of its garbage? (Other; Throw out by the household on the ground; Burned or buried by the household; Public dumpster, or private collection)
250	If any household members have worked as a farmer or herder in the past 12 months, then does the household currently have any sheep? (Someone worked as a farmer or herder, and the household currently has sheep; Someone worked as a farmer or herder, but the household does not currently have any sheep; No one worked as a farmer or herder, but the household currently has sheep)
250	In the past 12 months, has the male head/spouse worked as a farmer or herder? (Yes; No male head/spouse; No)
249	If any household members have worked as a farmer or herder in the past 12 months, then does the household currently have any sheep or goats? (Someone worked as a farmer or herder, and the household currently has sheep or goats; Someone worked as a farmer or herder, but the household does not currently have any sheep or goats; No one worked as a farmer or herder, but the household currently has sheep or goats; No)
245	Do any household members have cattle, donkey/mule/ass, horse, camel, or a working bicycle, motorcycle/scooter, or car? (No; Only cattle; Donkey/mule/ass, horse, camel, or bicycle (regardless of cattle, and without others); Motorcycle/scooter, or car (regardless of others))

Figure 2 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
244	Can the (eldest) female head/spouse write a short message in any language and do a simple calculation? (Cannot write nor calculate; Only can calculate; Only can write, or both write and calculate; No (eldest) female head/spouse)
244	Can the (eldest) female head/spouse write a letter in some language? (No; No (eldest) female head/spouse; Yes)
240	Does a household member have a working stove (gas/paraffin/kerosene/petroleum), sewing machine, grain mill, gas stove, improved wood stove, or refrigerator? (No; Yes)
238	If any household members have worked as a farmer or herder in the past 12 months, then does the household currently have any cattle, sheep, goats, donkeys/mules/asses, horses, or camels? (Someone worked as a farmer or herder, and the household currently has cattle, sheep, goats, donkeys/mules/asses, horses, or camels; Someone worked as a farmer or herder, but the household does not currently have any cattle, sheep, goats, donkeys/mules/asses, horses, or camels; No one worked as a farmer or herder, but the household currently has cattle, sheep, goats, donkeys/mules/asses, horses, or camels)
223	What is the marital status of the (eldest) female head/spouse? (Polygamously married; Divorced; Monogamously married; Widow, or separated; Single, never-married; No (eldest) female head/spouse)
211	What is the marital status of the male head/spouse? (Polygamously married; Monogamously married; No male head/spouse; Single, never-married, widow, divorced, or separated)
202	If any household members have worked as a farmer or herder in the past 12 months, then does the household currently have any cattle, donkeys/mules/asses, horses, or camels? (Someone worked as a farmer or herder, and the household currently has cattle, donkeys/mules/asses, horses, or camels; Someone worked as a farmer or herder, but the household does not currently have any cattle, donkeys/mules/asses, horses, or camels; No one worked as a farmer or herder, but the household currently has cattle, donkeys/mules/asses, horses, or camels; No)

Figure 2 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
198	If any household members have worked as a farmer or herder in the past 12 months, then does the household currently have any cattle? (Someone worked as a farmer or herder, and the household currently has cattle; Someone worked as a farmer or herder, but the household does not currently have any cattle; No one worked as a farmer or herder, but the household currently has cattle; No)
198	Does a household member have a working motorcycle/scooter? (No; Yes)
196	If any household members have worked as a farmer or herder in the past 12 months, then does the household currently have any donkeys/mules/asses, horses, or camels? (Someone worked as a farmer or herder, and the household currently has donkeys/mules/asses, horses, or camels; Someone worked as a farmer or herder, but the household does not currently have any donkeys/mules/asses, horses, or camels; No one worked as a farmer or herder, but the household currently has donkeys/mules/asses, horses, or camels; No)
194	Do any household members have a working iron? (No; Yes)
194	Does a household member have a working VCR/DVD or satellite dish/decoder? (No; Yes)
189	In what type of residence do you live now? (Traditional detached house; Other; Rented room; *Celibaterium*; Modern detached house, apartment, or studio appartment)
180	In the past 12 months, how many household members have worked as a farmer or herder? (One or more; None)
157	Did the male head/spouse work for at least one hour in the past seven days, or even if he did not work in the last seven days, does he have a permanent job to which he plans to return? (No; Yes; No male head/spouse)
154	How many working tables do household members have? (None; One; Two or more)
136	In the past 12 months, has the (eldest) female head/spouse worked for a salary or in employment where she was paid by the job? (No; Only an employment paid by the job; No (eldest) female head/spouse, only worked for salary, or worked for salary and was paid by the job)

Figure 2 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
130	Does the household have any goats? (No; Yes)
117	Does the household have any cattle, sheep, goats, donkeys/mules/asses, horses, or camels? (No; Yes)
116	Does the household have any cattle, sheep, goats, donkeys/mules/asses, horses, or camels? (No; Yes)
114	How many working beds do household members have? (None; One; Two; Three; Four or more)
106	How many rooms does the household occupy (excluding kitchens, bathrooms, hallways, and balconies? (One or two ; Three or more)
100	Does the household have any sheep? (No; Yes)
96	Do any household members have a working radio-cassette player? (No; Yes)
86	Can the male head/spouse do a simple calculation? (No; Yes; No male head/spouse)
85	In the past 12 months, has the (eldest) female head/spouse worked as a farmer or herder? (Yes; No; No (eldest) female head/spouse)
82	How many working sleeping mats do household members have? (None; One; Two; Three; Four; Five; Six or more)
64	In the past 12 months, how many household members have had work for which they were paid by the job? (Two or more; One; None)
47	Can the (eldest) female head/spouse do a simple calculation? (No; Yes; No (eldest) female head/spouse)
47	Where does the household cook its meals? (In the yard of the residence/compound, or other; In a kitchen, in a room inside the residence, or does not cook)
45	Does the household have any cattle, donkeys/mules/asses, horses, or camels? (No; Yes)
44	How many household members currently go to a school run by a private owner or a religious organization? (None ; One or more)
43	In the past 12 months, how many household members have had a salaried job or work for which they were paid by the job? (None; One; Two or more)
41	How many household members can write a letter in any language? (None; One; Two; Three or more)
40	Does a household member have a working bicycle? (No; Yes)

Figure 2 (cont.): Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
35	Have you always lived in your current residence? (Yes; No)
35	Does a household member have a working private automobile (not counting company cars)? (No; Yes)
35	Did the (eldest) female head/spouse work for at least one hour in the past seven days, or even if she did not work in the last seven days, does she have a permanent job to which she plans to return? (No; Yes; No (eldest) female head/spouse)
33	Does the household have any cattle? (No; Yes)
26	How many household members worked for at least one hour in the past seven days, or even if they did not work in the last seven days, had a permanent job to which they plan to return? (None; One or more)
23	Does the household have any donkeys/mules/asses, horses, or camels? (No; Yes)
21	Can any household members do a simple calculation or write a letter in some language? (None; Someone can do a simple calculation, but no one can read; Someone can read, but not one can do a simple calculation; Someone can read, and someone can do a simple calculation)
7	How many household members can read and write a short message in any language? (None; One or more)
6	Does a household member have a working wheelbarrow, animal-powered plow, animal-pulled cart, or animal-powered harrow? (No; Yes)

Source: 2007/8 ENBCM and the national poverty line

Tables for
100% of the National Poverty Line

(and Tables Pertaining to All Eight Poverty Lines)

Figure 3 (100% 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	90.4
5–9	89.7
10–14	78.7
15–19	76.0
20–24	67.9
25–29	53.9
30–34	40.0
35–39	32.3
40–44	32.3
45–49	25.3
50–54	11.4
55–59	5.3
60–64	1.7
65–69	1.7
70–74	0.0
75–79	0.0
80–84	0.0
85–89	0.0
90–94	0.0
95–100	0.0

Figure 4 (100% of the national line): Derivation of estimated poverty likelihoods associated with scores

Score	Households at score and < poverty line		All households at score		Poverty likelihood (%)
0–4	2,208	÷	2,443	=	90.4
5–9	7,276	÷	8,114	=	89.7
10–14	6,549	÷	8,326	=	78.7
15–19	7,789	÷	10,252	=	76.0
20–24	7,091	÷	10,445	=	67.9
25–29	5,133	÷	9,525	=	53.9
30–34	5,904	÷	14,763	=	40.0
35–39	3,157	÷	9,776	=	32.3
40–44	2,993	÷	9,270	=	32.3
45–49	1,234	÷	4,874	=	25.3
50–54	445	÷	3,888	=	11.4
55–59	105	÷	1,981	=	5.3
60–64	20	÷	1,216	=	1.7
65–69	27	÷	1,634	=	1.7
70–74	0	÷	839	=	0.0
75–79	0	÷	718	=	0.0
80–84	0	÷	1,140	=	0.0
85–89	0	÷	138	=	0.0
90–94	0	÷	300	=	0.0
95–100	0	÷	357	=	0.0

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

Figure 5: Probability that a given household's consumption falls in a range demarcated by two adjacent poverty lines

	Likelihood (%) of having daily per-capita expenditure in a range demarcated by adjacent poverty lines								
	<Food	≥Food and <USAID	≥USAID and <100% Natl.	≥100% Natl. and <$1.25/day	≥$1.25/day and <150% Natl.	≥150% Natl. and <$2.00/day	≥$2.00/day and <200% Natl.	≥200% Natl. and <$2.50/day	≥$2.50/day
Score	<XOF180	≥XOF180 and <XOF218	≥XOF218 and <XOF320	≥XOF320 and <XOF353	≥XOF353 and <XOF480	≥XOF480 and <XOF565	≥XOF565 and <XOF640	≥XOF640 and <XOF706	≥XOF706
0–4	40.2	32.0	18.2	1.5	7.1	0.9	0.0	0.0	0.0
5–9	36.0	18.1	35.6	1.2	7.7	0.8	0.2	0.2	0.2
10–14	25.1	16.6	36.9	6.9	11.1	1.7	0.8	0.1	0.8
15–19	20.1	15.5	40.4	7.9	12.8	1.7	0.8	0.1	0.8
20–24	15.0	18.2	34.7	6.7	22.0	1.7	0.8	0.1	0.8
25–29	10.7	8.8	34.5	9.5	20.9	11.1	2.1	0.6	2.0
30–34	4.9	7.5	27.5	10.2	22.8	15.3	4.4	1.8	5.6
35–39	3.5	6.5	22.2	6.5	25.8	9.6	10.1	5.2	10.5
40–44	2.9	7.1	22.2	4.1	24.3	9.9	9.2	3.2	17.0
45–49	1.9	4.4	19.1	4.7	29.9	10.5	4.7	2.8	22.2
50–54	0.6	0.8	10.1	5.4	37.5	13.0	6.0	3.5	23.1
55–59	0.2	0.1	5.0	3.7	15.2	12.1	8.0	6.8	48.8
60–64	0.0	0.2	1.4	3.7	11.7	16.0	6.5	7.9	52.5
65–69	0.0	0.0	1.7	1.3	6.9	11.7	10.8	4.9	62.8
70–74	0.0	0.0	0.0	0.7	5.0	2.1	6.2	5.7	80.3
75–79	0.0	0.0	0.0	0.7	3.7	2.3	4.3	7.1	81.9
80–84	0.0	0.0	0.0	0.7	3.7	2.3	4.3	5.6	83.4
85–89	0.0	0.0	0.0	0.0	4.4	2.3	4.3	4.7	84.3
90–94	0.0	0.0	0.0	0.0	0.0	0.0	3.5	4.9	91.6
95–100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Figure 6 (100% of the national line): Average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384 by score range, 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	–6.8	3.9	3.9	4.1
5–9	+7.5	2.2	2.6	3.8
10–14	–2.3	2.1	2.3	3.1
15–19	+3.3	2.0	2.5	3.2
20–24	+9.7	2.4	3.0	4.0
25–29	+5.8	2.5	3.0	4.0
30–34	+0.8	2.0	2.4	3.0
35–39	–10.2	6.2	6.4	6.8
40–44	+9.8	2.0	2.5	3.3
45–49	+9.0	2.8	3.3	4.1
50–54	–1.8	2.9	3.5	4.2
55–59	+0.7	2.0	2.4	3.0
60–64	–0.4	1.1	1.3	1.7
65–69	+1.1	0.4	0.5	0.6
70–74	+0.0	0.0	0.0	0.0
75–79	–0.9	1.0	1.1	1.4
80–84	–1.0	0.9	1.0	1.1
85–89	+0.0	0.0	0.0	0.0
90–94	+0.0	0.0	0.0	0.0
95–100	+0.0	0.0	0.0	0.0

Figure 7 (100% of the national line): Average differences between estimated poverty rates and true values for a group at a point in time, with confidence intervals, for 1,000 bootstraps of various sample sizes, 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	+1.7	71.8	73.2	85.6
4	+2.1	41.4	49.2	58.9
8	+2.3	31.7	35.9	43.0
16	+2.3	23.2	26.9	34.8
32	+2.3	16.9	19.4	25.5
64	+2.4	11.5	14.2	18.1
128	+2.6	7.8	9.6	13.1
256	+2.8	5.7	6.9	8.5
512	+2.7	4.1	4.8	6.5
1,024	+2.8	2.9	3.5	4.3
2,048	+2.8	2.1	2.5	3.1
4,096	+2.8	1.4	1.7	2.3
8,192	+2.8	1.0	1.1	1.5
16,384	+2.9	0.7	0.9	1.1

Figure 8 (All poverty lines): Average differences between estimates and true values for poverty rates of a group of households at a point in time, precision, and the α factor for precision, scorecard applied to the validation sample

	Poverty line							
		National			USAID	Intl. 2005 PPP		
	Food	100%	150%	200%	'Extreme'	$1.25	$2.00	$2.50
Estimate minus true value	–0.2	+2.9	+4.0	+0.7	+0.4	+3.4	+4.9	+0.7
Precision of difference	0.4	0.7	0.7	0.5	0.6	0.8	0.7	0.4
α factor for precision	1.03	1.12	1.27	1.14	1.06	1.14	1.40	1.10

Precision is measured as 90-percent confidence intervals in units of ± percentage points.
Differences and precision estimated from 1,000 bootstraps with 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.

Figure 9 (All poverty lines): Possible targeting outcomes

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

Figure 10 (100% of the national line): Shares of households by cut-off score and targeting classification, 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
≤4	2.3	47.6	0.1	49.9	52.3	–90.5
≤9	9.4	40.6	1.2	48.9	58.3	–60.1
≤14	15.9	34.0	3.0	47.1	63.0	–30.3
≤19	23.5	26.4	5.6	44.5	68.0	+5.4
≤24	30.0	19.9	9.6	40.5	70.5	+39.3
≤29	35.1	14.9	14.1	36.0	71.1	+68.6
≤34	41.3	8.6	22.5	27.5	68.9	+54.9
≤39	45.1	4.9	28.6	21.5	66.6	+42.8
≤44	48.0	1.9	34.9	15.2	63.2	+30.1
≤49	49.1	0.9	38.7	11.4	60.4	+22.5
≤54	49.7	0.3	42.0	8.0	57.7	+15.8
≤59	49.8	0.2	43.9	6.2	56.0	+12.1
≤64	49.8	0.1	45.0	5.0	54.9	+9.8
≤69	49.9	0.1	46.6	3.4	53.3	+6.6
≤74	49.9	0.1	47.5	2.6	52.5	+4.9
≤79	49.9	0.0	48.2	1.9	51.8	+3.5
≤84	49.9	0.0	49.3	0.8	50.7	+1.3
≤89	49.9	0.0	49.4	0.7	50.6	+1.0
≤94	49.9	0.0	49.7	0.4	50.3	+0.4
≤100	49.9	0.0	50.1	0.0	49.9	–0.3

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

Figure 11 (100% of the national line): Share of all households who are targeted (that is, score at or below the cut-off), the share of targeted households who are poor (that is, have consumption below the poverty line), the share of poor households who are targeted, and the number of poor households who are successfully targeted (inclusion) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all HHs who are targeted	% targeted HHs who are poor	% poor HHs who are targeted	Poor HHs targeted per non-poor HH targeted
≤4	2.4	94.9	4.6	18.8:1
≤9	10.6	88.8	18.8	8.0:1
≤14	18.9	84.4	31.9	5.4:1
≤19	29.1	80.7	47.1	4.2:1
≤24	39.6	75.8	60.1	3.1:1
≤29	49.1	71.4	70.2	2.5:1
≤34	63.9	64.7	82.8	1.8:1
≤39	73.6	61.2	90.3	1.6:1
≤44	82.9	57.9	96.2	1.4:1
≤49	87.8	55.9	98.3	1.3:1
≤54	91.7	54.2	99.4	1.2:1
≤59	93.7	53.1	99.7	1.1:1
≤64	94.9	52.5	99.8	1.1:1
≤69	96.5	51.7	99.9	1.1:1
≤74	97.3	51.2	99.9	1.1:1
≤79	98.1	50.9	99.9	1.0:1
≤84	99.2	50.3	100.0	1.0:1
≤89	99.3	50.3	100.0	1.0:1
≤94	99.6	50.1	100.0	1.0:1
≤100	100.0	49.9	100.0	1.0:1

Tables for

the Food Poverty Line

Figure 3 (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	40.2
5–9	36.0
10–14	25.1
15–19	20.1
20–24	15.0
25–29	10.7
30–34	4.9
35–39	3.5
40–44	2.9
45–49	1.9
50–54	0.6
55–59	0.2
60–64	0.0
65–69	0.0
70–74	0.0
75–79	0.0
80–84	0.0
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 (Food line): Average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384 by score range, 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	–6.0	5.2	5.6	6.9
5–9	+4.9	2.2	2.7	3.7
10–14	+3.2	2.1	2.4	3.4
15–19	+4.6	1.7	2.0	2.4
20–24	–4.2	3.0	3.3	3.6
25–29	+1.0	1.3	1.6	2.0
30–34	–5.2	3.2	3.3	3.6
35–39	+2.9	0.2	0.3	0.4
40–44	–0.2	0.7	0.8	1.1
45–49	+1.1	0.3	0.4	0.5
50–54	–0.4	0.4	0.5	0.7
55–59	+0.2	0.0	0.0	0.0
60–64	+0.0	0.0	0.0	0.0
65–69	+0.0	0.0	0.0	0.0
70–74	+0.0	0.0	0.0	0.0
75–79	+0.0	0.0	0.0	0.0
80–84	+0.0	0.0	0.0	0.0
85–89	+0.0	0.0	0.0	0.0
90–94	+0.0	0.0	0.0	0.0
95–100	+0.0	0.0	0.0	0.0

Figure 7 (Food line): Average differences between estimated poverty rates and true values for a group at a point in time, with confidence intervals, for 1,000 bootstraps of various sample sizes, 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	–0.4	57.9	60.5	68.1
4	–0.2	28.6	34.6	44.4
8	–0.4	19.2	23.6	32.3
16	–0.6	14.0	16.4	22.0
32	–0.5	9.8	11.4	14.6
64	–0.6	7.4	8.5	11.0
128	–0.4	5.0	6.1	8.4
256	–0.3	3.6	4.3	5.5
512	–0.3	2.5	2.8	3.7
1,024	–0.3	1.7	2.1	2.7
2,048	–0.3	1.2	1.5	1.9
4,096	–0.2	0.9	1.1	1.3
8,192	–0.2	0.6	0.7	0.9
16,384	–0.2	0.4	0.5	0.7

Figure 10 (Food line): Shares of households by cut-off score and targeting classification, 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
≤4	1.1	11.6	1.4	86.0	87.1	–72.1
≤9	4.0	8.7	6.6	80.8	84.8	+15.0
≤14	5.9	6.7	12.9	74.4	80.4	–2.3
≤19	7.6	5.1	21.6	65.8	73.3	–70.7
≤24	9.4	3.2	30.2	57.2	66.6	–138.6
≤29	10.5	2.1	38.6	48.8	59.3	–205.2
≤34	11.9	0.8	52.0	35.4	47.2	–311.3
≤39	12.0	0.6	61.6	25.7	37.8	–387.4
≤44	12.5	0.2	70.5	16.9	29.4	–457.3
≤49	12.5	0.1	75.2	12.1	24.7	–495.1
≤54	12.6	0.0	79.0	8.3	21.0	–525.2
≤59	12.6	0.0	81.0	6.3	19.0	–540.8
≤64	12.6	0.0	82.2	5.1	17.8	–550.4
≤69	12.6	0.0	83.9	3.5	16.1	–563.4
≤74	12.6	0.0	84.7	2.7	15.3	–570.0
≤79	12.6	0.0	85.4	1.9	14.6	–575.7
≤84	12.6	0.0	86.6	0.8	13.4	–584.7
≤89	12.6	0.0	86.7	0.7	13.3	–585.8
≤94	12.6	0.0	87.0	0.4	13.0	–588.2
≤100	12.6	0.0	87.4	0.0	12.6	–591.0

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

Figure 11 (Food line): Share of all households who are targeted (that is, score at or below the cut-off), the share of targeted households who are poor (that is, have consumption below the poverty line), the share of poor households who are targeted, and the number of poor households who are successfully targeted (inclusion) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all HHs who are targeted	% targeted HHs who are poor	% poor HHs who are targeted	Poor HHs targeted per non-poor HH targeted
≤4	2.4	44.2	8.5	0.8:1
≤9	10.6	37.7	31.5	0.6:1
≤14	18.9	31.5	47.0	0.5:1
≤19	29.1	25.9	59.7	0.3:1
≤24	39.6	23.8	74.5	0.3:1
≤29	49.1	21.4	83.2	0.3:1
≤34	63.9	18.6	93.9	0.2:1
≤39	73.6	16.3	95.1	0.2:1
≤44	82.9	15.0	98.5	0.2:1
≤49	87.8	14.3	99.3	0.2:1
≤54	91.7	13.8	100.0	0.2:1
≤59	93.7	13.5	100.0	0.2:1
≤64	94.9	13.3	100.0	0.2:1
≤69	96.5	13.1	100.0	0.2:1
≤74	97.3	13.0	100.0	0.1:1
≤79	98.1	12.9	100.0	0.1:1
≤84	99.2	12.7	100.0	0.1:1
≤89	99.3	12.7	100.0	0.1:1
≤94	99.6	12.7	100.0	0.1:1
≤100	100.0	12.6	100.0	0.1:1

Tables for

150% of the National Poverty Line

Figure 3 (150% of 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	99.1
5–9	98.6
10–14	96.6
15–19	96.6
20–24	96.6
25–29	84.3
30–34	73.0
35–39	64.6
40–44	60.7
45–49	59.9
50–54	54.4
55–59	24.2
60–64	17.2
65–69	9.9
70–74	5.7
75–79	4.4
80–84	4.4
85–89	4.4
90–94	0.0
95–100	0.0

Figure 6 (150% of national line): Average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384 by score range, 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	–0.9	0.5	0.5	0.5
5–9	–0.2	0.4	0.5	0.6
10–14	–2.5	1.4	1.4	1.5
15–19	+2.2	1.0	1.2	1.6
20–24	+5.1	1.3	1.5	2.0
25–29	+1.5	2.0	2.5	3.1
30–34	–2.8	2.3	2.5	2.8
35–39	–10.7	6.3	6.4	6.9
40–44	+23.0	2.5	3.0	3.9
45–49	+21.1	3.7	4.3	5.6
50–54	+16.2	4.1	4.8	6.2
55–59	+5.5	3.5	4.2	5.8
60–64	–14.8	10.9	11.6	13.5
65–69	+5.5	1.5	1.7	2.3
70–74	+4.5	0.7	0.8	1.0
75–79	+0.2	2.4	2.9	3.5
80–84	+3.1	0.7	0.9	1.1
85–89	–12.2	12.7	14.5	21.1
90–94	+0.0	0.0	0.0	0.0
95–100	+0.0	0.0	0.0	0.0

Figure 7 (150% of national line): Average differences between estimated poverty rates and true values for a group at a point in time, with confidence intervals, for 1,000 bootstraps of various sample sizes, 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	+3.0	56.5	65.0	89.7
4	+2.5	36.7	42.1	49.7
8	+3.2	28.2	32.2	37.6
16	+3.3	20.5	24.5	29.1
32	+3.5	16.1	18.4	23.1
64	+3.5	11.4	13.7	17.6
128	+3.8	8.1	9.6	11.8
256	+3.9	5.8	6.8	9.3
512	+3.9	4.2	4.9	6.5
1,024	+4.0	2.8	3.4	4.8
2,048	+4.0	2.0	2.3	3.0
4,096	+4.0	1.4	1.7	2.3
8,192	+4.0	1.0	1.1	1.7
16,384	+4.0	0.7	0.8	1.1

Figure 10 (150% of national line): Shares of households by cut-off score and targeting classification, 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
≤4	2.4	72.4	0.0	25.2	27.6	–93.5
≤9	10.4	64.4	0.2	25.0	35.4	–72.0
≤14	18.6	56.3	0.3	24.9	43.4	–50.0
≤19	28.3	46.5	0.8	24.4	52.7	–23.2
≤24	37.7	37.1	1.8	23.3	61.1	+3.3
≤29	45.8	29.1	3.3	21.8	67.6	+26.8
≤34	57.1	17.7	6.7	18.4	75.6	+61.7
≤39	64.3	10.6	9.4	15.8	80.1	+84.3
≤44	69.5	5.3	13.4	11.7	81.2	+82.1
≤49	71.7	3.1	16.1	9.1	80.8	+78.5
≤54	73.4	1.4	18.2	6.9	80.3	+75.6
≤59	74.1	0.8	19.6	5.6	79.6	+73.8
≤64	74.4	0.4	20.4	4.7	79.2	+72.7
≤69	74.7	0.2	21.9	3.3	78.0	+70.8
≤74	74.7	0.1	22.6	2.5	77.2	+69.7
≤79	74.8	0.1	23.3	1.9	76.6	+68.9
≤84	74.8	0.0	24.4	0.8	75.6	+67.4
≤89	74.8	0.0	24.5	0.7	75.5	+67.2
≤94	74.8	0.0	24.8	0.4	75.2	+66.8
≤100	74.8	0.0	25.2	0.0	74.8	+66.4

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

Figure 11 (150% of national line): Share of all households who are targeted (that is, score at or below the cut-off), the share of targeted households who are poor (that is, have consumption below the poverty line), the share of poor households who are targeted, and the number of poor households who are successfully targeted (inclusion) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all HHs who are targeted	% targeted HHs who are poor	% poor HHs who are targeted	Poor HHs targeted per non-poor HH targeted
≤4	2.4	100.0	3.3	Only poor targeted
≤9	10.6	98.5	13.9	64.2:1
≤14	18.9	98.3	24.8	59.5:1
≤19	29.1	97.2	37.9	35.3:1
≤24	39.6	95.3	50.4	20.5:1
≤29	49.1	93.2	61.2	13.7:1
≤34	63.9	89.5	76.4	8.5:1
≤39	73.6	87.3	85.9	6.9:1
≤44	82.9	83.8	92.9	5.2:1
≤49	87.8	81.7	95.8	4.5:1
≤54	91.7	80.1	98.1	4.0:1
≤59	93.7	79.1	99.0	3.8:1
≤64	94.9	78.5	99.5	3.6:1
≤69	96.5	77.4	99.8	3.4:1
≤74	97.3	76.7	99.8	3.3:1
≤79	98.1	76.2	99.9	3.2:1
≤84	99.2	75.4	100.0	3.1:1
≤89	99.3	75.3	100.0	3.1:1
≤94	99.6	75.1	100.0	3.0:1
≤100	100.0	74.8	100.0	3.0:1

Tables for

200% of the National Poverty Line

Figure 3 (200% of 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	100.0
5–9	99.6
10–14	99.1
15–19	99.1
20–24	99.1
25–29	97.5
30–34	92.6
35–39	84.3
40–44	79.8
45–49	75.0
50–54	73.4
55–59	44.4
60–64	39.6
65–69	32.3
70–74	14.0
75–79	11.0
80–84	11.0
85–89	11.0
90–94	3.5
95–100	0.0

Figure 6 (200% of national line): Average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384 by score range, 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	+0.0	0.0	0.0	0.0
5–9	–0.3	0.2	0.2	0.2
10–14	–0.4	0.3	0.3	0.4
15–19	+0.4	0.5	0.6	0.8
20–24	–0.5	0.3	0.3	0.4
25–29	+0.2	0.6	0.7	0.9
30–34	+7.5	1.6	2.0	2.8
35–39	–5.5	3.5	3.5	3.8
40–44	–10.5	5.9	6.0	6.2
45–49	+14.8	3.9	4.5	5.6
50–54	+14.1	4.3	5.2	6.6
55–59	+0.3	6.0	7.1	8.9
60–64	–1.0	7.1	8.2	11.2
65–69	+14.9	3.6	4.3	5.4
70–74	+11.9	1.0	1.2	1.6
75–79	+0.7	4.4	5.2	6.8
80–84	–6.8	6.1	6.8	8.5
85–89	–5.5	12.6	14.5	21.1
90–94	+3.5	0.0	0.0	0.0
95–100	+0.0	0.0	0.0	0.0

Figure 7 (200% of national line): Average differences between estimated poverty rates and true values for a group at a point in time, with confidence intervals, for 1,000 bootstraps of various sample sizes, 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	+0.7	53.2	74.1	82.6
4	+1.0	28.9	35.6	47.4
8	+0.9	21.0	24.6	30.8
16	+0.9	15.0	18.3	24.4
32	+0.7	11.3	13.3	17.7
64	+0.5	8.6	10.3	13.0
128	+0.6	5.9	6.9	8.7
256	+0.6	4.0	4.9	6.5
512	+0.6	2.8	3.4	4.6
1,024	+0.7	1.9	2.4	3.1
2,048	+0.7	1.3	1.6	2.3
4,096	+0.7	1.0	1.2	1.6
8,192	+0.8	0.7	0.9	1.2
16,384	+0.7	0.5	0.6	0.7

Figure 10 (200% of national line): Shares of households by cut-off score and targeting classification, 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
≤4	2.4	84.2	0.0	13.3	15.8	–94.4
≤9	10.5	76.1	0.0	13.3	23.8	–75.7
≤14	18.8	67.9	0.1	13.2	32.0	–56.6
≤19	28.9	57.8	0.2	13.1	42.0	–33.0
≤24	39.2	47.4	0.3	13.0	52.2	–9.0
≤29	48.3	38.3	0.8	12.6	60.9	+12.5
≤34	61.7	25.0	2.2	11.1	72.8	+44.8
≤39	70.3	16.4	3.4	10.0	80.2	+66.1
≤44	78.1	8.5	4.8	8.6	86.7	+85.8
≤49	81.5	5.2	6.3	7.0	88.5	+92.7
≤54	84.0	2.6	7.6	5.7	89.7	+91.2
≤59	85.1	1.6	8.6	4.8	89.9	+90.1
≤64	85.7	1.0	9.2	4.1	89.8	+89.4
≤69	86.2	0.5	10.3	3.0	89.2	+88.1
≤74	86.3	0.4	11.1	2.3	88.6	+87.2
≤79	86.4	0.3	11.7	1.7	88.1	+86.5
≤84	86.6	0.0	12.6	0.8	87.4	+85.5
≤89	86.7	0.0	12.7	0.7	87.3	+85.4
≤94	86.7	0.0	13.0	0.4	87.0	+85.0
≤100	86.7	0.0	13.3	0.0	86.7	+84.6

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

Figure 11 (200% of national line): Share of all households who are targeted (that is, score at or below the cut-off), the share of targeted households who are poor (that is, have consumption below the poverty line), the share of poor households who are targeted, and the number of poor households who are successfully targeted (inclusion) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all HHs who are targeted	% targeted HHs who are poor	% poor HHs who are targeted	Poor HHs targeted per non-poor HH targeted
≤4	2.4	100.0	2.8	Only poor targeted
≤9	10.6	99.7	12.1	388.2:1
≤14	18.9	99.3	21.6	149.3:1
≤19	29.1	99.2	33.4	124.8:1
≤24	39.6	99.1	45.3	115.7:1
≤29	49.1	98.5	55.8	63.9:1
≤34	63.9	96.5	71.1	27.8:1
≤39	73.6	95.4	81.1	20.8:1
≤44	82.9	94.2	90.2	16.4:1
≤49	87.8	92.8	94.0	12.9:1
≤54	91.7	91.7	97.0	11.0:1
≤59	93.7	90.9	98.2	9.9:1
≤64	94.9	90.3	98.9	9.3:1
≤69	96.5	89.3	99.5	8.4:1
≤74	97.3	88.6	99.6	7.8:1
≤79	98.1	88.1	99.7	7.4:1
≤84	99.2	87.3	100.0	6.9:1
≤89	99.3	87.2	100.0	6.8:1
≤94	99.6	87.0	100.0	6.7:1
≤100	100.0	86.7	100.0	6.5:1

Tables for

the USAID "Extreme" Poverty Line

Figure 3 (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	72.2
5–9	54.1
10–14	41.7
15–19	35.6
20–24	33.2
25–29	19.4
30–34	12.5
35–39	10.1
40–44	10.1
45–49	6.3
50–54	1.4
55–59	0.3
60–64	0.2
65–69	0.0
70–74	0.0
75–79	0.0
80–84	0.0
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 (USAID 'Extreme' line): Average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384 by score range, 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	+2.0	4.0	4.8	6.1
5–9	+6.6	2.6	3.2	4.1
10–14	+7.4	2.4	3.0	3.7
15–19	–0.6	2.2	2.7	3.4
20–24	+2.8	2.2	2.6	3.7
25–29	–0.4	1.8	2.2	2.9
30–34	–1.4	1.4	1.7	2.4
35–39	+2.0	1.2	1.4	1.8
40–44	–4.0	2.9	3.1	3.5
45–49	+5.0	0.4	0.5	0.7
50–54	–10.5	6.7	7.0	7.5
55–59	–0.2	0.4	0.4	0.6
60–64	+0.2	0.0	0.0	0.0
65–69	+0.0	0.0	0.0	0.0
70–74	+0.0	0.0	0.0	0.0
75–79	+0.0	0.0	0.0	0.0
80–84	+0.0	0.0	0.0	0.0
85–89	+0.0	0.0	0.0	0.0
90–94	+0.0	0.0	0.0	0.0
95–100	+0.0	0.0	0.0	0.0

Figure 7 (USAID 'Extreme' line): Average differences between estimated poverty rates and true values for a group at a point in time, with confidence intervals, for 1,000 bootstraps of various sample sizes, 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	+0.1	61.2	70.8	81.1
4	+0.8	34.8	41.5	54.4
8	+0.9	24.8	29.3	38.3
16	+0.0	18.6	21.9	28.7
32	–0.0	13.3	15.6	20.3
64	–0.1	9.5	11.4	14.0
128	+0.2	6.6	7.9	10.2
256	+0.3	4.5	5.5	7.8
512	+0.3	3.4	4.0	5.1
1,024	+0.3	2.3	2.8	3.7
2,048	+0.4	1.6	1.9	2.6
4,096	+0.4	1.1	1.4	1.8
8,192	+0.4	0.8	1.0	1.3
16,384	+0.4	0.6	0.7	0.9

Figure 10 (USAID 'Extreme' line): Shares of households by cut-off score and targeting classification, 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
≤4	1.5	21.6	0.9	75.9	77.5	–82.8
≤9	5.8	17.4	4.7	72.1	77.9	–29.3
≤14	8.9	14.3	10.0	66.8	75.7	+19.7
≤19	12.7	10.5	16.5	60.4	73.0	+29.0
≤24	15.9	7.3	23.7	53.1	69.0	–2.2
≤29	18.2	5.0	30.9	45.9	64.0	–33.5
≤34	20.2	2.9	43.6	33.2	53.4	–88.2
≤39	21.1	2.1	52.5	24.3	45.4	–126.6
≤44	22.6	0.6	60.3	16.5	39.1	–160.2
≤49	22.8	0.4	65.0	11.8	34.7	–180.3
≤54	23.2	0.0	68.5	8.3	31.5	–195.5
≤59	23.2	0.0	70.5	6.3	29.5	–204.0
≤64	23.2	0.0	71.7	5.1	28.3	–209.2
≤69	23.2	0.0	73.3	3.5	26.7	–216.3
≤74	23.2	0.0	74.2	2.7	25.8	–219.9
≤79	23.2	0.0	74.9	1.9	25.1	–223.0
≤84	23.2	0.0	76.0	0.8	24.0	–227.9
≤89	23.2	0.0	76.2	0.7	23.8	–228.5
≤94	23.2	0.0	76.5	0.4	23.5	–229.8
≤100	23.2	0.0	76.8	0.0	23.2	–231.3

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

Figure 11 (USAID 'Extreme' line): Share of all households who are targeted (that is, score at or below the cut-off), the share of targeted households who are poor (that is, have consumption below the poverty line), the share of poor households who are targeted, and the number of poor households who are successfully targeted (inclusion) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all HHs who are targeted	% targeted HHs who are poor	% poor HHs who are targeted	Poor HHs targeted per non-poor HH targeted
≤4	2.4	63.4	6.7	1.7:1
≤9	10.6	55.2	25.1	1.2:1
≤14	18.9	46.9	38.2	0.9:1
≤19	29.1	43.5	54.7	0.8:1
≤24	39.6	40.1	68.5	0.7:1
≤29	49.1	37.0	78.3	0.6:1
≤34	63.9	31.7	87.3	0.5:1
≤39	73.6	28.7	91.0	0.4:1
≤44	82.9	27.2	97.4	0.4:1
≤49	87.8	26.0	98.4	0.4:1
≤54	91.7	25.3	99.9	0.3:1
≤59	93.7	24.8	100.0	0.3:1
≤64	94.9	24.4	100.0	0.3:1
≤69	96.5	24.0	100.0	0.3:1
≤74	97.3	23.8	100.0	0.3:1
≤79	98.1	23.6	100.0	0.3:1
≤84	99.2	23.4	100.0	0.3:1
≤89	99.3	23.3	100.0	0.3:1
≤94	99.6	23.3	100.0	0.3:1
≤100	100.0	23.2	100.0	0.3:1

Tables for

the $1.25/day 2005 PPP Poverty Line

Figure 3 ($1.25/day 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	92.0
5–9	90.9
10–14	85.6
15–19	83.8
20–24	74.6
25–29	63.4
30–34	50.2
35–39	38.8
40–44	36.4
45–49	30.0
50–54	16.8
55–59	9.0
60–64	5.4
65–69	2.9
70–74	0.7
75–79	0.7
80–84	0.7
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 ($1.25/day line): Average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384 by score range, 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	–6.7	3.7	3.8	3.9
5–9	+7.8	2.2	2.7	3.7
10–14	–3.9	2.7	2.9	3.1
15–19	+4.5	1.8	2.2	2.7
20–24	+11.3	2.6	3.1	4.0
25–29	+6.4	2.6	3.1	3.9
30–34	–2.5	2.3	2.6	3.3
35–39	–8.9	5.6	5.7	6.1
40–44	+12.7	2.1	2.5	3.3
45–49	+12.3	2.8	3.3	4.3
50–54	+2.0	3.0	3.5	4.3
55–59	+3.1	2.1	2.5	3.2
60–64	+3.1	1.1	1.4	1.7
65–69	+1.8	0.6	0.7	1.0
70–74	+0.5	0.2	0.3	0.4
75–79	–2.5	2.5	2.7	3.4
80–84	–0.4	0.7	0.8	1.0
85–89	+0.0	0.0	0.0	0.0
90–94	+0.0	0.0	0.0	0.0
95–100	+0.0	0.0	0.0	0.0

Figure 7 ($1.25/day line): Average differences between estimated poverty rates and true values for a group at a point in time, with confidence intervals, for 1,000 bootstraps of various sample sizes, 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	69.1	73.7	87.0
4	+2.2	40.7	46.9	57.7
8	+2.7	31.7	36.2	43.2
16	+2.7	23.5	26.9	34.7
32	+2.9	16.3	19.6	25.0
64	+3.0	11.7	14.0	18.0
128	+3.1	8.2	9.9	12.8
256	+3.3	5.8	7.3	9.0
512	+3.3	4.1	5.0	6.5
1,024	+3.3	2.8	3.5	4.7
2,048	+3.3	2.1	2.4	3.2
4,096	+3.3	1.4	1.7	2.2
8,192	+3.3	1.0	1.2	1.6
16,384	+3.4	0.8	0.9	1.2

Figure 10 ($1.25/day line): Shares of households by cut-off score and targeting classification, 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
≤4	2.4	53.8	0.1	43.7	46.1	–91.4
≤9	9.6	46.7	1.0	42.8	52.3	–64.2
≤14	16.9	39.4	2.0	41.8	58.6	–36.4
≤19	25.1	31.2	4.1	39.7	64.8	–3.6
≤24	32.1	24.1	7.5	36.3	68.4	+27.5
≤29	37.9	18.3	11.2	32.6	70.6	+54.8
≤34	46.3	10.0	17.6	26.2	72.4	+68.7
≤39	50.5	5.7	23.2	20.6	71.1	+58.8
≤44	53.8	2.4	29.1	14.7	68.5	+48.2
≤49	55.0	1.2	32.8	11.0	66.0	+41.7
≤54	55.8	0.5	35.9	7.9	63.6	+36.1
≤59	56.0	0.2	37.7	6.1	62.1	+33.0
≤64	56.1	0.2	38.8	5.0	61.0	+31.0
≤69	56.1	0.1	40.4	3.4	59.5	+28.2
≤74	56.1	0.1	41.2	2.6	58.7	+26.7
≤79	56.2	0.0	41.9	1.9	58.1	+25.5
≤84	56.2	0.0	43.0	0.8	57.0	+23.5
≤89	56.2	0.0	43.1	0.7	56.9	+23.3
≤94	56.2	0.0	43.4	0.4	56.6	+22.8
≤100	56.2	0.0	43.8	0.0	56.2	+22.1

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

Figure 11 ($1.25/day line): Share of all households who are targeted (that is, score at or below the cut-off), the share of targeted households who are poor (that is, have consumption below the poverty line), the share of poor households who are targeted, and the number of poor households who are successfully targeted (inclusion) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all HHs who are targeted	% targeted HHs who are poor	% poor HHs who are targeted	Poor HHs targeted per non-poor HH targeted
≤4	2.4	97.9	4.3	47.5:1
≤9	10.6	90.5	17.0	9.6:1
≤14	18.9	89.3	30.0	8.4:1
≤19	29.1	86.0	44.6	6.2:1
≤24	39.6	81.1	57.1	4.3:1
≤29	49.1	77.3	67.5	3.4:1
≤34	63.9	72.4	82.3	2.6:1
≤39	73.6	68.6	89.8	2.2:1
≤44	82.9	64.9	95.7	1.8:1
≤49	87.8	62.7	97.8	1.7:1
≤54	91.7	60.8	99.2	1.6:1
≤59	93.7	59.8	99.6	1.5:1
≤64	94.9	59.1	99.7	1.4:1
≤69	96.5	58.2	99.8	1.4:1
≤74	97.3	57.7	99.9	1.4:1
≤79	98.1	57.3	99.9	1.3:1
≤84	99.2	56.7	100.0	1.3:1
≤89	99.3	56.6	100.0	1.3:1
≤94	99.6	56.4	100.0	1.3:1
≤100	100.0	56.2	100.0	1.3:1

Tables for

the $2.00/day 2005 PPP Poverty Line

Figure 3 ($2.00/day 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	100.0
5–9	99.4
10–14	98.4
15–19	98.4
20–24	98.4
25–29	95.4
30–34	88.2
35–39	74.2
40–44	70.6
45–49	70.3
50–54	67.4
55–59	36.3
60–64	33.1
65–69	21.6
70–74	7.8
75–79	6.7
80–84	6.7
85–89	6.7
90–94	0.0
95–100	0.0

Figure 6 ($2.00/day line): Average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384 by score range, 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	+0.0	0.0	0.0	0.0
5–9	–0.4	0.2	0.3	0.3
10–14	–1.2	0.7	0.7	0.7
15–19	+2.1	0.9	1.1	1.6
20–24	+3.4	1.0	1.1	1.5
25–29	–0.1	0.7	0.9	1.2
30–34	+5.3	1.7	2.0	2.7
35–39	–11.0	6.3	6.4	6.6
40–44	+23.0	2.9	3.4	4.5
45–49	+15.6	3.9	4.6	5.6
50–54	+9.4	4.2	5.1	6.6
55–59	–4.0	6.0	6.9	9.0
60–64	–2.6	7.0	8.3	11.1
65–69	+13.7	2.2	2.6	3.1
70–74	+6.6	0.7	0.8	1.0
75–79	+1.6	2.7	3.1	4.0
80–84	+5.4	0.7	0.9	1.1
85–89	–9.9	12.6	14.5	21.1
90–94	+0.0	0.0	0.0	0.0
95–100	+0.0	0.0	0.0	0.0

Figure 7 ($2.00/day line): Average differences between estimated poverty rates and true values for a group at a point in time, with confidence intervals, for 1,000 bootstraps of various sample sizes, 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	51.9	60.4	82.6
4	+2.6	35.0	38.6	47.0
8	+3.7	25.1	28.8	35.5
16	+4.1	19.4	22.4	26.9
32	+4.2	14.4	16.9	20.6
64	+4.2	10.6	12.7	17.3
128	+4.4	8.1	9.5	12.7
256	+4.6	5.6	6.6	9.2
512	+4.8	4.0	4.9	6.3
1,024	+4.8	2.9	3.4	4.4
2,048	+4.8	1.9	2.3	3.3
4,096	+4.9	1.4	1.7	2.2
8,192	+4.9	1.0	1.1	1.6
16,384	+4.9	0.7	0.8	1.1

Figure 10 ($2.00/day line): Shares of households by cut-off score and targeting classification, 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
≤4	2.4	79.2	0.0	18.3	20.8	–94.0
≤9	10.5	71.2	0.1	18.3	28.8	–74.2
≤14	18.7	62.9	0.1	18.2	36.9	–53.9
≤19	28.7	53.0	0.4	17.9	46.6	–29.2
≤24	38.5	43.2	1.1	17.2	55.8	–4.4
≤29	47.4	34.3	1.7	16.6	64.0	+18.1
≤34	60.0	21.6	3.8	14.5	74.5	+51.7
≤39	68.1	13.6	5.5	12.8	80.9	+73.6
≤44	74.4	7.3	8.5	9.8	84.2	+89.6
≤49	77.4	4.3	10.4	7.9	85.3	+87.2
≤54	79.8	1.9	11.9	6.4	86.2	+85.4
≤59	80.7	1.0	13.0	5.3	86.0	+84.1
≤64	81.1	0.5	13.7	4.6	85.7	+83.2
≤69	81.5	0.2	15.0	3.3	84.8	+81.6
≤74	81.5	0.1	15.8	2.5	84.0	+80.6
≤79	81.6	0.1	16.5	1.9	83.5	+79.8
≤84	81.7	0.0	17.5	0.8	82.4	+78.5
≤89	81.7	0.0	17.7	0.7	82.3	+78.4
≤94	81.7	0.0	18.0	0.4	82.0	+78.0
≤100	81.7	0.0	18.3	0.0	81.7	+77.6

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

Figure 11 ($2.00/day line): Share of all households who are targeted (that is, score at or below the cut-off), the share of targeted households who are poor (that is, have consumption below the poverty line), the share of poor households who are targeted, and the number of poor households who are successfully targeted (inclusion) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all HHs who are targeted	% targeted HHs who are poor	% poor HHs who are targeted	Poor HHs targeted per non-poor HH targeted
≤4	2.4	100.0	3.0	Only poor targeted
≤9	10.6	99.5	12.9	209.0:1
≤14	18.9	99.2	22.9	125.9:1
≤19	29.1	98.5	35.1	66.0:1
≤24	39.6	97.3	47.1	35.9:1
≤29	49.1	96.5	58.0	27.5:1
≤34	63.9	94.0	73.5	15.7:1
≤39	73.6	92.5	83.4	12.3:1
≤44	82.9	89.8	91.1	8.8:1
≤49	87.8	88.1	94.7	7.4:1
≤54	91.7	87.0	97.7	6.7:1
≤59	93.7	86.1	98.8	6.2:1
≤64	94.9	85.5	99.4	5.9:1
≤69	96.5	84.4	99.8	5.4:1
≤74	97.3	83.8	99.8	5.2:1
≤79	98.1	83.2	99.9	5.0:1
≤84	99.2	82.3	100.0	4.7:1
≤89	99.3	82.2	100.0	4.6:1
≤94	99.6	82.0	100.0	4.5:1
≤100	100.0	81.7	100.0	4.5:1

Tables for

the $2.50/day 2005 PPP Poverty Line

Figure 3 ($2.50/day 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	100.0
5–9	99.8
10–14	99.2
15–19	99.2
20–24	99.2
25–29	98.0
30–34	94.4
35–39	89.5
40–44	83.0
45–49	77.8
50–54	76.9
55–59	51.2
60–64	47.5
65–69	37.2
70–74	19.7
75–79	18.1
80–84	16.6
85–89	15.7
90–94	8.4
95–100	0.0

Figure 6 ($2.50/day line): Average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384 by score range, 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	+0.0	0.0	0.0	0.0
5–9	–0.2	0.1	0.1	0.1
10–14	–0.6	0.4	0.4	0.4
15–19	+0.5	0.5	0.6	0.8
20–24	–0.5	0.3	0.3	0.4
25–29	–1.2	0.7	0.7	0.7
30–34	+5.9	1.4	1.8	2.4
35–39	–2.2	1.7	1.9	2.0
40–44	–8.3	4.7	4.8	5.0
45–49	+5.0	3.4	4.0	5.4
50–54	+16.6	4.3	5.2	6.9
55–59	+3.8	6.2	7.2	9.2
60–64	+4.0	7.1	8.4	10.9
65–69	+11.9	4.5	5.3	6.9
70–74	+15.4	1.7	2.0	2.6
75–79	+4.1	5.2	6.1	7.8
80–84	–2.5	5.5	6.7	9.0
85–89	–0.8	12.6	14.5	21.1
90–94	+4.9	3.5	4.0	5.3
95–100	–7.0	6.3	6.9	8.2

Figure 7 ($2.50/day line): Average differences between estimated poverty rates and true values for a group at a point in time, with confidence intervals, for 1,000 bootstraps of various sample sizes, 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	50.4	69.1	89.2
4	+0.5	26.1	33.5	45.5
8	+0.4	18.9	23.2	30.0
16	+0.5	13.7	16.0	20.8
32	+0.5	10.0	11.7	15.2
64	+0.5	7.4	9.1	12.2
128	+0.6	5.3	6.3	8.3
256	+0.7	3.7	4.4	6.3
512	+0.6	2.6	3.1	4.1
1,024	+0.7	1.8	2.1	2.7
2,048	+0.7	1.2	1.4	2.0
4,096	+0.7	0.9	1.1	1.5
8,192	+0.7	0.7	0.8	1.0
16,384	+0.7	0.4	0.5	0.7

Figure 10 ($2.50/day line): Shares of households by cut-off score and targeting classification, 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
≤4	2.4	86.2	0.0	11.4	13.8	–94.5
≤9	10.6	78.1	0.0	11.4	21.9	–76.2
≤14	18.8	69.8	0.0	11.3	30.2	–57.4
≤19	29.0	59.7	0.2	11.2	40.2	–34.4
≤24	39.4	49.3	0.2	11.1	50.5	–11.0
≤29	48.7	40.0	0.4	10.9	59.6	+10.3
≤34	62.3	26.4	1.6	9.8	72.0	+42.3
≤39	71.1	17.5	2.5	8.8	80.0	+63.3
≤44	79.2	9.4	3.7	7.7	86.9	+82.9
≤49	82.9	5.8	4.9	6.4	89.3	+92.5
≤54	85.5	3.1	6.2	5.2	90.7	+93.0
≤59	86.7	1.9	7.0	4.4	91.1	+92.1
≤64	87.3	1.3	7.6	3.8	91.1	+91.5
≤69	88.0	0.6	8.5	2.9	90.9	+90.4
≤74	88.1	0.5	9.2	2.1	90.3	+89.6
≤79	88.3	0.4	9.8	1.6	89.9	+89.0
≤84	88.6	0.1	10.6	0.7	89.3	+88.0
≤89	88.6	0.0	10.7	0.6	89.2	+87.9
≤94	88.6	0.0	11.0	0.3	88.9	+87.6
≤100	88.6	0.0	11.4	0.0	88.6	+87.2

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

Figure 11 ($2.50/day line): Share of all households who are targeted (that is, score at or below the cut-off), the share of targeted households who are poor (that is, have consumption below the poverty line), the share of poor households who are targeted, and the number of poor households who are successfully targeted (inclusion) per non-poor household mistakenly targeted (leakage), scorecard applied to the validation sample

Targeting cut-off	% all HHs who are targeted	% targeted HHs who are poor	% poor HHs who are targeted	Poor HHs targeted per non-poor HH targeted
≤4	2.4	100.0	2.8	Only poor targeted
≤9	10.6	100.0	11.9	Only poor targeted
≤14	18.9	99.8	21.3	409.5:1
≤19	29.1	99.5	32.7	190.7:1
≤24	39.6	99.4	44.4	172.8:1
≤29	49.1	99.1	54.9	113.5:1
≤34	63.9	97.5	70.3	39.1:1
≤39	73.6	96.6	80.2	28.3:1
≤44	82.9	95.6	89.4	21.6:1
≤49	87.8	94.4	93.5	16.8:1
≤54	91.7	93.3	96.5	13.8:1
≤59	93.7	92.6	97.8	12.4:1
≤64	94.9	92.0	98.5	11.6:1
≤69	96.5	91.2	99.3	10.3:1
≤74	97.3	90.5	99.4	9.6:1
≤79	98.1	90.0	99.6	9.0:1
≤84	99.2	89.3	99.9	8.3:1
≤89	99.3	89.2	99.9	8.2:1
≤94	99.6	88.9	100.0	8.0:1
≤100	100.0	88.6	100.0	7.8:1