Simple Poverty Scorecard® Poverty-Assessment Tool Uganda

Mark Schreiner

26 June 2015

This document is at `SimplePovertyScorecard.com`.

Abstract

The Simple Poverty Scorecard®-brand poverty-assessment tool uses ten low-cost indicators from Uganda's 2012/13 National Household 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 Uganda to measure poverty rates, to track changes in poverty rates over time, and to segment clients for targeted services.

Version note

This paper uses 2012/13 data. It replaces Schreiner (2011a), which uses 2009/10 data. The new scorecard should be used from now on. The new and old scorecards use the same definition of *poverty*, so legacy users can still measure change over time with a baseline from the old scorecard and a follow-up from the new scorecard.

Acknowledgements

This paper was funded by Grameen Foundation (GF). Data are from Uganda's Bureau of Statistics. Thanks go to Gilbert Byarugaba Agaba, Julie Peachey, and Sharada Ramanathan. This scorecard was re-branded by (GF) as a Progress out of Poverty Index® tool. The PPI® is a performance-management tool that GF promotes to help organizations achieve their social objectives more effectively. Innovations for Poverty Action (IPA) and the PPI Alliance funded the 2011 PPP poverty lines. "Progress out of Poverty Index" and "PPI" are Registered Trademarks of IPA. "Simple Poverty Scorecard" is a Registered Trademark of Microfinance Risk Management, L.L.C. for its brand of poverty-assessment tools.

Author

Mark Schreiner directs Microfinance Risk Management, L.L.C. He is also a Senior Scholar at the Center for Social Development at Washington University in Saint Louis.

Simple Poverty Scorecard® Poverty-Assessment Tool

			Name	Identifier
Interview ID:				
Interview date:		Participant:		
Country:	UGA	Field agent:		
Scorecard:	002	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	3	
	C. Seven	4	
	D. Five or six	6	
	E. Four	8	
	F. Three	12	
	G. Two	21	
	H. One	28	
2. Are all household members ages 6 to 12 currently in school?	A. No	0	
	B. Yes	2	
	C. No one ages 6 to 12	5	
3. Can the (oldest) female head/spouse read and write with understanding in any language?	A. No	0	
	B. No female head/spouse	0	
	C. Yes	3	
4. What type of material is mainly used for construction of the wall of the dwelling?	A. Unburnt bricks with mud, mud and poles, or other	0	
	B. Unburnt bricks with cement, wood, tin/iron sheets, concrete/stones, burnt stabilized bricks, or cement blocks	4	
5. What type of material is mainly used for construction of the roof of the dwelling?	A. Thatch, or tins	0	
	B. Iron sheets, concrete, tiles, asbestos, or other	5	
6. What source of energy does the household mainly use for cooking?	A. Firewood, cow dung, or grass (reeds)	0	
	B. Charcoal, paraffin stove, gas, biogas, electricity (regardless of source), or other	6	
7. What type of toilet facility does the household mainly use?	A. No facility/bush/polythene bags/bucket/etc., or other	0	
	B. Uncovered pit latrine (with or without slab), Ecosan (compost toilet), or covered pit latrine without slab	4	
	C. Covered pit latrine with slab	6	
	D. VIP latrine, or flush toilet	11	
8. How many mobile phones do members of your household own?	A. None	0	
	B. One	7	
	C. Two	12	
	D. Three or more	22	
9. Does any member of your household own a radio?	A. No	0	
	B. Yes	7	
10. Does every member of the household have at least one pair of shoes?	A. No	0	
	B. Yes	9	

Score:

Back-page Worksheet:
Household Membership and School Attendance

In the scorecard header, record the unique interview identifier, the interview date, and the participant's sampling weight. Then record the name and identification number of the participant, of yourself as the field agent, and of the service point that the participant uses.

Then read to the respondent: *Please tell me the names and ages of all members of your household. A* household *is a person or group of persons, related or unrelated, who—for at least 6 of the last 12 months—normally cook, eat, and live together in the same dwelling unit, acknowledge one household head, and share living arrangements.* Record names, ages, and presence in at least 6 of the past 12 months. List the head of the household first, even if he/she is not the respondent, even if he/she is not a participant in your organization, and even if he/she is absent. For your own later use with the third scorecard indicator, note the name of the (oldest) female head/spouse (if she exists). Then ask: *Are there any other persons such as small children or infants that we have not listed? Are there any others who usually live here who may not be members of your family (such as domestic servants, lodgers, or friends)?* Again, record names, ages, and presence. Mark whether each person is a household member based on the full set of rules in the "Guidelines to the Interpretation of Scorecard Indicators". In the scorecard header, record the total next to "Number of household members:", and circle the response to the first scorecard indicator.

For each household member who is 6 to 12-years-old, ask: *Is <name> currently in school?* Based on the responses, circle the response for the second indicator.

Keep in mind the full rules in the "Guidelines for the Interpretation of Scorecard Indicators".

First name	Age	Has <name> been present at least 6 of the last 12 months?	Is <name> a household member? (apply rules)	If <name> is a household member 6- to 12-years-old, is he/she currently in school?
1.		No Yes	No Yes	Not 6–12/member No Yes
2.		No Yes	No Yes	Not 6–12/member No Yes
3.		No Yes	No Yes	Not 6–12/member No Yes
4.		No Yes	No Yes	Not 6–12/member No Yes
5.		No Yes	No Yes	Not 6–12/member No Yes
6.		No Yes	No Yes	Not 6–12/member No Yes
7.		No Yes	No Yes	Not 6–12/member No Yes
8.		No Yes	No Yes	Not 6–12/member No Yes
9.		No Yes	No Yes	Not 6–12/member No Yes
10.		No Yes	No Yes	Not 6–12/member No Yes
11.		No Yes	No Yes	Not 6–12/member No Yes
12.		No Yes	No Yes	Not 6–12/member No Yes
13.		No Yes	No Yes	Not 6–12/member No Yes
14.		No Yes	No Yes	Not 6–12/member No Yes
Members:			# "Yes":	

Look-up table to convert scores to poverty likelihoods: National poverty lines

	Poverty likelihood (%)			
	National			Poorest half
Score	100%	150%	200%	below 100% natl.
0–4	87.3	97.3	99.2	70.8
5–9	79.0	94.3	97.9	54.8
10–14	58.7	82.3	93.6	35.4
15–19	39.9	75.3	89.2	20.5
20–24	30.4	72.0	88.6	11.4
25–29	23.0	59.2	80.1	7.8
30–34	10.0	37.3	66.9	3.1
35–39	7.0	32.5	60.3	1.7
40–44	6.3	28.7	54.7	1.6
45–49	3.0	21.4	43.3	1.1
50–54	1.6	10.7	28.9	0.4
55–59	0.5	5.4	16.0	0.2
60–64	0.4	2.4	10.8	0.0
65–69	0.4	1.0	6.5	0.0
70–74	0.0	0.6	3.6	0.0
75–79	0.0	0.0	1.7	0.0
80–84	0.0	0.0	1.6	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

Look-up table to convert scores to poverty likelihoods: International 2005 and 2011 PPP lines

	Poverty likelihood (%)							
	Intl. 2005 PPP						Intl. 2011 PPP	
Score	**$1.25**	**$2.00**	**$2.50**	**$4.00**	**$5.00**	**$8.44**	**$1.90**	**$3.10**
0–4	96.7	99.4	99.7	100.0	100.0	100.0	96.7	99.4
5–9	92.1	98.4	99.5	100.0	100.0	100.0	92.5	98.7
10–14	76.0	94.2	98.3	99.8	100.0	100.0	81.1	96.6
15–19	65.3	91.5	95.0	99.5	100.0	100.0	73.5	93.2
20–24	58.4	90.4	95.0	99.0	99.9	100.0	68.3	92.6
25–29	45.3	82.2	92.9	98.8	99.6	100.0	54.5	88.1
30–34	27.9	66.9	82.6	95.4	99.0	99.8	37.5	76.7
35–39	23.9	60.5	77.2	93.1	97.2	99.4	29.7	70.7
40–44	20.1	56.6	71.5	91.6	95.0	99.1	26.0	63.5
45–49	10.9	45.7	60.0	81.4	89.2	98.8	16.7	51.6
50–54	4.9	29.3	45.3	75.0	85.7	96.1	8.1	36.1
55–59	3.1	19.5	34.2	65.1	73.9	91.8	4.0	27.9
60–64	0.3	11.1	21.6	57.4	69.1	90.3	0.6	17.2
65–69	0.0	3.0	10.5	37.7	59.1	86.3	0.4	6.4
70–74	0.0	0.8	4.9	27.9	40.9	72.3	0.0	2.1
75–79	0.0	0.0	2.7	17.9	31.3	69.5	0.0	0.5
80–84	0.0	0.0	2.6	8.9	27.9	52.8	0.0	0.5
85–89	0.0	0.0	0.0	3.5	12.3	41.3	0.0	0.0
90–94	0.0	0.0	0.0	0.0	0.0	36.3	0.0	0.0
95–100	0.0	0.0	0.0	0.0	0.0	36.3	0.0	0.0

Look-up table to convert scores to poverty likelihoods: Relative (percentile-base) poverty lines

	Poverty likelihood (%)				
	Relative (percentile) poverty lines				
Score	**20th**	**40th**	**50th**	**60th**	**80th**
0–4	92.3	96.7	97.7	99.4	100.0
5–9	81.6	92.4	95.3	98.4	100.0
10–14	56.3	78.8	88.6	93.4	99.3
15–19	43.4	69.3	83.1	90.0	97.7
20–24	32.5	63.3	77.8	88.3	97.7
25–29	22.6	52.1	65.3	78.4	95.8
30–34	10.6	34.5	46.9	62.8	86.1
35–39	6.1	27.7	39.2	53.1	82.6
40–44	5.8	24.3	35.4	49.3	76.6
45–49	2.5	15.4	25.7	37.5	66.1
50–54	1.0	6.8	12.6	23.3	53.3
55–59	0.3	3.9	7.4	13.1	44.8
60–64	0.0	0.6	2.8	6.0	34.6
65–69	0.0	0.4	0.8	1.3	15.5
70–74	0.0	0.0	0.0	0.8	9.0
75–79	0.0	0.0	0.0	0.0	4.6
80–84	0.0	0.0	0.0	0.0	3.4
85–89	0.0	0.0	0.0	0.0	0.0
90–94	0.0	0.0	0.0	0.0	0.0
95–100	0.0	0.0	0.0	0.0	0.0

Note on measuring changes in poverty rates over time using the old 2009/10 and new 2012/13 scorecards

This paper uses data from the 2012/13 Uganda National Household Survey. It replaces Schreiner (2011a), which uses data from the 2009/10 UNHS. The new scorecard here should be used from now on.

Some pro-poor programs in Uganda already use the old 2009/10 scorecard. Even after switching to the new 2012/13 scorecard, these legacy users can still estimate changes in poverty rates over time with existing baseline estimates from the old 2009/10 scorecard and follow-up estimates from the new 2012/13 scorecard. This is possible because both the new and old scorecards are calibrated to the same definition of *poverty*. For a given poverty line supported for both scorecards, valid estimates of change can be found as the difference between estimated poverty rates from a baseline measure with the old 2009/10 scorecard and from a follow-up measure with the new 2012/13 scorecard.

In sum, both first-time and legacy users should use the new 2012/13 scorecard from now on. Looking forward, this establishes the best baseline. Looking backward, legacy users of Uganda's old 2009/10 scorecard can still use existing estimates when measuring change.

Simple Poverty Scorecard® Poverty-Assessment Tool Uganda

1. Introduction

The Simple Poverty Scorecard poverty-assessment tool is a low-cost way for pro-poor programs in Uganda to estimate the likelihood that a household has consumption below a given poverty line, to measure groups' poverty rates at a point in time, to track changes in groups' poverty rates over time, and to segment clients for targeted services.

The new scorecard here uses data from the 2012/13 Uganda National Household Survey (UNHS); it replaces the old scorecard in Schreiner (2011a) that uses data from the 2009/10 UNHS. The new 2012/13 scorecard is more accurate, so from now on, only it should be used. Because both the new and old scorecards are calibrated to the same definition of *poverty*, existing users of the old 2009/10 scorecard can still estimate changes in poverty rates over time with a baseline from the old 2009/10 scorecard and a follow-up from the new 2012/13 scorecard.

The direct approach to poverty measurement via consumption surveys is difficult and costly. As a case in point, Uganda's 2012/13 UNHS has more than 60 pages and includes many hundreds of items, many of which may be asked multiple times (for example, for each household member, for each agricultural plot, or for each food item).

In comparison, the indirect approach via the scorecard is simple, quick, and low-cost. It uses ten verifiable indicators (such as "What source of energy does the household mainly use for cooking?" and "Does any member of your household own a radio?") to get a score that is highly correlated with poverty status as measured by the exhaustive UNHS 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). Poverty measures 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' line of $1.25/day at 2005 purchase-power parity (PPP). USAID microenterprise partners in Uganda can use scoring with the $1.25/day 2005 PPP line to report how many of their participants are "very poor".[2] Scoring can also be used to measure net movement across

[1] Uganda's Simple Poverty Scorecard tool is not, however, in the public domain. Copyright is held by 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—UGX1,920 on average in Uganda as a whole from July 2012 to July 2013—or the line (UGX1,137) that marks the poorest half of

a poverty line over time. In all these applications, 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 a low-cost scorecard to help with monitoring poverty and (if desired) segmenting clients for targeted services.

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 often 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, transparent scoring approaches can be about as accurate as complex, opaque 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

---

people below 100% of the national line. USAID (2014, p. 8) has approved the scorecard (re-branded as the PPI®) for use by their microenterprise partners.

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 2012/13 UNHS from Uganda's Bureau of Statistics (UBOS). 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 Uganda

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-adult-equivalent or 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 of poverty likelihoods 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. For households in the group(s), this estimate is the average follow-up poverty likelihood versus the average baseline likelihood.

The scorecard can also be used to segment participants for targeted services. To help managers choose appropriate targeting cut-offs for their purposes, this paper reports several measures of targeting accuracy for a range of possible cut-offs.

This paper presents a single scorecard whose indicators and points are derived with data from the 2012/13 UNHS. Scores from this one scorecard are calibrated to poverty likelihoods for 10 poverty lines, five of which are also supported by the old 2009/10 scorecard.

The new 2012/13 scorecard is constructed using half of the data from the 2012/13 UNHS. That same half of the data is also used to calibrate scores to poverty likelihoods. The other half of the data 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 segmenting clients.[3]

All three scoring-based estimators (the poverty likelihood of a household, the poverty rate of households at a point in time, and the change in the poverty rate of

[3] Several scorecard indicators and response options differ between the 2009/10 and 2012/13 UNHS. This precludes testing the accuracy of estimates of change over time by applying the new 2012/13 scorecard to 2009/10 data.

households over time) are *unbiased*. That is, they match the true value on average in repeated samples when constructed from (and applied to) a single, unchanging population in which the relationship between scorecard indicators and poverty is constant. Like all predictive models, the scorecard here is constructed from a single sample and so misses the mark when applied (in this paper) to a validation sample. Furthermore, it is biased to some unknown extent when applied (in practice) to a different population or when applied after 2012/13.[4]

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 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.

On average across 1,000 bootstraps of $n = 16{,}384$ from the validation sample, the difference between scorecard estimates of groups' poverty rates versus the true rates at a point in time for 100% of the national poverty line is –0.1 percentage points. Across all 10 poverty lines, the average absolute difference is about 0.9 percentage points, and the maximum absolute difference is 2.1 percentage points. These differences reflect sampling variation, not bias; the average difference would be zero if the 2012/13 UNHS

[4] Important examples include nationally representative samples at a later point in time or sub-groups that are not nationally representative (Diamond *et al.*, 2014; Tarozzi and Deaton, 2009).

survey was 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 with $n = 16{,}384$ are ± 0.6 percentage points or less. For $n = 1{,}024$, the 90-percent intervals are ± 2.4 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. Section 8 covers targeting. Section 9 places the scorecard here in the context of related exercises for Uganda. The last section is a summary.

The "Guidelines for the Interpretation of Scorecard Indicators" tells how to ask questions (and how to interpret responses) so as to mimic practice in the UNHS as closely as possible. These "Guidelines" (and the "Back-page Worksheet") are integral parts of the Simple Poverty Scorecard tool.

2. Data and definitions of poverty status

This section discusses the data used to construct and validate the scorecard. It also documents the 10 poverty lines to which scores are calibrated.

2.1 Data

The new scorecard is based on data from the 6,887 households in the 2012/13 UNHS. This is Uganda's most recent national consumption survey.

For the purposes of the scorecard, the households in the 2012/13 UNHS 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

Fieldwork for the 2012/13 UNHS ran from 25 July 2012 to 25 July 2013.[5] Consumption is measured in Uganda Shillings (UGX) in average prices for the country as a whole during fieldwork.

2.2 Poverty rates at the household, person, or participant level

A *poverty rate* is the share of units in households in which total household consumption (divided by the number of adult-equivalents in the household or by the number of household members) is below a given poverty line. The unit of analysis is

[5] The data give these dates for fieldwork. UBOS (2014) and Ssewanyana and Kasirye (2014) report June 2012 to June 2013.

either the household itself or a person in the household. Each household member has the same poverty status (or estimated poverty likelihood) as the other household members.

To illustrate, suppose a program serves two households. The first household is poor (its per-adult-equivalent or 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 has four members, two of whom are program participants.

Poverty rates are in terms 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 households with participants.[6] 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

[6] The examples here assume simple random sampling at the household level.

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, a program might count 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, organizations should make explicit the unit of analysis—household, household member, or participant—and explain why that unit is relevant.

Figure 1 reports poverty lines and poverty rates for households and people in the 2012/13 UNHS for Uganda as a whole and for the construction/calibration and validation sub-samples. Figure 2 reports poverty lines and poverty rates for the whole country and for urban/rural/overall in each of Uganda's four poverty-line regions. Household-level poverty rates are 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. Person-level poverty rates are also included in Figures 1 and 2 because these are the rates reported by the government of Uganda and because person-level rates are usually used in policy discussions.

In Figure 1, the all-Uganda person-level poverty rate by 100% of the national poverty line is 19.7 percent. This matches UBOS (2014, p. xiii).

2.3 Definition of *poverty*

Poverty is whether a household is poor or non-poor. In Uganda, this is determined by whether per-adult-equivalent[7] or per-capita aggregate household consumption is below a given poverty line. Thus, a definition of *poverty* has two aspects: a measure of aggregate household consumption, and a poverty line.

The definition of *poverty* is the same in the 2009/10 and 2012/13 UNHS.[8] Both surveys define *consumption* the same[9] and both—after adjustment for price changes over time—define the national poverty lines and the 2005 PPP lines the same. This means that estimated poverty rates from the new 2012/13 scorecard are comparable with estimates from the old 2009/10 scorecard.[10] Thus, a legacy user of the old scorecard can estimate change over time as the difference between a follow-up estimate from the new scorecard and a baseline estimate from the old scorecard.

[7] Adult equivalents adjust for varying nutritional requirements by age and sex. Uganda's scale is from WHO (1985) and appears in Appleton (2001, p. 117).
[8] UBOS (2014) and Ssewanyana and Kasirye (2014) compare estimates from the 2005/6, 2009/10, and 2012/13 UNHS.
[9] The 2012/13 UNHS defines some units of consumption more clearly. UBOS (2014) and Ssewanyana and Kasirye (2014) implicitly assume that this has no material effect.
[10] This holds for the five poverty lines supported for both the new and old scorecards: 100%, 150%, and 200% of the national line; and $1.25 and $2.50/day 2005 PPP.

2.4 Poverty lines

Appleton (2001) derives the national poverty line as the sum of food and non-food components. The food component is the cost of 3,000 Calories from the food basket consumed by the poorest half of adult equivalents in Uganda's 1993/4 First Monitoring Survey. This cost is adjusted by the change in the national Consumer Price Index (CPI) between the 1993/4 MS–1 and the 2012/13 UNHS. The cost is further adjusted for food-price differences across urban and rural areas in four poverty-line regions, using 2012/13 UNHS data.

Following Ravallion and Bidani (1994), the non-food component is defined as the non-food consumption observed for households in the 2012/13 UNHS whose total consumption equals the food component. The non-food component is derived separately for urban and rural areas in each of four poverty-line regions.

The national poverty line is the food component plus the non-food component. In average prices for all-Uganda during the 2012/13 UNHS fieldwork, this is UGX1,982 per adult-equivalent per day. The all-Uganda household-level poverty rate is then 15.6 percent, and the person-level poverty rate is 19.7 percent (Figure 1).[11]

[11] Van Campenhout, Sekabira, and Aduayom (2014) argue that Uganda's official definition of *poverty* is outdated because it uses a single food basket for the entire country (rather than regional food baskets) and because it is two decades old. With updated regional baskets, they find that the decline in poverty through time is less steep and that the relative poverty of the Western region increases.

Because local pro-poor organizations in Uganda may want to use different or various poverty lines, this paper calibrates scores from its single scorecard to poverty likelihoods for 10 lines:

- 100% of national
- 150% of national
- 200% of national
- Line marking the poorest half of people below 100% of the national line
- $1.25/day 2005 PPP
- $2.00/day
- $2.50/day
- $4.00/day
- $5.00/day
- $8.44/day

Five of these lines are supported for Uganda's old 2009/10 scorecard: 100%, 150%, and 200% of national; and $1.25 and $2.50/day 2005 PPP. These five lines can be used when measuring change over time with a baseline from the old 2009/10 scorecard and a follow-up from the new 2012/13 scorecard.

How are these poverty lines defined? The lines for 150% and 200% of national are multiples of the national line.

The line that marks the poorest half of people below 100% of the national line is defined—for urban and rural areas separately in each of Uganda's four poverty-line regions—as the median aggregate household per-adult-equivalent consumption of people (not households nor adult equivalents) below 100% of the national line (U.S. Congress, 2004).

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

- 2005 PPP exchange rate for "individual consumption expenditure by households" (World Bank, 2008): UGX744.618 per $1.00
- Average Consumer Price Index in calendar-year 2005 (Schreiner, 2011a): 96.92
- Average CPI during UNHS 2012/13 fieldwork: 199.880
- All-Uganda average national poverty line (Figure 1): UGX1,982
- Urban/rural national poverty lines in Uganda's eight poverty-line regions (Figure 2)

Given this, the $1.25/day 2005 PPP line in average prices in Uganda overall during the 2012/13 UNHS fieldwork is (Sillers, 2006):

$$(\text{2005 PPP exchange rate}) \cdot \$1.25 \cdot \left(\frac{\text{CPI}_{\text{Ave. July 2012 to July 2013}}}{\text{CPI}_{\text{2005 average}}} \right) =$$

$$\left(\frac{\text{UGX744.618}}{\$1.00} \right) \cdot \$1.25 \cdot \left(\frac{199.880}{96.92} \right) = \text{UGX1,920.}$$

The 2005 PPP lines are multiples of the $1.25/day line. The $8.44/day line is the 75th percentile of per-capita income (not consumption) worldwide as measured by Hammond *et al.* (2007).

The 2005 PPP lines apply to Uganda on average. In an urban or rural area of a given poverty-line region, the $1.25/day line is the all-Uganda $1.25/day line, multiplied the national line in that area and region, and divided by Uganda's average national line.

For example, the $1.25/day 2005 PPP line in rural areas of the Central region is the all-Uganda $1.25/day line of UGX1,920 (Figure 1), multiplied by the national line in rural Central of UGX1,999 (Figure 2), and divided by the average all-Uganda national line of UGX1,982 (Figure 1). This gives a $1.25/day line in rural Central of 1,920 x 1,999 ÷ 1,982 = UGX1,937 (Figure 2).

The person-level $1.25/day poverty rate reported by the World Bank's PovcalNet[12] for the 2012/13 UNHS is 37.8 percent, which is not far from the 36.2 percent in Figure 1. The $1.25/day estimate here is to be preferred (Schreiner, 2014) because PovcalNet does not report:

- Its line(s) in UGX
- The time/place of its price units
- Whether/how it adjusts for regional differences in prices
- How it deflates 2005 PPP factors

USAID microenterprise partners in Uganda 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 daily per-capita consumption is below the highest of the following poverty lines:[13]

- The line that marks the poorest half of people below 100% of the national line (UGX1,137, with a person-level poverty rate of 9.9 percent, Figure 1)
- $1.25/day 2005 PPP (UGX1,920, with a person-level poverty rate of 36.2 percent)

[12] `iresearch.worldbank.org/PovcalNet/index.htm`, retrieved 20 June 2015.
[13] U.S Congress (2004) did not consider that a per-adult-equivalent national line could be higher than a per-capita $1.25/day line and yet give a lower poverty rate. The $1.25/day line is used for USAID's purposes here because the law surely intends to select the line that gives the higher poverty rate, even if that is the lower line.

3. Scorecard construction

For Uganda, about 60 candidate indicators are initially prepared in the areas of:

- Household composition (such as the number of members)
- Education (such as the literacy of the (oldest) female head/spouse)
- Housing (such as the type of roof and walls)
- Ownership of durable assets (such as radios or mobile phones)

Figure 3 lists the candidate indicators, ordered by the entropy-based "uncertainty coefficient" (Goodman and Kruskal, 1979) that measures how well a given indicator predicts poverty status on its own.[14]

One application of the scorecard is to measure *changes* in poverty through time. Thus, when selecting indicators and holding other considerations constant, preference is given to more sensitive indicators. For example, the ownership of a radio 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 150% of 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).

[14] The uncertainty coefficient is not used as a criterion when selecting scorecard indicators; it is just a way to order the candidate indicators in Figure 3.

One of these one-indicator scorecards is then selected based on several factors (Schreiner *et al.*, 2014; Zeller, 2004). These include improvement in accuracy, likelihood of acceptance by users (judged 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, tendency to have a slow-changing relationship with poverty over time, 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 adding a second indicator to the one-indicator scorecard selected from the first round. 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.[15]

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).

[15] For Uganda, the selection of the final 10 indicators was also informed by feedback from future users via desk-based review and field testing.

This algorithm is similar to common R^2-based stepwise least-squares regression. It differs from naïve stepwise in that the selection of indicators considers both statistical[16] and non-statistical criteria. The use of non-statistical criteria can improve robustness through time and helps ensure that indicators are simple, sensible, and acceptable to users.

The single scorecard here applies to all of Uganda. Tests for Indonesia (World Bank, 2012), Bangladesh (Sharif, 2009), India and Mexico (Schreiner, 2006a and 2005a), Sri Lanka (Narayan and Yoshida, 2005), and Jamaica (Grosh and Baker, 1995) suggest that segmenting scorecards by urban/rural does not improve targeting accuracy much. In general, segmentation may improve the accuracy of estimates of poverty rates (Diamond *et al.*, 2016; Tarozzi and Deaton, 2009), but it may also increase the risk of overfitting (Haslett, 2012).

[16] The statistical criterion for selecting an indicator is not the p values of its coefficients but rather the indicator's contribution to the ranking of households by poverty status.

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 them to make sense.

To this end, Uganda'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 "multiple-choice" indicators
- Only simple points (non-negative integers, and no arithmetic beyond addition)

A field worker using Uganda's new 2012/13 scorecard would:

- Record the interview identifier, the date of the interview, the county code ("UGA"), the scorecard code ("002") and the sampling weight assigned by the survey design to the household of the participant
- Record the names and identifiers of the participant (who is not necessarily the respondent), field agent, and relevant organizational service point
- Complete the back-page worksheet with each household member's:
  - First name
  - Age
  - Presence in the household for at least six of the last 12 months
  - Whether the person qualifies as a *household member*
  - If the person is a household member aged 6 to 12, whether he/she is currently in school
- Record household size in the scorecard header next to "Number of household members:"
- Record the response to the first and second scorecard indicators based on the responses recorded 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).[17] 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 Scorecard Indicators" found at the end of this paper, as these "Guidelines"—along with the "Back-page Worksheet"—are integral parts of the Simple Poverty Scorecard tool.[18]

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 targeting. For the first stage of targeting in a conditional cash-transfer program in

[17] If a program does not want field workers and respondents 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. And even if points are hidden, field workers and respondents can apply common sense to guess how response options are linked with poverty.

[18] 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 the UBOS does in the UNHS.

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." 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 who use scoring for targeting in Uganda.

In terms of implementation and 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 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. The focus, however, 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 have a chance to meaningfully inform questions that matter to the organization.

The 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 declared their intention to apply the Simple Poverty Scorecard tool for Bangladesh (Schreiner, 2013) 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 Uganda, 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 poor, 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 100% of the national line, scores of 15–19 have a poverty likelihood of 39.9 percent, and scores of 20–24 have a poverty likelihood of 30.4 percent (Figure 4).

The poverty likelihood associated with a score varies by poverty line. For example, scores of 15–19 are associated with a poverty likelihood of 39.9 percent for 100% of the national line but of 65.3 percent for the $1.25/day 2005 PPP line.[19]

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-adult-equivalent consumption or per-capita consumption below a given poverty line.

[19] Starting with Figure 4, many figures have 10 versions, one for each poverty line. To keep them straight, figures are grouped by line. Single figures pertaining to all lines are placed with the figures for 100% of the national line.

For the example of 100% of the national line (Figure 5), there are 6,831 (normalized) households in the calibration sub-sample with a score of 15–19. Of these, 2,723 (normalized) are below the poverty line. The estimated poverty likelihood associated with a score of 15–19 is then 39.9 percent, because 2,723 ÷ 6,831 = 39.9 percent.

To illustrate with 100% of the national line and a score of 20–24, there are 8,284 (normalized) households in the calibration sample, of whom 2,519 (normalized) are below the line (Figure 5). The poverty likelihood for this score range is then 2,519 ÷ 8,284 = 30.4 percent.

The same method is used to calibrate scores with estimated poverty likelihoods for all 10 poverty lines.[20]

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.*, 2014). Of course,

[20] 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 while keeping users from balking when sampling variation in score ranges with few households would otherwise lead to higher scores being linked with higher poverty likelihoods.

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 objectivity depends on using data in score calibration, not on using data (and nothing else) in scorecard construction.

Although the points in the Uganda 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 in the population. Given the assumptions above, 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.[21]

Of course, the relationships between indicators and poverty do change to some unknown extent over time and also across sub-national groups in Uganda's population. Thus, the scorecard will generally be biased when applied after July 2013 (the last month of fieldwork for the 2012/13 UNHS) 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 Uganda 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 4) and the true poverty likelihood in the bootstrap sample
- Repeat the previous three steps 1,000 times
- For each score, report the average difference between estimated and true poverty likelihoods across the 1,000 bootstrap samples
- For each score, report the two-sided intervals containing the central 900, 950, and 990 differences between estimated and true poverty likelihoods

[21] This follows because these estimates of groups' poverty rates are linear functions of the unbiased estimates of households' 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 example of 100% of the national line, the average poverty likelihood across bootstrap samples for scores of 15–19 in the validation sample is too low by 19.6 percentage points. For scores of 20–24, the estimate is too high by 6.9 percentage points.[22]

The 90-percent confidence interval for the differences for scores of 15–19 is ±11.2 percentage points (100% of the national line, Figure 6). This means that in 900 of 1,000 bootstraps, the difference between the estimate and the true value is between –30.8 and –8.4 percentage points (because –19.6 – 11.2 = –30.8, and –19.6 + 11.2 = –8.4). In 950 of 1,000 bootstraps (95 percent), the difference is –19.6 ± 11.5 percentage points, and in 990 of 1,000 bootstraps (99 percent), the difference is –19.6 ± 12.1 percentage points.

A few differences between estimated poverty likelihoods and true values in Figure 6 are 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 Uganda's population. For targeting, however, what matters is less the difference in all score ranges and more the differences

[22] These differences are not zero, despite the estimator's unbiasedness, because the scorecard comes from a single sample from the 2012/13 UNHS. The average difference by score range would be zero if the UNHS was repeatedly applied to samples of the population of Uganda and then split into sub-samples before repeating the entire process of scorecard construction/calibration and validation.

in the score ranges just above and below the targeting cut-off. This mitigates the effects of bias and sampling variation on targeting (Friedman, 1997). Section 8 below looks at targeting accuracy in detail.

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

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 UNHS fieldwork in July 2013. That is, the scorecard may fit the data from the 2012/13 UNHS 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 2012/13 UNHS but not in the overall population of Uganda. 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 samples that are not nationally representative.

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 for nationally representative samples (see the next section). Furthermore, at least some of the differences in change-through-time estimates may 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 the availability, frequency, quantity, and quality of data from national consumption surveys (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 2015 and that they have scores of 20, 30, and 40, corresponding to poverty likelihoods of 30.4, 10.0, and 6.3 percent (100% of the national line, Figure 4). The group's estimated poverty rate is the households' average poverty likelihood of (30.4 + 10.0 + 6.3) ÷ 3 = 15.6 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 10.0 percent. This differs from the 15.6 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 meaningfully 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.

Existing users of the old 2009/10 scorecard who switch to the new 2012/13 scorecard and who want to salvage existing poverty-rate estimates for measuring

change over time can do so with a baseline from the old 2009/10 scorecard and a follow-up from the new 2012/13 scorecard.

6.1 Accuracy of estimated poverty rates at a point in time

For Uganda's new 2012/13 scorecard applied to 1,000 bootstraps of $n = 16{,}384$ from the validation sample and 100% of the national poverty line, the average difference between the estimated poverty rate at a point in time versus the true rate is –0.1 percentage points (Figure 8, summarizing Figure 7 across all poverty lines). Across all 10 poverty lines in the validation sample, the maximum absolute difference is 2.1 percentage points, and the average absolute difference is about 0.9 percentage points. At least part of these differences is due to sampling variation in the division of the 2012/13 UNHS 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 example of Uganda's new 2012/13 scorecard and 100% of the national line in the validation sample, bias is –0.1 percentage points, so the unbiased estimate in the three-household example above is 15.6 – (–0.1) = 15.7 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 ±0.6 percentage points or better for all lines (Figure 8). This means that in 900 of 1,000 bootstraps of this size, the estimate (after subtracting off bias) is within 0.6 percentage points of the true value.

For example, suppose that the average poverty likelihood in a sample of $n =$ 16,384 with the Uganda scorecard and 100% of the national line is 15.6 percent. Then estimates in 90 percent of such samples would be expected to fall in the range of 15.6 – (–0.1) – 0.5 = 15.2 percent to 15.6 – (–0.1) + 0.2 = 16.2 percent, with the most likely true value being the unbiased estimate in the middle of this range, that is, 15.6 – (–0.1) = 15.7 percent. This is because the original (biased) estimate is 15.6 percent, bias is –0.1 percentage points, and the 90-percent confidence interval for 100% of the national line in the validation sample with this sample size is ±0.5 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 (*bias*), together with their standard error (*precision*).

Schreiner (2008a) proposes an approach to deriving a formula for the standard errors of estimated poverty rates at a point in time from indirect measurement via the scorecard. It starts with Cochran's (1977) textbook formula of $\pm c = \pm z \cdot \sigma$ that relates confidence intervals with standard errors in the case of the direct measurement of ratios, 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, Uganda's 2012/13 UNHS gives a direct-measurement estimate of the household-level poverty rate for 100% of the national line in the validation sample of $\hat{p} = 15.6$ percent (Figure 1). If this estimate came from a sample of $n = 16{,}384$ households from a population N of 7,097,404 (the number of households in Uganda in 2012/13 according to the UNHS sampling weights), then the finite population correction

ϕ is $\sqrt{\frac{7{,}097{,}404 - 16{,}384}{7{,}097{,}404 - 1}} = 0.9988$, which very close to $\phi = 1$. If the desired confidence level is 90-percent ($z = 1.64$), then the confidence interval $\pm c$ is

$$\pm\, z \cdot \sqrt{\frac{\hat{p} \cdot (1 - \hat{p})}{n}} \cdot \sqrt{\frac{N - n}{N - 1}} = \pm 1.64 \cdot \sqrt{\frac{0.156 \cdot (1 - 0.156)}{16{,}384}} \cdot \sqrt{\frac{7{,}097{,}404 - 16{,}384}{7{,}097{,}404 - 1}} = \pm 0.464$$

percentage points. (If ϕ were taken as 1, then the interval is ± 0.465 percentage points.)

Scorecards, however, do not measure poverty directly, so this formula is not applicable. To derive a formula for the Uganda 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 100% of the national line in the validation sample, the 90-percent confidence interval is ± 0.502 percentage points.[23]

Thus, the 90-percent confidence interval with $n = 16{,}384$ is ± 0.502 percentage points for the Uganda scorecard and ± 0.464 percentage points for direct measurement. The ratio of the two intervals is $0.502 \div 0.464 = 1.08$.

Now consider the same exercise, but with $n = 8{,}192$. The confidence interval under direct measurement and 100% of the national line in the validation sample is

$\pm\, 1.64 \cdot \sqrt{\frac{0.156 \cdot (1 - 0.156)}{8{,}192}} \cdot \sqrt{\frac{7{,}097{,}404 - 8{,}192}{7{,}097{,}404 - 1}} = \pm 0.657$ percentage points. The empirical confidence interval with the Uganda scorecard (Figure 7) is ± 0.708 percentage points. Thus for $n = 8{,}192$, the ratio of the two intervals is $0.708 \div 0.657 = 1.08$.

[23] Due to rounding, Figure 7 displays 0.5, not 0.502.

This ratio of 1.08 for $n = 8{,}192$ is the same as the ratio for $n = 16{,}384$. Across all sample sizes of 256 or more in Figure 7, these ratios are generally close to each other, and the average ratio in the validation sample turns out to be 1.08 (Figure 8), implying that confidence intervals for indirect estimates of poverty rates via the Uganda scorecard and 100% of the national poverty line are—for a given sample size—about 8-percent wider than confidence intervals for direct estimates via the 2012/13 UNHS. This 1.08 appears in Figure 8 as the "α factor" because if $\alpha = 1.08$, then the formula for confidence intervals c for the Uganda 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 less than 1.00, it means that the scorecard is more precise than direct measurement. It turns out that α is less than 1.00 for seven of ten 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 $\tilde{p}$ 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

$$n = N \cdot \left(\frac{z^2 \cdot \alpha^2 \cdot \tilde{p} \cdot (1 - \tilde{p})}{z^2 \cdot \alpha^2 \cdot \tilde{p} \cdot (1 - \tilde{p}) + c^2 \cdot (N - 1)} \right).$$ 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 7,097,404 (the number of households in Uganda in 2012/13), suppose $c = 0.03986$, $z = 1.64$ (90-percent confidence), and the relevant poverty line is 100% of the national line so that the most sensible expected poverty rate $\widetilde{p}$ is Uganda's overall poverty rate for that line in 2012/13 (15.6 percent at the household level, Figure 1). The α factor is 1.08 (Figure 8). Then the sample-size formula gives

$$n = 7{,}097{,}404 \cdot \left(\frac{1.64^2 \cdot 1.08^2 \cdot 0.156 \cdot (1 - 0.156)}{1.64^2 \cdot 1.08^2 \cdot 0.156 \cdot (1 - 0.156) + 0.03986^2 \cdot (7{,}097{,}404 - 1)}\right) = 260,$$

which is close to the sample size of 256 observed for these parameters in Figure 7 for 100% of the national line. Taking the finite population correction factor ϕ as one (1) gives the same result, as $n = \left(\frac{1.08 \cdot 1.64}{0.03986}\right)^2 \cdot 0.156 \cdot (1 - 0.156) = 260$.[24]

Of course, the α factors in Figure 8 are specific to Uganda, its poverty lines, its poverty rates, and its scorecard. The derivation of the formulas for standard errors

[24] 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 Uganda should report using the $1.25/day line. Given the α factor of 1.02 for this line in 2012/13 (Figure 8), an expected before-measurement household-level poverty rate of 15.6 percent (the all-Uganda rate in 2012/13, Figure 1), and a confidence level of 90 percent ($z = 1.64$), then $n = 300$ implies a confidence interval of $\pm 1.64 \cdot 1.02 \cdot \sqrt{\frac{0.156 \cdot (1 - 0.156)}{300}} = \pm 3.5$ percentage points.

using the α factors, however, is valid for any scorecard following the approach in this paper.

In practice after the end of fieldwork for the UNHS in July 2013, a program would select a poverty line (say, 100% of 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 100% of the national line for Uganda of 15.6 percent in the 2012/13 UNHS in Figure 1), look up α (here, 1.08 in Figure 8), assume that the scorecard will still work in the future and for sub-groups that are not nationally representative,[25] and then compute the required sample size. In this illustration, $n = 10{,}000 \cdot \left(\frac{1.64^2 \cdot 1.08^2 \cdot 0.156 \cdot (1 - 0.156)}{1.64^2 \cdot 1.08^2 \cdot 0.156 \cdot (1 - 0.156) + 0.02^2 \cdot (10{,}000 - 1)} \right) =$ 937.

[25] This paper reports accuracy for the scorecard applied to its validation sample, but it cannot test accuracy for later years or for sub-groups. Performance after July 2013 will resemble that in the 2012/13 UNHS 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.

For some indicators in the new scorecard, the wording or response options in the 2009/10 UNHS differ from the 2012/13 UNHS. This precludes applying the new 2012/13 scorecard to data from the 2009/10 UNHS. Thus, this paper cannot test the accuracy of estimates of change over time for Uganda, and it can only suggest approximate formulas for standard errors. Nonetheless, the relevant concepts are presented here because, in practice, local pro-poor organizations in Uganda 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 2016, an organization samples three households who score 20, 30, and 40 and so have poverty likelihoods of 30.4, 10.0, and 6.3 percent (100% of the national line, Figure 4). Adjusting for the known bias in the validation sample of –0.1 percentage points (Figure 8), the group's baseline estimated poverty rate is the households' average poverty likelihood of $[(30.4 + 10.0 + 6.3) \div 3] - (-0.1) = 15.7$ 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 2018, 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 23.0, 7.0, and 3.0 percent, 100% of the national line, Figure 4). Adjusting for the known bias, the average poverty likelihood at follow-up is $[(23.0 + 7.0 + 3.0) \div 3] - (-0.1) = 11.1$ percent, an improvement of $15.7 - 11.1 = 4.6$ percentage points.[26]

[26] 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 22 participants in this hypothetical example cross the poverty line in 2016/8.[27] Among those who start below the line, about one in three or four (4.6 ÷ 15.7 = 29.3 percent) on net end up above the line.[28]

7.3 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,[29] and α is the average (across a range of bootstrap samples of various sample sizes) of the ratio of the observed confidence interval from a scorecard and the theoretical confidence interval under direct measurement.

[27] This is a net figure; some start above the line and end below it, and vice versa.
[28] The scorecard does not reveal the reasons for this change.
[29] 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.

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, 2015a, 2015b, 2013a, 2013b, 2012c, 2010, 2009a, 2009b, 2009c, 2009d; and Chen and Schreiner, 2009). The simple average of α across countries—after averaging α across poverty lines and survey years within each country—is 1.06. This rough figure is as reasonable as any to use for Uganda.

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 100% of the national line, $\alpha = 1.06$, $\hat{p} = 0.156$ (the household-level poverty rate in 2012/13 for 100% of the national line in Figure 1), and the population N is large enough relative to the expected sample size n that the finite population correction ϕ can be taken as one. Then the baseline sample size is $n = 2 \cdot \left(\frac{1.06 \cdot 1.64}{0.02} \right)^2 \cdot 0.156 \cdot (1 - 0.156) \cdot 1 = 1{,}990$, and the follow-up sample size is also 1,990.

7.4 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:[30]

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

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.

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

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

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

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 Uganda scorecard is applied twice (once after July 2013 and then again later) is

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

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 100% of the national line, the sample will first be scored in 2015 and then again in 2018 ($y = 3$), 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 $p_{2012/13}$ is taken as 15.6 percent (Figure 1), and α is assumed to be 1.30. Then the baseline sample size is

$n = 2 \cdot \left(\frac{1.30 \cdot 1.64}{0.02}\right)^2 \cdot \left\{-0.02 + 0.016 \cdot 3 + 0.47 \cdot [0.156 \cdot (1 - 0.156)]\right\} \cdot 1 = 2{,}043$. The same group of 2,043 households is scored at follow-up as well.

8. Targeting

When an organization uses the scorecard for segmenting clients for targeted services, 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 Uganda. For an example cut-off of 19 or less, outcomes for 100% of the national line in the validation sample are:

- Inclusion: 8.2 percent are below the line and correctly targeted
- Undercoverage: 7.4 percent are below the line and mistakenly not targeted
- Leakage: 6.7 percent are above the line and mistakenly targeted
- Exclusion: 77.7 percent are above the line and correctly not targeted

Increasing the cut-off to 24 or less improves inclusion and undercoverage but worsens leakage and exclusion:

- Inclusion: 10.7 percent are below the line and correctly targeted
- Undercoverage: 4.9 percent are below the line and mistakenly not targeted
- Leakage: 12.5 percent are above the line and mistakenly targeted
- Exclusion: 71.9 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 the "hit rate", where total net benefit is the number of households correctly included or correctly excluded:

Hit rate =	1	x	Households correctly included	–
	0	x	Households mistakenly undercovered	–
	0	x	Households mistakenly leaked	+
	1	x	Households correctly excluded.	

Figure 10 shows the hit rate for all cut-offs for the new 2012/13 scorecard for Uganda. For 100% of the national line in the validation sample, total net benefit is greatest (86.2) for a cut-off of 14 or less, with about seven in eight households in Uganda correctly classified.

The hit rate 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, then 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).[31]

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 Uganda 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 100% of the national line, targeting households in the validation sample who score 19 or less would target 14.9 percent of all households (second column) and would be associated with a poverty rate among those targeted of 55.1 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 100% of the national line with the validation sample and a cut-off of 19 or less, 52.7 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 100% of the national line with the validation sample and a cut-off of 19 or less, covering 1.2 poor households means leaking to 1 non-poor household.

[31] Figure 10 also reports BPAC, the Balanced Poverty Accuracy Criteria adopted by USAID for certifying poverty-assessment tools. BPAC is discussed in detail in Section 9.

9. Context for poverty-assessment tools in Uganda

This section discusses 12 poverty-assessment tools for Uganda in terms of their goals, methods, definitions of *poverty*, data, indicators, bias, precision, and cost. In general, the advantages of the scorecard are its:

- Use of data from the most recent available nationally representative consumption survey
- Use of a consumption-based definition of *poverty* that is widely understood and that is used by the government of Uganda
- Reporting bias and precision for estimates of poverty rates at a point in time from out-of-sample tests, including formulas for standard errors
- Using fewer and lower-cost indicators
- Targeting accuracy that is similar to that of alternative approaches
- Feasibility for local, pro-poor programs, due to its simplicity and transparency

9.1 Asset indexes

This sub-section reviews asset indexes derived using Principal Components Analysis with simple, low-cost indicators for Uganda. PCA asset indexes are like the scorecard here except that, because they do not consider consumption, they are based on a different conception of *poverty*, their accuracy vis-à-vis consumption-based poverty is unknown, and they can only be assumed to be a proxy for long-term wealth/economic status.[32] Well-known examples of the PCA asset-index approach include Stifel and

[32] 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 Lindelow (2006), Wagstaff and Watanabe (2003), and Montgomery *et al.* (2000).

Christiaensen (2007), Zeller *et al.* (2006a), Sahn and Stifel (2003), and Filmer and Pritchett (2001).

PCA indexes were developed for use in the health-care field to:

- Segment households by quintiles to see how health, population, and nutrition vary with socio-economic status
- Monitor (via exit surveys) how well local health-service posts reach the poor
- Measure coverage of health services via local, 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.

PCA asset indexes share many of the strengths of the scorecard approach in that they can be used for targeting and in that they are flexible, low-cost, and adaptable to diverse contexts. Because asset indexes do not require price adjustments over time or between countries—and because they do not require any consumption data at all—they are more adaptable in these dimensions than is the scorecard.

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

In essence, PCA asset indexes define *poverty* in terms of the indicators and the points in the index itself.[33] Thus, the index is not a proxy standing in for something else (such as consumption); rather, it is a direct measure of a non-consumption-based

[33] In this way, asset indexes resemble the Multidimensional Poverty Index (for Uganda, see Gaddis and Klasen, 2013; and Levine, Muwonge, and Batata, 2012).

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.

9.1.1 Gwatkin *et al.*

Gwatkin *et al.* (2007) apply to Uganda an approach that they use in 56 countries with Demographic and Health Surveys (Rutstein and Johnson, 2004). They construct a PCA asset index using 20 simple, low-cost indicators available for the 7,855 households in Uganda's 2000/1 DHS:

- Characteristics of the residence:
  - Type of floor
  - Type of wall
  - Type of roof
  - Fuel for cooking
  - Source of drinking water
  - Type of toilet arrangement
  - Electrical connection
  - Means of lighting
- Ownership of consumer durables:
  - Cupboard
  - Lantern
  - Radio
  - Television
  - Refrigerator
  - Telephone
  - Bicycle
  - Motorcycle
  - Car or truck
  - Boat or canoe
- Agriculture:
  - Whether any household members work their own or family's agricultural land
  - Donkey

Like most PCA asset indexes, the Gwatkin *et al.* index is more difficult and costly than the scorecard because it cannot be computed by hand in the field, as it has 20 indicators and 140 point values (half of them negative, and all with five decimal places).

9.1.2 Sahn and Stifel

Sahn and Stifel (2000) use factor analysis (a close relative of PCA) to construct an asset index that defines *poverty* in terms of long-term wealth. Their purpose is assessment (to inform governments and donors on the broad progress of poverty-reduction efforts in Africa) rather than management (to provide a tool to help pro-poor programs in Africa to improve their products and services).

To make their index, Sahn and Stifel pool data from Uganda's 1988 DHS (n = 5,101) and 1995 DHS (n = 7,550).[34] After defining poverty status according to lines set at the 25th and 40th percentiles of the asset index, they compare the distribution of the index and poverty rates over time (within Uganda) and across countries (Uganda and 10 other sub-Saharan countries).

For the cross-country analysis, Sahn and Stifel construct a single cross-country index from pooled DHS data for the 11 countries (plus five others for which only a single DHS round is available).[35] This elegantly allows them to compare asset-based poverty across time (within a country) and across countries based on a single index

[34] These DHS are not nationally representative.
[35] This is possible because, in all rounds and countries, the DHS uses a common set of simple, inexpensive, and verifiable indicators.

with a definition of *poverty* that—unlike a consumption-based definition—is measured consistently across time and countries.

Like the other asset indexes reviewed here, Sahn and Stifel (2000) share many of the strengths of the scorecard approach in that it can be used for targeting and in that it is flexible, low-cost, and adaptable to diverse contexts. In particular, an asset index does not require price adjustments over time and nor consumption data.

Sahn and Stifel's nine indicators are similar to those in Gwatkin *et al.* and in the scorecard here:

- Education of the head
- Characteristics of the residence:
  - Type of floor
  - Source of drinking water
  - Type of toilet arrangement
- Ownership of consumer durables:
  - Radio
  - Television
  - Refrigerator
  - Bicycle
  - Motorized transport

Sahn and Stifel (2000) find that their head-count measure of asset-based poverty decreased in Uganda between 1988 and 1995.

9.1.3 Filmer and Scott

Filmer and Scott (2008) test (on 11 countries, including Uganda) how well different types of asset indexes produce ranks that correlate with ranks from:

- Other asset indexes
- Consumption as directly measured by a survey
- Consumption as predicted by a regression (that is, a poverty-assessment tool)

They find that different approaches to constructing asset indexes generally lead to similar rankings vis-à-vis the benchmarks of directly measured consumption and regression-estimated consumption. This result is strongest for countries where regression works well for predicting consumption and weakest for less-poor countries with larger shares of non-food consumption.

For Uganda, Filmer and Scott use data on the 10,696 households in the 2000/1 UNHS, selecting 13 simple, low-cost, and verifiable indicators:

- Characteristics of the residence:
  - Tenancy status
  - Type of floor
  - Type of roof
  - Type of toilet arrangement
  - Source of lighting
  - Rooms per person
- Ownership of consumer durables:
  - Furnishings
  - Electronic appliances
  - Jewelry and watches
  - Bicycles
  - Other transportation assets
  - Houses
  - Other buildings

As Filmer and Scott's goal is to establish general properties of approaches to constructing asset indexes (rather than to provide asset indexes that local, pro-poor programs can use), they do not report the tool's points nor standard errors.

9.1.4 Zeller *et al.*

Zeller *et al.* (2006a) follow the approach of Zeller *et al.* (2006b) and Henry *et al.* (2003)[36] to construct PCA-based asset indexes for Uganda (and Bangladesh, Peru, and Kazakhstan) in order to:

- Predict households' poverty status and to monitor the poverty rates of groups of households with easily measured indicators
- Compare in-sample to out-of-sample predictive power[37]
- Report confidence intervals (equivalent to reporting standard errors)
- Compare the accuracy of a PCA asset index with that of poverty-assessment tools that directly estimate consumption or consumption-based poverty likelihoods (see next sub-sections)

Zeller *et al.* use their own nationally representative survey of 800 households in Uganda from August to October 2004 (Zeller and Alcaraz V., 2005a).[38] The poverty line is $1.08/day 1993 PPP, giving a household-level poverty rate in their data of 31.4

[36] Before the advent of the scorecard approach, this PCA-based "CGAP PAT" was the most widely used poverty-assessment tool in microfinance.

[37] *In-sample* tests use the same data to construct a tool as well as to test its accuracy. *Out-of-sample* tests divide data in two parts, one for tool construction and another for accuracy testing. In practice, poverty-assessment tools are used out-of-sample, so out-of-sample tests are more relevant. Also, in-sample tests tend to overstate accuracy. This paper uses out-of-sample tests with the scorecard.

[38] Zeller *et al.* do not use the 2002/3 UNHS—despite its availability, much larger sample, and almost-universal use in poverty research for Uganda—because they want to test some potential indicators that the UNHS does not collect. Nevertheless, all ten indicators that end up in their PCA index are also in the UNHS.

percent. Two-thirds of the data is used for construction, and one-third is set aside for out-of-sample validation.

Zeller *et al.* construct five types of poverty-assessment tools:

- Least-squares regression to estimate the logarithm of per-capita (not per-adult-equivalent) consumption for comparison with a consumption-based poverty line
- Quantile regression (Koenker and Hallock, 2001) to estimate the 46th percentile of per-capita consumption for comparison with a poverty line
- Probit regression to estimate the likelihood that consumption is below a poverty line
- Least-squares regression to estimate the likelihood of being below a poverty line
- PCA to find "the linear combination of the original indicators that accounts for the maximum of the total variance in the original indicators" (Zeller *et al.*, p. 6)

The four non-PCA tools are the same ones constructed by some of the same authors for the USAID/IRIS PAT (see next sub-section).

The ten indicators in the PCA index are:

- Characteristics of the residence:
  - Type of floor
  - Type of roof
  - Source of drinking water
  - Type of toilet arrangement
  - Type of cooking fuel
  - Source of lighting
- Ownership of consumer durables:
  - Black-and-white television
  - Mobile telephone
  - Savings account
  - Logarithm of the value of jewelry

According to Zeller *et al.* (p. 12), "the 10 indicators are fairly easy to measure in household surveys." But two indicators seem difficult: some households may be reluctant to reveal their ownership of savings accounts or jewelry, and if they do report

having jewelry, they are unlikely to estimate its value accurately. Furthermore, the index is not presented in a ready-to-use format.

To compare accuracy for the asset index versus the other four approaches requires a benchmark that defines whether a given household is poor. A common definition is whether a household has consumption below a poverty line.[39] Zeller *et al.*, however, use two definitions of poverty. For the PCA asset index, their benchmark is whether a household's asset-index value is below the average asset-index value of the 20 households centered on the 31.4th percentile of their construction sample. For the other four approaches, Zeller *et al.*'s benchmark is whether consumption from their survey is below $1.08/day 1993 PPP.

Using two benchmarks invalidates Zeller *et al.*'s accuracy comparisons. It does not make sense to compare how an PCA-based tool predicts one definition of *poverty* (having an index value below a given percentile in the ranking of households by the PCA tool itself) against how a non-PCA poverty-assessment tool predicts another definition of *poverty* (having consumption below a poverty line). Even though both definitions give poverty rates of 34.1 percent, the specific households defined as poor differ.

Thus, even if an asset index predicted poverty rates as accurately as an consumption-based tool, or even if an asset index targets poor households (by its definition) as accurately as an consumption-based tool (with a different definition), it

[39] Schreiner (2011b) uses this benchmark to compare the accuracy of a PCA index versus the scorecard in Bangladesh, Ethiopia, and Malawi.

says nothing about the two tools' relative power for a single, common definition of *poverty*.

Nevertheless, Zeller *et al.* (pp. 20–21) conclude that "our results demonstrate that these [PCA-based asset] indexes can be calibrated to predict absolute poverty status with relatively high accuracy." Even if their comparisons could be taken at face value, it is not clear by what standard accuracy is *relatively high*. In Zeller *et al.*'s out-of-sample tests, Uganda's PCA index has the lowest targeting accuracy and the most-biased estimates of poverty rates. For Bangladesh, "PCA is one of the most inferior methods" (Zeller *et al.*, p. 15), being next-to-last in terms of poverty-rate bias and third in terms of targeting. For Peru, the asset index does better, coming in second of five for both estimated poverty rates and for targeting. Finally, the Kazakhstan asset index has the worst bias and the second-best targeting accuracy.[40]

9.2 Direct-consumption poverty-assessment tools

As just discussed, an alternative to PCA asset indexes are poverty-assessment tools that estimate consumption-based poverty status directly as the:

- Level of consumption (which is compared to a poverty line to get poverty status), or
- Likelihood of having consumption below a poverty line

[40] Results for Kazakhstan are to be taken with a grain of salt, as only 37 of 800 households surveyed are poor (Zeller and Alcaraz V., 2005b). Given that the validation sample has about 13 poor households, sampling variation and overfitting should lead to imprecise estimates of out-of-sample accuracy and large in-sample/out-of-sample differences, and this is, in fact, what is observed (Zeller *et al.*, p. 15).

This sub-section presents direct-consumption tools for Uganda, and the next sub-section presents poverty-likelihood tools (like the scorecard).

Tools that estimate consumption directly are constructed from stepwise regressions that relate indicators to the logarithm of consumption. When the tool is applied to a given household, estimated consumption is the total points (raised to the power of 2.718281828). The household is "poor" if this estimate is below a given poverty line.

The direct-consumption approach has two weaknesses. First, its estimates of poverty rates are biased.[41] Second, it ignores that estimated consumption is an estimate; even though the point estimate of consumption is on one side of a poverty line, true consumption may be on the other side. For example, if a household's estimated consumption is UGX1,000 and the poverty line is UGX1,011, this approach labels the household as 100-percent poor, even though the likelihood that true consumption is above the line may be, say 47 percent. It is better to say that there is a 53-percent likelihood of being poor and a 47-percent likelihood of being non-poor.[42] In general, the errors of the direct-consumption approach on one side of the poverty line do not balance the errors on the other side, even on average in repeated samples.

[41] See Mathiassen (2009), Bedi, Coudouel, and Simler (2007), and Hentschel *et al.* (2000). Bias comes from changing the continuous estimate of consumption into a discrete poor/non-poor label.

[42] The poverty-likelihood approach in the next sub-section does exactly this.

The documents for the tools below seem unaware of these issues. In practice, however, direct-consumption tools are about as accurate as poverty-likelihood tools, so these issues are not reasons to favor one approach or the other.

9.2.1 IRIS Center

USAID commissioned IRIS Center (2010; see also Zeller and Alcaraz V., 2005a) to build a "Poverty Assessment Tool" (PAT) so that USAID's microenterprise partners in Uganda could report the share of their participants who are "very poor" (for Uganda in 2004, below $1.25/day 2005 PPP). In general, the PAT for Uganda is like the scorecard, except that it:

- Follows the direct-consumption approach and so uses poverty likelihoods of either 0 or 100 percent (rather than between 0 and 100)
- Uses an older (2004 versus 2012/13) and smaller survey (n of 788 versus 6,887)
- Has more indicators (17 rather than 10)
- Does not report standard errors

IRIS uses the same data as Zeller *et al.* (2006a). The tool supports five poverty lines in 2005 PPP:[43]

- $0.75/day
- $1.00/day
- $1.25/day
- $2.00/day
- $2.50/day

[43] $1.25/day 2005 PPP is 888UGX per person per day in prices as of September 2004 (`povertytools.org/countries/Uganda/Uganda.html`, retrieved 21 June 2015).

IRIS tests the four direct-consumption methods discussed in Zeller *et al.* (2006a) in both one-stage and two-stage versions (IRIS, 2005; Zeller and Alcaraz V., 2005a), settling on a one-step quantile regression that estimates the 54^{th} percentile of the logarithm of per-capita household consumption. Its 17 indicators (IRIS, 2010) differ from those in Zeller *et al.* (2006a):

- Demographics:
  - — Household size (and its square)
  - — Age of the head (and its square)
  - — Marital status of the head
- Education:
  - — Educational attainment of the head
  - — Share of HH members (excluding head) who have not completed first grade
  - — Share of HH members (excluding head) who completed superior education
- Whether any household member had a serious chronic illness or a major disability in the last three years
- Characteristics of the residence:
  - — Type of roof
  - — Type of fuel for cooking
  - — Source of lighting
- Ownership of consumer durables:
  - — Number of leather shoes owned by the household head
  - — Number of metal cooking pots (including sauce pans)
  - — Sprayers with a pump
  - — Number of *panga*
  - — Number of chickens and ducks
- Location:
  - — Region
  - — Urban/rural

All these indicators—except the one related to historical illness and disability—are simple and verifiable.

In terms of accuracy, IRIS reports in-sample results in terms of:

- Bias of estimated poverty rates at a point in time[44]
- Targeting (inclusion, undercoverage, leakage, and exclusion)
- The Balanced Poverty Accuracy Criterion

The purpose of the IRIS PAT is to estimate poverty rates for USAID. Its bias for estimated poverty rates is –0.1 percentage points (IRIS, 2010). In terms of targeting with the lowest-ranking 47 percent of households, inclusion is 35.7 percent, exclusion is 41.6 percent, and the hit rate is 77.3 percent. The PAT has a Balanced Poverty Accuracy Criterion of 75.5.

IRIS Center (2005) introduced BPAC, and USAID adopted it as its criterion for approving poverty-assessment tools for use by its microenterprise partners. BPAC considers accuracy in terms of inclusion and in terms of the absolute difference between undercoverage and leakage (which, under the PAT's approach, is equal to the absolute value of the bias of the estimated poverty rate). The formula is

$$\text{BPAC} = 100 \cdot \left(\frac{\text{Inclusion} - |\ \text{Undercoverage} - \text{Leakage}\ |}{\text{Inclusion} + \text{Undercoverage}} \right).$$

Because bias (in the PAT approach) is the difference between undercoverage and leakage, and because the normalization term $\frac{100}{\text{Inclusion} + \text{Undercoverage}}$ may be relevant only when comparing poverty-assessment tools across populations with different poverty rates (but irrelevant when selecting among alternative tools for a given

[44] IRIS (2005) calls bias the "Poverty Incidence Error" (PIE). IRIS picks a quantile so that undercoverage equals leakage. Under the approach in which estimated poverty likelihoods are either 0 or 100 based on a single cut-off, this makes bias zero, differentiating the PAT from the usual direct-consumption approach.

country in a given year for a given poverty line), the simpler formula

$\text{BPAC} = \text{Inclusion} - |\,\text{Bias}\,|$ ranks tools the same as the more complex formula.

Expressing BPAC as $\text{Inclusion} - |\,\text{Bias}\,|$ helps to show why BPAC is not useful for comparing the PAT with the scorecard (Schreiner, 2014). Given the assumptions discussed earlier in this paper,[45] the scorecard produces unbiased estimates of poverty rates, regardless of whether undercoverage differs from leakage. While BPAC can be used to compare alternative tools that all use the PAT's consumption-estimation approach, it does not make sense to apply BPAC to the scorecard's likelihood-estimation approach. This is because the scorecard does not use a single cut-off to classify households as either 100-percent poor or 0-percent poor. Instead, households have an estimated poverty likelihood somewhere between 0 to 100 percent. If a scorecard user sets a targeting cut-off, then that cut-off matters only for targeting, and it does not affect the estimation of poverty rates at all.

Both the PAT and the scorecard give unbiased estimates of poverty rates (after subtracting off known bias), so any distinction between their accuracy must hinge on targeting or on the precision of estimated poverty rates. Accuracy comparisons with the new scorecard are not done here because IRIS uses different (and older) data, uses in-sample tests, and does not report precision.

Although IRIS reports the PAT's targeting accuracy and although the BPAC formula considers targeting accuracy, IRIS says that the PAT should not be used for

[45] The unbiasedness of the PAT—or of any other poverty-assessment tool—also requires these assumptions.

targeting.[46] IRIS also doubts that the PAT can be useful for measuring change, noting that "it is unclear that the tools will be able to identify real changes in poverty over time due to their inherent measurement errors. Unless the changes in the poverty rate are exceptionally large and unless the tools are exceptionally accurate, then the changes identified are likely to be contained within the margin of error."[47]

Targeting and estimating changes over time are possible uses that are supported for the scorecard. In particular, this paper reports targeting accuracy so users can decide for themselves whether scoring targets adequately for their purposes.

9.2.2 Kraybill and Bashaasha

Kraybill and Bashaasha (2006) seek to test whether the poverty rate in Uganda would be reduced more by targeting households or by targeting geographic areas (Local Council 1 level). To do this, they use data on 9,664 households in the 2002/3 UNHS to construct a direct-consumption poverty-assessment tool with person-weighted least-squares regression. They compute per-adult-equivalent consumption themselves,[48] adjusting the poverty line to make their poverty rate match the published 37.7 percent. They construct tools at the national level and for urban/rural. The 22 indicators in the national tool are:

- Demographics:
  - — Sex of the head
  - — Age of the head

[46] `povertytools.org/faq/faq.html#11`, retrieved 19 February 2009.
[47] `povertytools.org/faq/faq2.html`, retrieved 7 December 2012.
[48] Although aggregate household consumption is the central item derived from the UNHS, the UBOS apparently did not provide it with the rest of the data.

    - Number of household members:
        - 9-years-old or younger
        - Ages 10 to 17
        - Ages 18 to 59
        - 60-years-old or older
- Education:
    - Number of adult females who completed:
        - Primary
        - Senior secondary
        - University
    - Number of adult males who completed:
        - Primary
        - Senior secondary
        - University
- Employment:
    - Number of adults with formal employment
    - Presence of a non-crop enterprise
- Agricultural assets:
    - Per-capita acres of land cultivated
    - Per-capita value of livestock
- Characteristics of the community:
    - Availability of electricity
    - Average distance to nearest:
        - Schools
        - Health posts
        - Government offices
    - Presence of two outlets selling agricultural inputs within five kilometers
    - Presence of a paid phone booth within two kilometers
    - Presence of a feeder/rural access/all-weather road within one km
    - Presence of a formal lender who does not require collateral within 10 km

Absent are indicators for the ownership of consumer durables (they were not collected in the 2002/3 UNHS) and for characteristics of the residence. Usually, these two classes provide several indicators, so their absence weakens this tool.

Assuming that all the relationships between indicators and poverty in their tool are causal, Kraybill and Bashaasha simulate the changes in poverty rates when targeting the poorest 10 percent of Local Council 1 jurisdictions versus targeting

households with the same number of people as in the geographically targeted jurisdictions. They consider six hypothetical policies that would somehow:

- Reduce by one the number of children 9-years-old or younger
- If there are adult females, increase by one the number who complete primary school
- If there are adult males, increase by one the number who complete primary school
- If there are adult males, increase by one the number with an A-level certificate
- Increase by one the number people in formal employment
- If a household does not have a non-crop enterprise, create one

It turns out that poverty rates decrease more with geographic targeting than with household targeting. How can this be? As Kraybill and Bashaasha explain, many of the poorest households are so poor that even large increases in consumption are often too little to push them over the poverty line. In contrast, the poorest communities have more poor people who are closer to the poverty line and who can thus leave poverty with a given push. They also point out that if the goal is to reduce not the poverty rate but rather the *poverty gap* (that is, the average distance between poor people and the poverty line), then household targeting would be better.

Kraybill and Bashaara differ from the scorecard here in that they use older data, they act as if they are building an explanatory model rather than a predictive one,[49] they do not report standard errors for their simulated changes in poverty rates, and their tool is has more indicators and is more complex.

More fundamentally, Kraybill and Bashaara seek the best way to target a program that is assumed to achieve a given outcome effectively. In contrast, the

[49] For example, they try to avoid indicators that are highly correlated with other indicators, and they report hypotheses for regression coefficients.

scorecard here seeks to help managers to improve the outcomes of their programs by sticking to its mission to serve the poor. After all, policymakers already know that poverty would be reduced by smaller families, more education, more formal jobs, and more off-farm jobs. The question of how to target an effective program is less important that the question of how to motivate the design, financing, and appropriate implementation of effective programs.

9.2.3 McKay

McKay (2001) reports on a direct-consumption poverty-assessment tool constructed using the 1999/2000 UNHS. The goal is to test the tool as a way for the UBOS to update estimates of poverty rates using non-consumption indicators from "light" monitoring surveys in-between UNHS consumption surveys. Nine tools (one national, and eight for urban/rural in four regions) are tested out-of-sample on data from Uganda's 1997 Monitoring Survey.

The national tool has 15 indicators:

- Demographics:
  - — Number of children 14-years-old or younger
  - — Ratio of all household members to economically active members
- Characteristics of the residence:
  - — Type of floor
  - — Source of drinking water
  - — Source of lighting
  - — People per room
- Ownership of consumer durables:
  - — Asset-index value (McKay does not provide additional detail)
  - — Whether each household member has:
    - Two sets of clothes
    - A blanket

- Expenditure on specific items (in an undocumented period):
  - Whether fresh milk was purchased
  - Level of expenditure on:
    - Sugar
    - Soap
    - Transport
- Characteristics of the community:
  - Region
  - Whether it is affected by cattle rustling

McKay's tools is more complex than the new scorecard here. Two indicators are ratios, the asset-index value is undocumented (but probably has several components), and the four expenditure indicators deal with non-verifiable past events that may be gamed or forgotten.

McKay judges targeting power by the quintile correspondence of ranks based on true consumption versus poverty-assessment tool estimates of consumption. Without explicitly establishing a standard or benchmark, he calls performance "disappointing" because "for any poverty cut-off, non-negligible minorities of households will be predicted as being non-poor when they are in fact poor" (p. 5).

McKay also says that poverty-assessment tools should not be used to estimate poverty indexes because they "predict less variation in the consumption-based standard-of-living measure than there actually is" (p. 5). This is true, but it matters only for higher-order measures (such as the poverty gap) that depend on distance from a poverty line. It does not matter for estimates of poverty rates, which depend only on being below a line.

After McKay finds that his tool is lacking in terms of targeting and in terms of estimating poverty rates,[50] he questions the usefulness of poverty-assessment tools in general, noting that reported accuracy for other countries are not better than in his test for Uganda.

As an alternative to poverty-assessment tools, McKay recommends:

- Monitoring poverty rates using full consumption surveys
- Tracking changes in individual indicators of poverty
- Using poverty-assessment tools only to estimate the average level of consumption

Fortunately, poverty-assessment tools may still be useful for targeting even with "non-negligible" errors, and McKay's Uganda tool may be unusually biased (or data quality may have changed from the 1997 Monitoring Survey and the 1999/2000 UNHS, see Figure 3 in Mathiassen, 2013). Rather than pretending to know the level of targeting accuracy that would be required in all cases, this paper gives potential users the information that they need to judge for themselves. In the same vein, it reports the bias and precision of estimated poverty rates.

Furthermore, whether a given level of accuracy is adequate depends on the cost of attaining more accuracy and on the expected benefits from improved decisions due to greater accuracy. Almost 15 years after McKay, several authors have found that poverty-assessment tools can usefully track changes in poverty rates (Christiaensen *et*

[50] McKay does not report figures for bias nor precision.

al, 2012; Stifel and Christiaensen, 2007; and for Uganda, Mathiassen, 2013; Louto, 2007; and Hoogeveen, Emwanu, and Okwi, 2003).[51]

9.2.4 Louto

Louto (2007) builds a direct-consumption poverty-assessment tool with the 1999/2000 UNHS to predict poverty in the 2002/3 UNHS.[52] Poverty unexpectedly increased between those two surveys, and Luoto seeks to check whether this might be spurious. The increase in poverty in this period is unexpected because Uganda saw improvements in:

- Households' ownership of assets
- Food's share of total consumption
- Most macroeconomic indicators

If a tool's estimate contradicts the survey's direct measures, then it adds to the evidence that the direct, survey-based measures are off. This is because "indicators such as the presence or absence of a radio in the home are arguably easier to measure accurately than is a consumption figure that is aggregated over many individual components and adjusted for spatial and temporal price differences" (Louto, p. 15).

Louto's data from the UBOS did not include official poverty lines nor consumption measures,[53] so she computes them herself (following Appleton, 2001) and then constructs urban and rural tools for each region. Unlike McKay, Luoto finds

[51] The previous section also cites papers on 11 countries that report bias and precision for estimates of changes in poverty rates from the scorecard.
[52] McKay also uses the 1999/2000 UNHS, predicting backward to the 1997 Monitoring Survey rather than forward to the 2002/3 UNHS.
[53] As for Kraybill and Bashaara, UBOS' omission of consumption is ironic, as it is the most-important item derived from the UNHS.

support for the assumption—unavoidable when using a poverty-assessment tool to track change—that the relationships between indicators and poverty is constant over time.

Luoto's tool for all of Uganda has 19 indicators:

- Demographics:
  - Household size (and its square)
  - Share of household members who are female
  - Whether the spouse is in the home
- Education:
  - Whether all children ages 6 to 12 attend school
  - Educational attainment of the head (and its square)
  - Average educational attainment of adult females
- Employment: Whether the household runs a non-crop enterprise
- Characteristics of the residence:
  - Type of residence
  - Type of cooking fuel
  - Type of lighting
- Ownership of consumer durables:
  - Radio
  - Bicycle
  - Whether each household member owns two sets of clothes
- Welfare indicators
  - What the household did when last they ran out of salt
  - Whether each household member ate meat or fish in the past seven days
  - Number of illnesses suffered by household members in the past 30 days
  - Number of adult working days lost to illness in the past 30 days
- Location:
  - Region
  - Urban/rural

Given Louto's purpose, it is not surprising that this tool—even though points are reported—would be difficult to implement, as it uses squares, ratios, and four indicators about unverifiable events in the past.

The poverty rate derived directly from the 2002/3 UNHS is 37.7 percent. In contrast, Louto's tool's estimate is about nine percentage points lower (28.8 percent with a 90-percent confidence interval of ±1.3 percentage points). This suggests that poverty fell from 1999/2000 to 2002/3, consistent with non-consumption evidence.[54] Luoto argues that extreme prices imputed to home-grown, home-consumed *matooke* (plantain) are the most likely cause of the unexpected increase in poverty in the UNHS consumption data.

9.2.5 Okwi, Emwanu, Hoogeveen, and Kristjansen

Okwi, Emwanu, and Hoogeveen (2003), and Emwanu, Okwi, Hoogeveen, and Kristjansen (2003, from now on, "OEHK") use Uganda's 1992/3 Integrated Household Survey (IHS) (n = 10,000) to build eight poverty-assessment tools (urban and rural in each of four regions) that are then applied to data from Uganda's January 1991 Population and Housing Census to estimate poverty rates at the level of Uganda's regions, counties, and sub-counties.[55] This is the "poverty mapping" approach of Elbers, Lanjouw, and Lanjouw (2003) and Hentschel *et al.* (2000). The purpose of OEHK's

[54] Still, Louto's estimated nine-percentage-point decrease in three years must also overshoot, albeit in the opposite direction of the UNHS' direct measure.
[55] Emwanu *et al.* (2007) update OEHK's poverty map with data from the 2002/3 UNHS and the 2001 Population Census.

poverty map is to show where the poor are so as to inform pro-poor growth policy and to facilitate the geographic targeting of poverty programs.

To construct their direct-consumption tools, OEHK use stepwise regression to predict the logarithm of per-capita consumption using data from the 1992/3 IHS and indicators found in both in the IHS and in the Census. They apply the tools to households in the Census to estimate poverty rates at various levels of disaggregation. At these levels, the poverty-mapping estimates are more precise than direct estimates based on the IHS,[56] and they can be reported as poverty maps that quickly show—in a way that is clear for non-specialists—how poverty rates vary by location.

[56] Emwanu *et al.* report standard errors but not sample sizes, so their α cannot be compared with that of the new scorecard here. They do not report bias (not having a benchmark against which to measure it).

Poverty mapping in OEHK (and poverty mapping in general) is similar to the scorecard approach in this paper in that they both:

- Build poverty-assessment tools with data that is representative of a population (all-Uganda for the scorecard, and the UNHS survey strata for the poverty map) and then apply the tools to other data on groups that are not, in general, representative of the same populations
- Use simple, verifiable indicators that are quick and inexpensive to collect
- Estimate poverty rates for groups
- Report bias
- Provide unbiased estimates when their assumptions hold
- Seek to be useful in practice and so aim to be understood by non-specialists

Strengths of poverty mapping include that it:

- Has formally established theoretical properties
- Can be applied straightforwardly to measures of well-being (such as the poverty gap) beyond head-count poverty rates
- Accounts for uncertainty in the estimation of a tool's points when estimating standard errors
- Requires data on fewer households for construction and calibration
- Includes community-level indicators, decreasing bias and increasing precision
- Uses only indicators that appear in a census
- Reports standard errors (and complex formula for standard errors)

Strengths of the scorecard include that it:

- Is simpler in terms of both construction and application
- Tests accuracy *out-of-sample* (that is, with data not used in scorecard construction)
- Associates poverty likelihoods with scores non-parametrically
- Reduces overfitting by selecting indicators with statistical and non-statistical criteria and by having only a single, all-Uganda scorecard[57]
- Surfaces estimates of poverty likelihoods for individual households
- Reports straightforward formulas for standard errors

The basic difference between the two approaches is that poverty mapping seeks to help governments to target pro-poor policies, while the scorecard seeks to help local, pro-poor organizations to manage their social performance.[58] On a technical level, OEHK estimate consumption directly, whereas the scorecard estimates poverty likelihoods.

[57] According to Mahadevan, Yoshida, and Praslova (2013, pp. 6–7) "the latest recommendation from poverty-map experts in the World Bank Research Department is not to use multiple [poverty-assessment tools] to predict household consumption" because they can be "problematic since the number of observations for each area becomes small and, as a result, the regression coefficients become less stable." To reduce overfitting, Haslett (2012) recommends that poverty maps be based on a single, all-country poverty-assessment tool.

[58] Another apparent difference is that the developers of poverty mapping (Elbers, Lanjouw, and Lanjouw, 2003; Demombynes *et al.*, 2004) say that poverty mapping is too inaccurate to be used for targeting at the household level. In contrast, Schreiner (2008b) supports household-level targeting as a legitimate, potentially useful application of the scorecard. In Elbers *et al.* (2007), the developers of poverty mapping seem to take a step back from their previous position.

The 24 indicators in OEHK's tool for Uganda's Central Rural region are:

- Demographics:
  - Household size expressed as:
    - Logarithm of number of people
    - Logarithm of the number of adult equivalents
    - Whether there are six household members
  - Number of household members who are male and ages:
    - 15 to 29
    - 30 or older
    - 50 or older
  - Number of household members who are female and ages:
    - 6 to 14
    - 60 or older
  - Proportion of females who are 52-years-old or younger
  - Age of head
- Education:
  - Number of males with education of:
    - One to four years
    - Primary
    - "O" level or higher
  - Proportion of males with secondary education
- Characteristics of the residence:
  - Type of wall
  - Whether the kitchen is shared with another household
  - Type of cooking fuel
  - Type of lighting
- Identity:
  - District
  - Tribal affiliation
- Other indicators whose definitions are not documented:
  - `mnyredad`
  - `mnyredad2`
  - `xnm30min`
  - `maxyredu`

The poverty-map tool can use only indicators that are in both the consumption survey and the census, so most indicators relate to demographics, education, and housing, without indicators for employment nor ownership of assets.

The OEHK tools may be *overfit*, that is, too closely tailored to the construction sample and any random patterns that happen to be in it. Overfitting leads to decreased accuracy in other samples. Clues to overfitting in OEHK include:

- Stepwise regression
- Many combinations of indicators (not listed above), such as the presence of a shared kitchen combined with the proportion of males with secondary education, and `maxyrede` combined with `xnm30min`
- Apportionment of the 20,000 households in the IHS among eight tools
- Similar indicators (such as the logarithm of the number of household members and the logarithm of the number of adult equivalents)
- Indicators without clear logic (such as whether household size is six)

OEHK report out-of-sample bias for their tool at the level of urban and rural areas in each of Uganda's four poverty-line regions and in Kampala. For the national poverty line (with an all-Uganda person-level poverty rate of 55.5 percent), the poverty map's maximum absolute bias in a stratum is 3.1 percentage points, and the average absolute bias across strata is 1.1 percentage points. For the scorecard applied out-of-sample with data from the 2012/13 UNHS in the eight poverty-line regions with 200% of the national poverty line, the maximum absolute bias is 15.3 percentage points, and the average absolute bias is 6.4 percentage points.[59] Thus, at sub-national levels, the poverty map has much less bias than the scorecard.

[59] The comparison is imperfect because, even though 200% of the national line in 2012/13 gives a similar head-count poverty rate (54.1 percent, Figure 1) as the national line in 1992/3 (55.5 percent), the data are 20 years apart. Also, OEHK break Kampala out of the regions of Urban Eastern and Rural Eastern, but this paper cannot do that. Looking only at non-Eastern regions, the tool's maximum absolute bias is 10.5 percentage points, and the average absolute bias is 4.5 percentage points.

9.2.6 Robinson and Rogers *et al.*

In a series of papers,[60] Rogers and Robinson *et al.* use the poverty-mapping approach to predict consumption with remotely sensed (satellite) environmental indicators instead of household-level socio-economic indicators from Uganda's Population Census. Their aim is to inform pro-poor policy by describing poverty, explaining the drivers of poverty, and predicting how changes in the drivers will lead to changes in poverty (Robinson, Emwanu, and Rogers, 2007, p. 205).

According to Rogers and Robinson *et al.*, environmental factors (such as the distance from a main road, aridity, or the length of the growing season) differ from socio-economic characteristics (such as number of household members, type of roof, or ownership of a radio) in that the environment affects a given household more strongly and more immediately than the household affects its environment (as long as the household does not move). Thus, a statistical association between an environmental indicator and consumption is more likely to reflect the causal effect of the environmental indicator on poverty rather than vice versa (and rather than the effect of a third factor that causes or is correlated with both poverty and the environmental indicator). In contrast, owning a radio is mostly caused by poverty. This means that finding that distance from a main road is statistically linked with poverty leads more directly to policy recommendations (build more and better roads closer to where the poor live) than does finding that radio ownership is linked with poverty. Furthermore,

[60] Nelson, Rogers, and Robinson, 2011; Rogers, *et al.*, 2011; Robinson, Emwanu, and Rogers, 2007; Rogers, Emwanu, and Robinson, 2006.

environmental indicators change slowly over time, exist in centralized repositories, and are available for much of the world.

Rogers and Robinson *et al.*'s poverty maps start by averaging household consumption per adult-equivalent from the UNHS 2002/3 in a given spatial cell area (starting as small as 1.1 km^2).[61] Indicators are likewise averaged in a given cell. Indicators and points are then derived with stepwise, spatially-weighted least-squares regression on the average level of consumption in cells (Nelson, Rogers, and Robinson, 2011; and Robinson, Emwanu, and Rogers, 2007) or stepwise discriminant analysis on the decile of average consumption.[62] Only small areas that include households interviewed by the UNHS 2002/3 are used to contruct the poverty-assessment tool, which is then applied to all small areas to predict average consumption. Accuracy and precision—bias, root-mean squared error, mean absolute error, and standard errors—is measured in-sample for areas with UNHS households by comparing predictions with values from the UNHS 2002/3.[63]

---

[61] Rogers and Robinson *et al.* find that the most useful grids are 20–40 km^2.

[62] Rogers *et al.* (2011) do not predict consumption for small areas in Uganda from the 2002/3 UNHS. Instead—and in the spirit of Sahn and Stifel (2000)—they pool DHS data from Eritrea, Ethiopia, Kenya, and Uganda to make a single asset index. They use environmental indicators to predict the deciles of the index for small areas in the four DHS countries as well as in Djibouti, Somalia, and Sudan, three countries in the Horn of Africa without DHS data. While there is no benchmark to check accuracy, the broad patterns in the three out-of-sample countries look reasonable, suggesting that the environmental poverty-mapping approach can be useful in countries without a national survey that measures poverty (as long as its neighbors are similar and do have national surveys).

[63] Rogers, Emwanu, and Robinson (2006, p. 16) insightfully acknowledge both the limitations and value available from the sorts of in-sample tests that are possible for

The environmental poverty maps use seven to 10 indicators from among:

- Land-surface temperature (day-time, or night-time)
- Air temperature
- Evapotransporation (potential, or actual)
- Precipitation
- Distance to nearest:
    - Market
    - Road
    - Major road
    - River
    - Wetland
- Vegetation Index (Normalized difference, or Enhanced)
- Distribution of livestock and disease vectors:
    - Cattle
    - Camels
    - Pigs
    - Sheep
    - Goats
    - Chickens
    - Tse-tse flies
- Land:
    - Cover
    - Elevation
    - Slope
- Length of growing season
- Population density
- Night-time lights
- Human Influence Index

---

poverty maps: "Clearly, we will never have enough test data to prove whether or not any predictive poverty-risk map is 100-percent accurate. Even well-resourced prediction systems (*e.g.*, weather forecasting) are never tested in this way. Instead, over the course of time, sufficient observations are accumulated to give us confidence [or not] in the capabilities of our poverty-mapping procedures."

The most important indicators are generally remote-sensed.

Nelson, Rogers, and Robinson (2011) eyeball estimates from their environmental poverty map (based on Uganda's UNHS 2002/3) as well as estimates from Emwanu *et al.*'s (2007) socio-economic poverty map (also based on the UNHS 2002/3), finding that the general patterns are similar. Nelson, Rogers, and Robinson (2011) also report that, for their preferred cell size of 31 km^2, estimates from their environmental map have lower errors and provide about seven times better spatial resolution than the socio-economic map. They conclude (p. 43) that "an environmental approach to poverty mapping in Uganda consistently out-performs [socio-economic poverty mapping] at equivalent spatial resolution."

Rogers and Robinson *et al.* believe that their environmental-indicator poverty maps are superior to socio-economic poverty maps and, by extension, the scorecard: "Brutally put, [with socio-economic indicators] we end up with a relatively poor description of poverty, no explanation, and no clear idea of how to intervene to make a difference. . . . It is time to take poverty mapping out of the realm purely of socio-economics" (Rogers, Emwanu, and Robinson, 2006, pp. 1 and 36).

While environmental poverty maps do provide greater resolution and so more accurate geographic targeting in small areas, and while environmental poverty maps do provide more unequivocal identification of some of the fundamental drivers of poverty, it does not follow that environmental poverty maps necessarily provide better information for improving pro-poor policy. After all, policy-makers cannot pass laws to

change aridity or the length of the growing season.[64,65] The actionable recommendations that the environmental approach does highlight—for example, to extend improved agricultural extension services to more poor farmers, to build more and better roads in poor areas, and to eradicate disease and vector-borne pathogens—are already at the top of the list of most careful poverty-alleviation strategies. But the technical solutions to the environmental drivers of poverty are developed and delivered by people and institutions embedded in socio-economic/political systems ruled not by the laws of physics or biology but by human-made incentives. Development is a social process, not a chemical reaction; if doing the right thing for the poor were merely a technical problem, then governments (and non-government organizations, and individuals) would single-mindedly, efficiently, and continuously develop improved technical solutions and deliver those that already exist. Would that it were enough to identify the drivers of poverty. Of course, it is useful, but poverty measurement, in and of itself, does only a little to provide people and organizations with the incentives to combine the poverty measures with other information to try to determine ways to change drivers and then to execute the changes.

In this sense, environmental science and social science are complements, not substitutes. In fact, it would make sense—as Rogers and Robinson *et al.* speculate—to make poverty maps with both environmental and socio-economic indicators. Overlap

[64] Except inasmuch as, in the long term, policy affects global warming.
[65] As Rogers, Emwanu, and Robinson (2006, p. 36) themselves note, "Poverty mapping is an exercise in development, not statistics."

between the two domains is likely low, offering the possibility of even greater improvement in accuracy for smaller areas. Of course, more accuracy still does not solve the incentive issues involved in development and delivery, but it does improve the contribution can be made by an analyst at a desk.

As Rogers and Robinson *et al.* acknowledge, environmental poverty mapping is mostly useful in rural areas. In urban areas, poorer households are more likely to live close to richer households in the same spatial cell, reducing the accuracy of environmental poverty maps (Bird *et al.*, 2014; Tatem *et al.* 2014). This weakness is attenuated for socio-economic poverty mapping and the scorecard, as they estimate poverty at the household level rather than at the level of groups of households.

Finally, Nelson, Rogers, and Robinson (2011, p. 44) recognize that, because the environmental approach does not predict consumption at the level of the household, it cannot estimate person-level poverty rates. This matters because head-count poverty rates are well-understood and tend to dominate conversations about poverty among policymakers and in the press.

9.3 Poverty-likelihood poverty-assessment tools

Rather than directly estimating consumption and then making an all-or-nothing comparison with a poverty line, poverty-likelihood poverty-assessment tools—such as the new scorecard here—estimate the probability that a household has consumption below a poverty line.

The poverty-likelihood approach has the advantages of giving unbiased estimates of poverty rates and of recognizing that its estimates have a sampling distribution. Its accuracy is close to that of direct-consumption poverty-assessment tools (Schreiner, 2014), so the choice between them should be based on other dimensions. The main disadvantage of the poverty-likelihood approach is that non-specialists often have difficulty thinking in terms of probabilities.

9.3.1 Mathiassen

Like McKay, Mathiassen (2013) seeks to measure the accuracy of poverty-assessment tools for Uganda when applied to data collected at a different time than the data in the construction sample (out-of-sample and out-of-time).[66] She finds that "the results are encouraging, as all models predict similar poverty trends. Although in most cases the results are precise, sometimes they differ significantly from the poverty level

[66] Like Mathiassen and McKay, Hoogeveen, Emwanu, and Okwi (2003) also seek to find a way to estimate poverty rates between national consumption surveys. They test a poverty-mapping approach with households interviewed in both the 1993/4 Monitoring Survey and the 2002/3 UNHS. They find that "the updated welfare estimates are plausible (in that they match well stratum-level estimates calculated directly from the household survey), satisfactorily precise (at a level of disaggregation below that allows by the household survey), and obtainable at low cost."

estimated from the survey directly" (p. 91).[67] In broad terms, this is similar to the results from accuracy tests for estimates of change over time for the scorecard (for example, Schreiner, 2015a and 2015b).

Mathiassen uses seven national consumption surveys for Uganda, all with the same definition of *poverty*:

- 1993/4 Monitoring Survey
- 1994/5 Monitoring Survey
- 1995/6 Monitoring Survey
- 1997 Monitoring Survey
- 1999/2000 UNHS
- 2002/3 UNHS
- 2005/6 UNHS

For each of the seven consumption surveys and by urban/rural, Mathiassen constructs six tools, each with indicators matched to one of the other six surveys.[68] The tools are then applied to the other surveys backwards and forwards in time, comparing estimated poverty rates versus the survey's direct measure. As in Luoto and as for the scorecard, tracking change requires assuming that the relationships between indicators and poverty do not change over time. Mathiassen finds support for this assumption in that all her tools predict trends whose directions match that of the actual trends.

Mathiassen's tools are constructed in two steps. The first uses stepwise regression to relate indicators to the logarithm of per-adult-equivalent consumption, just

[67] The purpose relative to which the results are *encouraging* is not stated. In line with Luoto (2007), Mathiassen presents convincing evidence that the worst errors are due to weak direct measures of poverty in the 1995/6 and 1999/2000 national surveys.
[68] For example, ownership of assets was not recorded until the 2005/6 UNHS, and some Monitoring Surveys did not ask about characteristics of the residence.

as in the direct-consumption poverty-assessment tools discussed above. The second step estimates a poverty likelihood by applying a Probit transformation to the difference between the poverty line and the direct estimate of consumption. The average of poverty likelihoods for households in a given group is an estimate of their poverty rate. The Probit transform is non-linear in the tool's points, so this estimator is biased, but Mathiassen (2009) shows how to remove the bias and also gives a formula for standard errors.

In the example of the 2002/3 tool used to estimate urban poverty rates in 2005/6, Mathiassen's 31 indicators are:

- Demographics:
  - Number of household members (and its square)
  - Number of household members 14-years-old or younger
  - Ratio of number of household members ages 15 to 59 to those of other ages
  - Age of head
- Education:
  - Education of the head
  - Highest education attained among all household members (and its square)
- Employment: Whether the main source of income is wage work
- Characteristics of the residence:
  - Type of floor
  - Type of wall
  - Type of toilet arrangement
  - Type of cooking fuel
  - Source of lighting
- Ownership of clothes by each household member:
  - Two sets of clothes
  - One pair of shoes

- Foods eaten in the past week:
  - — Fruit
  - — Eggs
  - — Rice
  - — Bread
  - — Fresh milk
  - — Meat
  - — Fish
  - — Restaurant food
- Expenditures made in the past month:
  - — Bathing soap
  - — Toothpaste
  - — Cosmetics
  - — Shoes
  - — Newspapers
  - — Transport
  - — Furniture
  - — Electricity
- Food security: Average number of meals per day in the past seven days

The indicators relating to food and to consumption in the past may be difficult to collect, and they are not verifiable.

Mathiassen reports t-values for tests for differences between estimated and true poverty rates, finding that about 30 percent of the estimates differ from the true rates with $p < 0.05$. But the paper—oddly—never reports bias quantitatively; the gaps between estimates and true values are shown only in graphs. This precludes judging the size of errors. Nor is the median absolute error reported.

Mathiassen notes—without establishing a benchmark for how much is *too much*, how large is *large*, and how one uses a model *with caution*, that "a model should be used with caution if too much time has passed between the surveys, and in particular if the region or country is in a phase of large changes in welfare" (p. 111).

9.3.2 Sulaiman

Following Schreiner (2006b), Sulaiman (2009) constructs a poverty-likelihood poverty-assessment tool to help BRAC/Uganda[69] target clients and monitor poverty rates. Sulaiman uses data from the 2005/6 UNHS, but otherwise Schreiner (2011a) is like his poverty-assessment tool. The definition of *poverty* has been discussed in Section 2 above. To reduce switching costs for BRAC/Uganda and other users of Sulaiman's tool, indicators in Schreiner (2011a) were selected with an eye toward matching the 10 in Sulaiman:

- Demographics: Number of household members 10-years-old or younger
- Education: Educational attainment of the head
- Characteristics of the residence:
  - Type of wall
  - Type of roof
  - Type of cooking fuel
- Ownership of consumer durables:
  - Electronic equipment (e.g., TV, radio, cassette, etc.)
  - Bed net
  - Jewelry or watch
  - Whether each household member has at least:
    - Two sets of clothes
    - One pair of shoes

Both Sulaiman and Schreiner (2011a) use the same Logit construction process, both scale points so that the total of points ranges from 0 to 100, both calibrate point totals to poverty likelihoods as in Figure 4, both report targeting accuracy for a range of cut-offs, and both use out-of-sample tests to report bias.[70]

[69] BRAC/Bangladesh (one of the world's largest microlenders) founded BRAC/Uganda.
[70] For Sulaiman's poverty line of $1.08/day 1993 PPP, bias is +0.4 percentage points. Standard errors are not reported.

10. Conclusion

Pro-poor programs in Uganda can use the scorecard to segment clients for targeted services as well as to estimate the:

- Likelihood that a household has consumption below a given poverty line
- Poverty rate of a group of households at a point in time
- Change in the poverty rate of a group of households over in time[71]

The new scorecard here—based on data from the 2012/13 UNHS—replaces the old scorecard—based on data from the 2009/10 UNHS—in Schreiner (2011a). The new scorecard should be used from now on. The new and old scorecards are based on the same definition of *poverty*, so legacy users can still measure change over time with a baseline from the old scorecard and a follow-up from the new scorecard.

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

The scorecard is constructed with half of the data from Uganda's 2012/13 UNHS, calibrated to 10 poverty lines, and tested on data from the other half of the 2012/13 UNHS. Bias and precision are reported for estimates of households' poverty likelihoods and for estimates of groups' poverty rates at a point in time. Accuracy for targeting is also reported.

[71] Scorecard estimates of change are not necessarily estimates of program impact.

When the scorecard is applied to the the validation sample, the maximum absolute difference between estimates versus true poverty rates for groups of households at a point in time is 2.1 percentage points. The average absolute bias across the 10 poverty lines is about 0.9 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 ± 0.6 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 transparent, low-cost way for pro-poor programs in Uganda 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.

References

Adams, Niall M.; and David J. Hand. (2000) "Improving the Practice of Classifier Performance Assessment", *Neural Computation*, Vol. 12, pp. 305–311.

Appleton, Simon. (2001) "Changes in Poverty and Inequality", pp. 83–121 in Paul Collier and Ritva Reinikka (eds.), *Uganda's Recovery: The Role of Farms, Firms, and Government*.

Baesens, Bart; Van Gestel, Tony; Viaene, Stijn; Stepanova, Maria; Suykens, Johan A.K.; and Jan Vanthienen. (2003) "Benchmarking State-of-the-Art Classification Algorithms for Credit Scoring", *Journal of the Operational Research Society*, Vol. 54, pp. 627–635.

Bedi, Tara; Coudouel, Aline; and Kenneth Simler. (2007) *More Than a Pretty Picture: Using Poverty Maps to Design Better Policies and Interventions*.

Bird, Tom; Sorichetta, Alessandro; Pezzulo, Carla; and Andrew J. Tatum. (2014) "High-Resolution Progress-Out-of-Poverty (PPI) Mapping in Bihar and Uttar Pradesh, India".

Bollen, Kenneth A.; Glanville, Jennifer L.; and Guy Stecklov. (2007) "Socio-Economic Status, Permanent Income, and Fertility: A Latent-Variable Approach", *Population Studies*, Vol. 61, No. 1, pp. 15–34.

Caire, Dean. (2004) "Building Credit Scorecards for Small-Business Lending in Developing Markets", `microfinance.com/English/Papers/Scoring_SMEs_Hybrid.pdf`, retrieved 23 June 2015.

_____; and Mark Schreiner. (2012) "Cross-Tab Weighting for Credit Scorecards in Developing Markets", `business-school.ed.ac.uk/crc/conferences/conference-archive?a=46055`, retrieved 23 June 2015.

Camacho, Adriana; and Emily Conover. (2011) "Manipulation of Social-Program Eligibility", *American Economic Journal: Economic Policy*, Vol. 3, No. 2, pp. 41–65.

Carter, Michael R.; and Christopher B. Barrett. (2006) "The Economics of Poverty Traps and Persistent Poverty: An Asset-Based Approach", *Journal of Development Studies,* Vol. 42, No. 2, pp. 178–199.

Chen, Shiyuan; and Mark Schreiner. (2009) "Simple Poverty Scorecard Poverty-Assessment Tool: Vietnam", SimplePovertyScorecard.com/VNM_2006_ENG.pdf, retrieved 23 June 2015.

Christiaensen, Luc; Lanjouw, Peter; Luoto, Jill; and David Stifel. (2012) "The Reliability of Small-Area Estimation Prediction Methods to Track Poverty", *Journal of Economic Inequality*, Vol. 10, No. 2, pp. 267–297.

Coady, David; Grosh, Margaret; and John Hoddinott. (2004) *Targeting of Transfers in Developing Countries*, hdl.handle.net/10986/14902, retrieved 13 May 2016.

Cochran, William G. (1977) *Sampling Techniques, Third Edition*.

Dawes, Robyn M. (1979) "The Robust Beauty of Improper Linear Models in Decision-Making", *American Psychologist*, Vol. 34, No. 7, pp. 571–582.

Demombynes, Gabriel; Elbers, Chris; Lanjouw, Jenny; Lanjouw, Peter; Mistiaen, Johan; and Berk Özler. (2004) "Producing an Improved Geographic Profile of Poverty: Methodology and Evidence from Three Developing Countries", pp. 154–176 in Anthony Shorrocks and Rolph van der Hoeven (eds.) *Growth, Inequality, and Poverty*.

Diamond, Alexis; Gill, Michael; Rebolledo Dellepiane, Miguel Angel; Skoufias, Emmanuel; Vinha, Katja; and Yiqing Xu. (2016) "Estimating Poverty Rates in Target Populations: An Assessment of the Simple Poverty Scorecard and Alternative Approaches", World Bank Policy Research Working Paper No. 7793, hdl.handle.net/10986/25038, retrieved 11 January 2017.

Elbers, Chris; Fujii, Tomoki; Lanjouw, Peter; Özler, Berk; and Wesley Yin. (2007) "Poverty Alleviation through Geographic Targeting: How Much Does Disaggregation Help?", *Journal of Development Economics*, Vol. 83, pp. 198–213.

_____; Lanjouw, Jean O.; and Peter Lanjouw. (2003) "Micro-Level Estimation of Poverty and Inequality", *Econometrica*, Vol. 71, No. 1, pp. 355–364.

Emwanu, Thomas; Okwi, Paul Okiira; Hoogeveen, Johannes G.; and Patti Kristjansen. (2003) *Where Are the Poor? Mapping Patterns of Well-Being in Uganda: 1992 and 1999*, mahider.ilri.org/bitstream/handle/10568/1542/UgandaPovertyAtlas.pdf?sequence=2, retrieved 23 June 2015.

_____; Okwi, Paul Okiira; Hoogeveen, Johannes G.; Kristjansen, Patti; and Norbert Henninger. (2007) *Nature, Distribution and Evolution of Poverty and Inequality in Uganda: 1992–2002*, ubos.org/onlinefiles/uploads/ubos/pdf%20documents/ILRI%20Poverty%20Report%202007.pdf, retrieved 21 June 2015.

Filmer, Deon; and Lant Pritchett. (2001) "Estimating Wealth Effects without Expenditure Data—or Tears: An Application to Educational Enrollments in States of India", *Demography*, Vol. 38, No. 1, pp. 115–132.

_____; and Kinnon Scott. (2012) "Assessing Asset Indices", *Demography*, Vol. 49, pp. 359–392.

Friedman, Jerome H. (1997) "On Bias, Variance, 0–1 Loss, and the Curse-of-Dimensionality", *Data Mining and Knowledge Discovery*, Vol. 1, pp. 55–77.

Fuller, Rob. (2006) "Measuring the Poverty of Microfinance Clients in Haiti", microfinance.com/English/Papers/Scoring_Poverty_Haiti_Fuller.pdf, retrieved 23 June 2015.

Gaddis, Isis; and Stephan Klasen. (2013) "Mapping Multidimensional and Monetary Poverty: The Case of Uganda", igaddis@uni-goettingen.de.

Goodman, Leo A.; and Kruskal, William H. (1979) *Measures of Association for Cross Classification*.

Grosh, Margaret; and Judy L. Baker. (1995) "Proxy-Means Tests for Targeting Social Programs: Simulations and Speculation", World Bank LSMS Working Paper No. 118, go.worldbank.org/W9OWN57PD0, retrieved 23 June 2015.

Gwatkin, Davidson R.; Rutstein, Shea; Johnson, Kiersten; Suliman, Eldaw; Wagstaff, Adam; and Agbessi Amouzou. (2007) "Socio-Economic Differences in Health, Nutrition, and Population: Uganda", World Bank Country Reports on HNP and Poverty, go.worldbank.org/T6LCN5A340, retrieved 23 June 2015.

Hammond, Allen L.; Kramer, William J.; Katz, Robert S.; Tran, Julia T.; and Courtland Walker. (2007) *The Next 4 Billion: Market Size and Business Strategy at the Base of the Pyramid*, wri.org/publication/next-4-billion, retrieved 23 June 2015.

Hand, David J. (2006) "Classifier Technology and the Illusion of Progress", *Statistical Science*, Vol. 22, No. 1, pp. 1–15.

Haslett, Stephen. (2012) "Practical Guidelines for the Design and Analysis of Sample Surveys for Small-Area Estimation", *Journal of the Indian Society of Agricultural Statistics*, Vol. 66, No. 1, pp. 203–212.

Henry, Carla; Sharma, Manohar; Lapenu, Cecile; and Manfred Zeller. (2003) "Microfinance Poverty Assessment Tool", CGAP Technical Tool No. 5, `cgap.org/publications/ microfinance-poverty-assessment-tool`, retrieved 23 June 2015.

Hentschel, Jesko; Lanjouw, Jean Olson; Lanjouw, Peter; and Javier Poggi. (2000) "Combining Census and Survey Data to Trace the Spatial Dimensions of Poverty: A Case Study of Ecuador", *World Bank Economic Review*, Vol. 14, No. 1, pp. 147–165.

Hoadley, Bruce; and Robert M. Oliver. (1998) "Business Measures of Scorecard Benefit", *IMA Journal of Mathematics Applied in Business and Industry*, Vol. 9, pp. 55–64.

Hoogeveen, Johannes G.; Emwanu, Thomas; and Paul Okiira Okwi. (2003) "Updating Small-Area Welfare Indicators in the Absence of a New Census", `siteresources.worldbank.org/INTPGI/Resources/Hoogeveen.UpdatingSmall AreaWelfareIndicators.pdf`, retrieved 23 June 2015.

IRIS Center. (2010) "Poverty-Assessment Tool Accuracy Submission: Addendum for New Poverty Lines, USAID/IRIS Tool for Uganda", 28 June, `povertytools.org/countries/Uganda/USAID_PAT_Uganda_addendum.pdf`, retrieved 21 June 2015.

_____. (2007a) "Manual for the Implementation of USAID Poverty Assessment Tools", `povertytools.org/training_documents/Manuals/USAID_PAT_Manual_Eng.pdf`, retrieved 23 June 2015.

_____. (2007b) "Introduction to Sampling for the Implementation of PATs", `povertytools.org/training_documents/Sampling/Introduction_Sampling.ppt`, retrieved 23 June 2015.

_____. (2005) "Notes on Assessment and Improvement of Tool Accuracy", `povertytools.org/other_documents/AssessingImproving_Accuracy.pdf`, retrieved 23 June 2015.

Johnson, Glenn. (2007) "Lesson 3: Two-Way Tables—Dependent Samples", `onlinecourses.science.psu.edu/stat504/node/96`, retrieved 23 June 2015.

Kolesar, Peter; and Janet L. Showers. (1985) "A Robust Credit-Screening Model Using Categorical Data", *Management Science*, Vol. 31, No. 2, pp. 124–133.

Koenker, Roger; and Kevin F. Hallock. (2001) "Quantile Regression", *Journal of Economic Perspectives*, Vol. 15, No. 4, pp. 143–156.

Kraybill, David S.; and Bernard Bashaasha. (2006) "The Potential Gains from Geographical Targeting of Anti-Poverty Programs in Uganda", *African Journal of Agricultural and Resource Economics*, Vol. 1, No. 1, pp. 37–48.

Levine, Sebastian; Muwonge, James; and Yele Maweki Batana. (2012) "A Robust Multidimensional Poverty Profile for Uganda", OPHI Working Paper No. 55, `ophi.org.uk/wp-content/uploads/ophi-wp-55.pdf`, retrieved 17 June 2015.

Lindelow, Magnus. (2006) "Sometimes More Equal Than Others: How Health Inequalities Depend on the Choice of Welfare Indicator", *Health Economics*, Vol. 15, pp. 263–279.

Lovie, Alexander D.; and Patricia Lovie. (1986) "The Flat-Maximum Effect and Linear Scoring Models for Prediction", *Journal of Forecasting*, Vol. 5, pp. 159–168.

Luoto, Jill. (2007) "What Happened in the UNHS-2? Re-Estimating Uganda's Poverty Numbers", `jill_luoto@rand.org`.

Mahadevan, Meera; Yoshida, Nobou; and Larisa Praslova. (2013) "Poverty Mapping in the Kyrgyz Republic: Methodology and Key Findings", World Bank Report No. 76690, `documents.worldbank.org/curated/en/2013/04/17584758/kyrgyz-republic-poverty-mapping-methodology-key-findings`, retrieved 23 June 2015.

Martinelli, César; and Susan W. Parker. (2007) "Deception and Misreporting in a Social Program", *Journal of the European Economic Association*, Vol. 4, No. 6, pp. 886–908.

Mathiassen, Astrid. (2013) "Testing Prediction Performance of Poverty Models: Empirical Evidence from Uganda", *Review of Income and Wealth*, Vol. 59, No. 1, pp. 91–112.

_____. (2009) "A Model-Based Approach for Predicting Annual Poverty Rates without Expenditure Data", *Journal of Economic Inequality*, June 2009, Vol. 7, No. 2, pp. 117–135.

Matul, Michal; and Sean Kline. (2003) "Scoring Change: Prizma's Approach to Assessing Poverty", Microfinance Centre for Central and Eastern Europe and the New Independent States Spotlight Note No. 4, mfc.org.pl/sites/mfc.org.pl/files/spotlight4.PDF, retrieved 23 June 2015.

McKay, Andrew. (2001) "Report on Investigating the Development of a Poverty Correlates Model for Uganda", a.mckay@sussex.ac.uk.

McNemar, Quinn. (1947) "Note on the Sampling Error of the Difference between Correlated Proportions or Percentages", *Psychometrika*, Vol. 17, pp. 153–157.

Montgomery, Mark; Gragnolati, Michele; Burke, Kathleen A.; and Edmundo Paredes. (2000) "Measuring Living Standards with Proxy Variables", *Demography*, Vol. 37, No. 2, pp. 155–174.

Myers, James H.; and Edward W. Forgy. (1963) "The Development of Numerical Credit-Evaluation Systems", *Journal of the American Statistical Association*, Vol. 58, No. 303, pp. 779–806.

Narayan, Ambar; and Nobuo Yoshida. (2005) "Proxy-Means Tests for Targeting Welfare Benefits in Sri Lanka", World Bank Report No. SASPR–7, Washington, D.C.: documents.worldbank.org/curated/en/2005/07/6209268/proxy-means-test-targeting-welfare-benefits-sri-lanka, retrieved 23 June 2014.

Nelson, Andrew; Rogers, David; and Timothy Robinson. (2011) "Poverty Mapping in Uganda: Extrapolating Household Expenditure Data Using Environmental Data and Regression Techniques", FAO Animal Production and Health Working Paper No. 9, fao.org/3/a-i2705e.pdf, retrieved 23 June 2015.

Okwi, Paul Okiira; Emwanu, Thomas; and Johannes G. Hoogeveen. (2003) "Poverty and Inequality in Uganda: Evidence from Small-Area Estimation Techniques", ftp.fao.org/upload/eims_object/Photo_library/draft4.doc, retrieved 23 June 2015.

Onwujekwe, Obinna; Hanson, Kara; and Julia Fox-Rushby. (2006) "Some Indicators of Socio-Economic Status May Not Be Reliable and Use of Indexes with These Data Could Worsen Equity", *Health Economics*, Vol. 15, pp. 639–644.

Ravallion, Martin; and Benu Bidani (1994) "How Robust is a Poverty Profile?", *World Bank Economic Review*, Vol. 8, No. 1, pp. 75–102.

Robinson, Timothy; Emwanu, Thomas; and David Rogers. (2007) "Environmental Approaches to Poverty Mapping: An Example from Uganda", *Information Development*, Vol. 23, No. 2–3, pp. 205–215.

Rogers, David; Emwanu, Thomas; and Timothy Robinson. (2006) "Poverty Mapping in Uganda: An Analysis Using Remotely Sensed and Other Environmental Data", Pro-Poor Livestock Policy Initiative Working Paper No. 36, `fao.org/ag/AGAinfo/programmes/en/pplpi/docarc/wp36.pdf`, retrieved 23 June 2015.

_____; Wint, William; Alexander, Neil; Pozzi, Francesca; and Timothy Robinson. (2011) "Wealth-Index Mapping in the Horn of Africa", Animal Production and Health Division Working Paper No. 4, `fao.org/docrep/014/i2427e/i2427e00.pdf`, retrieved 23 June 2015.

Rutstein, Shea Oscar; and Kiersten Johnson. (2004) "The DHS Wealth Index", DHS Comparative Reports No. 6, `measuredhs.com/pubs/pdf/CR6/CR6.pdf`, retrieved 23 June 2015.

Sahn, David E.; and David Stifel. (2003) "Exploring Alternative Measures of Welfare in the Absence of Expenditure Data", *Review of Income and Wealth*, Series 49, No. 4, pp. 463–489.

_____. (2000) "Poverty Comparisons over Time and across Countries in Africa", *World Development*, Vol. 28, No. 12, pp. 2123–2155.

SAS Institute Inc. (2004) "The LOGISTIC Procedure: Rank Correlation of Observed Responses and Predicted Probabilities", in *SAS/STAT User's Guide, Version 9*, `support.sas.com/documentation/cdl/en/statug/63033/HTML/default/viewer.htm#statug_logistic_sect035.htm`, retrieved 23 June 2015.

Schreiner, Mark. (2015a) "Simple Poverty Scorecard Poverty-Assessment Tool: Ghana", `SimplePovertyScorecard.com/GHA_2012_ENG.pdf`, retrieved 20 June 2015.

_____. (2015b) "Simple Poverty Scorecard Poverty-Assessment Tool: Cambodia", `SimplePovertyScorecard.com/KHM_2011_ENG.pdf`, retrieved 23 June 2015.

_____. (2014) "How Do the Simple Poverty Scorecard Poverty-Assessment Tool and the PAT Differ?", `microfinance.com/English/Papers/Scorecard_versus_PAT.pdf`, retrieved 23 June 2015.

_____. (2013a) "Simple Poverty Scorecard Poverty-Assessment Tool: Bangladesh", `SimplePovertyScorecard.com/BGD_2010_ENG.pdf`, retrieved 23 June 2015.

_____. (2013b) "Simple Poverty Scorecard Poverty-Assessment Tool: Nicaragua", SimplePovertyScorecard.com/NIC_2009_ENG.pdf, retrieved 23 June 2015.

_____. (2012a) "An Expert-Based Poverty Scorecard for Rural China", microfinance.com/English/Papers/Scoring_Poverty_China_EN.pdf, retrieved 23 June 2015.

_____. (2012b) "Simple Poverty Scorecard Poverty-Assessment Tool: Colombia", SimplePovertyScorecard.com/COL_2009_ENG.pdf, retrieved 14 March 2015.

_____. (2012c) "Simple Poverty Scorecard Poverty-Assessment Tool: Peru", SimplePovertyScorecard.com/PER_2010_ENG.pdf, retrieved 23 June 2015.

_____. (2011a) "Simple Poverty Scorecard Poverty-Assessment Tool: Uganda", SimplePovertyScorecard.com/UGA_2009_ENG.pdf, retrieved 23 June 2015.

_____. (2011b) "Estimating Expenditure-Based Poverty in the Demographic and Health Surveys".

_____. (2010) "Simple Poverty Scorecard Poverty-Assessment Tool: Honduras", SimplePovertyScorecard.com/HND_2007_ENG.pdf, retrieved 23 June 2015.

_____. (2009a) "Simple Poverty Scorecard Poverty-Assessment Tool: Philippines", SimplePovertyScorecard.com/PHL_2002_ENG.pdf, retrieved 23 June 2015.

_____. (2009b) "Simple Poverty Scorecard Poverty-Assessment Tool: Pakistan", SimplePovertyScorecard.com/PAK_2005_ENG.pdf, retrieved 23 June 2015.

_____. (2009c) "Simple Poverty Scorecard Poverty-Assessment Tool: Bolivia", SimplePovertyScorecard.com/BOL_2007_ENG.pdf, retrieved 23 June 2015.

_____. (2009d) "Simple Poverty Scorecard Poverty-Assessment Tool: Mexico", SimplePovertyScorecard.com/MEX_2008_ENG.pdf, retrieved 23 June 2015.

_____. (2009e) "Simple Poverty Scorecard Poverty-Assessment Tool: Peru", SimplePovertyScorecard.com/PER_2007_ENG.pdf, retrieved 23 June 2015.

_____. (2008a) "Simple Poverty Scorecard Poverty-Assessment Tool: Peru", SimplePovertyScorecard.com/PER_2003_ENG.pdf, retrieved 23 June 2015.

_____. (2008b) "Simple Poverty Scorecard Poverty-Assessment Tool: Ecuador", SimplePovertyScorecard.com/ECU_2005_ENG.pdf, retrieved 23 June 2015.

_____. (2006a) "Is One Simple Poverty Scorecard Poverty-Assessment Tool Enough for India?", microfinance.com/English/Papers/Scoring_Poverty_India_Segments.pdf, retrieved 23 June 2015.

_____. (2006b) "Simple Poverty Scorecard Poverty-Assessment Tool: Bangladesh", SimplePovertyScorecard.com/BGD_2000_ENG.pdf, retrieved 23 June 2015.

_____. (2005a) "Herramienta Índice de Calificación de la Pobreza™: México", SimplePovertyScorecard.com/MEX_2002_SPA.pdf, retrieved 23 June 2015.

_____. (2005b) "IRIS Questions on the Simple Poverty Scorecard Poverty-Assessment Tool", microfinance.com/English/Papers/Scoring_Poverty_Response_to_IRIS.pdf, retrieved 23 June 2015.

_____. (2002) *Scoring: The Next Breakthrough in Microfinance?* CGAP Occasional Paper No. 7, microfinance.com/English/Papers/Scoring_Breakthrough_CGAP.pdf, retrieved 23 June 2015.

_____; Matul, Michal; Pawlak, Ewa; and Sean Kline. (2014) "Poverty Scoring: Lessons from a Microlender in Bosnia-Herzegovina", *Poverty and Public Policy*, Vol. 6, No. 4, pp. 407–428.

_____; and Michael Sherraden. (2006) *Can the Poor Save? Saving and Asset Accumulation in Individual Development Accounts.*

Sharif, Iffath Anwar. (2009) "Building a Targeting System for Bangladesh Based on Proxy-Means Testing", World Bank Social Protection Discussion Paper No. 0914, siteresources.worldbank.org/SOCIALPROTECTION/Resources/SP-Discussion-papers/Safety-Nets-DP/0914.pdf, retrieved 23 June 2015.

Sherraden, Michael. (1991) *Assets and the Poor: A New American Welfare Policy.*

Sillers, Don. (2006) "National and International Poverty Lines: An Overview", pdf.usaid.gov/pdf_docs/Pnadh069.pdf, retrieved 23 June 2015.

Ssewanyana, Sarah N.; and Ibrahim Kasirye. (2014) "Uganda's Progress towards Poverty Reduction 2002/3 to 2012/13: Is the Gap between Leading and Lagging Areas Widening or Narrowing?", EPRC Research Series No. 118, eprc.or.ug/pdf_files/Ugandas_poverty%20reduction_Is%20the%20gap%20between_leading%20and%20lagging%20areas_%20widening%20RS%20118.pdf, retrieved 23 June 2015.

Stifel, David; and Luc Christiaensen. (2007) "Tracking Poverty over Time in the Absence of Comparable Consumption Data", *World Bank Economic Review*, Vol. 21, No. 2, pp. 317–341.

Stillwell, William G.; Barron, F. Hutton; and Ward Edwards. (1983) "Evaluating Credit Applications: A Validation of Multi-Attribute Utility-Weight Elicitation Techniques", *Organizational Behavior and Human Performance*, Vol. 32, pp. 87–108.

Sulaiman, Munshi. (2009) "Poverty Scorecard for Monitoring Progress against Dollar-a-Day in Uganda".

Tarozzi, Alessandro; and Angus Deaton. (2009) "Using Census and Survey Data to Estimate Poverty and Inequality for Small Areas", *Review of Economics and Statistics*, Vol. 91, No. 4, pp. 773–792.

Tatem, Andrew; Gething, Peter; Pezzulo, Carla; Weiss, Dan; and Samir Bhatt. (2014) "Development of High-Resolution Gridding Poverty Surfaces".

Toohig, Jeff. (2008) "PPI Pilot Training Guide", `microfinancegateway.org/sites/default/files/mfg-en-paper-progress-out-of-poverty-index-ppi-pilot-training-mar-2008.pdf`, retrieved 23 June 2015.

Uganda Bureau of Statistics (2014) *Uganda National Household Survey 2012/13*, `ubos.org/onlinefiles/uploads/ubos/UNHS_12_13/2012_13%20UNHS%20Final%20Report.pdf`, retrieved 24 June 2015.

USAID. (2014) *Microenterprise Results Reporting: Annual Report to Congress, Fiscal Year 2013*, `eads.usaid.gov/mrr/publications/ar2013.pdf`, retrieved 23 June 2015.

United States Congress. (2004) "Microenterprise Results and Accountability Act of 2004 (HR 3818 RDS)", November 20, `smith4nj.com/laws/108-484.pdf`, retrieved 23 June 2015.

Van Campenhout, Bjorn; Sekabira, Haruna; and Dede H. Aduayom. (2014) "Consumption Bundle Aggregation in Poverty Measurement", WIDER Working Paper No. 2014/150, `www.wider.unu.edu/publications/working-papers/2014/en_GB/wp2014-150/`, retrieved 23 June 2015.

Wagstaff, Adam; and Naoko Watanabe. (2003) "What Difference Does the Choice of SES Make in Health-Inequality Measurement?", *Health Economics*, Vol. 12, No. 10, pp. 885–890.

Wainer, Howard. (1976) "Estimating Coefficients in Linear Models: It Don't Make No Nevermind", *Psychological Bulletin*, Vol. 83, pp. 223–227.

World Bank. (2012) *Targeting Poor and Vulnerable Households in Indonesia*, documents.worldbank.org/curated/en/2012/01/15879773/targeting-poor-vulnerable-households-indonesia, retrieved 23 June 2015.

_____. (2008) "International Comparison Project: Tables of Results", siteresources.worldbank.org/ICPINT/Resources/icp-final-tables.pdf, retrieved 23 June 2015.

World Health Organization. (1985) *Energy and Protein Requirements*, WHO Technical Report Series 724, fao.org/DOCREP/003/AA040E/AA040E00.HTM, retrieved 23 June 2015.

Zeller, Manfred. (2004) "Review of Poverty Assessment Tools", pdf.usaid.gov/pdf_docs/PNADH120.pdf, retrieved 23 June 2015.

_____; and Gabriela Alcaraz V. (2005a) "Developing and Testing Poverty-Assessment Tools: Results from Accuracy Tests in Uganda", povertytools.org/other_documents/Uganda%20Accuracy%20Report.pdf, retrieved 23 June 2015.

_____ and Gabriela Alcaraz V. (2005b) "Developing and Testing Poverty-Assessment Tools: Results from Accuracy Tests in Kazakhstan", povertytools.org/other_documents/Kazakhstan%20Accuracy%20Report.pdf, retrieved 23 June 2015.

_____; Houssou, Nazaire; Alcaraz, Gabriela V.; Schwarze, Stefan; and Julia Johannsen. (2006a) "Developing Poverty Assessment Tools Based on Principal Components Analysis: Results from Bangladesh, Kazakhstan, Uganda, and Peru", ageconsearch.umn.edu/bitstream/25396/1/cp061033.pdf, retrieved 23 June 2015.

_____; Sharma, Manohar; Henry, Carla; and Cécile Lapenu. (2006b) "An Operational Method for Assessing the Poverty Outreach Performance of Development Policies and Projects: Results of Case Studies in Africa, Asia, and Latin America", *World Development*, Vol. 34, No. 3, pp. 446–464.

Guidelines for the Interpretation of Scorecard Indicators

The following comes from:

UBOS. (2013) *Manual of Instruction for UNHS 2012/13*, Kampala, [the *Manual*], `catalog.ihsn.org/index.php/catalog/4620/download/58618`, retrieved 15 June 2015.

UBOS. (2014) *Uganda National Household Survey 2012/13*, Kampala, [the *Final Report*], `ubos.org/onlinefiles/uploads/ubos/UNHS_12_13/2012_13%20UNHS%20Final%20Report.pdf`, retrieved 24 June 2015.

UBOS. (2012) *Uganda National Household Survey 2012/13: Socio-Economic Survey Questionnaire*, Kampala, [the *Questionnaire*], `catalog.ihsn.org/index.php/catalog/4620`, retrieved 15 June 2015.

and

UBOS. (2012) *Uganda National Panel Survey 2013/14: Interviewer Manual*, Kampala, [the *Panel Manual*].

When an issue arises that is not addressed here, its resolution should be left to the unaided judgment of the enumerator, as that apparently was the practice in the 2012/13 UNHS. That is, an organization using the scorecard should not promulgate any definitions or rules (other than those in these "Guidelines") to be used by all its field agents. Anything not explicitly addressed in these "Guidelines" is to be left to the unaided judgment of the individual enumerator.

General Guidelines

Fill out the scorecard header and the "Back-page Worksheet" first, following the directions on the "Back-page Worksheet". In particular, do not ask the first and second scorecard indicators directly. Instead, use the information recorded on the "Back-page Worksheet" to determine the proper responses for the first and second indicators.

Do not read the response options to the respondent. Unless instructed otherwise here, read the question, and then stop; wait for a response. If the respondent asks for clarification or otherwise hesitates or seems confused, then read the question again or provide additional assistance based on these "Guidelines" or as you, the enumerator, deem appropriate.

In general, you should accept the responses given by the respondent. Nevertheless, if the respondent says something—or if you see or sense something—that suggests that the response may not be accurate, that the respondent is uncertain, or that the respondent desires assistance in figuring out how to respond, then you should read the question again and provide whatever assistance you deem appropriate based on these "Guidelines".

While most indicators in the scorecard are verifiable, you do not—in general—need to verify responses unless something suggests to you that the response may not be accurate and thus that verification might improve data quality. For example, you might choose to verify if the respondent hesitates, seems nervous, or otherwise gives signals that he/she may be lying or be confused. Likewise, verification is probably appropriate if a child in the household or neighbor says something that does not square with the respondent's answer. Verification is also a good idea if you can see something yourself—such as a consumer durable that the respondent avers not to have, or a child eating in the room who has not been counted as a member of the household—that suggests that the response may not be accurate.

In general, the application of the scorecard should mimic as closely as possible the application of the 2012/13 UNHS. For example, the poverty-scoring interview should take place in the respondent's homestead because the 2012/13 UNHS took place in respondents' homesteads.

The 2012/13 UNHS left to each individual enumerator (or to local translators) to translate the survey instrument on the fly when needed to languages other than English. While the application of the scorecard should, in general, mimic the application of the 2012/13 UNHS, it makes sense to have a standard, well-done, cross-checked translation of the scorecard to languages and dialects that are common in Uganda. Without a standard translation, the variation in translations and interpretations across enumerators could greatly harm data quality. Any translation should reflect the meaning in the original English UNHS survey instrument as closely as possible. Ideally, all organizations using the scorecard in a given dialect or language in Uganda would coordinate and use a single translation.

Role of interviewer:
According to p. 2 of the *Manual*, "Your task is to ask questions and to record the answers. You must make every effort to obtain complete and accurate answers and then to record them correctly.

"The success of the survey depends on the respondents' willingness to co-operate, and it is your job to obtain it by being polite, patient, and tactful.

"The information you obtain is confidential and will be used to compile statistics [about clients of your organization]. You are not to discuss it, gossip about it, nor show your records to anyone not officially involved with the project. At no time should questionnaires be left lying around where unauthorised people may have access to them."

Asking questions:
According to p. 8 of the *Manual*, "To collect the information needed, you must understand how to ask each question, what information the question is attempting to collect, and how to handle problems that might arise during the interview. You must also know how to correctly record the answers the respondent gives.

"It is very important that you ask each question exactly as it is written in the questionnaire. When you are asking a question, speak slowly and clearly so that the respondent will have no difficulty hearing or understanding the question. At times, you may need to repeat the question to be sure the respondent understands it. In those cases, do not change the wording of the question but repeat it exactly as it is written. If, after you have repeated a question, the respondent still does not understand, you may have to re-state the question. Be very careful when you change the wording, however, so that you do not alter the meaning.

"In some cases, you may have to ask additional questions ('probing') to obtain a complete answer from a respondent. If you do this, then you must be careful that your probes are 'neutral' and that they do not suggest an answer to the respondent. Probing requires both tact and skill, and it will be one of the most challenging aspects of your work as an interviewer.

Who to interview:
According to p. 10 of the *Manual*, "The respondent should be the household head. You must ask a few questions to identify the head of the household.

"If the household head is absent, then the next person who is acting as household head should be interviewed. This respondent should be a usual member of the household and should be capable of providing all the necessary information about other members of the household. Note that other members of the household can help by adding information or details in the questions concerning them."

According to p. 4 of the *Manual*, "Any capable adult member of the household is a suitable respondent for the interview."

The respondent need not be a participant with your organization.

According to p. 11 of the *Manual*, "In most cases, the *head of the household* is the one who manages the income earned and expenses incurred by the household, and who is the most knowledgeable about other members of the household. He/she will be the person named when you ask, 'Who is the head of this household?'"

Page 12 of the *2009/10 Manual* adds to the above: "That is, the head is the person recognized by other household members as the head."

How to approach a responding household:

According to pp. 3–4 of the *Manual*, "Ensure that your dress is acceptable in the community where you are working.

"Act as though you expect to receive friendly cooperation, and behave as though you deserve it.

"Before you start work, introduce yourself to the local officials in the area. Use the introductory letters provided to you by [your organization].

"Start interviewing a responding household only when you have:

- Identified yourself
- Exchanged greetings
- Explained the purpose of the survey
- Said what the survey is about ([learning more about the clients of your organization])
- Answered all the questions about the survey that you are asked

"During interviews, let respondents take their time. Do not suggest answers for them. Work steadily and make sure that answers are clear to you before you record them. Do not immediately accept any statement you believe to be mistaken but rather tactfully ask further questions (probe) to obtain accurate answers.

"Someone may refuse to be interviewed because of a misunderstanding. Remain courteous and stress the importance of the survey and in particular that it has nothing to do with taxation nor any similar government activity. Furthermore, point out that the information will be kept confidential and that the survey results will be published as numerical tables in such a way that it will be impossible to identify characteristics of individual persons and households.

"You should be able to clear up any misunderstandings, but if you cannot persuade a person to respond, or if his/her refusal is deliberate, then [excuse yourself and take your leave, reporting the refusal to your supervisor]."

How to conduct an interview:
According to pp. 4–6 of the *Manual*, "Successful interviewing is an art and should not be treated as a mechanical process. Each interview is a new source of information; make it interesting and pleasant. The art of interviewing develops with practice, but there are certain basic principles that are followed by every successful interviewer. Below you will find a number of general guidelines on how to build rapport with a respondent and how to conduct a successful interview.

"*Build rapport with the respondent*: Any capable adult member of the household is a suitable respondent for the household interview.

"As an interviewer, your first responsibility is to establish a good rapport with a respondent.

"At the beginning of the interview, you and the respondent do not know each other. The respondent's first impression of you will influence his/her willingness to cooperate with the survey. Be sure that your manner is friendly as you introduce yourself. You will also carry a letter and an identification card that indicates that you are working with [your organization].

"*Make a good first impression*. When you arrive at the household, do your best to make the respondent feel at ease. With a few well-chosen words, you can put the respondent in the right frame of mind for the interview. Open the interview with a smile and a greeting such as "Good afternoon", and then proceed with your introduction.

"*Always take a positive approach*. Never adopt an apologetic manner, and do not use words such as 'Are you too busy?' Such questions invite refusal before you start. Rather, tell the respondent, 'I would like to ask you a few questions', or 'I would like to talk with you for a few moments.'

"*Assure the respondent of the confidentiality of responses (if necessary)*. If the respondent is hesitant about responding, or if he/she asks what the data will be used for, explain that:

- The information you collect will remain confidential
- No individual names will be used for any purpose
- All information will be grouped together to create reports

"Also, you should never mention anything about other interviews or show completed questionnaires to [anyone involved in the project] in front of a respondent nor any other person [not involved in the project].

"*Answer any questions from the respondent frankly.* Before agreeing to be interviewed, the respondent may ask you questions about the survey or about how he/she was selected to be interviewed. Be direct and pleasant when you answer.

"The respondent may also be concerned about the length of the interview. If he/she asks, tell him/her that the interview usually takes about 60 to 90 minutes. Indicate your willingness to return at another time if it is inconvenient for the respondent to answer questions right then.

"During the interview, the respondent may ask questions or want to talk further about the topics you bring up. It is important not to interrupt the flow of the interview, so tell him/her that you will be happy to answer his/her questions or to talk further after the interview.

"*Be neutral throughout the interview.* Most people are polite and will tend to give answers that they think you want to hear. It is therefore very important that you remain absolutely neutral as you ask questions. Never—whether by the expression on your face or by the tone of your voice—allow the respondent to think that he/she has given the 'right' or 'wrong' answer to a question. Never appear to approve or disapprove of any of the respondent's replies.

"The questions are all carefully worded to be neutral. They do not suggest that one answer is more likely or more preferred. If you fail to read the complete question, you may destroy that neutrality. That is why it is important to read the whole question as it is written.

"If the respondent gives an ambiguous answer, try to probe in a neutral way, asking questions such as:

- 'Can you explain a little more?'
- 'I did not quite hear you; could you please tell me again?'
- 'There is no hurry; take a moment to think about it.'

"*Never suggest answers to the respondent.* If a respondent's answer is not relevant to a question, do not prompt her/him by saying something like 'I suppose you mean that . . . . Is that right?' In many cases, she/he will agree with your interpretation of her/his answer, even if that is not what she/he really meant. Rather, you should probe in such a manner that the respondent her/himself comes up with the relevant answer.

"You should never read out the list of coded answers to the respondent, even if she/he has trouble answering.

"*Do not change the wording or the sequence of questions.* The wording of the questions and their sequence in the questionnaire must be maintained.

"If the respondent has not understood a question, you should repeat it slowly and clearly. If there is still a problem, you may rephrase the question, being careful not to

alter the meaning of the original question. Provide only the minimum information required to get an appropriate response.

"*Handle hesitant respondents tactfully.* There will be situations where the respondents simply say, 'I don't know,' give an irrelevant answer, act bored or detached, or contradict something that they have already said. In these cases, you must try to re-interest them in the conversation. For example, if you sense that they are shy or afraid, try to remove their shyness or fear before asking the next question. Spend a few moments talking about things unrelated to the interview (for example, their town or village, the weather, their daily activities, etc.).

"If the respondent is giving irrelevant or elaborate answers, do not stop him/her abruptly or rudely; rather, listen to what he/she has to say. Then try to steer him/her gently back to the original question. A good atmosphere must be maintained throughout the interview. The best atmosphere for an interview is one in which the respondent sees the interviewer as friendly, sympathetic, and responsive, someone who is not intimidating, with whom they can say anything without feeling shy or embarrassed.

"If the respondent is reluctant or unwilling to answer a question, then explain once again that the same question is being asked [of many participants with your organization] and that the answers will all be merged together. If the respondent is still reluctant, simply write 'REFUSED' next to the question and proceed as if nothing had happened. Remember, the respondent cannot be forced to give an answer.

"*Do not form expectations.* You must not form expectations of the ability and knowledge of the respondent. For example, do not assume respondents from rural areas or those who are less educated or illiterate do not know [answers to some types of questions].

"*Do not rush the interview.* Ask the questions slowly to ensure that the respondent understands what is being asked. After you have asked a question, pause; give the respondent time to think. If the respondent feels hurried or is not allowed to formulate his/her own opinion, he/she may respond with 'I don't know' or give an inaccurate answer.

"If you feel the respondent is answering without thinking just to speed up the interview, then say to the respondent, 'There is no hurry. Your opinion is very important, so consider your answers carefully.'"

According to p. 9 of the *Manual*, "It is the responsibility of the interviewer to review each questionnaire when the interview is finished. This review should be done before you leave the household so that you can be sure every question was asked, that all answers are clear and reasonable, and that your handwriting is legible."

Guidelines for specific scorecard indicators

1. How many members does the household have?
    A. Nine or more
    B. Eight
    C. Seven
    D. Five or six
    E. Four
    F. Three
    G. Two
    H. One

Do not read this question directly to the respondent. Instead, mark the relevant response based on the data you collect on the "Back-page Worksheet".

According to p. 11 of the *Manual*, "The household roster must be filled out with the utmost care. In order to do so, you must have a clear understanding of the definition of a *household* and the guidelines for identifying household members."

According to p. 8 of the *2009/10 Manual*, a *household* is "a person or group of persons, related or unrelated, who:

- Live together in the same dwelling unit
- Acknowledge one adult male or female as the head of the household
- Share the same living arrangements, and
- Are considered as one unit

According to p. 177 of the *Final Report*, a *household* is "a person or group of people who normally cook, eat, and live together (for at least six of the twelve months preceding the interview), irrespective of whether they are related or unrelated."

Pages 10–11 of the *Manual* defines a *household* as "a group of people who have been living and eating their meals together for at least six of the twelve months preceding the interview. Therefore, the member of the household is defined on the basis of the usual place of residence.

"There are some exceptions:

- Some people are considered as *household members* even though they have lived together for less than six of the past twelve months:
  - — Infants who are less than 6-months-old
  - — Newlyweds who have been living together for less than six months
  - — Students and seasonal workers who have not been living as part of another household
  - — Other persons living together for less than six months but who are expected to live in the household permanently (or for a total duration of at least six months)
- Servants, farm workers, and other such individuals who live and take meals with the household are *household members* even though they may not have blood or marital relationship with the household head
- People who have lived in the household for more than six of the past twelve months but who have permanently left the household (for example, they died or got divorced) are not considered as *household members*

According to p. 8 of the *2009/10 Manual*, "In some cases, one may find a group of people living together in the same house, but each person has separate eating arrangements; they should be counted as separate one-person households. Collective living arrangements such as hostels, army camps, boarding schools, or prisons are not considered as households."

According to p. 11 of the *Manual*, "People who live in the same dwelling, but who do not share food expenses or eat meals together, are not members of the same household. For example, if a man has two or more wives who (with their children) live and eat together, then they all form one household together. Alternatively, if each wife and her children live and eat separately, then this family will form more than one household. Similarly, if two brothers, each having his own family, live in the same house, but maintain separate food budgets, then they constitute two separate households.

"The following are examples of [possible] households:

- A man and his wife/wives and children, father/mother, nephew, other relatives, and non-relatives
- A single person
- A couple or several couples with or without their children"

According to pp. 11–12 of the *2009/10 Manual*, two categories of people count as *household members*, and three categories do not count.

- Household members:
  - *Usual members* (regardless of presence on the date of interview)
  - *Regular members*, such as children or others who are away from home for six months or more for education, search of employment, business transactions etc. (regardless of presence on the date of interview)
- Non-household members:
  - Visiting non-members or guests staying temporarily on the date of interview or who slept in the household the night before the interview
  - Usual members (as defined above) who have stayed abroad for six months or more
  - Those who have left the household permanently or who have died

Usual members are counted as *household members*. They are "persons who have been living in the household for at least six of the last twelve months.

"Members who have come to stay in the household permanently are also to be included as *usual members*, even if they have lived in the household for less than six months.

"Furthermore, children born to usual members during the last 12 months are counted as *usual members*."

Regular members are also to be counted as *household members*. They are "persons who would have been usual members except that they have been away for more than six of the last twelve months for education, search of employment, business transactions etc. and who, while away, did not live as part of other households but rather lived in boarding schools, lodging houses, hostels, etc."

Visitors are not counted as *household members*. Relatives of the head who happen to be visiting temporarily are not counted as *household members*.

Regular members who have been abroad for six or more of the last twelve months are not counted as *household members*.

Anyone who has left the household as of the day of the interview or who has died is not counted as a *household member*.

According to p. 1 of the *Questionnaire*, the enumerator should—after listing all members in the past twelve months mentioned by the respondent—ask:

- "Are there any other persons such as small children or infants that we have not listed?
- Are there any other people who may not be members of your family (such as domestic servants, lodgers, or friends) who usually live here?"

2. Are all household members ages 6 to 12 currently in school?
    A. No
    B. Yes
    C. No one ages 6 to 12

Do not read this question directly to the respondent. Instead, mark the relevant response based on the data you collect on the "Back-page Worksheet".

See the "Guidelines" for the previous indicator for the definitions of *household* and of *household member*.

According to p. 13 of the *Manual*, age is taken in units of years as of the person's last birthday.

According to p. 17 of the *Manual*, this question relates to household members "who are currently attending any formal school.

"Students out-of-school on holidays, vacation, or because of the temporary closure of the school or institution are counted as *currently attending*.

"Similarly, members who are temporarily absent from school due to illness or other unavoidable circumstances but will be going back to school are to be counted as *currently attending*.

"Students who are not attending school as such but who are preparing to take examinations privately are counted as *currently attending*.

According to p. 16 of the *Manual*, "*Formal schooling* includes schooling at primary or secondary school and vocational/technical or professional training."

3. Can the (oldest) female head/spouse read and write with understanding in any language?
    A. No
    B. No (oldest) female head/spouse
    C. Yes

When asking this question, use the actual name of the (oldest) female head/spouse, who—if she exists—you will have identified while completing the "Back-page Worksheet". That is, do not read this question to the respondent as "Can the (oldest) female head/spouse read and write with understanding in any language?" Instead, read it as "Can <name> read and write with understanding in any language?"

Any language means any language and so includes not only English but also any other language. For example, if the female head/spouse cannot read and write in English, but she can read and write in Luganda, then the response marked should be "C. Yes".

If there is no female head/spouse in the household (a fact which you will know after completing the "Back-page worksheet"), then do not read the question at all; mark "No (oldest) female head/spouse", and then go on to the next question.

To qualify as Yes, the (oldest) female head/spouse must be able to both read *and* write, not just one or the other (but not both).

If the (oldest) female head/spouse can read only Braille, then mark No.

According to p. 11 of the *Manual*, "In most cases, the *head of the household* is the one who manages the income earned and expenses incurred by the household, and who is the most knowledgeable about other members of the household. He/she will be the person named when you ask 'Who is the head of this household?'"

Page 12 of the *2009/10 Manual* adds to the above: "That is, the head is the person recognized by other household members as the head."

For the purposes of the scorecard, the *(oldest) female head/spouse* is:

- The household head, if the head is female
- The (oldest) spouse/conjugal partner of the household head, if the head is male
- Non-existent, if the head is male and if he does not have a spouse/conjugal partner who is also a member of the household

If there is more than one female head/spouse, then ask this question of the oldest one.

4. What type of material is mainly used for construction of the wall of the dwelling?
    A. Unburnt bricks with mud, mud and poles, or other
    B. Unburnt bricks with cement, wood, tin/iron sheets, concrete/stones, burnt stabilized bricks, or cement blocks

According to p. 28 of the *2009/10 Manual*, "Record the main construction material of the wall of the *main dwelling unit*. If the wall is composed of more than one material, then record the predominant material in the main structure."

According to p. 27 of the *Manual*, "Most of the questions on housing conditions can be answered by observation [without asking the respondent]. However, when in doubt, please ask the respondent. The response should refer to the characteristics of the biggest part of the dwelling unit."

According to p. 27 of the *Manual*, "If more than one kind of material is used, record the main type of material (that is, the material that covers the largest part of the wall of the dwelling unit). The quality of the material does not matter. Construction materials are usually obvious."

According to p. 28 of the *Manual*, "*Bricks* are building materials molded from earth or clay. They may or may not be burnt, and may or may not be stabilized with another material such as lime, cement, or mud.

"*Cement blocks* are building materials made out of a mixture of cement and sand. They are usually larger than bricks."

According to p. 8 of the *Manual*, "'Other' should be circled when the respondent's answer is different from any of the pre-coded responses listed. Before using 'other', make sure that the answer does not fit in any of the specified categories."

According to p. 27 of the *Manual*, "A *housing unit* is a unit designed/intended for habitation by one household. A housing unit may be a detached house, a flat, a hut, a room in labour lines, or another place intended to be habited by one household. A housing unit, although intended to be inhabited by one household, may in fact house two or more households. For example, a house or flat may be shared by two or three households. Another example is where one household occupies the main house and another occupies the garage. In such cases, there are two households in one housing unit.

"A dwelling unit is the unit actually occupied by the household."

According to p. 28 of the *Questionnaire*, this question pertains to "all the rooms and all separate buildings used by the household members."

5. What type of material is mainly used for construction of the roof of the dwelling?
    A. Thatch, or tins
    B. Iron sheets, concrete, tiles, asbestos, or other

According to p. 22 of the *2009/10 Manual*, "Record the main construction material of the roof of the *main dwelling unit*. If the roof is composed of more than one material, then record the predominant material in the main structure."

According to p. 27 of the *Manual*, "Most of the questions on housing conditions can be answered by observation [without asking the respondent]. However, when in doubt, please ask the respondent. The response should refer to the characteristics of the biggest part of the dwelling unit."

According to p. 27 of the *Manual*, "If more than one kind of material is used, record the main type of material (that is, the material that covers the largest part of the roof of the dwelling unit). The quality of the material does not matter. Construction materials are usually obvious."

According to p. 28 of the *Manual*, "*Thatch* includes grass, papyrus, banana fibre, banana leaves, etc."

According to p. 8 of the *Manual*, "'Other' should be circled when the respondent's answer is different from any of the pre-coded responses listed. Before using 'other', make sure that the answer does not fit in any of the specified categories."

According to p. 27 of the *Manual*, "A *housing unit* is a unit designed/intended for habitation by one household. A housing unit may be a detached house, a flat, a hut, a room in labour lines, or other place intended to be habited by one household. A housing unit, although intended to be inhabited by one household, may in fact house two or more households. For example, a house or flat may be shared by two or three households. Another example is where one household occupies the main house and another occupies the garage. In such cases, there are two households in one housing unit.

"A dwelling unit is the unit actually occupied by the household."

According to p. 28 of the *Questionnaire*, this question pertains to "all the rooms and all separate buildings used by the household members."

6. What source of energy does the household mainly use for cooking?
    A. Firewood, cow dung, or grass (reeds)
    B. Charcoal, paraffin stove, gas, biogas, electricity (regardless of source), or other

According to p. 31 of the *Manual*, "If the household uses more than one source of energy for cooking, then record the source of energy *mainly* used."

According to p. 32 of the *Manual*, "For households that do not cook at all, probe to establish the energy source they use when they cook once in a while."

According to p. 8 of the *Manual*, "'Other' should be circled when the respondent's answer is different from any of the pre-coded responses listed. Before using 'other', make sure that the answer does not fit in any of the specified categories."

7. What type of toilet facility does the household mainly use?
    A. No facility/bush/polythene bags/bucket/etc., or other
    B. Uncovered pit latrine (with or without slab), Ecosan (compost toilet), or covered pit latrine without slab
    C. Covered pit latrine with slab
    D. VIP latrine, or flush toilet

According to pp. 30–31 of the *Manual*, this question asks about "the type of toilet used by the household. It refers to *use* rather than *ownership*.

"With a *pit latrine*, excreta is deposited without flushing directly into a hole in the ground.

"An *uncovered pit latrine* does not have a structure over it, or the structure lacks either walls or a roof."

"A *pit latrine without slab* (open pit) is a latrine without a squatting slab and without platform or seat. An *open pit* is a rudimentary hole in the ground where excreta is collected.

"A *pit latrine with slab* is a latrine with a squatting slab or with a platform or seat. A latrine has a 'slab' if the floor of the latrine is made of a hard, smooth material that can easily be thoroughly cleaned (for example, cement, very smooth wood with no gaps, or smooth stone). Latrines with floors made of dirt, mud-covered floors, or floors of mud and sticks do not have a 'slab'. The 'slab' does not have to be raised above ground level. A platform or seat must be firmly supported on all sides and raised above the surrounding ground level to prevent surface water from entering the pit and for ease of cleaning.

"An *Ecosan (compost toilet)* is a toilet where feaces and urine is either composted or dehydrated (using ash or other materials) on-site before it is exposed to the environment."

"A *covered pit latrine* is a latrine with a structure consisting of at least three walls and a roof over it. The cover on the latrine keeps rainwater from entering the latrine.

"A *VIP latrine* (ventilated improved pit latrine), is a latrine ventilated by a pipe extending above the latrine roof. The open end of the vent pipe is covered with gauze mesh or fly-proof netting, and the inside of the superstructure is kept dark.

"A *flush toilet* uses a cistern or holding tank for flushing water and has a water seal—which is a U-shaped pipe—below the seat or squatting pan that prevents the passage of flies and odors.

"A *pour flush toilet* uses a water seal, but—unlike a flush toilet—it uses water poured by hand for flushing (no cistern is used)."

According to p. 31 of the *Manual*, "For households that use different toilet facilities during day and night, consider the facility used during the day.

According to p. 8 of the *Manual*, "'Other' should be circled when the respondent's answer is different from any of the pre-coded responses listed. Before using 'other', make sure that the answer does not fit in any of the specified categories."

8. How many mobile phones do members of your household own?
    A. None
    B. One
    C. Two
    D. Three or more

According to the *Questionnaire*, count mobile phones as *owned* if they are owned by a household member, regardless of whether ownership is individual or joint.

According to p. 33 of the *Manual*, "Ownership in this case refers to personal property irrespective of the purpose it serves. Any mobile phone got on credit shall be treated as owned. . . . If any of the household members has access to a mobile phone, but he/she actually does not own it, then it does not count."

According to p. 33 of the *Manual*, "Mobile phones that have computer facilities *should be excluded* for this question. The main reason why someone buys a phone is to make and receive calls and not for purposes of being used as a computer facility.

"By computer, we mean a programmable electronic and digital device that performs mathematical calculations and logical operations. It can process, store, and retrieve large amounts of data and produce results."

9. Does any member of your household own a radio?
    A. No
    B. Yes

According to the *Questionnaire*, count radios as *owned* if they are owned by a household member, regardless of whether ownership is individual or joint.

According to p. 33 of the *Manual*, "Ownership in this case refers to personal property irrespective of the purpose it serves. Any radio got on credit shall be treated as owned. . . . If any of the household members has access to a radio, but he/she actually does not own it, then it does not count."

10. Does every member of the household have at least one pair of shoes?
    A. No
    B. Yes

According to p. 35 of the *Manual*, "Find out whether every member of the household has a pair of shoes in good condition. Slippers, 'tire' shoes (*lugabire*), and gumboots are not considered as *shoes*."

Figure 1: National poverty lines (and the line marking the poorest half of people below 100% of the national line) and poverty rates for all of Uganda and for construction/validation samples, by households and people, for 2012/13

Sample	Line or Rate	Households or people	Households surveyed	% with consumption below a poverty line			
				National			Poorest half
				100%	150%	200%	below 100% natl.
All Uganda	Line			1,982	2,973	3,963	1,137
	Rate	Households	6,887	15.6	36.5	54.1	7.5
	Rate	People		19.7	44.4	63.0	9.9
Construction and calibration (Selecting indicators and weights, and associating scores with likelihoods)							
	Rate	Households	3,452	15.6	36.5	54.3	7.5
Validation (Measuring accuracy)							
	Rate	Households	3,435	15.6	36.5	54.0	7.6

Source: 2012/13 Uganda National Household Survey

Poverty lines are in UGX in average prices for all of Uganda from July 2012 to July 2013.

National lines are per-adult-equivalent per day.

The line marking the poorest half of people below 100% of the national line is per-capita per day.

Figure 1: International 2005 and 2011 PPP poverty lines and poverty rates for all of Uganda and for construction/validation samples, by households and people, for 2012/13

	Line or	Households or		% with consumption below a poverty line							
				Intl. 2005 PPP						Intl. 2011 PPP	
Sample	**Rate**	**people**	**Households surveyed**	**$1.25**	**$2.00**	**$2.50**	**$4.00**	**$5.00**	**$8.44**	**$1.90**	**$3.10**
All Uganda	Line			1,920	3,071	3,839	6,143	7,678	12,961	2108	3439
	Rate	Households	6,887	28.7	55.1	65.8	82.2	87.7	95.6	33.8	60.8
	Rate	People		36.2	65.1	75.5	89.3	93.5	97.9	42.1	70.8
Construction and calibration (Selecting indicators and weights, and associating scores with likelihoods)											
	Rate	Households	3,452	28.8	55.1	65.9	81.9	87.6	95.6	34.2	60.7
Validation (Measuring accuracy)											
	Rate	Households	3,435	28.7	55.2	65.7	82.5	87.8	95.5	33.5	60.9

Source: 2012/13 Uganda National Household Survey

Poverty lines are per-person per day in UGX in average prices for all of Uganda from July 2012 to July 2013.

Figure 1: Relative (percentile-based) poverty lines and poverty rates for all of Uganda and for construction/validation samples, by households and people, for 2012/13

Sample	Line or Rate	Households or people	Households surveyed	% with consumption below a poverty line				
				Relative (percentile) poverty lines				
				20th	40th	50th	60th	80th
All Uganda	Line			1,467	2,047	2,413	2,825	4,311
	Rate	Households	6,887	15.7	32.1	40.9	50.4	70.8
	Rate	People		20.0	40.0	50.0	60.0	80.0
Construction and calibration (Selecting indicators and weights, and associating scores with likelihoods)								
	Rate	Households	3,452	15.7	32.3	41.3	50.8	70.8
Validation (Measuring accuracy)								
	Rate	Households	3,435	15.6	32.0	40.5	50.0	70.8

Source: 2012/13 Uganda National Household Survey

Poverty lines are per-person per day in UGX in average prices for all of Uganda from July 2012 to July 2013.

Figure 2 (all Uganda): National poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			National poverty lines			Poorest half
		n	**100%**	**150%**	**200%**	**below 100% Natl.**
Urban	Line	1,944	2,103	3,155	4,206	1,109
	Rate (HHs)		6.4	17.3	30.0	3.3
	Rate (people)		9.3	23.6	38.6	5.1
Rural	Line	4,943	1,946	2,919	3,892	1,109
	Rate (HHs)		18.9	43.5	62.9	9.2
	Rate (people)		22.8	50.5	70.2	11.3
Overall	Line	6,887	1,982	2,973	3,963	1,109
	Rate (HHs)		15.6	36.5	54.1	7.6
	Rate (people)		19.7	44.4	63.0	9.9

Figure 2 (all Uganda): International 2005 and 2011 poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Intl. 2005 PPP						Intl. 2011 PPP	
		n	**$1.25**	**$2.00**	**$2.50**	**$4.00**	**$5.00**	**$8.44**	**$1.90**	**$3.10**
Urban	Line		2,037	3,260	4,075	6,519	8,149	13,756	2,237	3,650
	Rate (HHs)	1,944	13.3	30.0	41.8	62.6	72.8	89.5	15.5	36.4
	Rate (people)		19.0	39.5	53.1	73.3	81.9	94.0	21.7	47.1
Rural	Line		1,885	3,016	3,770	6,033	7,541	12,729	2,070	3,377
	Rate (HHs)	4,943	34.3	64.3	74.5	89.3	93.2	97.8	40.5	69.7
	Rate (people)		41.2	72.5	82.0	94.0	96.8	99.1	48.0	77.8
Overall	Line		1,920	3,071	3,839	6,143	7,678	12,961	2,108	3,439
	Rate (HHs)	6,887	28.7	55.1	65.8	82.2	87.7	95.6	33.8	60.8
	Rate (people)		36.2	65.1	75.5	89.3	93.5	97.9	42.1	70.8

Figure 2 (all Uganda): Relative (percentile-based) poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Relative (percentile) poverty lines				
		n	**20th**	**40th**	**50th**	**60th**	**80th**
Urban	Line	1,944	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		6.4	14.9	20.1	26.2	47.9
	Rate (people)		9.7	21.0	27.4	34.4	59.2
Rural	Line	4,943	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		19.0	38.4	48.4	59.2	79.1
	Rate (people)		23.0	45.6	56.6	67.5	86.0
Overall	Line	6,887	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		15.7	32.1	40.9	50.4	70.8
	Rate (people)		20.0	40.0	50.0	60.0	80.0

Figure 2 (Central): National poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			National poverty lines			Poorest half
		n	**100%**	**150%**	**200%**	**below 100% Natl.**
Urban	Line	1,082	2,171	3,256	4,342	1,109
	Rate (HHs)		1.6	6.3	15.3	0.8
	Rate (people)		2.2	8.5	19.4	1.5
Rural	Line	928	1,999	2,999	3,999	1,109
	Rate (HHs)		4.7	24.4	42.9	1.5
	Rate (people)		6.3	31.5	53.0	2.2
Overall	Line	2,010	2,066	3,100	4,133	1,109
	Rate (HHs)		3.3	16.3	30.6	1.2
	Rate (people)		4.7	22.5	39.9	1.9

Figure 2 (Central): International 2005 and 2011 poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Intl. 2005 PPP						Intl. 2011 PPP	
		n	**$1.25**	**$2.00**	**$2.50**	**$4.00**	**$5.00**	**$8.44**	**$1.90**	**$3.10**
Urban	Line	1,082	2,103	3,364	4,205	6,729	8,411	14,198	2,309	3,767
	Rate (HHs)		5.1	15.2	26.3	50.2	63.7	85.1	5.5	21.1
	Rate (people)		7.2	20.1	33.6	59.3	72.5	89.6	7.8	27.9
Rural	Line	928	1,937	3,099	3,874	6,198	7,747	13,077	2,127	3,470
	Rate (HHs)		16.4	44.1	57.9	79.8	86.4	94.7	21.5	50.0
	Rate (people)		22.6	56.4	69.9	88.8	94.0	98.0	29.1	62.1
Overall	Line	2,010	2,002	3,202	4,003	6,405	8,006	13,515	2,198	3,586
	Rate (HHs)		11.4	31.2	43.8	66.6	76.3	90.4	14.4	37.1
	Rate (people)		16.6	42.2	55.7	77.3	85.6	94.7	20.8	48.7

Figure 2 (Central): Relative (percentile-based) poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Relative (percentile) poverty lines				
		n	**20th**	**40th**	**50th**	**60th**	**80th**
Urban	Line	1,082	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		1.3	5.4	8.3	11.7	31.8
	Rate (people)		2.1	7.7	11.0	15.4	39.9
Rural	Line	928	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		5.6	19.5	27.9	39.9	64.4
	Rate (people)		7.7	26.3	36.8	50.9	75.9
Overall	Line	2,010	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		3.7	13.2	19.2	27.3	49.9
	Rate (people)		5.5	19.0	26.7	37.0	61.9

Figure 2 (Eastern): National poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			National poverty lines			Poorest half
		n	**100%**	**150%**	**200%**	**below 100% Natl.**
Urban	Line	266	2,075	3,112	4,149	1,109
	Rate (HHs)		11.7	34.0	54.0	5.0
	Rate (people)		14.5	41.2	64.0	6.8
Rural	Line	1,130	1,937	2,905	3,873	1,109
	Rate (HHs)		22.2	55.0	76.0	9.1
	Rate (people)		26.3	62.1	81.4	10.6
Overall	Line	1,396	1,957	2,936	3,914	1,109
	Rate (HHs)		20.4	51.2	72.1	8.4
	Rate (people)		24.5	59.0	78.8	10.1

Figure 2 (Eastern): International 2005 and 2011 poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Intl. 2005 PPP						Intl. 2011 PPP	
		n	**$1.25**	**$2.00**	**$2.50**	**$4.00**	**$5.00**	**$8.44**	**$1.90**	**$3.10**
Urban	Line	266	2,010	3,216	4,019	6,431	8,039	13,569	2,207	3,600
	Rate (HHs)		24.2	53.2	65.4	80.1	85.0	95.9	30.4	60.5
	Rate (people)		30.3	64.3	77.3	88.3	91.9	97.8	37.7	71.7
Rural	Line	1,130	1,876	3,001	3,752	6,003	7,503	12,666	2,060	3,361
	Rate (HHs)		44.9	76.8	84.8	94.6	96.2	99.2	52.3	81.6
	Rate (people)		52.0	82.8	89.8	97.0	98.5	99.5	59.5	87.3
Overall	Line	1,396	1,896	3,033	3,791	6,066	7,583	12,799	2,082	3,396
	Rate (HHs)		41.2	72.6	81.3	92.0	94.2	98.6	48.4	77.9
	Rate (people)		48.8	80.1	87.9	95.7	97.5	99.2	56.2	85.0

Figure 2 (Eastern): Relative (percentile-based) poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Relative (percentile) poverty lines				
		n	**20th**	**40th**	**50th**	**60th**	**80th**
Urban	Line	266	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		12.9	28.9	37.9	47.8	70.3
	Rate (people)		17.0	35.9	47.2	55.6	81.6
Rural	Line	1,130	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		21.8	49.7	61.0	71.6	88.0
	Rate (people)		25.5	56.7	68.8	78.5	92.0
Overall	Line	1,396	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		20.2	46.0	56.9	67.4	84.8
	Rate (people)		24.2	53.6	65.6	75.1	90.5

Figure 2 (Northern): National poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			National poverty lines			Poorest half
		n	**100%**	**150%**	**200%**	**below 100% Natl.**
Urban	Line	291	2,044	3,066	4,088	1,109
	Rate (HHs)		23.0	41.4	54.9	13.6
	Rate (people)		29.8	50.8	64.7	18.0
Rural	Line	1,769	1,957	2,936	3,914	1,109
	Rate (HHs)		40.2	63.6	79.5	23.5
	Rate (people)		46.5	69.4	84.0	28.6
Overall	Line	2,060	1,972	2,958	3,944	1,109
	Rate (HHs)		37.2	59.8	75.3	21.8
	Rate (people)		43.7	66.3	80.7	26.8

Figure 2 (Northern): International 2005 and 2011 poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Intl. 2005 PPP						Intl. 2011 PPP	
		n	**$1.25**	**$2.00**	**$2.50**	**$4.00**	**$5.00**	**$8.44**	**$1.90**	**$3.10**
Urban	Line	291	1,980	3,168	3,960	6,336	7,921	13,370	2,174	3,548
	Rate (HHs)		36.3	54.2	65.4	79.9	87.0	95.2	38.9	59.9
	Rate (people)		45.9	66.1	75.6	88.6	93.0	98.3	48.6	70.6
Rural	Line	1,769	1,896	3,033	3,792	6,067	7,583	12,801	2,082	3,397
	Rate (HHs)		54.3	79.7	87.7	95.9	97.8	99.3	60.0	83.9
	Rate (people)		61.5	85.2	91.8	97.9	99.0	99.7	67.2	89.0
Overall	Line	2,060	1,910	3,056	3,820	6,112	7,640	12,896	2,097	3,422
	Rate (HHs)		51.2	75.3	83.9	93.1	95.9	98.6	56.3	79.8
	Rate (people)		58.9	82.0	89.1	96.3	98.0	99.5	64.1	85.9

Figure 2 (Northern): Relative (percentile-based) poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Relative (percentile) poverty lines				
		n	**20th**	**40th**	**50th**	**60th**	**80th**
Urban	Line	291	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		22.9	38.2	43.6	50.1	70.4
	Rate (people)		30.5	47.5	54.2	61.5	79.5
Rural	Line	1,769	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		40.1	57.9	68.0	75.5	90.4
	Rate (people)		47.0	65.2	74.6	81.4	94.2
Overall	Line	2,060	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		37.1	54.5	63.8	71.2	86.9
	Rate (people)		44.2	62.3	71.1	78.0	91.7

Figure 2 (Western): National poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			National poverty lines			Poorest half
		n	**100%**	**150%**	**200%**	**below 100% Natl.**
Urban	Line	305	2,028	3,042	4,056	1,109
	Rate (HHs)		2.7	14.3	29.1	1.2
	Rate (people)		4.1	19.2	36.0	1.6
Rural	Line	1,116	1,904	2,857	3,809	1,109
	Rate (HHs)		8.4	28.5	50.1	3.0
	Rate (people)		9.8	33.2	56.6	3.6
Overall	Line	1,421	1,929	2,893	3,857	1,109
	Rate (HHs)		7.1	25.3	45.4	2.6
	Rate (people)		8.7	30.5	52.5	3.2

Figure 2 (Western): International 2005 and 2011 poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Intl. 2005 PPP						Intl. 2011 PPP	
		n	**$1.25**	**$2.00**	**$2.50**	**$4.00**	**$5.00**	**$8.44**	**$1.90**	**$3.10**
Urban	Line	305	1,964	3,143	3,929	6,286	7,857	13,263	2,157	3,519
	Rate (HHs)		9.2	30.6	44.0	66.6	75.3	91.4	11.6	37.8
	Rate (people)		13.3	38.0	55.2	77.8	84.4	96.4	16.2	47.4
Rural	Line	1,116	1,845	2,951	3,689	5,903	7,379	12,455	2,026	3,305
	Rate (HHs)		19.5	53.2	65.2	85.7	91.4	97.3	25.8	60.0
	Rate (people)		23.2	60.4	72.6	90.9	94.9	98.9	30.6	67.7
Overall	Line	1,421	1,868	2,989	3,736	5,978	7,473	12,614	2,051	3,347
	Rate (HHs)		17.2	48.2	60.4	81.4	87.8	96.0	22.6	55.1
	Rate (people)		21.3	56.0	69.2	88.3	92.9	98.4	27.8	63.7

Figure 2 (Western): Relative (percentile-based) poverty lines and rates (and the line marking the poorest half of people below 100% of the national line) by urban, rural, and all, and by households and people for 2012/13

			Relative (percentile) poverty lines				
		n	**20th**	**40th**	**50th**	**60th**	**80th**
Urban	Line	305	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		2.4	10.6	18.5	27.4	53.4
	Rate (people)		3.3	15.4	24.1	35.0	64.6
Rural	Line	1,116	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		8.5	24.1	33.8	46.8	71.6
	Rate (people)		10.2	28.5	40.0	53.5	78.8
Overall	Line	1,421	1,467	2,047	2,413	2,825	4,311
	Rate (HHs)		7.2	21.1	30.4	42.5	67.5
	Rate (people)		8.8	26.0	36.9	49.9	76.0

Figure 3: Poverty indicators by uncertainty coefficient

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
1,380	Does every member of the household have at least one pair of shoes? (No; Yes)
1,328	In what sub-region does the household live? (North-east; West Nile; Eastern; Mid-north; East Central; Central II; Mid-west; South-western; Central I; Kampala)
1,155	What type of material is mainly used for the construction of the floor? (Rammed earth, brick, stone, or wood; Earth, or other; Cement screed, concrete, or tiles)
1,085	What source of energy does this household mainly use for lighting? (Paraffin *tadooba*, biogas, gas, firewood, cow dung, or grass (reeds); Electricity (community/thermal plant), or other; Paraffin lantern, or candles; Electricity (national grid, solar, or personal generator))
1,021	Does any member of your household own a radio, cassette/DVD/CD, or television? (None; Only radio; Cassette/DVD/CD, but no television (regardless of radio); Television (regardless of others))
1,011	How many mobile phones do members of your household own? (None; One; Two; Three or more)
944	In what region does the household reside? (Northern; Eastern; Central; Western)
936	What source of energy does the household mainly use for cooking? (Firewood, cow dung, or grass (reeds); Charcoal, paraffin stove, gas, biogas, electricity (regardless of source), or other)
915	What is the highest grade that the (oldest) female head/spouse completed? (None, or went to school but did not complete P.1; P.1 to P.4; P.5 to P.6; P.7; J.1 to J.3, or S.1 to S.3; No (oldest) female head/spouse; S.4 to S.6; Post-primary/junior specialized training or certificate or diploma, post-secondary specialized training or diploma, or degree or above)
860	What is the main source of drinking water for the household? (River/stream/lake, or gravity-flow scheme; Public borehole; Unprotected well/spring; Protected well/spring, or tanker truck; Public taps, borehole in yard/plot, or rain water; Other; Piped water into dwelling, piped water to the yard, vendor, or bottled water)
772	What type of toilet facility does the household mainly use? (No facility/bush/polythene bags/bucket/etc., or other; Uncovered pit latrine (with or without slab), Ecosan (compost toilet), or covered pit latrine without slab; Covered pit latrine with slab; VIP latrine, or flush toilet)

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

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
761	Does any member of your household own a radio or cassette/DVD/CD? (None; Only radio; Cassette/DVD/CD (regardless of radio))
757	What type of material is mainly used for construction of the wall of the dwelling? (Unburnt bricks with mud, mud and poles, or other; Unburnt bricks with cement, wood, tin/iron sheets, concrete/stones, burnt stabilized bricks, or cement blocks)
747	What type of bathroom does this household mainly use? (None, or other; Makshift; Outside built, no drainage provided; Outside built, drainage provided; Inside, no drainage provided; Inside, drainage provided)
743	What type of material is mainly used for construction of the roof of the dwelling? (Thatch, or tins; Iron sheets, concrete, tiles, asbestos, or other)
726	How many household members are 16-years-old or younger? (Five or more; Four; Three Two; One; None)
724	How many household members are 15-years-old or younger? (Five or more; Four; Three Two; One; None)
723	How many household members are 17-years-old or younger? (Five or more; Four; Three Two; One; None)
721	If you were asked to classify the household into very poor, poor, neither poor nor rich, or rich, where would you put your own household? (Very poor; Poor; Neither poor nor rich, or rich)
716	How many household members are 18-years-old or younger? (Six or more; Five; Four; Three Two; One; None)
690	How many household members are 14-years-old or younger? (Five or more; Four; Three Two; One; None)
666	How many household members are 13-years-old or younger? (Five or more; Four; Three Two; One; None)
653	On a scale of 1 to 5 (1=poorest, 2=poor, 3=average, 4=above average, and 5=rich), how would you rate your standard of living in relation to other households in your community? (Poorest; Poor; Average, above average, or rich)
649	Are all household members ages 6 to 14 currently in school? (No; Yes; No one ages 6 to 14)
636	Are all household members ages 6 to 15 currently in school? (No; Yes; No one ages 6 to 15)
636	Does any member of your household own a television? (No; Yes)

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

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
632	How many household members are 12-years-old or younger? (Five or more; Four; Three Two; One; None)
623	Are all household members ages 6 to 16 currently in school? (No; Yes; No one ages 6 to 16)
622	How many members does the household have? (Nine or more; Eight; Seven; Five or six; Four; Three; Two; One)
613	Are all household members ages 6 to 17 currently in school? (No; Yes; No one ages 6 to 17)
607	Are all household members ages 6 to 12 currently in school? (No; Yes; No one ages 6 to 12)
605	Are all household members ages 6 to 13 currently in school? (No; Yes; No one ages 6 to 13)
588	Are all household members ages 6 to 11 currently in school? (No; Yes; No one ages 6 to 11)
570	Are all household members ages 6 to 18 currently in school? (No; Yes; No one ages 6 to 18)
565	How many household members are 11-years-old or younger? (Four or more; Three; Two; One; None)
543	Does every member of this household have at least two sets of clothes? (No; Yes)
515	What type of dwelling is it? (Detached house (single or multi-storey), flat in a block of flats, servants quarters, garage, go down/basement, store, or other; Semi-detached house; Room/rooms in a main house; Tenement (*muzigo*))
492	What was the average number of meals taken by household members per day in the last seven days? (None or one; Two; Three or more)
463	What is the highest grade that the male head/spouse completed? (*None, or went to school but did not complete P.1; P.1 to P.6; No male head/spouse; P.7; J.1 to J.3, or S.1 to S.3; S.4 to S.6; Post-primary/junior specialized training or certificate or diploma, post-secondary specialized training or diploma, degree or above)
457	What is the occupancy tenure of the dwelling unit? (Owner-occupied, subsidized public, subsidized private, or other; Free private; Rented public; Rented private; Free public)
432	Does every child in this household (all those under 18-years-old) have a blanket? (No; Yes)
409	Does any member of your household own a cassette/DVD/CD? (No; Yes)
350	Does any member of your household own a radio? (No; Yes)

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

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
343	What is the most commonly used method of solid waste disposal from the household? (Garden; Pit, or other; Heap; Burning; Skip bin or waste vendor)
339	Does any member of your household own any household appliances (e.g., kettle, flat iron, etc.)? (No; Yes)
334	Can the (oldest) female head/spouse read and write with understanding in any language? (No; No (oldest) female head/spouse; Yes)
316	How many household members are 6-years-old or younger? (Three or more; Two; One; None)
300	In the last week, did the (oldest) female head/spouse work on the household's farm? (Yes; No; No (oldest) female head/spouse)
234	Can the male head/spouse read and write with understanding in any language? (No; No male head/spouse; Yes)
231	What is the most important source of earnings for the household during the last 12 months? (Subsistence farming, transfers (pension, allowances, social-security benefits), organizational support (e.g., food aid, WFP, NGOs, etc.), or other; Wage employment; Non-agricultural enterprises; Remittances; Commercial farming, or property income)
229	In the last week, did the male head/spouse work on the household's farm? (Yes; No male head/spouse; No)
214	What is the present marital status of the (oldest) female head/spouse? (Divorced/separated; Widow; Married polygamous; Married monogamous; Never married; No (oldest) female head/spouse)
204	What is the present marital status of the male head/spouse? (Married polygamous; Married monogamous; No male head/spouse Divorced/separated, or widower; Never married)
188	What is the structure of household headship? (Both male and female heads/spouses; Female head/spouse only; Male head/spouse only)
175	Does any member of your household own any furniture/furnishings? (No; Yes)
132	Does any member of your household own a motor cycle? (No; Yes)
99	Does any member of your household own any land? (No; Yes)

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

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
77	What type of kitchen does this household mainly use? (Inside, no specific room; Makeshift; Outside, built; Open space; Inside, specific room, or other)
51	Does any member of your household own a motor vehicle? (No; Yes)
34	How many rooms does your household use for sleeping? (One; Two; Three or ore)
30	Does any member of your household own any buildings other than an owner-occupied house? (No; Yes)
23	Does any member of your household own a bicycle, motor cycle, or motor vehicle? (No; Yes)
1	Does any member of your household own a bicycle? (No; Yes)

Source: 2012/13 UNHS questionnaire and 100% of the national poverty line

Figures for
100% of the National Poverty Line

(and Figures Pertaining to all Poverty Lines)

Figure 4 (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	87.3
5–9	79.0
10–14	58.7
15–19	39.9
20–24	30.4
25–29	23.0
30–34	10.0
35–39	7.0
40–44	6.3
45–49	3.0
50–54	1.6
55–59	0.5
60–64	0.4
65–69	0.4
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 5 (100% of the national line): Derivation of estimated poverty likelihoods associated with scores

Score	Households in range and < poverty line		All households in range		Poverty likelihood (%)
0–4	678	÷	777	=	87.3
5–9	2,081	÷	2,633	=	79.0
10–14	2,741	÷	4,666	=	58.7
15–19	2,723	÷	6,831	=	39.9
20–24	2,519	÷	8,284	=	30.4
25–29	1,933	÷	8,388	=	23.0
30–34	1,035	÷	10,333	=	10.0
35–39	672	÷	9,588	=	7.0
40–44	603	÷	9,638	=	6.3
45–49	272	÷	9,076	=	3.0
50–54	102	÷	6,536	=	1.6
55–59	29	÷	6,180	=	0.5
60–64	23	÷	5,476	=	0.4
65–69	19	÷	4,510	=	0.4
70–74	0	÷	2,629	=	0.0
75–79	0	÷	3,198	=	0.0
80–84	0	÷	1,095	=	0.0
85–89	0	÷	86	=	0.0
90–94	0	÷	76	=	0.0
95–100	0	÷	0	=	0.0

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

Figure 6 (100% of the national line): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (±percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	+5.2	7.0	8.2	12.1
5–9	+21.1	4.6	5.5	7.4
10–14	+2.8	3.5	4.1	5.4
15–19	–19.6	11.2	11.5	12.1
20–24	+6.9	2.1	2.5	3.1
25–29	+2.1	1.9	2.3	3.0
30–34	+0.2	1.4	1.7	2.1
35–39	+1.7	0.9	1.1	1.4
40–44	+1.5	0.8	1.0	1.3
45–49	+1.0	0.6	0.6	0.9
50–54	–1.8	1.4	1.5	1.6
55–59	–0.6	0.5	0.6	0.8
60–64	+0.1	0.3	0.3	0.4
65–69	–2.8	2.2	2.4	2.7
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 (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, 2012/13 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	58.4	74.4	88.7
4	+0.1	29.3	35.9	47.3
8	–0.0	20.4	25.2	31.9
16	+0.1	15.2	17.1	21.0
32	–0.2	10.4	12.2	16.5
64	–0.2	7.8	9.0	12.7
128	–0.1	5.5	6.6	8.6
256	–0.0	4.0	4.7	6.1
512	+0.0	2.8	3.3	4.4
1,024	–0.0	1.9	2.4	3.1
2,048	–0.0	1.4	1.7	2.1
4,096	–0.1	1.0	1.2	1.5
8,192	–0.1	0.7	0.8	1.1
16,384	–0.1	0.5	0.6	0.8

Figure 8 (National poverty lines and the line that marks the poorest half of people below 100% of the national line): 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, 2012/13 scorecard applied to the validation sample

	Poverty line			
	National			
	100%	150%	200%	Poorest half below 100% natl.
Estimate minus true value	–0.1	–1.6	–1.0	+0.4
Precision of difference	0.5	0.6	0.6	0.3
α factor for precision	1.08	0.96	0.94	0.96

Results pertain to the 2012/13 scorecard applied to the validation sample.
Differences between estimates and true values are displayed in units of percentage points.
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 8 (International 2005 and 2011 PPP 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, 2012/13 scorecard applied to the validation sample

	Intl. 2005 PPP						Intl. 2011 PPP	
	$1.25	**$2.00**	**$2.50**	**$4.00**	**$5.00**	**$8.44**	**$1.90**	**$3.10**
Estimate minus true value	–2.1	–1.1	–0.0	–1.1	–0.4	–0.2	–1.1	–0.7
Precision of difference	0.6	0.6	0.5	0.4	0.4	0.3	0.6	0.6
α factor for precision	1.02	0.93	0.91	0.77	0.86	0.94	0.98	0.91

Results pertain to the 2012/13 scorecard applied to the validation sample.
Differences between estimates and true values are displayed in units of percentage points.
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 8 (Relative—percentile-based—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, 2012/13 scorecard applied to the validation sample

	Relative (percentile) poverty lines				
	20th	**40th**	**50th**	**60th**	**80th**
Estimate minus true value	+0.1	–1.7	–1.0	–0.5	–0.1
Precision of difference	0.5	0.6	0.6	0.6	0.5
α factor for precision	1.07	1.01	0.95	0.96	0.95

Results pertain to the 2012/13 scorecard applied to the validation sample.
Differences between estimates and true values are displayed in units of percentage points.
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): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.7	14.9	0.1	84.3	84.9	–90.8
≤9	2.4	13.2	1.0	83.4	85.9	–62.5
≤14	4.9	10.7	3.2	81.3	86.2	–16.6
≤19	8.2	7.4	6.7	77.7	85.9	+48.3
≤24	10.7	4.9	12.5	71.9	82.6	+19.8
≤29	12.6	3.0	19.0	65.4	77.9	–22.1
≤34	13.8	1.8	28.1	56.3	70.0	–80.5
≤39	14.4	1.2	37.1	47.3	61.8	–137.8
≤44	15.0	0.6	46.1	38.3	53.3	–195.9
≤49	15.2	0.4	55.0	29.4	44.6	–252.8
≤54	15.4	0.2	61.3	23.1	38.5	–293.5
≤59	15.5	0.1	67.4	17.0	32.5	–332.6
≤64	15.5	0.1	72.9	11.5	27.0	–367.6
≤69	15.6	0.0	77.3	7.1	22.7	–396.1
≤74	15.6	0.0	80.0	4.5	20.0	–412.9
≤79	15.6	0.0	83.2	1.3	16.8	–433.4
≤84	15.6	0.0	84.2	0.2	15.8	–440.5
≤89	15.6	0.0	84.3	0.1	15.7	–441.0
≤94	15.6	0.0	84.4	0.0	15.6	–441.5
≤100	15.6	0.0	84.4	0.0	15.6	–441.5

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 a 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), 2012/13 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	0.8	84.1	4.2	5.3:1
≤9	3.4	71.4	15.6	2.5:1
≤14	8.1	61.0	31.6	1.6:1
≤19	14.9	55.1	52.7	1.2:1
≤24	23.2	46.1	68.6	0.9:1
≤29	31.6	39.7	80.5	0.7:1
≤34	41.9	32.9	88.3	0.5:1
≤39	51.5	28.0	92.6	0.4:1
≤44	61.1	24.5	96.3	0.3:1
≤49	70.2	21.7	97.6	0.3:1
≤54	76.7	20.1	98.9	0.3:1
≤59	82.9	18.7	99.4	0.2:1
≤64	88.4	17.6	99.5	0.2:1
≤69	92.9	16.8	100.0	0.2:1
≤74	95.5	16.3	100.0	0.2:1
≤79	98.7	15.8	100.0	0.2:1
≤84	99.8	15.6	100.0	0.2:1
≤89	99.9	15.6	100.0	0.2:1
≤94	100.0	15.6	100.0	0.2:1
≤100	100.0	15.6	100.0	0.2:1

Tables for
150% of the National Poverty Line

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

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	97.3
5–9	94.3
10–14	82.3
15–19	75.3
20–24	72.0
25–29	59.2
30–34	37.3
35–39	32.5
40–44	28.7
45–49	21.4
50–54	10.7
55–59	5.4
60–64	2.4
65–69	1.0
70–74	0.6
75–79	0.0
80–84	0.0
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 (150% of the national line): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	–2.7	1.4	1.4	1.4
5–9	+6.2	2.9	3.4	4.8
10–14	–0.1	2.6	3.1	3.9
15–19	–11.8	6.7	6.9	7.1
20–24	–7.2	4.6	4.7	5.0
25–29	+4.7	2.5	3.0	4.1
30–34	–12.8	7.7	7.9	8.2
35–39	+4.4	2.2	2.6	3.5
40–44	+4.7	2.1	2.4	3.1
45–49	+6.3	1.5	1.8	2.4
50–54	–2.9	2.4	2.6	2.8
55–59	+0.1	1.1	1.4	1.8
60–64	–2.6	2.0	2.2	2.5
65–69	–4.6	3.2	3.4	3.8
70–74	–0.7	0.8	0.9	1.1
75–79	–0.7	0.6	0.7	0.8
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 (150% 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, 2012/13 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	–0.8	65.3	75.3	88.4
4	–0.5	34.3	40.1	51.1
8	–1.1	24.8	30.1	39.5
16	–1.1	18.0	21.9	28.1
32	–1.1	12.7	15.1	18.7
64	–1.3	9.3	10.8	14.5
128	–1.5	6.8	8.1	10.5
256	–1.5	4.8	5.6	8.1
512	–1.5	3.4	4.0	5.4
1,024	–1.6	2.4	2.9	3.6
2,048	–1.6	1.7	1.9	2.5
4,096	–1.6	1.2	1.4	1.8
8,192	–1.6	0.8	1.0	1.3
16,384	–1.6	0.6	0.7	1.0

Figure 10 (150% of the national line): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	35.7	0.0	63.5	64.3	–95.7
≤9	3.1	33.4	0.3	63.2	66.4	–82.0
≤14	7.0	29.5	1.1	62.4	69.4	–58.7
≤19	12.6	23.9	2.3	61.2	73.7	–24.7
≤24	18.7	17.9	4.5	59.0	77.6	+14.6
≤29	23.0	13.5	8.6	54.9	77.9	+49.5
≤34	27.8	8.7	14.1	49.4	77.3	+61.5
≤39	30.9	5.6	20.6	42.9	73.8	+43.6
≤44	33.2	3.4	28.0	35.5	68.7	+23.4
≤49	34.7	1.8	35.5	28.0	62.7	+2.8
≤54	35.6	0.9	41.1	22.4	58.0	–12.6
≤59	36.0	0.5	46.9	16.6	52.5	–28.5
≤64	36.2	0.3	52.2	11.3	47.6	–42.8
≤69	36.4	0.1	56.5	7.0	43.4	–54.7
≤74	36.5	0.0	59.1	4.4	40.9	–61.7
≤79	36.5	0.0	62.2	1.3	37.8	–70.4
≤84	36.5	0.0	63.3	0.2	36.7	–73.4
≤89	36.5	0.0	63.4	0.1	36.6	–73.6
≤94	36.5	0.0	63.5	0.0	36.5	–73.9
≤100	36.5	0.0	63.5	0.0	36.5	–73.9

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

Figure 11 (150% of the national line): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	2.1	Only poor targeted
≤9	3.4	92.3	8.6	12.0:1
≤14	8.1	86.6	19.1	6.5:1
≤19	14.9	84.4	34.5	5.4:1
≤24	23.2	80.5	51.1	4.1:1
≤29	31.6	72.9	63.0	2.7:1
≤34	41.9	66.4	76.3	2.0:1
≤39	51.5	60.0	84.7	1.5:1
≤44	61.1	54.2	90.8	1.2:1
≤49	70.2	49.5	95.1	1.0:1
≤54	76.7	46.4	97.6	0.9:1
≤59	82.9	43.4	98.6	0.8:1
≤64	88.4	41.0	99.3	0.7:1
≤69	92.9	39.2	99.8	0.6:1
≤74	95.5	38.2	99.9	0.6:1
≤79	98.7	37.0	100.0	0.6:1
≤84	99.8	36.6	100.0	0.6:1
≤89	99.9	36.5	100.0	0.6:1
≤94	100.0	36.5	100.0	0.6:1
≤100	100.0	36.5	100.0	0.6:1

Tables for
200% of the National Poverty Line

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

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	99.2
5–9	97.9
10–14	93.6
15–19	89.2
20–24	88.6
25–29	80.1
30–34	66.9
35–39	60.3
40–44	54.7
45–49	43.3
50–54	28.9
55–59	16.0
60–64	10.8
65–69	6.5
70–74	3.6
75–79	1.7
80–84	1.6
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 (200% of the national line): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	–0.8	0.4	0.4	0.4
5–9	–0.7	1.0	1.2	1.4
10–14	+1.0	1.8	2.1	2.9
15–19	–7.5	4.1	4.2	4.3
20–24	–1.4	1.3	1.4	1.9
25–29	+2.5	2.0	2.3	3.3
30–34	–11.8	6.8	6.9	7.2
35–39	+5.9	2.8	3.2	4.3
40–44	+9.9	2.3	2.6	3.7
45–49	–1.8	2.4	2.8	3.7
50–54	–1.4	2.4	2.9	4.0
55–59	–1.6	2.0	2.3	3.0
60–64	–4.7	3.6	3.9	4.5
65–69	–2.1	2.1	2.5	3.2
70–74	–4.1	3.2	3.4	3.8
75–79	+1.0	0.5	0.6	0.8
80–84	–1.9	2.2	2.7	3.5
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 (200% 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, 2012/13 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	61.8	82.0	91.4
4	–0.4	34.2	41.8	53.5
8	–0.7	25.8	29.9	38.2
16	–0.5	18.5	21.7	29.9
32	–0.7	13.4	16.2	21.3
64	–0.9	9.9	11.6	14.6
128	–1.0	6.9	8.3	10.8
256	–1.0	4.9	5.8	7.4
512	–0.9	3.3	4.1	5.3
1,024	–1.0	2.4	2.8	3.7
2,048	–1.0	1.7	2.0	2.7
4,096	–1.0	1.2	1.3	1.9
8,192	–1.0	0.8	0.9	1.2
16,384	–1.0	0.6	0.7	0.9

Figure 10 (200% of the national line): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	0.8	100.0	1.4	Only poor targeted
≤9	3.4	99.0	6.2	100.9:1
≤14	8.1	95.7	14.3	22.5:1
≤19	14.9	95.3	26.3	20.4:1
≤24	23.2	92.1	39.5	11.7:1
≤29	31.6	88.0	51.5	7.4:1
≤34	41.9	84.6	65.6	5.5:1
≤39	51.5	79.8	76.1	4.0:1
≤44	61.1	74.5	84.3	2.9:1
≤49	70.2	70.4	91.5	2.4:1
≤54	76.7	67.0	95.3	2.0:1
≤59	82.9	63.5	97.5	1.7:1
≤64	88.4	60.4	98.8	1.5:1
≤69	92.9	57.8	99.5	1.4:1
≤74	95.5	56.5	99.9	1.3:1
≤79	98.7	54.7	99.9	1.2:1
≤84	99.8	54.1	100.0	1.2:1
≤89	99.9	54.1	100.0	1.2:1
≤94	100.0	54.0	100.0	1.2:1
≤100	100.0	54.0	100.0	1.2:1

Figure 11 (200% of the national line): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	1.4	Only poor targeted
≤9	3.4	99.0	6.2	100.9:1
≤14	8.1	95.7	14.3	22.5:1
≤19	14.9	95.3	26.3	20.4:1
≤24	23.2	92.1	39.5	11.7:1
≤29	31.6	88.0	51.5	7.4:1
≤34	41.9	84.6	65.6	5.5:1
≤39	51.5	79.8	76.1	4.0:1
≤44	61.1	74.5	84.3	2.9:1
≤49	70.2	70.4	91.5	2.4:1
≤54	76.7	67.0	95.3	2.0:1
≤59	82.9	63.5	97.5	1.7:1
≤64	88.4	60.4	98.8	1.5:1
≤69	92.9	57.8	99.5	1.4:1
≤74	95.5	56.5	99.9	1.3:1
≤79	98.7	54.7	99.9	1.2:1
≤84	99.8	54.1	100.0	1.2:1
≤89	99.9	54.1	100.0	1.2:1
≤94	100.0	54.0	100.0	1.2:1
≤100	100.0	54.0	100.0	1.2:1

Tables for
the Line that Marks the Poorest Half of People below 100% of the National Poverty Line

Figure 4 (Line marking poorest half below 100% of natl. 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	70.8
5–9	53.1
10–14	31.1
15–19	22.1
20–24	11.7
25–29	7.4
30–34	3.9
35–39	2.1
40–44	2.1
45–49	1.1
50–54	0.4
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 (Line marking poorest half below 100% of natl. line): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	+14.6	9.5	11.1	14.4
5–9	+17.0	4.4	5.1	6.8
10–14	–9.0	6.4	6.7	7.3
15–19	–18.5	11.1	11.3	11.9
20–24	+2.6	1.2	1.5	2.1
25–29	–2.0	1.8	1.9	2.2
30–34	+1.7	0.5	0.6	0.8
35–39	+0.3	0.5	0.7	0.9
40–44	+0.8	0.4	0.5	0.7
45–49	+0.3	0.4	0.5	0.6
50–54	+0.1	0.3	0.3	0.4
55–59	–0.1	0.3	0.3	0.4
60–64	0.0	0.0	0.0	0.0
65–69	–3.2	2.4	2.6	2.9
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 (Line marking poorest half below 100% of natl. 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, 2012/13 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	–1.4	50.0	61.8	75.7
4	–0.3	22.6	28.3	42.2
8	–0.7	16.6	21.1	29.3
16	–1.0	13.1	15.5	20.8
32	–1.2	9.1	11.5	14.7
64	–1.3	6.6	8.1	10.3
128	–1.3	5.0	5.9	7.1
256	–1.2	3.6	4.3	5.5
512	–1.2	2.5	2.9	4.1
1,024	–1.3	1.8	2.1	2.8
2,048	–1.2	1.2	1.5	2.0
4,096	–1.2	0.9	1.0	1.4
8,192	–1.2	0.7	0.8	1.1
16,384	–1.2	0.4	0.5	0.7

Figure 10 (Line marking poorest half below 100% of natl. line): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.5	7.1	0.3	92.0	92.5	–83.1
≤9	1.6	6.0	1.8	90.4	92.0	–33.8
≤14	3.1	4.5	5.0	87.2	90.3	+33.9
≤19	4.8	2.7	9.9	82.3	87.2	–30.9
≤24	5.8	1.7	17.2	75.0	80.9	–127.1
≤29	6.7	0.9	24.7	67.5	74.2	–227.0
≤34	7.0	0.5	34.7	57.5	64.5	–358.9
≤39	7.2	0.3	44.1	48.1	55.4	–482.9
≤44	7.4	0.2	53.6	38.7	46.1	–608.1
≤49	7.4	0.1	62.6	29.7	37.1	–727.0
≤54	7.5	0.1	69.1	23.2	30.6	–813.1
≤59	7.5	0.1	75.2	17.0	24.5	–894.4
≤64	7.5	0.1	80.7	11.5	19.0	–966.8
≤69	7.6	0.0	85.1	7.1	14.6	–1,025.4
≤74	7.6	0.0	87.8	4.5	12.0	–1,060.2
≤79	7.6	0.0	91.0	1.3	8.8	–1,102.5
≤84	7.6	0.0	92.1	0.2	7.7	–1,116.9
≤89	7.6	0.0	92.2	0.1	7.6	–1,118.1
≤94	7.6	0.0	92.2	0.0	7.6	–1,119.1
≤100	7.6	0.0	92.2	0.0	7.6	–1,119.1

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

Figure 11 (Line marking poorest half below 100% of natl. line): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	64.5	6.6	1.8:1
≤9	3.4	47.1	21.2	0.9:1
≤14	8.1	37.9	40.4	0.6:1
≤19	14.9	32.4	63.8	0.5:1
≤24	23.2	25.2	77.1	0.3:1
≤29	31.6	21.1	88.1	0.3:1
≤34	41.9	16.7	92.8	0.2:1
≤39	51.5	14.0	95.5	0.2:1
≤44	61.1	12.1	97.7	0.1:1
≤49	70.2	10.6	98.3	0.1:1
≤54	76.7	9.7	98.7	0.1:1
≤59	82.9	9.0	99.0	0.1:1
≤64	88.4	8.5	99.0	0.1:1
≤69	92.9	8.1	100.0	0.1:1
≤74	95.5	7.9	100.0	0.1:1
≤79	98.7	7.7	100.0	0.1:1
≤84	99.8	7.6	100.0	0.1:1
≤89	99.9	7.6	100.0	0.1:1
≤94	100.0	7.6	100.0	0.1:1
≤100	100.0	7.6	100.0	0.1:1

Tables for
The $1.25/Day 2005 PPP Poverty Line

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

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	96.7
5–9	92.1
10–14	76.0
15–19	65.3
20–24	58.4
25–29	45.3
30–34	27.9
35–39	23.9
40–44	20.1
45–49	10.9
50–54	4.9
55–59	3.1
60–64	0.3
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 ($1.25/day): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (±percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	–3.3	1.7	1.7	1.7
5–9	+8.0	3.3	3.9	5.1
10–14	–2.2	2.7	3.2	4.5
15–19	–15.2	8.6	8.8	9.1
20–24	–4.6	3.6	3.8	4.2
25–29	–2.0	2.5	3.1	4.0
30–34	–11.6	7.1	7.3	7.8
35–39	+4.3	1.9	2.2	3.0
40–44	+6.0	1.8	2.1	2.7
45–49	+4.5	1.0	1.2	1.5
50–54	–4.8	3.1	3.3	3.5
55–59	–0.4	0.9	1.1	1.5
60–64	0.0	0.3	0.3	0.4
65–69	–3.3	2.5	2.6	3.0
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 ($1.25/day): 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, 2012/13 scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	–0.9	67.2	72.6	86.4
4	–0.5	33.0	38.3	48.1
8	–1.2	23.9	29.1	37.5
16	–1.3	18.1	20.7	27.2
32	–1.4	12.7	15.2	19.7
64	–1.8	9.2	10.9	14.0
128	–1.9	6.6	8.0	10.6
256	–2.0	4.7	5.6	7.3
512	–1.9	3.3	4.0	5.1
1,024	–2.1	2.3	2.7	3.7
2,048	–2.1	1.7	1.9	2.4
4,096	–2.1	1.2	1.4	1.7
8,192	–2.1	0.8	1.0	1.3
16,384	–2.1	0.6	0.7	0.9

Figure 10 ($1.25/day): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	27.9	0.0	71.3	72.1	–94.6
≤9	3.0	25.6	0.4	70.9	74.0	–77.5
≤14	6.6	22.1	1.5	69.9	76.5	–48.8
≤19	11.6	17.1	3.3	68.0	79.6	–7.7
≤24	16.5	12.2	6.7	64.6	81.1	+38.4
≤29	20.2	8.5	11.4	59.9	80.1	+60.4
≤34	23.7	5.0	18.2	53.1	76.8	+36.4
≤39	25.8	2.9	25.7	45.6	71.4	+10.3
≤44	27.0	1.7	34.1	37.2	64.2	–19.0
≤49	27.7	1.0	42.5	28.8	56.5	–48.1
≤54	28.3	0.3	48.4	22.9	51.2	–68.7
≤59	28.6	0.1	54.3	17.0	45.5	–89.4
≤64	28.6	0.1	59.8	11.5	40.1	–108.4
≤69	28.7	0.0	64.2	7.1	35.8	–123.9
≤74	28.7	0.0	66.9	4.5	33.1	–133.0
≤79	28.7	0.0	70.1	1.3	29.9	–144.2
≤84	28.7	0.0	71.1	0.2	28.9	–148.0
≤89	28.7	0.0	71.2	0.1	28.8	–148.3
≤94	28.7	0.0	71.3	0.0	28.7	–148.6
≤100	28.7	0.0	71.3	0.0	28.7	–148.6

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

Figure 11 ($1.25/day): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	2.7	Only poor targeted
≤9	3.4	89.4	10.6	8.4:1
≤14	8.1	82.0	23.1	4.6:1
≤19	14.9	77.7	40.4	3.5:1
≤24	23.2	71.2	57.5	2.5:1
≤29	31.6	64.0	70.4	1.8:1
≤34	41.9	56.5	82.5	1.3:1
≤39	51.5	50.0	89.8	1.0:1
≤44	61.1	44.2	94.1	0.8:1
≤49	70.2	39.5	96.6	0.7:1
≤54	76.7	36.9	98.8	0.6:1
≤59	82.9	34.5	99.6	0.5:1
≤64	88.4	32.4	99.7	0.5:1
≤69	92.9	30.9	100.0	0.4:1
≤74	95.5	30.0	100.0	0.4:1
≤79	98.7	29.1	100.0	0.4:1
≤84	99.8	28.7	100.0	0.4:1
≤89	99.9	28.7	100.0	0.4:1
≤94	100.0	28.7	100.0	0.4:1
≤100	100.0	28.7	100.0	0.4:1

Tables for
The $2.00/Day 2005 PPP Poverty Line

Figure 4 ($2.00/day): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	99.4
5–9	98.4
10–14	94.2
15–19	91.5
20–24	90.4
25–29	82.2
30–34	66.9
35–39	60.5
40–44	56.6
45–49	45.7
50–54	29.3
55–59	19.5
60–64	11.1
65–69	3.0
70–74	0.8
75–79	0.0
80–84	0.0
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 ($2.00/day): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	–0.6	0.3	0.3	0.3
5–9	–1.6	0.8	0.8	0.8
10–14	–1.2	1.5	1.7	2.2
15–19	–5.2	3.0	3.0	3.1
20–24	–0.3	1.2	1.4	1.8
25–29	+2.6	1.9	2.3	3.2
30–34	–11.9	6.8	7.0	7.3
35–39	+2.5	2.7	3.3	4.5
40–44	+10.5	2.3	2.6	3.6
45–49	–0.8	2.4	2.8	3.6
50–54	–2.1	2.5	3.0	4.1
55–59	–2.5	2.4	2.7	3.6
60–64	–2.3	2.3	2.8	3.6
65–69	–4.8	3.5	3.6	3.9
70–74	–1.2	1.1	1.1	1.4
75–79	–0.7	0.6	0.7	0.8
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 ($2.00/day): 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, 2012/13 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	60.6	81.4	92.0
4	–1.3	33.6	41.3	52.3
8	–0.9	26.2	30.6	38.6
16	–0.6	19.1	22.0	29.2
32	–0.8	13.5	15.9	22.3
64	–1.1	9.7	11.5	15.2
128	–1.1	6.9	8.4	10.4
256	–1.1	4.8	5.6	6.9
512	–1.0	3.2	3.9	5.4
1,024	–1.1	2.4	2.9	3.9
2,048	–1.1	1.7	2.0	2.5
4,096	–1.1	1.2	1.4	1.8
8,192	–1.1	0.8	0.9	1.2
16,384	–1.1	0.6	0.7	0.9

Figure 10 ($2.00/day): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	54.4	0.0	44.8	45.6	–97.2
≤9	3.4	51.8	0.0	44.8	48.2	–87.6
≤14	7.9	47.3	0.2	44.6	52.5	–71.1
≤19	14.4	40.8	0.5	44.3	58.7	–46.9
≤24	21.6	33.5	1.6	43.3	64.9	–18.8
≤29	28.3	26.9	3.3	41.5	69.8	+8.5
≤34	36.0	19.2	5.9	38.9	74.9	+41.3
≤39	42.0	13.1	9.5	35.4	77.4	+69.6
≤44	46.7	8.5	14.5	30.4	77.0	+73.8
≤49	50.7	4.5	19.6	25.3	75.9	+64.5
≤54	52.8	2.4	24.0	20.9	73.6	+56.5
≤59	54.2	1.0	28.8	16.1	70.3	+47.9
≤64	54.8	0.4	33.6	11.2	66.0	+39.0
≤69	55.1	0.1	37.9	7.0	62.0	+31.4
≤74	55.1	0.0	40.4	4.4	59.6	+26.7
≤79	55.2	0.0	43.6	1.3	56.4	+21.0
≤84	55.2	0.0	44.7	0.2	55.3	+19.0
≤89	55.2	0.0	44.8	0.1	55.2	+18.9
≤94	55.2	0.0	44.8	0.0	55.2	+18.7
≤100	55.2	0.0	44.8	0.0	55.2	+18.7

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

Figure 11 ($2.00/day): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	1.4	Only poor targeted
≤9	3.4	100.0	6.2	Only poor targeted
≤14	8.1	97.6	14.3	40.9:1
≤19	14.9	96.4	26.0	26.5:1
≤24	23.2	93.2	39.2	13.7:1
≤29	31.6	89.6	51.3	8.6:1
≤34	41.9	85.9	65.3	6.1:1
≤39	51.5	81.6	76.2	4.4:1
≤44	61.1	76.3	84.6	3.2:1
≤49	70.2	72.1	91.8	2.6:1
≤54	76.7	68.7	95.7	2.2:1
≤59	82.9	65.3	98.2	1.9:1
≤64	88.4	62.0	99.3	1.6:1
≤69	92.9	59.2	99.8	1.5:1
≤74	95.5	57.7	99.9	1.4:1
≤79	98.7	55.9	100.0	1.3:1
≤84	99.8	55.3	100.0	1.2:1
≤89	99.9	55.2	100.0	1.2:1
≤94	100.0	55.2	100.0	1.2:1
≤100	100.0	55.2	100.0	1.2:1

Tables for
the $2.50/Day 2005 PPP Poverty Line

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

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	99.7
5–9	99.5
10–14	98.3
15–19	95.0
20–24	95.0
25–29	92.9
30–34	82.6
35–39	77.2
40–44	71.5
45–49	60.0
50–54	45.3
55–59	34.2
60–64	21.6
65–69	10.5
70–74	4.9
75–79	2.7
80–84	2.6
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 ($2.50/day): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (±percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	–0.3	0.1	0.1	0.1
5–9	–0.5	0.3	0.3	0.3
10–14	–1.3	0.8	0.8	0.8
15–19	–4.2	2.3	2.3	2.3
20–24	–0.7	0.8	1.0	1.4
25–29	+2.4	1.3	1.6	2.1
30–34	–7.3	4.3	4.4	4.6
35–39	+10.3	2.9	3.4	4.9
40–44	+5.2	2.1	2.5	3.3
45–49	–1.4	2.3	2.7	3.5
50–54	+0.1	2.6	3.2	4.2
55–59	–1.9	2.7	3.2	4.5
60–64	–1.0	2.7	3.1	4.1
65–69	–4.1	3.3	3.5	4.0
70–74	–5.3	4.0	4.3	4.8
75–79	+2.0	0.5	0.6	0.8
80–84	–0.9	2.2	2.7	3.5
85–89	0.0	0.0	0.0	0.0
90–94	0.0	0.0	0.0	0.0
95–100	0.0	-5000.0	-5000.0	-5000.0

Figure 7 ($2.50/day): 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, 2012/13 scorecard applied to the validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	+0.0	63.1	74.2	91.2
4	–0.2	30.2	37.3	53.1
8	–0.1	22.7	29.6	39.6
16	+0.3	17.0	21.9	27.9
32	+0.2	13.0	15.3	19.8
64	–0.1	9.3	10.7	14.0
128	–0.1	6.4	7.7	10.0
256	–0.0	4.5	5.4	7.1
512	+0.0	3.2	3.7	4.9
1,024	–0.0	2.3	2.7	3.5
2,048	+0.0	1.6	1.9	2.5
4,096	–0.0	1.1	1.3	1.7
8,192	–0.0	0.8	1.0	1.3
16,384	–0.0	0.5	0.6	0.8

Figure 10 ($2.50/day): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	64.9	0.0	34.3	35.1	–97.6
≤9	3.4	62.3	0.0	34.3	37.7	–89.6
≤14	8.0	57.7	0.0	34.3	42.3	–75.5
≤19	14.8	50.9	0.1	34.2	48.9	–54.8
≤24	22.6	43.1	0.6	33.7	56.3	–30.3
≤29	30.1	35.6	1.4	32.9	63.0	–6.1
≤34	39.2	26.5	2.7	31.6	70.9	+23.5
≤39	46.3	19.4	5.2	29.1	75.4	+48.9
≤44	52.8	12.9	8.3	26.0	78.7	+73.4
≤49	58.3	7.4	11.9	22.4	80.6	+81.8
≤54	61.3	4.4	15.5	18.8	80.1	+76.5
≤59	63.5	2.2	19.4	14.9	78.4	+70.5
≤64	64.7	1.0	23.7	10.6	75.3	+63.9
≤69	65.4	0.3	27.5	6.7	72.1	+58.1
≤74	65.6	0.1	29.9	4.4	70.0	+54.5
≤79	65.7	0.0	33.1	1.2	66.9	+49.7
≤84	65.7	0.0	34.1	0.2	65.9	+48.1
≤89	65.7	0.0	34.2	0.1	65.8	+47.9
≤94	65.7	0.0	34.3	0.0	65.7	+47.8
≤100	65.7	0.0	34.3	0.0	65.7	+47.8

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

Figure 11 ($2.50/day): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	1.2	Only poor targeted
≤9	3.4	100.0	5.2	Only poor targeted
≤14	8.1	99.6	12.2	246.5:1
≤19	14.9	99.1	22.5	114.6:1
≤24	23.2	97.5	34.4	38.7:1
≤29	31.6	95.5	45.9	21.0:1
≤34	41.9	93.6	59.7	14.7:1
≤39	51.5	89.9	70.5	8.9:1
≤44	61.1	86.4	80.4	6.3:1
≤49	70.2	83.0	88.7	4.9:1
≤54	76.7	79.9	93.3	4.0:1
≤59	82.9	76.6	96.7	3.3:1
≤64	88.4	73.2	98.5	2.7:1
≤69	92.9	70.4	99.5	2.4:1
≤74	95.5	68.7	99.9	2.2:1
≤79	98.7	66.5	99.9	2.0:1
≤84	99.8	65.8	100.0	1.9:1
≤89	99.9	65.8	100.0	1.9:1
≤94	100.0	65.7	100.0	1.9:1
≤100	100.0	65.7	100.0	1.9:1

Tables for
the $4.00/Day 2005 PPP Poverty Line

Figure 4 ($4.00/day): 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	100.0
10–14	99.8
15–19	99.5
20–24	99.0
25–29	98.8
30–34	95.4
35–39	93.1
40–44	91.6
45–49	81.4
50–54	75.0
55–59	65.1
60–64	57.4
65–69	37.7
70–74	27.9
75–79	17.9
80–84	8.9
85–89	3.5
90–94	0.0
95–100	0.0

Figure 6 ($4.00/day): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	0.0	0.0	0.0	0.0
10–14	–0.2	0.1	0.1	0.1
15–19	–0.5	0.2	0.2	0.2
20–24	–0.7	0.5	0.5	0.5
25–29	–0.7	0.5	0.5	0.5
30–34	–1.4	1.0	1.1	1.3
35–39	–1.3	1.1	1.2	1.4
40–44	+0.8	1.3	1.6	2.0
45–49	–5.4	3.4	3.6	3.9
50–54	–7.1	4.5	4.8	5.2
55–59	+0.3	2.6	3.1	4.3
60–64	+1.9	2.9	3.4	4.7
65–69	0.0	3.3	3.9	5.3
70–74	–8.2	6.3	6.7	7.5
75–79	+9.2	2.0	2.5	3.1
80–84	+2.0	2.8	3.4	4.2
85–89	+3.5	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 ($4.00/day): 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, 2012/13 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	53.8	71.8	83.2
4	–1.2	23.6	29.4	40.0
8	–1.2	16.2	20.7	29.0
16	–1.0	11.5	14.2	19.9
32	–0.9	8.3	10.1	14.3
64	–1.1	6.3	7.4	9.4
128	–1.1	4.1	5.1	6.2
256	–1.1	2.9	3.6	4.8
512	–1.0	2.0	2.5	3.2
1,024	–1.1	1.5	1.8	2.3
2,048	–1.1	1.1	1.2	1.7
4,096	–1.1	0.8	0.9	1.1
8,192	–1.1	0.6	0.6	0.8
16,384	–1.1	0.4	0.5	0.6

Figure 10 ($4.00/day): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	81.8	0.0	17.5	18.2	–98.1
≤9	3.4	79.1	0.0	17.5	20.9	–91.7
≤14	8.1	74.5	0.0	17.5	25.5	–80.4
≤19	14.9	67.6	0.0	17.5	32.4	–63.9
≤24	23.2	59.4	0.0	17.4	40.6	–43.9
≤29	31.5	51.1	0.1	17.3	48.8	–23.6
≤34	41.4	41.1	0.5	17.0	58.4	+1.0
≤39	50.4	32.2	1.1	16.3	66.7	+23.4
≤44	59.2	23.3	1.9	15.5	74.7	+45.8
≤49	67.0	15.5	3.2	14.3	81.3	+66.3
≤54	72.3	10.3	4.5	13.0	85.2	+80.5
≤59	76.3	6.3	6.7	10.8	87.1	+91.9
≤64	79.3	3.2	9.1	8.3	87.6	+89.0
≤69	81.1	1.5	11.8	5.6	86.7	+85.7
≤74	82.1	0.4	13.4	4.0	86.1	+83.7
≤79	82.4	0.1	16.3	1.1	83.6	+80.2
≤84	82.5	0.0	17.3	0.2	82.7	+79.1
≤89	82.5	0.0	17.4	0.1	82.6	+78.9
≤94	82.5	0.0	17.5	0.0	82.5	+78.9
≤100	82.5	0.0	17.5	0.0	82.5	+78.9

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

Figure 11 ($4.00/day): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	0.9	Only poor targeted
≤9	3.4	100.0	4.1	Only poor targeted
≤14	8.1	100.0	9.8	Only poor targeted
≤19	14.9	100.0	18.1	Only poor targeted
≤24	23.2	99.9	28.1	679.9:1
≤29	31.6	99.7	38.1	296.2:1
≤34	41.9	98.8	50.2	84.9:1
≤39	51.5	97.8	61.0	44.0:1
≤44	61.1	96.8	71.7	30.6:1
≤49	70.2	95.5	81.2	21.2:1
≤54	76.7	94.2	87.6	16.1:1
≤59	82.9	92.0	92.4	11.4:1
≤64	88.4	89.7	96.1	8.7:1
≤69	92.9	87.3	98.2	6.9:1
≤74	95.5	85.9	99.5	6.1:1
≤79	98.7	83.5	99.9	5.1:1
≤84	99.8	82.7	100.0	4.8:1
≤89	99.9	82.6	100.0	4.8:1
≤94	100.0	82.5	100.0	4.7:1
≤100	100.0	82.5	100.0	4.7:1

Tables for
the $5.00/Day 2005 PPP Poverty Line

Figure 4 ($5.00/day): 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	100.0
10–14	100.0
15–19	100.0
20–24	99.9
25–29	99.6
30–34	99.0
35–39	97.2
40–44	95.0
45–49	89.2
50–54	85.7
55–59	73.9
60–64	69.1
65–69	59.1
70–74	40.9
75–79	31.3
80–84	27.9
85–89	12.3
90–94	0.0
95–100	0.0

Figure 6 ($5.00/day): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	0.0	0.0	0.0	0.0
10–14	0.0	0.0	0.0	0.0
15–19	0.0	0.0	0.0	0.0
20–24	+0.3	0.2	0.3	0.4
25–29	–0.2	0.2	0.2	0.2
30–34	+0.5	0.5	0.5	0.7
35–39	0.0	0.7	0.9	1.0
40–44	+2.3	1.3	1.5	1.9
45–49	–0.8	1.4	1.7	2.2
50–54	–3.5	2.6	2.7	3.1
55–59	–4.6	3.5	3.6	4.1
60–64	+2.2	2.8	3.3	4.3
65–69	–6.2	4.6	4.9	5.6
70–74	–22.1	13.0	13.4	14.3
75–79	+15.5	2.8	3.3	4.0
80–84	+3.9	5.3	6.2	8.7
85–89	+12.3	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 ($5.00/day): 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, 2012/13 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	+0.3	55.0	60.4	81.9
4	–0.2	21.8	26.7	38.4
8	–0.1	15.3	19.1	28.1
16	+0.0	10.9	13.2	20.3
32	+0.0	8.0	9.4	12.0
64	–0.3	5.6	6.5	9.2
128	–0.3	3.9	4.7	6.2
256	–0.3	2.8	3.5	4.7
512	–0.3	2.0	2.3	3.0
1,024	–0.3	1.4	1.6	2.2
2,048	–0.3	1.0	1.2	1.6
4,096	–0.4	0.7	0.9	1.1
8,192	–0.4	0.5	0.6	0.8
16,384	–0.4	0.4	0.4	0.6

Figure 10 ($5.00/day): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	87.0	0.0	12.2	13.0	–98.2
≤9	3.4	84.4	0.0	12.2	15.6	–92.2
≤14	8.1	79.7	0.0	12.2	20.3	–81.6
≤19	14.9	72.9	0.0	12.2	27.1	–66.0
≤24	23.2	64.7	0.0	12.2	35.3	–47.2
≤29	31.5	56.3	0.1	12.1	43.7	–28.1
≤34	41.7	46.1	0.2	12.0	53.6	–4.8
≤39	51.0	36.8	0.5	11.7	62.6	+16.7
≤44	60.0	27.8	1.1	11.1	71.1	+38.0
≤49	68.2	19.6	2.0	10.2	78.4	+57.6
≤54	74.0	13.8	2.7	9.5	83.5	+71.7
≤59	78.9	8.9	4.0	8.2	87.1	+84.3
≤64	82.6	5.3	5.8	6.3	88.9	+93.3
≤69	85.4	2.4	7.5	4.7	90.1	+91.4
≤74	86.9	0.9	8.6	3.6	90.5	+90.2
≤79	87.5	0.3	11.3	0.9	88.4	+87.2
≤84	87.8	0.0	12.0	0.2	88.0	+86.3
≤89	87.8	0.0	12.1	0.1	87.9	+86.2
≤94	87.8	0.0	12.2	0.0	87.8	+86.1
≤100	87.8	0.0	12.2	0.0	87.8	+86.1

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

Figure 11 ($5.00/day): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	0.9	Only poor targeted
≤9	3.4	100.0	3.9	Only poor targeted
≤14	8.1	100.0	9.2	Only poor targeted
≤19	14.9	100.0	17.0	Only poor targeted
≤24	23.2	99.9	26.4	679.9:1
≤29	31.6	99.8	35.9	557.0:1
≤34	41.9	99.4	47.5	176.0:1
≤39	51.5	99.0	58.0	96.1:1
≤44	61.1	98.2	68.4	54.3:1
≤49	70.2	97.2	77.7	34.1:1
≤54	76.7	96.4	84.3	27.0:1
≤59	82.9	95.2	89.9	19.6:1
≤64	88.4	93.4	94.0	14.1:1
≤69	92.9	91.9	97.3	11.4:1
≤74	95.5	91.0	99.0	10.1:1
≤79	98.7	88.6	99.6	7.8:1
≤84	99.8	88.0	100.0	7.3:1
≤89	99.9	87.9	100.0	7.2:1
≤94	100.0	87.8	100.0	7.2:1
≤100	100.0	87.8	100.0	7.2:1

Tables for
the $8.44/Day 2005 PPP Poverty Line

Figure 4 ($8.44/day): 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	100.0
10–14	100.0
15–19	100.0
20–24	100.0
25–29	100.0
30–34	99.8
35–39	99.4
40–44	99.1
45–49	98.8
50–54	96.1
55–59	91.8
60–64	90.3
65–69	86.3
70–74	72.3
75–79	69.5
80–84	52.8
85–89	41.3
90–94	36.3
95–100	36.3

Figure 6 ($8.44/day): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	0.0	0.0	0.0	0.0
10–14	0.0	0.0	0.0	0.0
15–19	0.0	0.0	0.0	0.0
20–24	0.0	0.0	0.0	0.0
25–29	0.0	0.0	0.0	0.0
30–34	–0.2	0.1	0.1	0.1
35–39	+0.9	0.5	0.6	0.8
40–44	+0.9	0.6	0.7	0.9
45–49	+1.3	0.7	0.9	1.1
50–54	–3.3	1.8	1.8	1.9
55–59	+4.1	2.0	2.4	3.2
60–64	+0.3	1.7	2.0	2.8
65–69	–0.6	2.2	2.6	3.1
70–74	–17.7	9.9	10.2	10.5
75–79	+1.7	3.5	4.2	5.3
80–84	–16.2	11.3	11.8	13.0
85–89	+41.3	0.0	0.0	0.0
90–94	+36.3	0.0	0.0	0.0
95–100	0.0	0.0	0.0	0.0

Figure 7 ($8.44/day): 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, 2012/13 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	+0.5	27.5	50.0	69.5
4	–0.1	15.8	20.2	32.7
8	–0.1	10.0	13.5	19.3
16	+0.0	7.6	9.8	15.1
32	+0.0	5.6	7.0	8.9
64	–0.1	3.9	4.8	6.5
128	–0.1	2.9	3.3	4.6
256	–0.1	1.9	2.3	3.1
512	–0.1	1.5	1.7	2.3
1,024	–0.2	1.0	1.2	1.5
2,048	–0.2	0.7	0.9	1.1
4,096	–0.2	0.5	0.6	0.8
8,192	–0.2	0.4	0.4	0.6
16,384	–0.2	0.3	0.3	0.4

Figure 10 ($8.44/day): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	94.8	0.0	4.5	5.2	–98.4
≤9	3.4	92.1	0.0	4.5	7.9	–92.9
≤14	8.1	87.5	0.0	4.5	12.5	–83.1
≤19	14.9	80.6	0.0	4.5	19.4	–68.8
≤24	23.2	72.3	0.0	4.5	27.7	–51.4
≤29	31.6	64.0	0.0	4.5	36.0	–33.9
≤34	41.9	53.6	0.0	4.5	46.4	–12.3
≤39	51.4	44.2	0.1	4.3	55.7	+7.7
≤44	60.9	34.7	0.3	4.2	65.0	+27.7
≤49	69.7	25.8	0.5	3.9	73.6	+46.4
≤54	76.2	19.4	0.6	3.9	80.0	+60.1
≤59	81.7	13.8	1.2	3.2	85.0	+72.3
≤64	86.6	9.0	1.8	2.6	89.2	+83.2
≤69	90.4	5.1	2.5	2.0	92.4	+91.9
≤74	92.7	2.8	2.8	1.7	94.4	+97.0
≤79	94.8	0.7	4.0	0.5	95.3	+95.9
≤84	95.5	0.0	4.3	0.2	95.7	+95.5
≤89	95.5	0.0	4.4	0.1	95.6	+95.4
≤94	95.5	0.0	4.5	0.0	95.5	+95.3
≤100	95.5	0.0	4.5	0.0	95.5	+95.3

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

Figure 11 ($8.44/day): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	0.8	Only poor targeted
≤9	3.4	100.0	3.6	Only poor targeted
≤14	8.1	100.0	8.5	Only poor targeted
≤19	14.9	100.0	15.6	Only poor targeted
≤24	23.2	100.0	24.3	Only poor targeted
≤29	31.6	100.0	33.1	Only poor targeted
≤34	41.9	100.0	43.9	Only poor targeted
≤39	51.5	99.8	53.8	399.3:1
≤44	61.1	99.5	63.7	216.4:1
≤49	70.2	99.2	72.9	131.9:1
≤54	76.7	99.2	79.7	128.8:1
≤59	82.9	98.5	85.5	66.9:1
≤64	88.4	97.9	90.6	47.3:1
≤69	92.9	97.3	94.7	36.5:1
≤74	95.5	97.0	97.1	32.9:1
≤79	98.7	96.0	99.2	24.0:1
≤84	99.8	95.7	100.0	22.2:1
≤89	99.9	95.6	100.0	21.7:1
≤94	100.0	95.5	100.0	21.4:1
≤100	100.0	95.5	100.0	21.4:1

Tables for
the $1.90/Day 2011 PPP Poverty Line

Figure 4 ($1.90/day 2011 PPP): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	96.7
5–9	92.5
10–14	81.1
15–19	73.5
20–24	68.3
25–29	54.5
30–34	37.5
35–39	29.7
40–44	26.0
45–49	16.7
50–54	8.1
55–59	4.0
60–64	0.6
65–69	0.4
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 ($1.90/day 2011 PPP): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of $n = 16{,}384$, 2012/13 scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (±percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	–3.3	1.7	1.7	1.7
5–9	+5.4	3.1	3.7	4.8
10–14	–0.6	2.6	3.0	4.0
15–19	–12.0	6.9	7.1	7.4
20–24	–3.7	3.0	3.2	3.6
25–29	+0.9	2.5	2.9	4.1
30–34	–7.3	4.9	5.2	5.6
35–39	+5.0	2.1	2.5	3.3
40–44	+6.3	2.0	2.3	2.9
45–49	+1.7	1.7	2.1	2.7
50–54	–3.6	2.6	2.8	3.1
55–59	0.0	1.0	1.2	1.6
60–64	0.0	0.3	0.4	0.5
65–69	–4.7	3.3	3.5	3.7
70–74	–0.3	0.3	0.3	0.4
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 ($1.90/day 2011 PPP): 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, 2012/13 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	62.4	71.1	88.6
4	+0.6	33.8	39.8	51.0
8	–0.3	25.0	29.2	38.2
16	–0.2	18.2	20.9	28.8
32	–0.4	12.2	14.4	19.4
64	–0.7	9.3	10.8	14.4
128	–0.9	6.9	8.1	9.7
256	–1.0	4.7	5.7	7.2
512	–1.0	3.3	3.9	5.3
1,024	–1.1	2.4	2.9	3.7
2,048	–1.1	1.7	2.0	2.5
4,096	–1.1	1.2	1.3	1.7
8,192	–1.1	0.8	1.0	1.3
16,384	–1.1	0.6	0.7	0.9

Figure 10 ($1.90/day 2011 PPP): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	32.7	0.0	66.5	67.3	–95.4
≤9	3.1	30.3	0.3	66.3	69.4	–80.5
≤14	6.9	26.6	1.2	65.4	72.3	–55.2
≤19	12.4	21.1	2.6	64.0	76.3	–18.6
≤24	17.9	15.5	5.3	61.3	79.2	+22.9
≤29	22.2	11.3	9.4	57.2	79.4	+60.7
≤34	26.4	7.1	15.5	51.0	77.4	+53.7
≤39	29.1	4.4	22.4	44.1	73.2	+33.0
≤44	30.9	2.6	30.3	36.3	67.1	+9.5
≤49	32.2	1.3	38.0	28.5	60.7	–13.6
≤54	33.0	0.5	43.8	22.7	55.7	–30.8
≤59	33.2	0.2	49.7	16.8	50.1	–48.5
≤64	33.3	0.2	55.1	11.4	44.7	–64.7
≤69	33.5	0.0	59.5	7.1	40.5	–77.7
≤74	33.5	0.0	62.1	4.5	37.9	–85.5
≤79	33.5	0.0	65.3	1.3	34.7	–95.0
≤84	33.5	0.0	66.4	0.2	33.6	–98.3
≤89	33.5	0.0	66.5	0.1	33.5	–98.6
≤94	33.5	0.0	66.5	0.0	33.5	–98.8
≤100	33.5	0.0	66.5	0.0	33.5	–98.8

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

Figure 11 ($1.90/day 2011 PPP): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	2.3	Only poor targeted
≤9	3.4	91.7	9.3	11.1:1
≤14	8.1	85.5	20.6	5.9:1
≤19	14.9	82.9	36.9	4.8:1
≤24	23.2	77.3	53.6	3.4:1
≤29	31.6	70.3	66.3	2.4:1
≤34	41.9	63.0	78.9	1.7:1
≤39	51.5	56.4	86.9	1.3:1
≤44	61.1	50.5	92.2	1.0:1
≤49	70.2	45.9	96.2	0.8:1
≤54	76.7	43.0	98.5	0.8:1
≤59	82.9	40.1	99.3	0.7:1
≤64	88.4	37.7	99.5	0.6:1
≤69	92.9	36.0	100.0	0.6:1
≤74	95.5	35.0	100.0	0.5:1
≤79	98.7	33.9	100.0	0.5:1
≤84	99.8	33.5	100.0	0.5:1
≤89	99.9	33.5	100.0	0.5:1
≤94	100.0	33.5	100.0	0.5:1
≤100	100.0	33.5	100.0	0.5:1

Figure 4 ($3.10/day 2011 PPP): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	99.4
5–9	98.7
10–14	96.6
15–19	93.2
20–24	92.6
25–29	88.1
30–34	76.7
35–39	70.7
40–44	63.5
45–49	51.6
50–54	36.1
55–59	27.9
60–64	17.2
65–69	6.4
70–74	2.1
75–79	0.5
80–84	0.5
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 ($3.10/day 2011 PPP): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of $n = 16{,}384$, 2012/13 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	–0.6	0.3	0.3	0.3
5–9	–1.3	0.6	0.6	0.6
10–14	–2.7	1.5	1.6	1.6
15–19	–5.8	3.1	3.1	3.1
20–24	–1.4	1.1	1.3	1.6
25–29	+4.7	1.8	2.2	2.9
30–34	–9.3	5.4	5.5	5.8
35–39	+8.0	2.9	3.5	4.8
40–44	+4.8	2.3	2.7	3.3
45–49	–2.6	2.5	2.8	3.5
50–54	+0.2	2.5	2.9	4.1
55–59	–2.1	2.5	3.0	4.1
60–64	+0.2	2.5	2.9	3.8
65–69	–3.7	3.0	3.2	3.5
70–74	–2.3	2.0	2.1	2.4
75–79	–0.2	0.5	0.6	0.8
80–84	–3.0	2.7	3.0	3.5
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 ($3.10/day 2011 PPP): 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, 2012/13 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	67.3	74.4	93.1
4	–1.3	31.7	39.8	52.7
8	–0.9	23.4	29.8	39.1
16	–0.5	18.6	21.9	28.4
32	–0.5	12.9	15.4	21.9
64	–0.8	9.4	11.0	14.6
128	–0.7	6.8	8.0	10.7
256	–0.7	4.6	5.6	7.0
512	–0.6	3.3	3.8	5.3
1,024	–0.7	2.3	2.8	3.7
2,048	–0.6	1.6	2.0	2.5
4,096	–0.7	1.2	1.4	1.7
8,192	–0.7	0.8	1.0	1.2
16,384	–0.7	0.6	0.7	0.9

Figure 10 ($3.10/day 2011 PPP): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	60.1	0.0	39.1	39.9	–97.4
≤9	3.4	57.5	0.0	39.1	42.5	–88.8
≤14	8.0	52.9	0.1	39.1	47.1	–73.6
≤19	14.7	46.2	0.2	38.9	53.7	–51.3
≤24	22.3	38.5	0.9	38.3	60.6	–25.2
≤29	29.4	31.5	2.2	36.9	66.3	+0.1
≤34	38.0	22.9	3.9	35.2	73.2	+31.2
≤39	44.6	16.2	6.9	32.3	76.9	+57.9
≤44	50.3	10.6	10.8	28.3	78.6	+82.2
≤49	55.1	5.8	15.1	24.0	79.1	+75.2
≤54	57.5	3.3	19.2	19.9	77.5	+68.5
≤59	59.4	1.5	23.5	15.6	75.0	+61.3
≤64	60.2	0.7	28.2	10.9	71.2	+53.7
≤69	60.7	0.2	32.3	6.9	67.5	+47.0
≤74	60.8	0.1	34.7	4.4	65.2	+43.0
≤79	60.8	0.0	37.9	1.2	62.1	+37.8
≤84	60.9	0.0	39.0	0.2	61.0	+36.0
≤89	60.9	0.0	39.0	0.1	61.0	+35.9
≤94	60.9	0.0	39.1	0.0	60.9	+35.7
≤100	60.9	0.0	39.1	0.0	60.9	+35.7

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

Figure 11 ($3.10/day 2011 PPP): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	1.3	Only poor targeted
≤9	3.4	100.0	5.6	Only poor targeted
≤14	8.1	99.3	13.2	142.2:1
≤19	14.9	98.8	24.2	80.7:1
≤24	23.2	96.3	36.7	26.2:1
≤29	31.6	93.0	48.3	13.4:1
≤34	41.9	90.6	62.4	9.7:1
≤39	51.5	86.7	73.3	6.5:1
≤44	61.1	82.3	82.7	4.7:1
≤49	70.2	78.5	90.5	3.6:1
≤54	76.7	75.0	94.5	3.0:1
≤59	82.9	71.6	97.5	2.5:1
≤64	88.4	68.1	98.9	2.1:1
≤69	92.9	65.3	99.6	1.9:1
≤74	95.5	63.6	99.9	1.8:1
≤79	98.7	61.6	99.9	1.6:1
≤84	99.8	61.0	100.0	1.6:1
≤89	99.9	60.9	100.0	1.6:1
≤94	100.0	60.9	100.0	1.6:1
≤100	100.0	60.9	100.0	1.6:1

Tables for
the First-Quintile (20^{th}-percentile) Poverty Line

Figure 4 (First-Quintile/20th-percentile): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	92.3
5–9	81.6
10–14	56.3
15–19	43.4
20–24	32.5
25–29	22.6
30–34	10.6
35–39	6.1
40–44	5.8
45–49	2.5
50–54	1.0
55–59	0.3
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 (First-Quintile/20th-percentile): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	+4.6	6.2	7.2	10.3
5–9	+10.7	4.4	5.1	7.0
10–14	+1.5	3.5	4.2	5.7
15–19	–17.6	10.2	10.6	11.1
20–24	+10.5	2.0	2.4	3.0
25–29	+0.6	2.0	2.5	3.3
30–34	+0.9	1.4	1.7	2.1
35–39	+1.3	0.8	1.0	1.3
40–44	+1.8	0.7	0.9	1.2
45–49	+0.6	0.5	0.6	0.9
50–54	–0.3	0.6	0.6	0.9
55–59	–1.7	1.2	1.3	1.5
60–64	–0.3	0.3	0.3	0.4
65–69	–3.2	2.4	2.6	2.9
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 (First-Quintile/20th-percentile): 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, 2012/13 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	60.4	72.9	90.7
4	+0.4	28.0	34.5	43.7
8	+0.3	20.2	23.7	29.6
16	+0.4	14.3	16.5	21.8
32	–0.0	10.4	12.1	16.3
64	–0.1	7.7	9.1	12.2
128	+0.0	5.4	6.5	8.3
256	+0.1	3.8	4.7	6.1
512	+0.1	2.7	3.2	4.2
1,024	+0.1	1.9	2.3	3.0
2,048	+0.1	1.4	1.7	2.1
4,096	+0.1	1.0	1.2	1.5
8,192	+0.1	0.7	0.8	1.1
16,384	+0.1	0.5	0.6	0.8

Figure 10 (First-Quintile/20th-percentile): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.7	14.9	0.1	84.3	85.0	–90.5
≤9	2.7	12.9	0.7	83.7	86.4	–60.8
≤14	5.1	10.5	2.9	81.5	86.6	–15.2
≤19	8.6	7.0	6.3	78.1	86.7	+50.9
≤24	11.0	4.6	12.2	72.2	83.3	+22.1
≤29	12.9	2.7	18.7	65.7	78.6	–19.8
≤34	14.0	1.6	27.9	56.5	70.5	–78.8
≤39	14.6	1.0	36.9	47.5	62.1	–136.4
≤44	15.1	0.5	46.0	38.4	53.4	–195.2
≤49	15.3	0.3	54.9	29.5	44.8	–252.0
≤54	15.4	0.2	61.4	23.0	38.4	–293.3
≤59	15.5	0.1	67.4	17.0	32.5	–332.2
≤64	15.5	0.1	72.9	11.5	27.0	–367.2
≤69	15.6	0.0	77.3	7.1	22.7	–395.6
≤74	15.6	0.0	79.9	4.5	20.1	–412.5
≤79	15.6	0.0	83.1	1.3	16.9	–433.0
≤84	15.6	0.0	84.2	0.2	15.8	–440.0
≤89	15.6	0.0	84.3	0.1	15.7	–440.5
≤94	15.6	0.0	84.4	0.0	15.6	–441.0
≤100	15.6	0.0	84.4	0.0	15.6	–441.0

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

Figure 11 (First-Quintile/20th-percentile): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	90.7	4.5	9.8:1
≤9	3.4	79.6	17.4	3.9:1
≤14	8.1	63.8	33.0	1.8:1
≤19	14.9	57.9	55.3	1.4:1
≤24	23.2	47.6	70.8	0.9:1
≤29	31.6	40.8	82.7	0.7:1
≤34	41.9	33.4	89.8	0.5:1
≤39	51.5	28.4	93.7	0.4:1
≤44	61.1	24.7	96.7	0.3:1
≤49	70.2	21.8	98.1	0.3:1
≤54	76.7	20.1	98.7	0.3:1
≤59	82.9	18.7	99.4	0.2:1
≤64	88.4	17.6	99.5	0.2:1
≤69	92.9	16.8	100.0	0.2:1
≤74	95.5	16.3	100.0	0.2:1
≤79	98.7	15.8	100.0	0.2:1
≤84	99.8	15.6	100.0	0.2:1
≤89	99.9	15.6	100.0	0.2:1
≤94	100.0	15.6	100.0	0.2:1
≤100	100.0	15.6	100.0	0.2:1

Tables for
the Second-Quintile (40^{th}-percentile) Poverty Line

Figure 4 (Second-Quintile/40th-percentile): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	96.7
5–9	92.4
10–14	78.8
15–19	69.3
20–24	63.3
25–29	52.1
30–34	34.5
35–39	27.7
40–44	24.3
45–49	15.4
50–54	6.8
55–59	3.9
60–64	0.6
65–69	0.4
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 (Second-Quintile/40th-percentile): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 scorecard applied to the validation sample

	Difference between estimate and true value			
		Confidence interval (±percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	–3.3	1.7	1.7	1.7
5–9	+7.9	3.4	4.0	5.3
10–14	–2.9	2.7	3.0	4.0
15–19	–15.2	8.5	8.7	8.9
20–24	–3.2	2.8	3.1	4.1
25–29	+0.5	2.5	3.0	4.4
30–34	–8.3	5.4	5.7	6.2
35–39	+4.5	2.0	2.4	3.5
40–44	+5.5	1.9	2.3	2.9
45–49	+1.9	1.7	2.0	2.7
50–54	–4.6	3.2	3.3	3.5
55–59	–0.1	1.0	1.2	1.6
60–64	+0.2	0.3	0.3	0.4
65–69	–4.7	3.3	3.5	3.7
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 (Second-Quintile/40th-percentile): 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, 2012/13 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	–0.3	67.8	71.0	87.4
4	+0.3	34.5	39.9	51.6
8	–0.7	25.0	29.8	39.6
16	–0.8	18.0	21.6	28.1
32	–1.1	12.6	15.0	19.5
64	–1.3	9.4	10.9	13.8
128	–1.5	6.9	8.0	10.1
256	–1.6	4.8	5.7	7.5
512	–1.6	3.4	4.1	5.6
1,024	–1.7	2.4	2.8	4.0
2,048	–1.7	1.7	1.9	2.5
4,096	–1.7	1.2	1.4	1.7
8,192	–1.7	0.8	1.0	1.3
16,384	–1.7	0.6	0.7	1.0

Figure 10 (Second-Quintile/40th-percentile): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	31.2	0.0	68.0	68.8	–95.1
≤9	3.1	28.9	0.3	67.7	70.7	–79.8
≤14	6.8	25.2	1.2	66.8	73.6	–53.4
≤19	12.2	19.8	2.7	65.3	77.4	–15.4
≤24	17.5	14.5	5.7	62.3	79.8	+27.1
≤29	21.5	10.5	10.0	58.0	79.5	+66.0
≤34	25.5	6.5	16.4	51.6	77.1	+48.7
≤39	28.0	4.0	23.5	44.5	72.4	+26.4
≤44	29.6	2.4	31.5	36.5	66.1	+1.5
≤49	30.8	1.2	39.4	28.6	59.4	–23.2
≤54	31.5	0.5	45.2	22.8	54.3	–41.3
≤59	31.8	0.2	51.1	16.9	48.7	–59.8
≤64	31.8	0.2	56.6	11.4	43.3	–76.8
≤69	32.0	0.0	60.9	7.1	39.1	–90.4
≤74	32.0	0.0	63.5	4.5	36.5	–98.6
≤79	32.0	0.0	66.7	1.3	33.3	–108.6
≤84	32.0	0.0	67.8	0.2	32.2	–112.0
≤89	32.0	0.0	67.9	0.1	32.1	–112.3
≤94	32.0	0.0	68.0	0.0	32.0	–112.5
≤100	32.0	0.0	68.0	0.0	32.0	–112.5

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

Figure 11 (Second-Quintile/40th-percentile): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	2.4	Only poor targeted
≤9	3.4	90.0	9.6	9.0:1
≤14	8.1	84.7	21.4	5.5:1
≤19	14.9	81.7	38.0	4.5:1
≤24	23.2	75.3	54.6	3.1:1
≤29	31.6	68.2	67.3	2.1:1
≤34	41.9	60.8	79.7	1.6:1
≤39	51.5	54.3	87.4	1.2:1
≤44	61.1	48.5	92.6	0.9:1
≤49	70.2	43.9	96.2	0.8:1
≤54	76.7	41.1	98.5	0.7:1
≤59	82.9	38.3	99.4	0.6:1
≤64	88.4	36.0	99.5	0.6:1
≤69	92.9	34.4	100.0	0.5:1
≤74	95.5	33.5	100.0	0.5:1
≤79	98.7	32.4	100.0	0.5:1
≤84	99.8	32.0	100.0	0.5:1
≤89	99.9	32.0	100.0	0.5:1
≤94	100.0	32.0	100.0	0.5:1
≤100	100.0	32.0	100.0	0.5:1

Tables for
the Median (50th-percentile) Poverty Line

Figure 4 (Median/50th-percentile): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	97.7
5–9	95.3
10–14	88.6
15–19	83.1
20–24	77.8
25–29	65.3
30–34	46.9
35–39	39.2
40–44	35.4
45–49	25.7
50–54	12.6
55–59	7.4
60–64	2.8
65–69	0.8
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 (Median/50th-percentile): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of $n = 16{,}384$, 2012/13 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	–2.3	1.2	1.2	1.2
5–9	+7.3	3.0	3.7	4.6
10–14	+0.2	2.1	2.4	3.2
15–19	–11.0	6.0	6.1	6.3
20–24	–3.9	2.8	2.9	3.2
25–29	+3.4	2.5	2.9	3.9
30–34	–5.4	4.0	4.2	4.7
35–39	+2.9	2.4	2.9	4.0
40–44	+5.5	2.2	2.6	3.3
45–49	–1.3	2.3	2.7	3.5
50–54	–2.3	2.1	2.3	3.0
55–59	+1.4	1.1	1.3	1.9
60–64	–1.0	1.2	1.4	1.9
65–69	–4.8	3.3	3.6	3.9
70–74	–0.3	0.3	0.3	0.4
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 (Median/50th-percentile): 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, 2012/13 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	64.9	76.0	90.6
4	–0.3	34.8	40.1	53.4
8	–0.7	26.0	29.9	36.6
16	–0.4	18.1	21.7	29.1
32	–0.6	12.8	15.9	20.3
64	–0.7	9.7	11.3	15.0
128	–0.9	6.8	7.8	10.5
256	–0.9	4.7	5.5	7.3
512	–0.9	3.4	4.0	5.2
1,024	–1.0	2.4	3.0	3.6
2,048	–1.0	1.6	2.0	2.6
4,096	–1.0	1.2	1.4	1.9
8,192	–1.0	0.9	1.0	1.4
16,384	–1.0	0.6	0.7	0.9

Figure 10 (Median/50th-percentile): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	39.7	0.0	59.5	60.3	–96.2
≤9	3.2	37.3	0.2	59.2	62.4	–83.8
≤14	7.3	33.2	0.8	58.7	66.0	–62.0
≤19	13.5	27.0	1.4	58.0	71.5	–29.8
≤24	19.7	20.7	3.4	56.1	75.8	+5.9
≤29	24.7	15.7	6.8	52.7	77.5	+39.1
≤34	29.9	10.5	11.9	47.6	77.5	+70.5
≤39	33.8	6.7	17.7	41.8	75.6	+56.3
≤44	36.5	3.9	24.5	35.0	71.5	+39.3
≤49	38.6	1.8	31.5	28.0	66.6	+22.1
≤54	39.6	0.8	37.1	22.4	62.0	+8.3
≤59	40.0	0.4	42.8	16.7	56.7	–5.9
≤64	40.2	0.2	48.1	11.4	51.6	–19.0
≤69	40.4	0.0	52.4	7.1	47.5	–29.6
≤74	40.4	0.0	55.0	4.5	44.9	–36.1
≤79	40.4	0.0	58.2	1.3	41.7	–44.0
≤84	40.4	0.0	59.3	0.2	40.6	–46.7
≤89	40.4	0.0	59.4	0.1	40.5	–46.9
≤94	40.4	0.0	59.5	0.0	40.4	–47.1
≤100	40.4	0.0	59.5	0.0	40.4	–47.1

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

Figure 11 (Median/50th-percentile): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	1.9	Only poor targeted
≤9	3.4	92.7	7.8	12.7:1
≤14	8.1	90.1	18.0	9.1:1
≤19	14.9	90.3	33.3	9.4:1
≤24	23.2	85.0	48.8	5.7:1
≤29	31.6	78.4	61.2	3.6:1
≤34	41.9	71.4	74.0	2.5:1
≤39	51.5	65.5	83.5	1.9:1
≤44	61.1	59.8	90.4	1.5:1
≤49	70.2	55.0	95.5	1.2:1
≤54	76.7	51.6	97.9	1.1:1
≤59	82.9	48.3	99.0	0.9:1
≤64	88.4	45.5	99.5	0.8:1
≤69	92.9	43.5	100.0	0.8:1
≤74	95.5	42.3	100.0	0.7:1
≤79	98.7	41.0	100.0	0.7:1
≤84	99.8	40.5	100.0	0.7:1
≤89	99.9	40.5	100.0	0.7:1
≤94	100.0	40.4	100.0	0.7:1
≤100	100.0	40.4	100.0	0.7:1

Tables for
the Third-Quintile (60^{th}-percentile) Poverty Line

Figure 4 (Third quintile/60th percentile): Estimated poverty likelihoods associated with scores

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	99.4
5–9	98.4
10–14	93.4
15–19	90.0
20–24	88.3
25–29	78.4
30–34	62.8
35–39	53.1
40–44	49.3
45–49	37.5
50–54	23.3
55–59	13.1
60–64	6.0
65–69	1.3
70–74	0.8
75–79	0.0
80–84	0.0
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 (Third quintile/60th percentile): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	–0.6	0.3	0.3	0.3
5–9	–0.2	1.0	1.2	1.4
10–14	+1.6	1.8	2.2	3.0
15–19	–5.2	3.0	3.1	3.3
20–24	–0.7	1.3	1.6	2.0
25–29	+4.9	2.1	2.6	3.5
30–34	–7.5	4.8	4.9	5.4
35–39	+6.9	2.7	3.2	4.3
40–44	+7.9	2.3	2.6	3.4
45–49	–2.9	2.7	2.9	3.7
50–54	–2.6	2.5	2.9	3.7
55–59	–3.2	2.5	2.8	3.2
60–64	–6.5	4.5	4.7	5.1
65–69	–4.3	3.1	3.3	3.6
70–74	+0.5	0.3	0.3	0.4
75–79	–0.7	0.6	0.7	0.8
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 (Third quintile/60th percentile): 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, 2012/13 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	–0.3	62.6	77.6	92.0
4	–0.8	35.0	42.3	52.2
8	–0.5	25.4	30.3	37.4
16	–0.2	19.1	22.5	29.2
32	–0.2	13.6	16.4	20.8
64	–0.5	10.0	11.6	15.4
128	–0.4	6.9	8.2	10.7
256	–0.4	5.1	5.9	7.4
512	–0.4	3.3	4.1	5.5
1,024	–0.5	2.4	2.8	3.6
2,048	–0.4	1.6	2.0	2.6
4,096	–0.5	1.2	1.4	1.8
8,192	–0.5	0.9	1.0	1.3
16,384	–0.5	0.6	0.7	0.9

Figure 10 (Third quintile/60th percentile): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	49.3	0.0	50.0	50.7	–96.9
≤9	3.4	46.7	0.0	49.9	53.3	–86.4
≤14	7.7	42.4	0.4	49.6	57.3	–68.5
≤19	14.0	36.0	0.9	49.1	63.1	–42.2
≤24	21.0	29.0	2.2	47.8	68.8	–11.6
≤29	27.1	22.9	4.5	45.5	72.6	+17.3
≤34	33.9	16.1	8.0	42.0	75.9	+51.6
≤39	39.0	11.0	12.5	37.5	76.5	+75.1
≤44	43.1	6.9	18.0	32.0	75.1	+64.0
≤49	46.5	3.5	23.7	26.3	72.8	+52.6
≤54	48.2	1.8	28.5	21.4	69.6	+42.9
≤59	49.3	0.8	33.7	16.3	65.6	+32.7
≤64	49.8	0.2	38.6	11.4	61.1	+22.8
≤69	50.0	0.0	42.9	7.0	57.0	+14.2
≤74	50.0	0.0	45.5	4.4	54.4	+9.0
≤79	50.0	0.0	48.7	1.3	51.3	+2.6
≤84	50.0	0.0	49.8	0.2	50.2	+0.5
≤89	50.0	0.0	49.9	0.1	50.1	+0.3
≤94	50.0	0.0	50.0	0.0	50.0	+0.1
≤100	50.0	0.0	50.0	0.0	50.0	+0.1

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

Figure 11 (Third quintile/60th percentile): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	1.6	Only poor targeted
≤9	3.4	99.0	6.7	100.9:1
≤14	8.1	95.1	15.3	19.4:1
≤19	14.9	94.0	28.0	15.6:1
≤24	23.2	90.7	42.0	9.7:1
≤29	31.6	85.8	54.2	6.1:1
≤34	41.9	81.0	67.8	4.3:1
≤39	51.5	75.8	78.0	3.1:1
≤44	61.1	70.6	86.2	2.4:1
≤49	70.2	66.2	92.9	2.0:1
≤54	76.7	62.8	96.3	1.7:1
≤59	82.9	59.4	98.5	1.5:1
≤64	88.4	56.3	99.5	1.3:1
≤69	92.9	53.8	99.9	1.2:1
≤74	95.5	52.3	99.9	1.1:1
≤79	98.7	50.7	100.0	1.0:1
≤84	99.8	50.1	100.0	1.0:1
≤89	99.9	50.1	100.0	1.0:1
≤94	100.0	50.0	100.0	1.0:1
≤100	100.0	50.0	100.0	1.0:1

Tables for
the Fourth-Quintile (80th-percentile) Poverty Line

Figure 4 (Fourth quintile/80th percentile): 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	100.0
10–14	99.3
15–19	97.7
20–24	97.7
25–29	95.8
30–34	86.1
35–39	82.6
40–44	76.6
45–49	66.1
50–54	53.3
55–59	44.8
60–64	34.6
65–69	15.5
70–74	9.0
75–79	4.6
80–84	3.4
85–89	0.0
90–94	0.0
95–100	0.0

Figure 6 (Fourth quintile/80th percentile): For each score range, average differences between estimated and true poverty likelihoods for households, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2012/13 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	0.0	0.0	0.0	0.0
10–14	–0.7	0.4	0.4	0.4
15–19	–1.8	1.0	1.0	1.1
20–24	–0.1	0.6	0.7	1.0
25–29	+4.1	1.2	1.5	2.0
30–34	–5.8	3.5	3.6	3.8
35–39	+11.2	3.0	3.5	4.7
40–44	–0.3	1.9	2.2	3.0
45–49	–5.1	3.6	3.8	4.0
50–54	–1.2	2.7	3.2	4.4
55–59	–2.3	2.8	3.4	4.6
60–64	+4.5	2.8	3.3	4.4
65–69	–7.9	5.4	5.7	6.5
70–74	–4.5	3.7	4.1	4.8
75–79	+3.9	0.5	0.6	0.8
80–84	–0.7	2.3	2.7	3.5
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 (Fourth quintile/80th percentile): 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, 2012/13 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	65.9	74.0	90.1
4	–0.5	29.9	36.8	55.2
8	–0.6	23.4	29.0	41.4
16	+0.1	17.7	21.4	28.2
32	+0.2	12.4	15.3	21.1
64	–0.1	9.0	10.6	14.5
128	–0.1	6.5	7.6	10.5
256	–0.0	4.5	5.2	7.1
512	–0.0	3.2	3.8	4.8
1,024	–0.1	2.3	2.8	3.7
2,048	–0.0	1.6	1.9	2.5
4,096	–0.1	1.1	1.3	1.7
8,192	–0.1	0.8	0.9	1.2
16,384	–0.1	0.5	0.6	0.8

Figure 10 (Fourth quintile/80th percentile): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2012/13 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	Hit rate Inclusion + Exclusion	BPAC See text
≤4	0.8	70.1	0.0	29.2	29.9	–97.8
≤9	3.4	67.4	0.0	29.2	32.6	–90.4
≤14	8.1	62.8	0.0	29.2	37.2	–77.2
≤19	14.8	56.0	0.1	29.1	43.9	–58.0
≤24	22.9	47.9	0.3	28.9	51.8	–34.9
≤29	30.6	40.3	1.0	28.1	58.7	–12.3
≤34	40.0	30.9	1.9	27.2	67.2	+15.6
≤39	47.5	23.3	4.0	25.2	72.7	+39.8
≤44	54.9	15.9	6.2	23.0	77.9	+63.8
≤49	61.3	9.5	8.9	20.2	81.6	+85.6
≤54	64.9	5.9	11.8	17.3	82.3	+83.3
≤59	67.8	3.1	15.1	14.0	81.8	+78.6
≤64	69.4	1.4	19.0	10.1	79.5	+73.2
≤69	70.4	0.4	22.5	6.6	77.0	+68.2
≤74	70.8	0.1	24.8	4.4	75.1	+65.0
≤79	70.8	0.1	27.9	1.2	72.0	+60.5
≤84	70.8	0.0	29.0	0.2	71.0	+59.1
≤89	70.8	0.0	29.1	0.1	70.9	+59.0
≤94	70.8	0.0	29.2	0.0	70.8	+58.9
≤100	70.8	0.0	29.2	0.0	70.8	+58.9

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

Figure 11 (Fourth quintile/80th percentile): Share of all households who are targeted (that is, score at or below a 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), 2012/13 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	0.8	100.0	1.1	Only poor targeted
≤9	3.4	100.0	4.8	Only poor targeted
≤14	8.1	100.0	11.4	Only poor targeted
≤19	14.9	99.5	20.9	215.1:1
≤24	23.2	98.7	32.3	78.2:1
≤29	31.6	96.8	43.1	30.0:1
≤34	41.9	95.4	56.4	20.7:1
≤39	51.5	92.3	67.1	11.9:1
≤44	61.1	89.9	77.6	8.9:1
≤49	70.2	87.3	86.5	6.9:1
≤54	76.7	84.6	91.7	5.5:1
≤59	82.9	81.7	95.7	4.5:1
≤64	88.4	78.5	98.0	3.7:1
≤69	92.9	75.8	99.4	3.1:1
≤74	95.5	74.1	99.9	2.9:1
≤79	98.7	71.7	99.9	2.5:1
≤84	99.8	71.0	100.0	2.4:1
≤89	99.9	70.9	100.0	2.4:1
≤94	100.0	70.8	100.0	2.4:1
≤100	100.0	70.8	100.0	2.4:1