Simple Poverty Scorecard® Poverty-Assessment Tool Bolivia

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Abstract

The Simple Poverty Scorecard-brand poverty-assessment tool uses ten low-cost indicators from Bolivia's 2013 Household Survey to estimate the likelihood that a household has income 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 Bolivia to measure poverty rates, to track changes in poverty rates over time, and to segment clients for targeted services.

Version note

This paper uses 2013 data, replacing Schreiner (2009a), which uses 2007 data. The new 2013 scorecard here should be used from now on. Both scorecards use the same definition of *poverty*, so existing users of Schreiner (2009a) can measure change over time using supported poverty lines with a baseline from the old 2007 scorecard and a follow-up from the new 2013 scorecard.

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Simple Poverty Scorecard® Poverty-Assessment Tool

			Name	Identifier
Interview ID:				
Interview date:		Participant:		
Country:	BOL	Field agent:		
Scorecard:	003	Service point:		
Sampling wgt.:		Number of household members:		

Indicator	Response	Points	Score
1. How many members does the household have?	A. Five or more	0	
	B. Four	9	
	C. Three	14	
	D. Two	20	
	E. One	23	
2. In the past calendar week, did the male head/spouse work for at least one hour?	A. No	0	
	B. No male head/spouse	6	
	C. Yes	10	
3. What is the mother tongue of the female head/spouse?	A. Something other than Spanish	0	
	B. Spanish	6	
	C. No female head/spouse	10	
4. How many rooms does the household occupy, not counting bathrooms, kitchens, laundry rooms, garages, storage rooms, or rooms used for business?	A. One or two	0	
	B. Three	2	
	C. Four	5	
	D. Five or more	7	
5. What is the main construction material of the floors of the residence?	A. Dirt, or other	0	
	B. Bricks, or cement	5	
	C. Wood planks, hardwood floors or parquet, tile (mosaic, stone, or ceramic), or rug or carpet	11	
6. What type of toilet arrangement do the members of the household usually use?	A. None/bush/field	0	
	B. Open-pit latrine (no solid floor), latrine with solid floor, composting toilet, flush toilet or flush latrine, or other	5	
7. What is the main fuel or energy source used for cooking?	A. Firewood, dung/manure, *taquía*, kerosene, or other	0	
	B. LPG from a cylinder	7	
	C. Piped-in natural gas, electricity, or does not cook	12	
8. Does the household own, possess, or have the use of a refrigerator or freezer?	A. No	0	
	B. Yes	7	
9. Does the household own, possess, or have the use of a television?	A. No	0	
	B. Yes	9	
10. Does the household own, possess, or have the use of a motorcycle (for its personal use) or an automobile (for its personal use)?	A. No	0	
	B. Yes	6	

Score:

Back-page Worksheet: Household Membership

In the scorecard header, write the interview's unique identifier (if known), the interview date, and the sampling weight of the participant (if known). Then record the names and the unique identification numbers of the participant, of yourself as the field agent, and of the service point that the participant uses.

Ask the respondent: *Please tell me the name and age of each member of this household. A* household *is one person or a group of people—regardless of blood or marital relationship—who live in the same residence and who eat from the same kitchen. Please start with the head of the household.*

Household members are those who eat from the same kitchen and who have lived in the residence for at least three months (or who expect to do so for a total of at least three months). People who usually live and eat with the household but who are temporarily absent are also counted as *household members* as long as their total absence will not last more than three months.

Be sure to count as *household members* all those who meet the criteria. Pay special attention to those who are temporarily absent, children, newborns, the elderly, visitors, and domestic servants (and their relatives) who do not have another residence. For your own use, note who is the male head/spouse (if he exists) as well as who is the female head/spouse (if she exists).

In the header under "Number of household members:", record the number of members. Also mark the response that corresponds to the first scorecard indicator.

Always keep in mind the full definitions in the "Guidelines for the Interpretation of Indicators" for *household* and *household member*.

Name
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
12.
13.
14.
15.
16.
 # members:

Look-up table to convert scores to poverty likelihoods

	Poverty likelihood (%)									
	National				Poorest half	International 2005 PPP				
Score	Food	100%	150%	200%	< 100% natl.	$1.25	$2.00	$2.50	$5.00	$8.44
0–4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
5–9	98.0	100.0	100.0	100.0	82.3	75.9	96.8	97.6	100.0	100.0
10–14	85.4	97.8	100.0	100.0	76.1	67.3	77.3	83.9	100.0	100.0
15–19	81.4	91.1	97.8	100.0	73.5	50.9	64.1	76.6	91.1	100.0
20–24	65.8	83.1	93.1	96.2	67.2	36.4	53.9	63.3	84.9	94.4
25–29	61.0	81.7	92.7	96.2	58.0	24.0	38.4	56.4	84.5	94.4
30–34	45.3	78.9	92.2	96.1	41.0	13.6	22.9	36.5	81.5	94.4
35–39	31.0	63.9	85.2	94.0	30.2	7.3	16.2	25.7	67.3	90.5
40–44	20.9	55.0	75.9	86.0	22.4	4.8	14.1	18.8	57.6	83.0
45–49	16.8	44.1	66.6	83.9	17.5	3.7	11.5	15.9	47.4	78.3
50–54	9.4	35.5	61.2	78.7	11.7	2.0	4.7	8.5	40.0	72.7
55–59	7.5	31.6	58.9	75.3	8.0	2.0	4.3	6.7	35.3	69.3
60–64	4.7	21.4	42.6	61.4	5.2	1.5	2.8	4.4	23.7	55.4
65–69	3.2	12.9	33.5	51.2	3.8	1.4	2.2	3.4	15.8	44.4
70–74	3.0	10.2	27.2	43.2	3.8	1.4	2.2	3.4	12.3	36.3
75–79	2.8	6.8	17.4	29.1	2.8	1.4	2.0	2.9	7.2	23.0
80–84	0.6	2.1	8.0	19.0	0.6	0.6	0.6	0.6	2.1	16.4
85–89	0.0	1.7	5.9	11.2	0.0	0.0	0.0	0.0	1.7	10.7
90–94	0.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0
95–100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note on estimating changes in poverty rates over time using the old 2007 and new 2013 scorecards

This paper uses data from Bolivia's 2013 Household Survey (*Encuesta de Hogares*, EH). It replaces Schreiner (2009a), which uses data from the 2007 EN. The new 2013 scorecard here should be used from now on.

Some pro-poor programs in Bolivia already use the old 2007 scorecard. Even after switching to the new 2013 scorecard, these legacy users can still estimate changes in poverty rates over time with existing baseline estimates from the old 2007 scorecard and follow-up estimates from the new 2013 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 estimate with the old 2007 scorecard and from a follow-up estimate with the new 2013 scorecard.

In sum, both first-time and legacy users should use the new 2013 scorecard from now on. Looking forward, this establishes the best baseline. Looking backward, legacy users of Bolivia's old 2007 scorecard can still use existing estimates when measuring change.

Simple Poverty Scorecard® Poverty-Assessment Tool Bolivia

1. Introduction

Pro-poor programs in Bolivia can use the Simple Poverty Scorecard poverty-assessment tool to estimate the likelihood that a household has income 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 Bolivia's 2013 Household Survey (*Encuesta de Hogares*, EH); it replaces the old scorecard in Schreiner (2009a) that uses data from the 2007 EH. Only the new 2013 scorecard should be used from now on, as it is more accurate. Because both the new and old scorecards are calibrated to the same definition of *poverty*, existing users of the old 2007 scorecard can still estimate changes in poverty rates over time with a baseline from the old 2007 scorecard and a follow-up from the new 2013 scorecard.

The direct approach to poverty measurement via income surveys is difficult and costly. As a case in point, Bolivia's 2013 EH has 38 pages and includes about 300 questions, many of which may be asked multiple times (for example, for each household member or for each consumption item).

In comparison, the indirect approach of the scorecard is simple, quick, and low-cost. It uses ten verifiable indicators (such as "What is the mother tongue of the female head/spouse?" and "What is the main construction material of the floors of the residence?") to get a score that is correlated with poverty status as measured by the exhaustive EH 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 Bolivia can use scoring with the line that marks the poorest half of people with income below 100% of the national poverty line to report how many of their participants are

[1] The Simple Poverty Scorecard tool for Bolivia is not, however, in the public domain. Copyright is held by the sponsor and by Microfinance Risk Management, L.L.C.

"very poor".[2] Scoring can also be used to measure net movement across a poverty line over time. In all these applications, the scorecard provides an income-based, objective tool with known accuracy. While income 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 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 approaches are usually about as accurate as complex, opaque ones (Schreiner, 2012a; Caire and Schreiner, 2012).

[2] USAID defines a household as *very poor* if its daily per-capita income is less than the highest of the $1.25/day line—BOL5.90 in average prices for all of Bolivia in November/December 2013—or the line (BOL12.14) that marks the poorest half of people below 100% of the national line (Table 1). USAID (2014, p. 8) has approved the scorecard—branded as a Progress Out of Poverty Index®—for use by its microenterprise partners.

Beyond its simplicity and transparency, the technical approach of the scorecard is innovative in how it associates scores with poverty likelihoods, in the extent of its accuracy tests, and in how it derives formulas for standard errors. Although the accuracy tests are simple and commonplace in statistical practice and in the for-profit field of credit-risk scoring, they have rarely been applied to poverty measurement via scorecards.

The scorecard is based on data from the 2013 EH from Bolivia's *Instituto Nacional de Estadística* (INE). 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 Bolivia

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

The scorecard can be used to estimate three basic quantities. First, it can estimate a particular household's *poverty likelihood*, that is, the probability that the household has per-capita income 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 between two points in time. With two independent samples from the same population, this estimate is the

change in the average poverty likelihood in the baseline group versus the average likelihood in the follow-up group. With one sample in which each household is scored twice, this estimate is the average of each household's change from baseline to follow-up (Schreiner, 2015).

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 100% of the national poverty line applied to data from the 2013 EH. Scores from this one scorecard are calibrated with data from the 2013 EH to poverty likelihoods for 10 poverty lines.

The new 2013 scorecard is constructed using half of the data from the 2013 EH. That same half of the 2013 data is also used to calibrate scores to poverty likelihoods for 10 poverty lines. The other half of the 2013 EH 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. Furthermore, the accuracy of estimates of changes in poverty rates over time is tested using the validation sample from the 2013 EH (baseline) and all the data from the 2007 EH or all the data from the 2011 EH (follow-up).

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

rate between two points in 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 unchanging. Like all predictive models, the scorecard here is constructed from a single sample and so misses the mark to some unknown extent when applied (as in this paper) to validation samples. Furthermore, it makes errors when applied (in practice) to a different population or when applied before or after 2013 (because the relationships between indicators and poverty change over time).[3]

Thus, while the indirect scoring approach is less costly than the direct survey approach, it makes errors when applied in practice. (Estimates from the survey approach are correct by definition.) There are errors because scoring 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 2013 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 –0.9 percentage points. Across all 10 poverty lines, the average absolute difference is about 0.8 percentage points, and the maximum absolute difference is 2.0 percentage points. These

[3] Important cases include nationally representative samples at a later point in time or sub-groups that are not nationally representative (Diamond *et al.*, 2015 and 2014; Tarozzi and Deaton, 2007).

differences reflect estimation errors due to sampling variation, not bias; the average difference would be zero if the whole 2013 EH survey were to be repeatedly re-fielded and divided into sub-samples before repeating the entire process of constructing and validating scorecards.

With $n = 16{,}384$, the 90-percent confidence intervals are ± 0.7 percentage points or less. For $n = 1{,}024$, the 90-percent intervals are ± 2.6 percentage points or less.

To check the accuracy of estimates of changes in poverty rates over time, the new 2013 scorecard is applied to data from the 2013 validation sample (as a baseline) and to all of the 2007 EH or to all of the 2011 EH (as a follow-up).

Across 1,000 bootstraps with $n = 16{,}384$, the average absolute error across 18 estimates of change (nine poverty lines in each of the two year-pairs of 2013 to 2007 and 2013 to 2011)[4] is about 2.3 percentage points. For comparison, the average absolute true change is about 8.2 percentage points.

The 90-percent confidence interval (with $n = 1{,}024$) includes the true value for 14 of 18 estimates. The estimated direction is correct and "statistically significant" (its 90-percent confidence interval with $n = 1{,}024$ does not include zero) for all 18 estimates.

The largest errors are negative; in these cases, the scorecard estimates that poverty increased from 2013 to 2007 or from 2013 to 2011, but the estimated increase is smaller than the true increase.

[4] There are no estimates of change for the line marking the poorest half of people below 100% of the national poverty line because that line's real value changes over time.

Section 2 below documents data and the definition of *poverty*. 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 Bolivia. The last section is a summary.

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

2. Data and the definition of *poverty*

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

2.1 Data

Indicators and points for the new 2013 scorecard are selected (*constructed*) based on a random half of the data from the 9,553 households in the 2013 EH, Bolivia's most recent national income survey.

The half of the 2013 data that is used in scorecard construction is also used to associate (*calibrate*) scores to poverty likelihoods for all poverty lines.

To test the accuracy and precision of scorecard estimates, data from three validation samples are used:

- The half of the 2013 EH not used in construction/calibration
- All 4,148 households in the 2007 EH
- All 8,851 households in the 2011 EH

Fieldwork for the EH surveys took place in November/December of 2007, 2011, and 2013. Income[5] is in BOL in average prices for Bolivia as a whole as of November/December of a given survey year.

[5] It is not clear whether Bolivia's INE defines *poverty* in terms of income or in terms of consumption. For consistency with Schreiner (2009a and 2007), this document uses the term *income*, but it is possible that the actual measure used is consumption.

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 income (divided by the number of household members) is below a given poverty line. The unit of analysis is either the household itself or a person in the household. By assumption, 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-capita income 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 weighted[6] average of poverty statuses (or estimated poverty likelihoods) across households with participants. 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

[6] The example here assumes simple random sampling at the household level. This means that each household has the same weight, taken here to be one (1).

denominator is the sum of the weights of the two households. Household-level weights are used 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[7] average of poverty statuses for households with participants, or $\frac{3 \cdot 1 + 4 \cdot 0}{3 + 4} = \frac{3}{7} = 0.43 = 43$ percent. In the "$3 \cdot 1$" term in the numerator, the "3" is the first household's weight because it has three members, and the "1" is its poverty status (poor). In the "$4 \cdot 0$" term in the numerator, the "4" is the second household's weight because it has four members, and the zero is its poverty status (non-poor). The "$3 + 4$" in the denominator is the sum of the weights of the two households. A household's weight is its number of members because the unit of analysis is the household member.

As a final example, 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[8] 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

[7] Given simple random sampling at the household level, a household's person-level weight is the number of people in the household.
[8] Given simple random sampling at the household level, a household's participant-level weight is the number of participants in the household.

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—assuming simple random sampling—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.

Table 1 reports poverty lines and poverty rates for households and people in the 2007, 2011, and 2013 EH for Bolivia as a whole, for the construction/calibration sample, and for the three validation samples. Table 2 reports these same things for urban/rural/overall for Bolivia as a whole, for each department, and for La Paz and El Alto separately. 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 Tables 1 and 2 because these are the rates reported by the government of

Bolivia. Furthermore, person-level rates are usually used in popular and policy discussions.

2.3 Definition of *poverty*, and poverty lines

Poverty is whether a household is poor or non-poor. In Bolivia and for the purposes here, poverty status is determined by whether per-capita aggregate household income is below a given poverty line. Thus, a definition of *poverty* has two aspects: a measure of aggregate household income, and a poverty line.

In Bolivia, INE used the same definition of *poverty* in the 2007, 2011, and 2013 EH, so poverty estimates are comparable across surveys.[9] Income is measured the same in each survey, and the poverty lines have the same real values through time (Unidad de Análisis de Políticas Sociales y Económicas, 2004).

The derivation of Bolivia's official poverty lines begins with the cost of a daily food basket that provides a minimum level of calories and protein. A single basket is used for all rural areas, and different baskets are defined for urban areas by department.[10]

The food poverty line (*línea de pobreza extrema*) is defined as the cost of the food basket observed for a reference group of households in an area. The reference

[9] INE compares poverty estimates across rounds without caveats, and (in personal communication), Porfidia Ajata Ramos, Carlos Oyola, and Gustavo Javier Canavire Bacerreza aver that a single definition of *poverty* has been in use in Bolivia since 1999.
[10] In La Paz department, there are separate urban baskets for La Paz and El Alto.

group is made up of households in contiguous deciles of average caloric consumption is closest to that of the food basket.

The national (food-plus-non-food) poverty line (usually called here "100% of the national line", corresponding to INE's *línea de pobreza moderada*) is then the food line, plus the average non-food expenditure by the reference group in the area.

In 2013, the average food line for Bolivia as a whole is BOL11.97 per person per day in average prices in November/December 2013, giving a household-level poverty rate of 15.8 percent and a person-level poverty rate of 18.8 percent (Table 1). The value of 100% of the national poverty line (food-plus-non-food) in 2013 is BOL22.25 per person per day, giving poverty rates of 34.6 percent (households) and 39.0 percent (people).

In 2007, 2011, and 2013, the person-level poverty rates in Table 1 for the food and national lines match those of INE (2015a and 2015b). This suggests that this paper is using the same data as INE and that it has successfully replicated its derivation of households' poverty status.

2.4 Supported poverty lines

Because pro-poor organizations in Bolivia may want to use different or various poverty lines, this paper calibrates scores from its single new 2013 scorecard to poverty likelihoods for 10 lines:

- Food
- 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 2005 PPP
- $2.50/day 2005 PPP
- $5.00/day 2005 PPP
- $8.44/day 2005 PPP

All the lines that are supported for the new 2013 corecard are comparable with corresponding lines supported for the old 2007 scorecard, except:

- $2.00/day, $5.00/day, and $8.44/day are not supported for the old 2007 scorecard
- $3.75/day is supported for the old 2007 scorecard but not for the new 2013 scorecard
- The line marking the poorest half of people below 100% of the national line is supported for both scorecards but it is not comparable between them because the line's value is not constant through time

The lines for 150% and 200% of the national line are multiples of 100% of the national line.

The line that marks the poorest half of people below 100% of the national line is defined—separately in each of Bolivia's 10 poverty-line regions in a given EH round—as the median aggregate household per-capita income of people (not households) 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): BOL2.571 per $1.00
- Average Consumer Price Index (CPI) for all of Bolivia:[11]
  - In the twelve months of 2005: 102.8197
  - In November/December of 2007: 122.6344
- Average national poverty line (per-person, per-day) in Bolivia as a whole in November/December prices (Table 1):
  - 2007: BOL14.45
  - 2011: BOL20.68
  - 2013: BOL22.25
- Area-specific national poverty lines in Bolivia's 10 poverty-line regions in 2007, 2011, and 2013 (Table 2)

Given this, the $1.25/day 2005 PPP line in average prices in Bolivia overall during the 2013 EH fieldwork is (Sillers, 2006):[12]

$$\left(\text{2005 PPP exchange rate}\right) \cdot \$1.25 \cdot \left(\frac{\text{CPI}_{\text{Nov/Dec2007}}}{\text{CPI}_{\text{2005 average}}}\right) \cdot \left(\frac{\text{Natl. line}_{\text{Nov/Dec2013}}}{\text{Natl. Line}_{\text{Nov/Dec2007}}}\right) =$$

$$\left(\frac{\text{BOL2.571}}{\$1.00}\right) \cdot \$1.25 \cdot \left(\frac{122.6344}{102.8917}\right) \cdot \left(\frac{22.25}{14.45}\right) = \text{BOL5.90.}$$

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 in Table 1 are all-Bolivia averages. In a given poverty-line region in a given year, the $1.25/day line is the all-Bolivia $1.25/day line in the year,

[11] `www.ine.gob.bo/indice/visualizador.aspx?ah=PC02020104.HTM`, retrieved 4 November 2015. The tables here are re-based to January 2005 = 100. The ratio of the CPIs is 1.1927 here (122.6344 ÷ 102.8197) and in the original data (103.25 ÷ 86.57).

[12] For adjusting prices over time from 2007 on, the change in the national poverty line differs from the change in Bolivia's CPI. This paper uses the change in the national line because it should reflect more closely the prices relevant for households close to it.

multiplied the national line in that region in the year, and divided by Bolivia's average national line in the year.

For example, the $1.25/day 2005 PPP line in rural areas of the department of Chuquisaca in 2013 is the all-Bolivia $1.25/day line in 2013 of BOL5.90 (Table 1), multiplied by the national line in rural Chuquisaca in 2013 of BOL17.83 (Table 2), and divided by the average all-Bolivia national line in 2013 of BOL22.25 (Table 1). This gives a $1.25/day line in rural Chuquisaca in 2013 of 5.90 x 17.83 ÷ 22.25 = BOL4.73 (Table 2).

The World Bank's PovcalNet[13] reports person-level poverty rates for the $1.25/day line in 2007, 2011, and 2013 (based on the EH) of 8.1, 4.2, and 4.4 percent. These are a lot lower than the 14.3, 8.2, and 7.7 percent in Table 1 here. The $1.25/day estimates here are to be preferred (Schreiner, 2014) because PovcalNet does not report:

- Its lines in BOL
- The time/place of its price units
- Whether/how it adjusts for regional differences in prices
- How it deflates 2005 PPP factors
- What measure of income or expenditure it uses

[13] `iresearch.worldbank.org/PovcalNet/index.htm`, retrieved 4 November 2015.

USAID microenterprise partners in Bolivia who use the scorecard to report the number of their participants who are "very poor" to USAID should use the line that marks the poorest half of people below 100% of the national poverty line. This is because USAID defines the "very poor" as those people in households whose daily per-capita income is below the highest of the following two poverty lines:

- The line that marks the poorest half of people below 100% of the national line (BOL12.14 in 2013, with a person-level poverty rate of 19.5 percent, Table 1)
- $1.25/day 2005 PPP (BOL5.90 in 2013, with a person-level poverty rate of 7.7 percent)

3. Scorecard construction

For Bolivia, about 75 candidate indicators are initially prepared in the areas of:

- Household composition (such as the number of members)
- Education (such as the literacy of the female head/spouse)
- Housing (such as the type of floor)
- Ownership of durable assets (such as refrigerators or televisions)
- Employment (such as whether the male head/spouse works)

Table 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 possible 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 refrigerator is probably more likely to change in response to changes in poverty than is the mother tongue of the female head/spouse.

The scorecard itself is built using 100% of the national poverty line and Logit regression on the 2013 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 to help select scorecard indicators; it is just a way to order the candidate indicators listed in Table 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 (determined by simplicity, cost of collection, and "face validity" in terms of experience, theory, and common sense), sensitivity to changes in poverty, variety among indicators, applicability across regions, tendency to have a slow-changing relationship with poverty over time, relevance for distinguishing among households at the poorer end of the distribution of income, 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 Bolivia, indicator selection was also informed by feedback from a field test by Fundación Boliviana para el Desarrollo with support from Vision Fund International.

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, common-sense, and acceptable to users.

The single scorecard here applies to all of Bolivia. Tests for Indonesia (World Bank, 2012), Bangladesh (Sharif, 2009), India and Mexico (Schreiner, 2006 and 2005a), Sri Lanka (Narayan and Yoshida, 2005), and Jamaica (Grosh and Baker, 1995) suggest that segmenting 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.*, 2015 and 2014; Tarozzi and Deaton, 2007), 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, Bolivia'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)

The scorecard (and its back-page worksheet) is ready to be photocopied. A field worker using Bolivia's new 2013 scorecard would:

- Record the interview identifier, interview date, county code ("BOL"), scorecard code ("003") and the sampling weight assigned by the survey design to the household of the participant
- Record the names and identifiers of the participant (who may not be the same as the respondent), field agent, and relevant organizational service point
- Complete the back-page worksheet with each household member's first name
- Record household size in the scorecard header next to "Number of household members:", and record the response to the first scorecard indicator based on the number of household members listed on the back-page worksheet
- Read each of the remaining nine 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 managers or 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 Indicators" found at the end of this paper, as the "Guidelines"—along with the "Back-page Worksheet"—are an integral part 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. Even if points are hidden, field workers and respondents can apply common sense to guess how response options are linked with poverty. 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.

[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 Bolivia's INE does in the EH.

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 Bolivia.

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

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

In general, the sampling design should follow from the organization's goals for the exercise, the questions to be answered, and the budget. The main goal should be to make sure that the sample is representative of a well-defined population and that the scorecard will inform an issue that matters to the organization.

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

- Employees of the organization
- Third parties

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

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

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

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

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

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 Bolivia, 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 40–44 correspond with a poverty likelihood of 55.0 percent, and scores of 45–49 correspond with a poverty likelihood of 44.1 percent (Table 4).

The poverty likelihood associated with a score varies by poverty line. For example, scores of 40–44 are associated with a poverty likelihood of 55.0 percent for 100% of the national line but of 4.8 percent for the $1.25/day line.[19]

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

5.1 Calibrating scores with poverty likelihoods

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

For the example of 100% of the national line (Table 5), there are 6,786 (normalized) households in the 2013 calibration sub-sample with a score of 40–44. Of these, 3,732 (normalized) are below the poverty line. The estimated poverty likelihood associated with a score of 40–44 is then 55.0 percent, because 3,732 ÷ 6,786 = 55.0 percent.

To illustrate with 100% of the national line and a score of 45–49, there are 8,227 (normalized) households in the 2013 calibration sample, of whom 3,624 (normalized) are below the line (Table 5). The poverty likelihood for this score range is then 3,624 ÷ 8,227 = 44.1 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

[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.

income. 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, 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 Bolivia scorecard are transformed coefficients from a Logit regression, (untransformed) scores are not converted to poverty likelihoods via the Logit formula of $2.718281828^{\text{score}}$ x $(1 + 2.718281828^{\text{score}})^{-1}$. 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 who 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. 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 Bolivia's population. Thus, the scorecard will generally be biased when applied after December 2013 (the last month of fieldwork for the 2013 EH) or when applied with sub-groups that are not nationally representative.

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

How accurate are estimates of households' poverty likelihoods, given the assumption of unchanging relationships between indicators and poverty over time and the assumption of a sample that is representative of Bolivia as a whole? To find out, the scorecard is applied to 1,000 bootstrap samples of size $n = 16{,}384$ from the 2013 validation sample. Bootstrapping means to:

- Score each household in the 2013 validation sample
- Draw a bootstrap sample *with replacement* from the 2013 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 income below a poverty line
- For each score, record the difference between the estimated poverty likelihood (Table 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

For each score range and for $n = 16{,}384$, Table 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 40–44 in the 2013 validation sample is too low by 6.8 percentage points. For scores of 45–49, the estimate is too high by 2.0 percentage points.[22]

[22] These differences are not zero, despite the estimator's unbiasedness, because the scorecard comes from a single sample from the 2013 EH. The average difference by score range would be zero if the EH was repeatedly applied to samples of the population

The 90-percent confidence interval for the differences for scores of 40–44 is ±4.8 percentage points (100% of the national line, Table 6). This means that in 900 of 1,000 bootstraps, the difference between the estimate and the true value is between –11.6 and –2.0 percentage points (because –6.8 – 4.8 = –11.6, and –6.8 + 4.8 = –2.0). In 950 of 1,000 bootstraps (95 percent), the difference is –6.8 ± 5.0 percentage points, and in 990 of 1,000 bootstraps (99 percent), the difference is –6.8 ± 5.5 percentage points.

A few differences between estimated poverty likelihoods and true values in Table 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 Bolivia's population. For targeting, however, what matters is less the difference in all score ranges and more the differences 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, although it holds less well for sub-national groups.

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of Bolivia and then split into sub-samples before repeating the entire process of scorecard construction/calibration and validation.

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 EH fieldwork in December 2013. That is, the scorecard may fit the data from the 2013 EH 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 2013 EH but not in the overall population of Bolivia. 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 two sections). Furthermore, at least some of the differences in change-through-time estimates 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 income 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 2016 and that they have scores of 20, 30, and 40, corresponding to poverty likelihoods of 83.1, 78.9, and 55.0 percent (100% of the national line, Table 4). The group's estimated poverty rate is the households' average poverty likelihood of (83.1 + 78.9 + 55.0) ÷ 3 = 72.3 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 78.9 percent. This differs from the 72.3 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.

Scores from the new 2013 scorecard are calibrated with data from the 2013 EH for all 10 poverty lines. The process of calibrating scores to poverty likelihoods and the approach to estimating poverty rates is exactly the same for all lines, regardless of their

definition. For users, the only difference is in the specific look-up table used to convert scores to poverty likelihoods.

Existing users of the old 2007 scorecard who switch to the new 2013 scorecard can salvage existing poverty-rate estimates for measuring change over time by using supported poverty lines to estimate poverty rates for use in estimates of change with a baseline from the old 2007 scorecard and a follow-up from the new 2013 scorecard.

6.1 Accuracy of estimated poverty rates at a point in time

For the new 2013 scorecard applied to 1,000 bootstraps of $n = 16{,}384$ from the 2013 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 –0.9 percentage points (Table 8, summarizing Table 7 across all poverty lines). Across all 10 poverty lines in the 2013 validation sample, the maximum absolute difference is 2.0 percentage points, and the average absolute difference is about 0.8 percentage points. At least part of these differences is due to sampling variation in the division of the 2013 EH into two sub-samples.

When estimating poverty rates at a point in time for a given poverty line, the average error reported in Table 8 should be subtracted from the average poverty likelihood to give a corrected estimate. For the example of the new 2013 scorecard and 100% of the national line in the 2013 validation sample, the error is –0.9 percentage

points, so the corrected estimate in the three-household example above is 72.3 – (–0.9) = 73.2 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 ±0.7 percentage points or better for all poverty lines (Table 8). This means that in 900 of 1,000 bootstraps of this size, the estimate (after correcting for the known average error) is within 0.7 percentage points of the true value.

For example, suppose that the (uncorrected) average poverty likelihood in a sample of $n = 16{,}384$ with the Bolivia scorecard and 100% of the national line is 72.3 percent. Then estimates in 90 percent of such samples would be expected to fall in the range of 72.3 – (–0.9) – 0.7 = 72.5 percent to 72.3 – (–0.9) + 0.7 = 73.9 percent, with the most likely true value being the corrected estimate in the middle of this range, that is, 72.3 – (–0.9) = 73.2 percent. This is because the original (uncorrected) estimate is 72.3 percent, the average error is –0.9 percentage points, and the 90-percent confidence interval for 100% of the national line in the 2013 validation sample with this sample size is ±0.7 percentage points (Table 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 (*error*), 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 scorecards. 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 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, Bolivia's 2013 EH gives a direct-measurement estimate of the household-level poverty rate for 100% of the national line in the 2013 validation sample of $\hat{p} = 34.6$ percent (Table 1). If this estimate came from a sample of $n = 16{,}384$ households from a population N of 2,804,957 (the number of households in Bolivia in 2013 according to the EH sampling weights), then the finite population correction ϕ is $\sqrt{\frac{2{,}804{,}957 - 16{,}384}{2{,}804{,}957 - 1}} = 0.9971$, which very close to $\phi = 1$. If the desired confidence level is 90-percent ($z = 1.64$), then the confidence interval $\pm c$ is

$$\pm z \cdot \sqrt{\frac{\hat{p} \cdot (1 - \hat{p})}{n}} \cdot \sqrt{\frac{N - n}{N - 1}} = \pm 1.64 \cdot \sqrt{\frac{0.346 \cdot (1 - 0.346)}{16{,}384}} \cdot \sqrt{\frac{2{,}804{,}957 - 16{,}384}{2{,}804{,}957 - 1}} = \pm 0.608$$

percentage points. (If ϕ were taken as 1, then the interval is ± 0.609 percentage points.)

Scorecards, however, do not measure poverty directly, so this formula is not applicable. To derive a formula for the new 2013 Bolivia scorecard, consider Table 7, which reports empirical confidence intervals $\pm c$ for the differences for the scorecard applied to 1,000 bootstraps of various sizes from the 2013 validation sample. For example, with $n = 16{,}384$ and 100% of the national line in the 2013 validation sample, the 90-percent confidence interval is ± 0.662 percentage points.[23]

Thus, the 90-percent confidence interval with $n = 16{,}384$ is ± 0.662 percentage points for the Bolivia scorecard and ± 0.608 percentage points for direct measurement. The ratio of the two intervals is $0.662 \div 0.608 = 1.09$.

[23] Due to rounding, Table 7 displays 0.7, not 0.662.

Now consider the same exercise, but with $n = 8{,}192$. The confidence interval under direct measurement and 100% of the national line in the 2013 validation sample is $\pm 1.64 \cdot \sqrt{\frac{0.346 \cdot (1 - 0.346)}{8{,}192}} \cdot \sqrt{\frac{2{,}804{,}957 - 8{,}192}{2{,}804{,}957 - 1}} = \pm 0.861$ percentage points. The empirical confidence interval with the Bolivia scorecard (Table 7) is ± 0.908 percentage points. Thus for $n = 8{,}192$, the ratio of the two intervals is $0.908 \div 0.861 = 1.05$.

This ratio of 1.05 for $n = 8{,}192$ is close to the ratio of 1.09 for $n = 16{,}384$. Across all sample sizes of 256 or more in Table 7, these ratios are generally close to each other, and the average of these ratios in the 2013 validation sample turns out to be 1.05, implying that confidence intervals for indirect estimates of poverty rates via the Bolivia scorecard and 100% of the national poverty line are—for a given sample size—about 5-percent wider than confidence intervals for direct estimates via the 2013 EH. This 1.05 appears in Table 8 as the "α factor for precision" because if $\alpha = 1.05$, then the formula for confidence intervals c for the Bolivia scorecard is $\pm c = \pm z \cdot \alpha \cdot \sigma$. That is, the formula for the standard error σ for point-in-time estimates of poverty rates via scoring is $\alpha \cdot \sqrt{\frac{\hat{p} \cdot (1 - \hat{p})}{n}} \cdot \sqrt{\frac{N - n}{N - 1}}$.

In general, α can be more or less than 1.00. When α is more than 1.00, it means that the scorecard is less precise than direct measurement. It turns out that α is more than 1.00 for seven of 10 poverty lines in Table 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 $n = \left(\frac{\alpha \cdot z}{c} \right)^2 \cdot \tilde{p} \cdot (1 - \tilde{p})$.

To illustrate how to use this, suppose the population N is 2,804,957 (the number of households in Bolivia in 2013), suppose $c = 0.04967$, $z = 1.64$ (90-percent confidence), and the relevant poverty line is 100% of the national line so that the most sensible expected poverty rate $\tilde{p}$ is Bolivia's overall poverty rate for that line in 2013 (34.6 percent at the household level, Table 1). The α factor is 1.05 (Table 8). Then the sample-size formula gives

$$n = 2{,}804{,}957 \cdot \left(\frac{1.64^2 \cdot 1.05^2 \cdot 0.346 \cdot (1 - 0.346)}{1.64^2 \cdot 1.05^2 \cdot 0.346 \cdot (1 - 0.346) + 0.04967^2 \cdot (2{,}804{,}957 - 1)} \right) = 272,$$

which is not too far from the sample size of 256 observed for these parameters in Table 7 for 100% of the national line. Taking the finite population correction factor ϕ as one (1) gives the same result, as $n = \left(\frac{1.05 \cdot 1.64}{0.04967} \right)^2 \cdot 0.346 \cdot (1 - 0.346) = 272$.[24]

[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

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

In practice after the end of fieldwork for the EH in December 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 Bolivia of 34.6 percent in the 2013 EH in Table 1), look up α (here, 1.05 in Table 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, $n = 10{,}000 \cdot \left(\frac{1.64^2 \cdot 1.05^2 \cdot 0.346 \cdot (1 - 0.346)}{1.64^2 \cdot 1.05^2 \cdot 0.346 \cdot (1 - 0.346) + 0.02^2 \cdot (10{,}000 - 1)} \right) = 1{,}437.$

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microenterprise partners in Bolivia should report using the line marking the poorest half of people below 100% of the national line. Given the α factor of 1.14 for this line in 2013 (Table 8), an expected before-measurement household-level poverty rate of 15.9 percent (the all-Bolivia rate in 2013, Table 1), and a confidence level of 90 percent ($z = 1.64$), then $n = 300$ implies a confidence interval of $\pm 1.64 \cdot 1.14 \cdot \sqrt{\frac{0.159 \cdot (1 - 0.159)}{300}} = \pm 3.9$ percentage points.

[25] This paper reports accuracy for the scorecard applied to its validation samples, but it cannot test accuracy for later years or for sub-groups. Performance after December 2013 will resemble that in the 2013 EH 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.

To give an idea of how accurate the new 2013 Bolivia scorecard might be when used to measure changes in poverty rates over time from now on, this section looks at how accurate the scorecard would have been, had it been applied between:

- 2013 validation sample (as baseline)
- All of the 2007 data (as follow-up)
- All of the 2011 data (as follow-up)

The tests here are stringent because:

- They compare scorecard estimates with known, true values from the EH
- Poverty rates in Bolivia fell a lot (from 2007 to 2013) and by a little (from 2011 to 2013). A long time frame increases the risk of inaccuracy due to greater changes in the relationships between indicators and poverty, and a short time frame increases the difficulty of producing an estimate with a precision that distinguishes it from an estimate of zero/"no change"
- The tests use a nine-indicator scorecard that omits "What type of toilet arrangement do the members of the household usually use?" because that question does not appear in the 2007 nor 2011 EH. All else constant, fewer indicators decrease accuracy when measuring change over time
- The tests are *out-of-sample* in that they use only EH data that is not also used in construction or calibration of the new 2013 scorecard
- The tests are *out-of-time* in that the follow-up is from a different time (2007 or 2011) than the baseline (2013

Of course, these backward-looking tests—the only ones possible for estimates of changes in poverty rates—can only give a rough idea of how accurate the scorecard might be when used from now on. After all, the factors that mattered in the past will

differ in type, degree, and extent from the factors that will matter in the future. This is the unfortunate-but-inevitable nature of scorecards.

Because estimates from the scorecard are unbiased when applied to an unchanging population in which there are unchanging relationships between indicators and poverty, inaccuracies in estimates of change between two given EH rounds must be due to:

- Sampling variation
- Inconsistent data quality
- Inconstancy in the definitions of poverty lines over time
- Changes in the relationships between indicators and poverty over time
- Changes in the composition of Bolivia's population

7.1 Warning: Change is not necessarily 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 83.1, 78.9, and 55.0 percent (100% of the national line, Table 4). Correcting for the known average error in the validation sample of –0.9 percentage points (Table 8), the group's corrected baseline estimated poverty rate is the households' average poverty likelihood of [(83.1 + 78.9 + 55.0) ÷ 3] – (–0.9) = 73.2 percent.

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

- Score a new, independent sample from the same population
- Score the same sample that was scored at baseline

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 and finds that their scores are 25, 35, and 45 (poverty likelihoods of 81.7, 63.9, and 44.1 percent, 100% of the national line, Table 4). Adjusting for the known average error, the average poverty likelihood at follow-up is [(81.7 + 63.9 + 44.1) ÷ 3] – (–0.9) = 64.1 percent, an improvement of 73.2 – 64.1 = 9.1 percentage points.[26] Supposing that exactly two years passed between the average baseline interview and the average follow-up interview, the estimated annual decrease in

[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.

poverty is 9.1 ÷ 2 = 4.6 percentage points per year. About one in 11 participants in this hypothetical example cross the poverty line in 2016/8.[27] Among those who start below the line, about one in eight (9.1 ÷ 73.2 = 12.4 percent) on net end up above the line.[28]

Alternatively, suppose that the three original households who were scored at baseline are scored again on 1 January 2018. Given scores of 25, 35, and 45, their follow-up poverty likelihoods are 81.7, 63.9, and 44.1 percent. The average across households of the difference in each given household's baseline poverty likelihood and its follow-up poverty likelihood is [(83.1 – 81.7) + (78.9 – 63.9) + (55.0 – 44.1)] ÷ 3 = 9.1 percentage points. Assuming in this example that there are exactly two years between each household's interviews, the estimated annual decrease in poverty is (again) 9.1 ÷ 2 = 4.6 percentage points per year.

Both approaches to estimating change through time are unbiased. In general (and unlike in the simple example here), however, they will give different estimates due to differences in the timing of interviews, in the composition of the samples, and in the nature of two samples being scored once versus one sample being scored twice (Schreiner, 2015).

[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.

7.3 Accuracy for estimated change in two independent samples

The accuracy of scoring's estimates of changes in poverty rates over time is checked using EH data from 2007, 2011, and 2013. While one cannot "drive by looking in the rear-view mirror", historical accuracy is the best-available—but inevitably imperfect—indicator of future accuracy.

Across the nine poverty lines for which change over time can be estimated[29] over the two time frames from 2013 to 2007 and from 2013 to 2011, the average absolute error is 2.3 percentage points, while the average absolute true change is 8.2 percentage points.

For 14 of 18 estimates, the true value is in the estimate's 90-percent confidence interval (given $n = 1{,}024$). That is, the estimated change is not statistically different from the true change with 90-percent confidence for three in four estimates. Of course, if all of scoring's assumptions held, then 90 percent of estimates' 90-percent confidence intervals would contain the true value.

Scoring estimates the direction of change (that is, whether poverty increased or decreased) correctly in all 18 cases. Furthermore, in all 18 cases the estimated (and correct) direction is "statistically significant" in that zero is not in the estimate's 90-percent confidence interval (given $n = 1{,}024$).

[29] Changes are not estimated with the line that marks the poorest half of people below the national line because the real value of this line is not constant over time.

In sum, the scorecard always got the *sign* of change correct. The absolute error in the estimated *size* of change is, on average, about one-fourth of the absolute true change, and three-fourths of the true changes are in the 90-percent confidence interval of the estimated changes.

Are these estimates of change for Bolivia "good enough"? The answer depends, of course, on the context and purpose of a given analysis task. Sometimes scoring is adequate, sometimes not. While greater accuracy is always preferred and sought, a strength of the scorecard is that its accuracy is known, allowing judgments about how much trust to put in scoring estimates to be transparent and intentional. The accuracy of estimates of change here for Bolivia is among the highest of the 13 countries for which such tests have been done. Of course, accuracy might be worse (or better) from now on in Bolivia.

7.4 Precision for estimates of change in two samples

Beyond errors in the size and the sign of estimated magnitudes, another formal aspect of accuracy is the standard statistical concept of *precision*. Table 9 reports precision as 90-percent confidence intervals (given $n = 16{,}384$) and more generally as the α factor used in formulas for standard errors.

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,[30] and α is the average (across a range of bootstrapped sample sizes) of the ratio of the observed confidence interval from a scorecard and the theoretical confidence interval under direct measurement.

Given $n = 16{,}384$, the 90-percent confidence intervals for estimates of change over time are ± 1.0 percentage points or less (Table 9).

Seen another way, the average α factor across the 18 cases in Table 9 is 1.13; scoring's standard errors for estimates of change are on average about 13-percent larger than standard errors under direct measurement.

Is this precise enough? There can be no general, once-and-for-all answer as to whether the estimation errors and standard errors of the scorecard are small enough to be useful for measuring change over time. After all, accuracy requirements vary by context and purpose. The scorecard's precision is a little worse than that of direct measurement. The estimated direction of change is always correct and statistically

[30] This means that—for a given level of 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.

significant ($n = 1{,}024$). The average absolute error is about one-fourth of the average absolute true change, and three-fourths of estimates include the true value in their 90-percent confidence interval ($n = 1{,}024$).

Is the scorecard better than feasible alternatives for measuring change over time? This question is also difficult to answer. A central strength of scoring is that its accuracy is known, while the accuracy of most alternatives is unknown, unreported, or defined so as to always be perfectly accurate.

As before, the formula for standard errors can be rearranged to give a formula for sample size 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 $n = 2 \cdot \left(\frac{\alpha \cdot z}{c} \right)^2 \cdot \widetilde{p} \cdot (1 - \widetilde{p})$.

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, $\alpha = 1.02$ (Table 9 for 2013), $\hat{p} = 0.346$ (the household-level poverty rate in 2013 for 100% of the national line in Table 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 $n = 2 \cdot \left(\frac{1.02 \cdot 1.64}{0.02}\right)^2 \cdot 0.346 \cdot (1 - 0.346) \cdot 1 = 3{,}167$, and the follow-up sample size is also 3,167.

7.5 Precision for estimated change for one sample, scored twice

Analogous to previous derivations, the general formula relating the confidence interval $\pm c$ to the standard error σ when using a scorecard to estimate change for a single group of households, all of whom are scored at two points in time, is:[31]

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

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.

Because the EH data for Bolivia does not cover the same households in more than one round (except by pure chance, and even then, there is no way to identify such households), it is not possible to estimate values of α here.

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

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

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

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

Because $\widetilde{p}_{*}$ could be anything between 0 and 0.5, more information is needed to apply this formula. Suppose that the observed relationship between $\widetilde{p}_{*}$, the number of years y between baseline and follow-up, and $p_{\text{pre-baseline}} \cdot \left(1 - p_{\text{pre-baseline}}\right)$ is—as in Peru (Schreiner, 2009b)—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 new 2013 Bolivia scorecard is applied twice (once after December 2013 and then again later) is

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

In Peru (the only source of a data-based estimate, Schreiner, 2009b), 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 2016 and then again in 2019 ($y = 3$), 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_{2016} is taken as 34.6 percent (Table 1), and α is assumed to be 1.30. Then the baseline sample size is

$n = 2 \cdot \left(\frac{1.30 \cdot 1.64}{0.02} \right)^2 \cdot \{-0.02 + 0.016 \cdot 3 + 0.47 \cdot [0.346 \cdot (1 - 0.346)]\} \cdot 1 = 3{,}054$. The same group of 3,054 households is scored at follow-up as well.

8. Targeting

When an organization uses scoring 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 income below a poverty line). Poverty status is a fact that is defined by whether income 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.

Households who score at or below a given cut-off should be labeled as *targeted*,[32] not as *poor*. After all, unless all targeted households have poverty likelihoods of 100 percent, some of them are non-poor (their income is above a given poverty line). With scoring, the terms *poor* and *non-poor* have specific definitions. Using these same terms for targeting status is incorrect and misleading.

[32] A label is acceptable as long as it describes the segment and does not confuse targeting status (having a score below a program-selected cut-off) with poverty status (having income below an externally defined poverty line). Examples of acceptable labels include *Groups A, B, and C*; *Households scoring 29 or less, 30 to 69, or 70 or more*; and *Households who qualify for reduced fees, or do not qualify for reduced fees*.

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*).

Table 10 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).

Table 11 shows the distribution of households by targeting outcome for Bolivia. For an example cut-off of 44 or less, outcomes for 100% of the national line in the 2013 validation sample are:

- Inclusion: 17.9 percent are below the line and correctly targeted
- Undercoverage: 16.7 percent are below the line and mistakenly not targeted
- Leakage: 7.7 percent are above the line and mistakenly targeted
- Exclusion: 57.7 percent are above the line and correctly not targeted

Increasing the cut-off to 49 or less improves inclusion and undercoverage but worsens leakage and exclusion:

- Inclusion: 21.3 percent are below the line and correctly targeted
- Undercoverage: 13.3 percent are below the line and mistakenly not targeted
- Leakage: 12.5 percent are above the line and mistakenly targeted
- Exclusion: 52.9 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 Table 11 for a given poverty line
- Select the cut-off with the highest total net benefit

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

Table 11 shows the hit rate for all cut-offs for the new 2013 scorecard for Bolivia. For 100% of the national line in the 2013 validation sample, total net benefit—under the hit rate—is greatest (75.6) for a cut-off of 44 or less, with about three in four households in Bolivia 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).[33]

[33] Table 11 also reports BPAC, the Balanced Poverty Accuracy Criteria adopted by USAID for certifying scorecards. It is discussed in Section 9.

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 Table 12 ("% targeted HHs who are poor") shows, for Bolivia's new 2013 scorecard applied to the 2013 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 2013 validation sample who score 44 or less would target 25.6 percent of all households (second column) and would be associated with a poverty rate among those targeted of 69.9 percent (third column).

Table 12 also reports two other measures of targeting accuracy. The first is a version of coverage ("% poor HHs who are targeted").[34] For the example of 100% of the national line with the 2013 validation sample and a cut-off of 44 or less, 51.7 percent of all poor households are covered.

The final targeting measure in Table 12 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 2013 validation sample and a cut-off of 44 or less, covering 2.3 poor households means leaking to 1 non-poor household.

[34] Klasen and Lange (2015) call this the *true positive rate*.

9. Context for poverty-measurement tools in Bolivia

This section discusses four existing poverty-measurement tools for Bolivia 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 income survey
- Fewer and lower-cost indicators
- Use of an income-based definition of *poverty* that is widely understood and that is used by government of Bolivia
- Reporting of errors and precision for estimates of poverty rates at a point in time from out-of-sample tests, including formulas for standard errors
- Reporting of errors and precision for estimates of changes in poverty rates between two points in time from out-of-sample/out-of-time tests, including formulas for standard errors
- Targeting accuracy that is similar to that of alternative approaches
- Feasibility for local, pro-poor programs, due to its simplicity and transparency

9.1 Gwatkin *et al.*

Gwatkin *et al.* (2007) construct a poverty-measurement tool for Bolivia with an approach that they use in 56 countries with Demographic and Health Surveys (Rutstein and Johnson, 2004). They use Principal Components Analysis to make an asset index from simple, low-cost indicators available for the 19,207 households in Bolivia's 2003 DHS.[35] The PCA index is like the scorecard here except that, because the DHS does not collect data on income, the index is based on a different conception of *poverty*, its

[35] All DHS datasets for Bolivia since 1994 include each household's asset-index score (`dhsprogram.com/topics/wealth-index/Wealth-Index-Construction.cfm`, retrieved 31 October 2015).

accuracy vis-à-vis income-based poverty is unknown, and it can only be assumed to be a proxy for long-term wealth/economic status.[36] Well-known examples of the PCA asset-index approach include Stifel and Christiaensen (2007), Zeller *et al.* (2006), Sahn and Stifel (2003 and 2000), Henry *et al.* (2003), and Filmer and Pritchett (2001).

Most of the 23 indicators in Gwatkin *et al.* are similar to those in the scorecard in terms of their simplicity, low cost, and verifiability:

- Residence:
  - — Presence of electricity
  - — Whether the kitchen is a room in the residence
  - — Source of drinking water
  - — Frequency with which piped drinking water is available in the residence
  - — Time required to travel to the source of drinking water
  - — Type of fuel for cooking
  - — Type of toilet arrangement
  - — Type of floor
  - — Type of wall
  - — Type of roof
  - — Method of disposal of solid waste
  - — Number of rooms
  - — Number of household members per sleeping room
- Ownership of consumer durables:
  - — Radios
  - — Televisions
  - — Refrigerators
  - — Electric water pumps
  - — Land-line telephones
  - — Cellular telephones

[36] Nevertheless, the indicators are similar and the "flat maximum" is important, so carefully built PCA indexes and income-based scorecards 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, directly-measured income, and income-based scorecards include Filmer and Scott (2012), Howe *et al.* (2009), Lindelow (2006), Sahn and Stifel (2003 and 2000), Wagstaff and Watanabe (2003), and Montgomery *et al.* (2000).

— Computers
— Bicycles
— Motorcycles or scooters
— Cars or trucks

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

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

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

Still, the Gwatkin *et al.* index is more costly and difficult-to-use than the scorecard. The index has 23 indicators (versus 10), and while the scorecard requires adding up 10 integers (some of them usually zeroes), Gwatkin *et al.*'s index requires adding up 135 numbers, each with five decimal places and half with negative signs.

A strength of asset indexes is that, because they do not require income data, they can be applied to a wide array of "light" surveys such as censuses, Demographic and Health Surveys, Welfare Monitoring Surveys, and Core Welfare Indicator Questionnaires. In comparison, the scorecard is linked directly to an income-based poverty line. Thus, while both approaches can rank households, only the scorecard can estimate income-based poverty status.

In essence, Gwatkin *et al.*—like all asset indexes—define *poverty* in terms of the indicators and the points in the index itself. Thus, the index is not a proxy standing in for something else (such as income); rather, it is a direct measure of a non-income-based

definition of *poverty*. There is nothing wrong—and a lot right—about defining *poverty* in this way, but it is not as common as an income-based definition. It also means that ranks from different asset indexes are not comparable, because the definition of *poverty* changes when the indicators and points in a country's asset index change.

The asset-based 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 income
- 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, "Would income allow for 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.

9.2 Jiménez, Lizárraga, and Canavire

Jiménez, Lazárraga, and Canavire ("JLC", 2003) use a poverty-measurement tool to construct a "poverty map" (Elbers, Lanjouw, and Lanjouw, 2003) of poverty rates for Bolivia's municipalities. According to Arias and Robles (2007, p. 68), "The purpose is to generate local indicators of monetary poverty and consumption inequality for the measurement of municipal disparities and to provide an additional tool for planning and targeting within Bolivia's poverty-reduction strategy and the on-going process of decentralization and local participation."

JLC build 16 tools (urban and rural for eight departments)[37] using stepwise ordinary least-squares on the logarithm of per-capita expenditure for a pooled sample of the 13,328 households in the 1999, 2000, and 2001 EH, using only indicators found also in the 2001 National Population and Housing Census.

They apply the tools with data from households in the 2001 census to estimate poverty rates by municipality, using an "extreme" line equal to the cost of a minimal food basket, a "low" line corresponding to the food line here, and a "high" line corresponding to 100% of the national line here. At the municipal level, the poverty-mapping estimates are more precise than direct estimates based on the EH.[38] Finally, JLC make "poverty maps" that quickly show—in a way that is clear for non-specialists—how poverty rates vary across municipalities.

[37] Beni and Pando are treated as a single department.
[38] The poverty-map estimates also have unknown errors, but JLC do not note this.

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

- Build poverty-measurement tools with data that is representative of a population (all-Bolivia for the scorecard, and the EH 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
- 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 scorecard points when estimating standard errors
- Requires data on fewer households for construction and calibration
- Includes community-level indicators, decreasing errors 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-Bolivia scorecard[39]
- Surfaces estimates of poverty likelihoods for individual households
- Reports straightforward formulas for standard errors
- Reports 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.[40] On a technical level, JLC estimate expenditure directly, whereas the scorecard estimates poverty likelihoods.

[39] 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-measurement tools] to predict household consumption" because multiple tools 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 scorecard.

[40] 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.

JLC use the following indicators in their tools for Bolivia:

- Characteristics of the household head:
  - Place of birth
  - Age
  - Sex
  - Mother tongue
  - Education
  - Whether works in a professional occupation
- Demographics of the household:
  - Number of members (and its square)
  - Number of children ages six or younger
  - Type of family structure
- Characteristics of the residence:
  - Presence of an electrical connection
  - Presence of piped-in gas
  - Type of floor
  - Type of wall
  - Type of roof
  - Type of fuel used for cooking
  - Source of drinking water
  - Type of toilet arrangement
  - Number of rooms
- Ownership of durable assets:
  - Radio or stereo
  - Television
  - Refrigerator
  - Land-line or cellular telephone
  - Bicycle
  - Motorcycle
  - Motor vehicle
- Characteristics of the municipality (average):
  - Presence of an electrical connection
  - Proximity to health services
  - Educational attainment
  - Type of floor
  - Type of wall
  - Type of roof
  - Housing material and area
  - Type of fuel used for cooking
  - Source of drinking water
  - Type of toilet arrangement

The average tool in JLC uses 17 of these 36 indicators and is based on data from 833 households. All 16 tools are built with stepwise regression, so some may be overfit. For example, "type of cooking fuel" is an indicator only for urban Cochabamba, rural La Paz, and rural Oruro. But common sense would suggest that cooking fuel should be an indicator everywhere, or nowhere, so the fact that it shows up in three of 16 tools suggests overfitting.

Because the 2001 Census does not measure of income, JLC cannot test prediction errors out-of-sample, that is, using data that is not also used to construct the scorecard. JLC report standard errors, but not sample sizes, so the precision of their estimates cannot be compared with those in this paper.

Arias and Robles conclude that JLC's poverty maps "have had a modest impact on policy-making in Bolivia" (p. 80). Despite the maps' simplicity, Arias and Robles suggest that greater impact would require more simplification, updates (presumably after the next census), active promotion among potential users, training for mid-level technicians, and simple tools to overlay poverty maps on other maps.

9.3 IRIS Center

USAID commissioned IRIS Center (2009) to build a "Poverty Assessment Tool" (PAT) using data from the 2005 EH so that USAID's microenterprise partners in Bolivia could report the share of their participants who are "very poor". In general, the PAT for Bolivia is like the scorecard, except that the PAT:

- Estimates income directly (rather than poverty likelihoods) and then converts estimated income into a poverty likelihood of either 0 or 100 percent (rather than a poverty likelihood that is between 0 and 100)
- Has more indicators (17 rather than 10)

The PAT supports two poverty lines:

- Line marking the poorest half of households (not people) below 100% of the national line
- 100% of the national line

IRIS tests four regression-based approaches in both one-stage and two-stage versions (IRIS, 2005), settling on a one-step quantile regression that estimates the 42th percentile of the logarithm of per-capita household expenditure.[41] It uses 17 indicators (IRIS, 2009):

- Household demographics:
  - — Household size (and its square)
  - — Age of the household head (and its square)
- Residence:
  - — Tenancy status
  - — Type of floor
  - — Type of wall
- Asset ownership:
  - — Radio-cassette player
  - — Refrigerator
  - — Television
  - — VCR or DVD
  - — Fan
  - — Car
  - — Bed
  - — Stove
  - — Computer
  - — Sheep
- Region of residence:
  - — Department
  - — Urban/rural

All these indicators are simple, inexpensive, and verifiable.

[41] IRIS defines *poverty* in terms of expenditure, acknowledging that the government of Bolivia and the World Bank use income. At the same time, IRIS applies the government's poverty lines that are designed for income. In any case, it is not clear whether what the government of Bolivia calls *income* is really expenditure.

It is not possible to compare accuracy for IRIS (2009) versus the old 2007 scorecard from Schreiner (2009a) nor the new 2013 scorecard here because the PAT uses the 2005 EH, and perhaps a different definition of *poverty*. Across countries where the PAT and the scorecard can be compared, Schreiner (2014) finds that:

- For estimating a group's poverty rate at a point in time, both tools are unbiased. They have similar prediction errors, and the scorecard has smaller standard errors
- For targeting individual households, the PAT correctly classifies about one more household per 100
- For use in practice, the scorecard has an edge in availability, recentness, and transparency

When IRIS reports accuracy, it focuses on the Balanced Poverty Accuracy Criterion. IRIS Center (2005) introduces 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 targeting 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 error in 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 the error (in the PAT approach) is the difference between undercoverage and leakage, and because the normalization term $\frac{100}{\text{Inclusion} + \text{Undercoverage}}$ is possibly relevant only when comparing tools across populations with different poverty rates (but irrelevant when selecting among alternative tools for a given country in a given year for

a given poverty line), the simpler formula BPAC = Inclusion− | Average error | ranks poverty-measurement tools the same as the more complex formula.

Expressing BPAC as Inclusion− | Average error | helps to show why BPAC is not useful for comparing the PAT with the scorecard (Schreiner, 2014). Given the assumptions discussed earlier,[42] the scorecard produces unbiased estimates of poverty rates, regardless of whether undercoverage differs from leakage. While BPAC can be used to compare alternative scorecards that use the PAT's expenditure-estimation approach, it does not make sense to apply BPAC to the scorecard's likelihood-estimation approach. This is because—unlike the PAT—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 poverty-scorecard user sets a targeting cut-off, then that cut-off matters only for targeting, without affecting the estimation of poverty rates at all.

Although IRIS reports the PAT's targeting accuracy and although the BPAC formula considers targeting accuracy in terms of inclusion, IRIS says that the PAT should not be used for targeting.[43]

[42] The unbiasedness of the PAT also requires these same assumptions.
[43] `povertytools.org/faq/faq.html#11`, retrieved 19 February 2009.

IRIS also doubts that the PAT can be useful for measuring change over time, 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."[44]

That is, IRIS asserts[45] that the confidence interval for estimates of change—for some unstated confidence level, some unstated sample size, and some unstated true change—will usually include zero. In Bolivia for the new 2013 scorecard applied out-of-sample to the 2013 validation sample (baseline) and out-of-sample/out-of-time to the entire 2007 EH and separately to the entire 2011 EH (follow-up), estimates of change have the same sign as the true change and are statistically different from zero with $n =$ 1,024 and 90-percent confidence for all 18 estimates. Likewise, the 90-percent confidence interval ($n = 1{,}024$) of the estimated change includes the true change for 14 of 18 estimates.

In the same way, targeting is a possible use that is supported for the scorecard, despite IRIS' doubts. In particular, this paper reports targeting accuracy so users can decide for themselves whether scoring targets adequately for their purposes.

[44] `povertytools.org/faq/faq2.html`, retrieved 7 December 2012.
[45] IRIS has never reported the PAT's accuracy for estimates of change over time.

9.4 Klasen and Lange

Like IRIS, Klasen and Lange (2015) make a poverty-assessment tool with least-squares regression. Their tool—derived with data from the 2011 EH—classifies people as *targeted* based on whether their estimated per-adult-equivalent expenditure is below a given quantile of the distribution of per-adult-equivalent expenditure in Bolivia. Among other things, Klasen and Lange test how well scoring can identify the poor. They judge that their tool for Bolivia performs "poorly" when a small share (10 percent) of people are targeted, although they note that the share of those targeted who are poor increases as a greater share of the population is targeted.[46] They also find—unsurprisingly, in light of the "flat maximum"—that there are sharply diminishing returns to additional indicators, so that "policy makers would want to opt for parsimonious [poverty-measurement tools]" (p. 20).

Klasen and Lange build a single, all-Bolivia tool using a definition of per-adult-equivalent expenditure that they compute themselves and that differs from INE's definition of per-capita income that is used here. The departures from official data and definitions likely represent improvements, but they increase the risk of discussions being derailed by disagreements and misunderstandings over definitions.

[46] Klasen and Lange point out that even if scoring does not concentrate the poorest very densely among the lowest scores, it still concentrates the richest very densely among the highest scores. Thus, scoring can serve to exclude the richest from broadly targeted schemes, if not also to include the poorest in narrowly targeted schemes.

The most-accurate version of Klasen and Lange's tool has 30 indicators, all of which are simple, low-cost, and verifiable:

- Number of household members who are:
  - Male and:
    - 4-years-old or younger
    - 5- to 15-years-old
    - 16- to 64-years-old
    - 65-years-old or older
  - Female and:
    - 4-years-old or younger
    - 5- to 15-years-old
    - 16- to 64-years-old
    - 65-years-old or older
- Residence:
  - Number of rooms
  - Whether there is a dedicated room serving as a kitchen
  - Presence of an electrical connection
  - Presence of piped-in water
  - Whether the toilet arrangement is inside the residence
  - Whether the toilet arrangement is shared with another household
  - Whether public solid-waste removal services are used
  - Type of floor
  - Type of wall
  - Type of roof
- Possession of consumer durables:
  - Television
  - Refrigerator
  - Microwave oven
  - Washing machine
  - Land-line telephone
  - Cellular telephone
  - Personal computer
  - Air conditioner
  - Heater
  - Car
- Place of residence (department, by urban/rural)

Klasen and Lange do not report points, nor the specific wording or interpretation of their questions and responses. Thus, while the government of Bolivia might use the tool in large programs, it is less likely that smaller pro-poor organizations would use it to improve their internal management of social performance.

How does Klasen and Lange compare with the new 2013 scorecard here in terms of targeting accuracy? While both tools test accuracy out-of-sample with the 2011 EH, an apples-to-apples test is not possible. In particular, Klasen and Lange:

- Use 30 indicators (versus 10), including eight related to household composition and one that interacts department with urban/rural location
- Construct their most-relevant tool with data from the 2011 EH, so the test reported here is out-of-sample but in-time (versus out-of-sample and out-of-time)[47]
- Use person-level weights in both construction and testing (versus household-level weights in construction and then person-level weights in testing)

Most important, the two tools use different definitions of *poverty*. Thus, even though both tools use data from the 2011 EH, the set of households below the x^{th} percentile is not the same in the data to which the two tools are applied.

To permit a comparison, the new 2013 scorecard here is:

- Re-constructed—still with household weights and data from the 2013 EH—after removing "What type of toilet arrangement do the members of the household usually use?", as this indicator is not in the 2011 EH
- Applied to the entire 2011 EH with person-level weights

[47] Consistent with experience in the scoring industry and literature, Klasen and Lange find that scoring's power to order households by expenditure does not decrease much when they apply their 2011 tool out-of-time to data from the 2008 EH. Thus, being in-time is not likely a major advantage for their tool in the comparison here.

With poverty lines set at the 10th, 25th, and 50th percentiles and then targeting those same shares of the population, Klasen and Lange report the share of the poor who are targeted (the "true positive rate") as 57.7, 67.4, and 78.2 percent (p. 21), implying hit rates of 91.4, 82.4, and 78.2 percent and inclusion of 5.7, 16.2, and 39.1 percent. For the new 2013 scorecard here, the corresponding true positive rates are 54.2, 60.4, and 72.9 percent, the hit rates are 90.8, 80.2, and 72.8 percent, and inclusion is 5.4, 15.1, and 36.4 percent.

Thus, Klasen and Lange target better. Looking at inclusion—a simple, sufficient statistic for targeting accuracy when the share targeted is set at the population poverty rate—the new 2013 scorecard is about 93 percent as accurate as Klasen and Lange. While the comparison is imperfect, Klasen and Lange would still be more accurate in an apples-to-apples test because they use more indicators. In particular, most of their edge probably comes from the detailed indicators for household composition (number of members by sex and age) and place of residence (department by urban/rural).

In the end, Klasen and Lange (p. 20) "conclude that [poverty-assessment tools] are less accurate in identifying the poor when only a small percentage of the population is poor and an equally small share is targeted. The appropriateness of PMTs when the goal is to reach the poorest with a very limited program is thus questionable. . . . It is

not clear whether one would want to accept that only about half of the poorest ten percent are covered by the program."[48]

Of course, whether a given level of targeting accuracy is "good enough" depends on the context, purpose, alternatives, and costs/benefits of the four possible targeting outcomes of inclusion, undercoverage, leakage, and exclusion.[49] Without establishing a benchmark or objective and without discussing alternatives (McCloskey and Ziliak, 1996; McCloskey, 1985), there is no scientific—that is, transparent and open to improvement—way to determine in general whether covering only half of people in the poorest decile when targeting 10 percent of all people is "good enough". Scoring may or may not be useful for narrowly targeting the poorest. The reasons that Klasen and Lange offer to back up the judgment that scoring targets "poorly" are also used by others, with equal lack of force, to claim that scoring targets well.

[48] In this, they tend to concur with Kidd and Wylde (2011).

[49] Klasen and Lange (p. 21) also say that poverty-assessment tools "perform much better when a larger portion of the population is considered poor and the program channels transfers to an equally larger share of beneficiaries. . . . Thus, if leakage is not a major concern, broad targeting can be achieved with reasonably high true positive rates." But how high is *reasonably high*? If scoring's performance is to be judged solely by the true positive rate, then universal targeting is best, and targeting tools are unneeded. Leakage increases with the true positive rate, so if leakage matters at all, then judging scoring's targeting performance requires being explicit about the relative benefits and costs of leakage and of the other three possible targeting outcomes.

10. Conclusion

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

- The likelihood that a household has income below a given poverty line
- The poverty rate of a population at a point in time
- The change in the poverty rate of a population between two points in time

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 Bolivia that want to improve how they monitor and manage their social performance.

The scorecard is constructed with half of the data from Bolivia's 2013 EH. Its scores are then calibrated with that same data to poverty likelihoods for 10 poverty lines. Six of these lines are also supported for the old 2007 scorecard in Schreiner (2009a), so existing users of Bolivia's old 2007 scorecard can switch to the new 2013 scorecard here and still estimate of changes in poverty rates over time with a baseline with the old 2007 scorecard and a follow-up with the new 2013 scorecard. The new 2013 scorecard should be used from now on.

The accuracy of the new 2013 scorecard is tested on data from the 2007, 2011, and 2013 EH that is not used in scorecard construction. Errors and precision are reported for estimates of households' poverty likelihoods, populations' poverty rates at a point in time, and changes in populations' poverty rates over time. Of course, the scorecard's estimates of change are not necessarily the same as estimates of program impact. Targeting accuracy is also reported.

When the scorecard is applied to the 10 poverty lines in the 2013 validation sample, the maximum absolute error for estimates versus true poverty rates for groups of households at a point in time is 2.0 percentage points. The average absolute error is about 0.8 percentage points. Corrected estimates may be had by subtracting the known average error for a given poverty line from the original, uncorrected estimates.

For $n = 16{,}384$ and 90-percent confidence, the precision of point-in-time estimates of poverty rates is ± 0.7 percentage points or better. With $n = 1{,}024$, the 90-percent confidence intervals are ± 2.6 percentage points or better.

Accuracy is also tested for scorecard estimates of changes in poverty rates over time. On average when the scorecard is applied to nine poverty lines in each of the pairs of years from 2013 to 2007 and from 2013 to 2011, the average absolute error is about 2.3 percentage points, which is about one-fourth of the average absolute true change of 8.2 percentage points. The true change is in the estimate's 90-percent confidence interval ($n = 1{,}024$) in 14 of 18 cases, and the estimated direction of change is always correct and "statistically significant" in that zero is outside its 90-percent confidence interval ($n = 1{,}024$).

If an organization wants to use the scorecard for segmenting clients for targeted services, 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's managers feel so daunted by a scorecard's complexity or its cost that they do not even try to use it.

For this reason, the scorecard uses ten indicators that are straightforward, low-cost, and verifiable. Points are all zeros or positive integers, and scores range from 0 (most likely below a poverty line) to 100 (least likely below a poverty line). Scores are converted to poverty likelihoods via simple look-up tables, and targeting cut-offs are likewise straightforward to apply. The design attempts to facilitate voluntary adoption by helping managers to understand and trust scoring and by allowing non-specialists to add up scores quickly in the field.

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

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Guidelines for the Interpretation of Indicators

The following comes from:

Instituto Nacional de Estadística. (2013) "Manual del Encuestador/a", [the *Manual*], La Paz.

and

Instituto Nacional de Estadística. (2013) "Cuestionario de la Encuesta de Hogares, 2013", [the *Questionnaire*], La Paz.

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 of Bolivia's INE in the 2013 EH. That is, an organization using the scorecard should not promulgate any definitions nor 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".

Do not ask the first scorecard indicator directly ("How many members does the household have?"). Instead, use the information recorded on the "Back-page Worksheet" to determine the proper response. You must also record the number of household members in the scorecard header next to "Number of household members".

Do not read the response options to the respondent except for the sixth indicator ("What type of toilet arrangement do the members of the household usually use?"). In all other cases, 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 help you deem appropriate based on these "Guidelines".

While most indicators in the scorecard are verifiable, you do not—in general—need to verify responses. You should verify a response only if 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 a 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 possess, 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, your application of the scorecard should mimic as closely as possible INE's application of the 2013 EH. For example, poverty-scoring interviews should take place in respondents' homesteads because the 2013 EH took place in respondents' homesteads.

Questionnaire Translation:

The 2013 EH left translation of the survey instrument to languages other than Spanish to each individual enumerator (or perhaps to local translators). When such translation was needed, it was done on the fly.

While the application of the scorecard should, in general, mimic the application of the 2013 EH, it nevertheless makes sense to have a standard, well-done, checked translation to languages and dialects that are common in Bolivia (such as Quechua and Aymara, among others). Without a standard translation, the variation in translations and interpretations across enumerators could greatly harm data quality. Of course, any translation should reflect the meaning in the original Spanish EH survey instrument as closely as possible. In particular, such a translation should be based on the scorecard and documentation in Spanish, not on this documentation in English. Ideally, all organizations using the scorecard in a given dialect or language in Bolivia would coordinate and use a single translation.

Confidentiality:
According to p. 8 of the *Manual*, "the data obtained in the survey must be kept strictly confidential. It will be used only for statistical purposes, and nothing should ever be divulged in a way that allows linkage with a specific household."

Who to interview:
According to p. 20 of the *Manual*, "The head of the household (whether male or female) is the preferred respondent. If he or she is not available, then the respondent may be any household member who is 12-years-old or older."

According to p. 21 of the *Manual*, "The *head of the household* is the person recognized as the such by the other household members, regardless of the head's age, sex, or marital status. If the members of the household cannot come to an agreement as to who is the head, then ask them to decide based on their answers to 'Who is responsible for the well-being of the household?' and 'Who makes the key decisions?'."

Administering the interview:
Study these "Guidelines" carefully, and carry them with you while you work.

According to p. 29 of the *Manual*, "Keep in mind that you should never:

- Assume or make-up responses
- Delegate your duties to an unauthorized person
- Divulge responses to anyone outside of the household interviewed, as that would break the commitment to strict confidentiality
- Argue with respondents
- Ask questions unrelated to the survey
- Promise anything to the responding household in return for their participation
- Arrive at work unprepared to do the job

"To the extent possible, avoid interviewing in the presence of third parties who are not members of the household being interviewed."

According to pp. 30–35 of the *Manual*, an interview has three stages.

1. Introduction

The *introduction* "is your first contact with the members of the household. If done well, it goes a long way towards a successful interview. It is important that you:

- Dress appropriately for the region; this will help you to gain respondents' respect, trust, and acceptance
- Introduce yourself, giving your name and showing your identification badge to demonstrate that you work with [your organization]
- Explain the purpose of your visit simply and clearly so that the respondent can easily understand. The following example introduction can serve as a guide:

> *'Good morning. My name is [your name]. I work with [your organization]. Your household was selected to participate in a survey whose purpose is to learn more about how [participants in your organization] live. The information will be used to improve [decision-making at your organization] . . .'*

"Greet the household cordially, and do your work as an enumerator with great respect, always fostering a climate of trust.

"If a household's members do not want to participate, then gently try to persuade them, explaining that their information will be kept strictly confidential and that the data will be used only in statistical reports in which it will be impossible to trace their answers back to their household.

2. Interview proper

"Once you have introduced yourself and established an atmosphere of trust, you must take care to preserve that trust throughout the entire interview. To do this, you must employ a variety of strategies.

Attitude. "Pay careful and constant attention. This is common courtesy, and it shows respect for the respondent, who will then respond to you in kind. Paying careful attention will also help you to collect high-quality data as well as help you to avoid losing track of your place in sequence of questions.

Rhythm. "Do not treat the respondent like an 'answer machine', as this can reduce data quality. Try to read the questions at a steady speed; do not start slow and then speed up, and do not start fast and then slow down. Figure out how well the respondent understands, and adjust how quickly you ask the questions accordingly. Read each word of each question clearly. If you notice that the respondent is getting tired or annoyed, then remind him or her that the interview will not take long, and maintain a

good rhythm. Try not to take long breaks. If you need to pause to speak off-topic with a tired or distracted respondent, be brief and try to get the conversation back on track.

Self-control. You will sometimes face unexpected inconveniences (for example, interrupting children, visiting salespeople, and ringing telephones). Remind yourself that such nuisances are part of the every-day life of the household and that the household itself, being used to them, is not bothered by them. So keep your emotions in check, being prudent and patient. As you wait to continue the interview, do not show any impatience or anger. It is better that the respondent senses trust and responds willingly instead of refusing to participate because you seem intolerant.

Focus on the work. In the course of an interview, you may be left alone for a time, for example, because the respondent gets up to attend to something in the kitchen or because he or she takes a phone call. In these cases, do not get up and wander around nor look at objects or papers that may be lying about. This is impolite and in bad taste. After all, not only are you a visitor, but you also invited yourself in. Stay calm, stay seated, and think about what you can do to help the rest of the interview go well. Take advantage of the chance to review the responses so far and to plan the rest of the work so that you do not have to come back to the household again later.

Interview management. Sometimes, a respondent will give obviously inaccurate or irrelevant answers, make side—or snide—comments, or beat around the bush. When this happens, do not rudely cut him or her off. Instead, listen calmly to what he or she has to say, and then gently guide the discussion back to the original question.

Be neutral. The questions in [the scorecard] are carefully crafted to be neutral and to avoid suggesting a preference for any particular response. Likewise, you as the enumerator must maintain complete and constant neutrality. Do not permit yourself to show any surprise, approval, or disapproval—whether by facial expression, tone of voice, or body language—at anything that the respondent says. Nor should you express personal opinions. If the respondent asks for your opinion, explain that, to avoid influencing the results of the survey, you would be happy to discuss your personal views after the interview is complete. If a respondent gives a vague or ambiguous response, do not be offended or suppose that he or she has done this on purpose. Simply to ask for clarification.

Probing. If the respondent gives a vague or imprecise response, then you should gently probe—in a neutral way—saying 'Could you repeat that?' or 'I could not hear what you said.' Never record something that differs from what the respondent says.

Clarify questions. If the respondent says that he or she does not understand the question, then explain what it means.

If the respondent's statements are confusing, or if you do not understand them, then ask for clarification or for complementary information.

3. Completion

Once the interview is complete, review the responses that you have marked [on the scorecard and its header], making sure that everything is filled in and correct. If you do this before you leave, you will be able to ask any additional questions as needed.

Finally, take your leave graciously, thanking the respondent and the members of the household profusely for their cooperation. Be sure to let them know that you may return in the future to ask them for additional help if it turns out to be necessary.

For example, you could say good-bye as follows:

> *'As a representative of [your organization], I am very grateful for your generous cooperation and, above all, for the time that you have given for the interview. If it turns out that myself or someone else from [your organization] needs to return to get additional information, I would greatly appreciate it if you could provide us with the same welcome again.'*

Guidelines for specific scorecard indicators

1. How many members does the household have?
    A. Five or more
    B. Four
    C. Three
    D. Two
    E. One

According to p. 12 of the *Manual*, "a *household* is a group of people—with or without a blood or marital relationship—who live in the same residence and who eat together from the same kitchen, even if they do not all contribute to the provision and preparation of food. One person living alone independently also counts as a *household*."

According to p. 58 of the *Manual*, "Ask: 'What is the name of each of the persons who usually live in this household?'

"In the first row, write down the name of the head of the household, and in the next row, write that of the spouse/conjugal partner of the head (if there is one)."

According to p. 4 of the *Questionnaire* and p. 58 of the *Manual*, be sure to "count those people who are temporarily absent, such as children, newborns, the elderly, visitors (as long as they usually live in the residence and plan to continue), and domestic servants who do not have another residence elsewhere (and their families)" if these qualify as *household members*.

According to p. 4 of the *Questionnaire* and p. 58 of the *Manual*, a *usual resident* is "anyone who usually lives in the residence and who has been absent for less than three months or who, despite not having lived with the household for at least three months, plans to be a permanent part of the household from now on."

According to p. 60 of the *Manual*, "Count as *household members* those who:

- Usually live in the residence and depend on the household budget to meet their basic needs (regardless of whether they contribute to meeting the needs of the other members of the household)
- Usually live in the residence but who, at the time of the interview, are temporarily absent for a period whose total duration has not exceeded (nor is not expected to exceed) three months. The absence may be due, for example, to vacation, visits with friends or relatives, business trips, hospitalization, etc.

"Do not count as *household members* those who:

- Are staying temporarily in the residence but who usually live elsewhere. This includes, for example, students or soldiers who usually live elsewhere (for example, in barracks, boarding schools, or military schools); people serving in the military who normally live in military housing; and people who contribute monetarily to the household's budget but who—for reasons of work or study—usually live elsewhere
- Foreigners on official business (embassadors or consuls), and, in general, foreigners who will stay at the residence for only a short time
- Children of household members who have been absent for more than three months—whether for work, school, or other reasons—regardless of whether they depend economically on the household
- Lodgers who usually live in the residence and who pay for their room and board"

According to p. 57 of the *Manual*, "Make clear to the responding household that the first names collected here are not recorded in the database to ensure the strict confidentiality of the information."

2. In the past calendar week, did the male head/spouse work for at least one hour?
    A. No
    B. No male head/spouse
    C. Yes

Remember that you already know the name of the male head/spouse (and whether he exists) from the notes you took for your own use while compiling the "Back-page Worksheet". Thus, if there is a male head/spouse, do not mechanically ask, "In the past calendar week, did the male head/spouse work for at least one hour?". Instead, use the actual name of the male head/spouse, for example: "In the past calendar week, did José work for at least one hour?" If there is no male head/spouse, then do not read the question at all; just mark "B. No male head/spouse" and proceed to the next indicator.

According to p. 21 of the *Manual*, "The *head of the household* is the person recognized as the such by the other household members, regardless of the head's age, sex, or marital status. If the members of the household cannot come to an agreement as to who is the head, then ask them to decide based on their answers to 'Who is responsible for the well-being of the household?' and 'Who makes the key decisions?'."

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

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

According to p. 95 in the *Manual*, "The reference period is the calendar week preceding the day of the interview.

"For example, if an interview takes place on Thursday, October 24, the reference period runs from Monday, October 14 through Sunday, October 20." In particular, the reference period is not Thursday, October 17 through Wednesday, October 23.

October 2013						
Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Reference week

Day of the interview

According to pp. 95–96 of the *Manual*, *work* is "any economic activity done in exchange for pay (whether in-cash or in-kind), including activities that help earn income or that contribute to an economic activity, even if those activities are not directly or immediately productive or remunerated.

"A person is considered to have *worked* if he or she did such an activity for at least one hour in the past calendar week."

"Keep in mind the following criteria for determining whether an activity is to be considered as *work*.

"Activities that count as *work*:

- Activities done for an organization, institution, business, or office (public or private)
- Sale of items in the street, whether from a fixed location or as a peddler
- Provision of services to others, for example, domestic service, child care, cooking, cleaning, etc.
- Working in a family business or as an apprentice/intern is counted as *working*, even though it does not directly generate any remuneration

"Example of activities that do not count as *work*:

- Household chores done by household members who are unpaid and unremunerated
- Unpaid and unremunerated volunteer work in the community
- Unpaid and unremunerated work done for a salaried household member (for example, helping to type a text for a relative who is in the civil service)
- Begging

3. What is the mother tongue of the female head/spouse?
    A. Something other than Spanish
    B. Spanish
    C. No female head/spouse

Remember that you already know the name of the female head/spouse (and whether she exists) from the notes you took while compiling the "Back-page Worksheet". Thus, if there is a female head/spouse, do not mechanically ask, "In the past calendar week, did the female head/spouse work for at least one hour?". Instead, use the actual name of the female head/spouse, for example: "In the past calendar week, did María work for at least one hour?" If there is no female head/spouse, then do not read the question at all; just mark "C. No female head/spouse" and proceed to the next indicator.

According to p. 62 of the *Manual*, "This question seeks to identify the language in which the [female head/spouse] first learned to speak, that is, her mother tongue. Keep in mind that [the female head/spouse's] mother tongue may not be the same as the language that she currently speaks."

According to p. 21 of the *Manual*, "The *head of the household* is the person recognized as the such by the other household members, regardless of the head's age, sex, or marital status. If the members of the household cannot come to an agreement as to who is the head, then ask them to decide based on their answers to 'Who is responsible for the well-being of the household?' and 'Who makes the key decisions?'."

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

- The household head, if the head is female
- The 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 a member of the interviewed household

4. How many rooms does the household occupy, not counting bathrooms, kitchens, laundry rooms, garages, storage rooms, or rooms used for business?
    A. One or two
    B. Three
    C. Four
    D. Five or more

According to p. 8 of the *Manual*, a *residence* "is a building with one or more floors covered by a roof and that was built or modified to be inhabited by one or more people permanently or temporarily. It must have access to public areas outside of the residence (either directly and independently, or via common areas such as hallways, courtyards, or stairways)."

According to pp. 54–55 of the *Manual*, "a *room* is a physical space with a roof and walls that is large enough to fit an adult-sized bed or cot and that is meant to shelter people. Examples include bedrooms, dining rooms, etc.

"If a physical space is demarcated by a piece of furniture or a curtain so as to mark its division into different uses, then for the purposes of [the scorecard] it is to be counted as a single room (not as two rooms), even if the respondent considers the space to be two rooms. Furthermore, do not count rooms that serve economic functions, such as for running a business or for the provision of services, etc."

5. What is the main construction material of the floors of the residence?
    A. Dirt, or other
    B. Bricks, or cement
    C. Wood planks, hardwood floors or parquet, tile (mosaic, stone, or ceramic), or rugs or carpets

According to pp. 45–46 of the *Manual*, "This question is concerned with the main construction material of the floors of the residence." The response options are defined as follows:

- *Dirt*: When the floor is not covered with anything, so that its surface is earth
- *Other*: Examples include stones, cane, etc.
- *Bricks*: When the floor is paved with brick blocks
- *Cement*. When the floor is of a mixture of cement and sand
- *Wood planks*: When the floor is covered with untreated wood
- *Hardwood floors or parquet*: When the floor is covered with wood that has been treated, such as hardwood floors or parquet. Usually, the treated wood is nailed or glued to the underlying surface
- *Tile (mosaic, stone, or ceramic)*: These are small, pre-fabricated blocks that are arranged together on the floor
- *Rugs or carpet*: When the floor is covered with rugs or carpet

According to p. 44 of the *Manual*, "Do not read [the response options] to the respondent. Listen to the response, and circle the corresponding option. If the respondent mentions more than one type of material, then tell him or her to indicate which is the main one."

6. What type of toilet arrangement do the members of the household usually use?
    A. None/bush/field
    B. Open-pit latrine (no solid floor), latrine with solid floor, composting toilet, flush toilet or flush latrine, or other

According to pp. 48–49 of the *Manual*, this question "identifies the toilet arrangement that the household *actually uses*." The response options are defined as follows:

- *None/bush/field*: There is no toilet arrangement. This includes: defecating in the bushes, on the ground, or in ditches; digging a small hole and burying excrement in it; wrapping up excrement in a plastic bag and throwing it in the trash, etc.
- *Open-pit latrine (no solid floor)*: This arrangement collects excrement in deep hole. It has no slab, platform, nor seat to stand or sit on nor to prevent things from going into the hole. An open-pit latrine is a crude hole into which excrement is deposited
- *Latrine with solid floor*: This arrangement collects excrement in deep hole. It has a slab or platform that covers the hole and that can safely support a person's weight. The slab or platform is built up above ground level so that surface water does not drain into the pit. It may or may not have a seat
- *Composting toilet*: This arrangement is a dry latrine in which excrement is deposited along with other organic materials such as table scraps, straw, grass, sawdust, and ashes. It is designed to produce non-toxic fertilizer. It may or may not have separate chambers for solid and liquid waste. It does not have any flushing mechanism
- *Flush toilet or flush latrine*: A flush-toilet arrangement has a water-storage tank from which water flushes away waste. It also has a hydraulic seal (a U-shaped tube below the toilet bowl or the slab/platform that seals the pit or drainage pipe and that blocks flies and foul odors). This option also includes flush-latrine arrangements in which the water for flushing is poured in manually (without a storage tank) from a pail or bucket
- *Other*: Any other type of toilet arrangement, sanitary-disposal system, or latrine that does not appear among the other response options here

According to pp. 36–37 of the *Manual*, the enumerator *should* read the response options ("None/bush/field", etc.) to the respondent. This differs from the practice used with all the other indicators.

7. What is the main fuel or energy source used for cooking?
    A. Firewood, dung/manure, *taquía*, kerosene, or other
    B. LPG from a cylinder
    C. Piped-in natural gas, electricity, or does not cook

According to pp. 53–54 of the *Manual*, the response options are defined as follows:

- *Firewood*: Chopped firewood, branches/twigs, brushwood, or grass roots
- *Dung/manure, or taquía*: Dried excrement from llamas, sheep, goats, cattle, etc. (called *taquía* in the Altiplano)
- *Kerosene*: Liquid fuel used in cookers, stoves, etc.
- *Other*: Cooking fuels or energy sources not included in the other response options
- *LPG from a cylinder*: Liquid petroleum gas, distributed in cylinders
- *Piped-in natural gas*: Natural gas supplied via a piped connection
- *Electricity*: Energy source for cooking (hot plate, electric stove, etc.)
- *Does not cook*: Household members do not cook their food for themselves

According to p. 44 of the *Manual*, "Do not read [the response options] to the respondent. Listen to the response, and circle the corresponding option. If the respondent mentions more than one type of material, then tell him or her to indicate which is the main one."

8. Does the household own, possess, or have the use of a refrigerator or freezer?
    A. No
    B. Yes

The *Manual* does not have any additional information for this indicator.

9. Does the household own, possess, or have the use of a television?
    A. No
    B. Yes

The *Manual* does not have any additional information for this indicator.

10. Does the household own, possess, or have the use of a motorcycle (for its personal use) or an automobile (for its personal use)?
    A. No
    B. Yes

The *Manual* does not have any additional information for this indicator.

Table 1: Poverty lines, poverty rates, and sample size for all of Bolivia and for the construction and validation samples, by households and people, for 2007, 2011, and 2013

	Line or	HHs or		% with income below a poverty line									
				National				Poorest half	International 2005 PPP				
Year	Rate	people	HHs Surveyed	Food	100%	150%	200%	< 100% natl.	$1.25	$2.00	$2.50	$5.00	$8.44
All of Bolivia													
2007	Line			7.85	14.45	21.68	28.90	6.81	3.83	6.13	7.66	15.32	25.87
	Rate	HHs	4,148	32.9	53.0	66.7	75.2	25.6	12.8	22.0	29.8	55.4	72.1
	Rate	People		37.7	60.1	74.3	81.7	30.0	14.3	25.3	34.3	62.6	79.2
2011	Line			11.13	20.68	31.01	41.35	11.87	5.48	8.77	10.96	21.92	37.01
	Rate	HHs	8,851	17.7	39.1	58.7	71.0	18.9	6.4	12.2	16.9	42.0	66.3
	Rate	People		20.8	44.9	65.8	77.7	22.5	8.2	15.0	20.0	48.1	73.2
2013	Line			11.97	22.25	33.38	44.50	12.14	5.90	9.44	11.80	23.60	39.83
	Rate	HHs	9,553	15.8	34.6	53.4	66.7	15.9	5.9	10.5	14.5	37.1	61.5
	Rate	People		18.8	39.0	59.3	73.0	19.5	7.7	13.2	17.8	41.8	67.8
Construction and calibration (Selecting indicators and weights, and associating scores with likelihoods)													
2013	Rate	HHs	4,820	15.9	34.6	53.5	67.0	15.9	6.1	10.5	14.5	37.2	62.1
Validation (Measuring accuracy)													
2007	Rate	HHs	4,148	32.9	53.0	66.7	75.2	25.6	12.8	22.0	29.8	55.4	72.1
2011	Rate	HHs	8,851	17.7	39.1	58.7	71.0	18.9	6.4	12.2	16.9	42.0	66.3
2013	Rate	HHs	4,733	15.8	34.6	53.3	66.4	16.0	5.7	10.5	14.5	37.0	60.9

Source: 2007, 2011, and 2013 *Encuesta de Hogares*

Poverty lines in 2007, 2011, and 2013 are daily per-capita BOB in ave. prices for all of Bolivia in Nov./Dec. of the corresponding year.

Table 2 (All of Bolivia) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			8.44	15.85	23.78	31.70	7.15	4.20	6.72	8.40	16.81	28.37
		Rate	HHs	2,840	19.7	44.0	61.8	71.4	13.9	3.4	12.1	19.1	47.1	67.8
		Rate	People		23.7	50.9	69.8	78.2	17.3	4.1	14.9	23.2	54.0	75.2
	Rural	Line			6.75	11.84	17.76	23.67	6.18	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	1,308	57.4	69.8	75.8	82.1	47.2	30.3	40.3	49.6	70.9	79.9
		Rate	People		63.9	77.3	82.7	88.3	53.9	33.4	44.9	55.2	78.5	86.5
	Overall	Line			7.85	14.45	21.68	28.91	6.81	3.83	6.13	7.66	15.33	25.87
		Rate	HHs	4,148	32.9	53.0	66.7	75.2	25.6	12.8	22.0	29.8	55.4	72.1
		Rate	People		37.7	60.1	74.3	81.7	30.0	14.3	25.3	34.3	62.6	79.2
2011	Urban	Line			11.90	22.60	33.90	45.19	12.34	5.99	9.59	11.98	23.96	40.45
		Rate	HHs	5,963	9.2	31.6	53.7	67.6	9.7	2.2	5.8	9.2	34.6	62.3
		Rate	People		10.7	36.8	60.7	74.4	11.5	2.5	6.9	10.8	40.3	69.3
	Rural	Line			9.56	16.78	25.17	33.56	10.94	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	2,888	34.8	54.3	68.8	77.7	37.3	14.9	25.1	32.4	57.0	74.4
		Rate	People		41.3	61.3	76.1	84.4	44.6	19.6	31.3	38.7	64.0	81.2
	Overall	Line			11.13	20.68	31.01	41.35	11.87	5.48	8.77	10.96	21.93	37.01
		Rate	HHs	8,851	17.7	39.1	58.7	71.0	18.9	6.4	12.2	16.9	42.0	66.3
		Rate	People		20.8	44.9	65.8	77.7	22.5	8.2	15.0	20.0	48.1	73.2
2013	Urban	Line			12.85	24.39	36.58	48.78	12.77	6.47	10.35	12.93	25.86	43.66
		Rate	HHs	7,236	7.6	24.4	44.9	60.1	7.6	2.0	4.8	7.5	26.9	54.2
		Rate	People		9.2	28.9	51.2	67.1	9.4	2.1	5.8	9.2	32.0	61.0
	Rural	Line			10.16	17.83	26.74	35.65	10.82	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	2,317	32.5	55.1	70.6	80.1	32.7	13.9	21.8	28.7	57.5	76.2
		Rate	People		38.8	59.9	75.9	85.4	40.4	19.4	28.6	35.7	62.2	81.9
	Overall	Line			11.97	22.25	33.38	44.50	12.14	5.90	9.44	11.80	23.60	39.83
		Rate	HHs	9,553	15.8	34.6	53.4	66.7	15.9	5.9	10.5	14.5	37.1	61.5
		Rate	People		18.8	39.0	59.3	73.0	19.5	7.7	13.2	17.8	41.8	67.8

Table 2 (Chuquisaca) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			8.58	16.23	24.35	32.47	5.79	4.30	6.89	8.61	17.22	29.06
		Rate	HHs	175	23.5	48.6	64.5	73.8	6.4	3.7	12.3	23.5	52.3	71.3
		Rate	People		31.4	57.5	73.1	79.6	9.2	5.2	17.2	31.4	60.4	77.8
	Rural	Line			6.75	11.84	17.76	23.67	5.79	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	165	68.6	76.7	83.5	86.3	52.5	32.6	47.7	58.1	77.5	86.3
		Rate	People		77.9	85.5	90.7	93.0	60.2	41.5	55.6	66.1	86.5	93.0
	Overall	Line			7.61	13.91	20.87	27.82	5.79	3.69	5.90	7.38	14.75	24.90
		Rate	HHs	340	46.9	63.2	74.3	80.2	30.3	18.7	30.6	41.4	65.4	79.1
		Rate	People		55.9	72.3	82.4	86.7	36.1	24.4	37.5	49.7	74.2	85.8
2011	Urban	Line			12.73	25.20	37.80	50.40	8.97	6.68	10.69	13.36	26.72	45.11
		Rate	HHs	324	12.0	43.0	65.5	76.8	5.4	2.0	8.9	13.4	46.5	73.4
		Rate	People		14.4	48.7	70.7	82.4	6.8	2.6	11.0	16.3	52.3	79.1
	Rural	Line			9.56	16.78	25.17	33.56	8.97	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	288	47.2	71.5	82.0	84.5	45.4	18.7	34.5	44.6	73.0	83.8
		Rate	People		59.3	79.8	89.1	90.7	57.8	27.3	46.3	56.9	80.9	90.3
	Overall	Line			11.16	21.04	31.56	42.08	8.97	5.58	8.93	11.16	22.31	37.66
		Rate	HHs	612	27.7	55.8	72.9	80.2	23.2	9.5	20.3	27.3	58.3	78.0
		Rate	People		36.6	64.0	79.8	86.5	32.0	14.8	28.5	36.4	66.5	84.6
2013	Urban	Line			13.69	27.12	40.68	54.23	6.53	7.19	11.50	14.38	28.76	48.54
		Rate	HHs	240	5.0	25.1	45.9	61.2	2.1	2.1	3.3	5.0	27.5	55.9
		Rate	People		7.9	30.2	54.1	68.7	3.6	3.6	5.2	7.9	33.3	63.1
	Rural	Line			10.16	17.83	26.74	35.65	6.53	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	192	62.0	81.7	87.4	90.8	45.6	35.0	50.4	60.6	83.1	90.0
		Rate	People		69.0	84.9	90.9	94.7	53.4	41.7	58.7	67.5	86.8	93.9
	Overall	Line			11.88	22.35	33.53	44.70	6.53	5.93	9.48	11.85	23.70	40.01
		Rate	HHs	432	30.5	50.4	64.5	74.5	21.6	16.8	24.4	29.9	52.4	71.2
		Rate	People		39.2	58.2	72.9	82.0	29.1	23.1	32.7	38.4	60.8	78.9

Table 2 (La Paz) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			7.87	14.16	21.24	28.33	5.91	3.75	6.01	7.51	15.02	25.35
		Rate	HHs	388	16.5	37.6	56.6	63.8	10.3	1.9	10.5	15.6	41.4	61.5
		Rate	People		21.0	43.4	64.7	71.0	14.3	2.7	14.8	20.1	47.0	68.7
	Rural	Line			6.75	11.84	17.76	23.67	5.91	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	228	59.5	71.4	79.6	84.2	44.7	35.6	41.1	49.8	73.1	82.5
		Rate	People		63.5	74.9	81.3	86.0	46.5	35.0	41.8	51.0	76.1	84.8
	Overall	Line			7.37	13.12	19.68	26.24	5.91	3.48	5.56	6.96	13.91	23.48
		Rate	HHs	616	36.2	53.1	67.1	73.1	26.1	17.4	24.5	31.3	55.9	71.1
		Rate	People		40.0	57.5	72.1	77.7	28.8	17.2	26.9	34.0	60.1	75.9
2011	Urban	Line			12.22	21.97	32.96	43.95	10.36	5.83	9.32	11.65	23.30	39.33
		Rate	HHs	732	10.3	28.9	48.7	61.9	8.6	3.1	7.2	9.9	31.7	55.8
		Rate	People		10.9	33.4	56.5	69.2	9.0	3.7	7.6	10.4	36.7	63.4
	Rural	Line			9.56	16.78	25.17	33.56	10.36	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	543	36.3	56.9	71.9	79.4	38.6	13.2	26.1	34.3	60.9	76.0
		Rate	People		39.1	62.2	78.8	85.7	41.1	16.4	30.9	37.2	66.6	82.5
	Overall	Line			11.06	19.71	29.57	39.43	10.36	5.23	8.36	10.45	20.91	35.29
		Rate	HHs	1,275	21.5	41.0	58.7	69.4	21.5	7.4	15.3	20.4	44.3	64.5
		Rate	People		23.1	45.9	66.2	76.3	23.0	9.2	17.7	22.0	49.7	71.7
2013	Urban	Line			13.65	24.56	36.84	49.12	9.86	6.51	10.42	13.02	26.04	43.96
		Rate	HHs	1,037	10.2	25.4	44.5	59.0	4.7	2.6	6.0	9.0	28.3	52.8
		Rate	People		11.9	28.6	48.4	63.1	5.3	2.9	6.7	10.6	31.8	57.0
	Rural	Line			10.16	17.83	26.74	35.65	9.86	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	443	36.6	63.9	78.7	86.3	34.1	13.7	22.1	30.9	66.3	83.1
		Rate	People		46.5	70.0	83.5	89.8	44.6	22.3	33.4	42.3	71.8	87.5
	Overall	Line			11.97	21.32	31.98	42.64	9.86	5.65	9.04	11.31	22.61	38.17
		Rate	HHs	1,480	23.3	44.4	61.4	72.5	19.2	8.1	13.9	19.8	47.1	67.8
		Rate	People		28.5	48.5	65.3	75.9	24.2	12.2	19.6	25.9	51.0	71.6

Table 2 (El Alto) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			7.40	12.20	18.30	24.39	6.55	3.23	5.17	6.47	12.93	21.83
		Rate	HHs	287	30.9	53.2	70.1	81.2	24.9	2.0	14.4	24.2	55.7	76.8
		Rate	People		35.9	59.2	75.2	84.9	29.6	2.7	17.0	28.6	62.1	81.5
	Rural	Line			7.40	12.20	18.30	24.39	6.55	3.23	5.17	6.47	12.93	21.83
		Rate	HHs	287	30.9	53.2	70.1	81.2	24.9	2.0	14.4	24.2	55.7	76.8
		Rate	People		35.9	59.2	75.2	84.9	29.6	2.7	17.0	28.6	62.1	81.5
	Overall	Line			10.53	17.36	26.04	34.72	11.18	4.60	7.36	9.20	18.41	31.07
		Rate	HHs	677	14.2	34.4	59.4	74.2	16.1	1.5	6.2	11.2	38.7	68.1
		Rate	People		15.3	39.1	65.6	80.2	17.9	2.0	7.4	12.4	43.4	74.2
2011	Urban	Line			9.56	16.78	25.17	33.56	11.18	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	47	25.8	44.3	64.2	75.5	30.1	2.6	9.2	21.7	47.7	74.7
		Rate	People		40.8	59.3	78.4	85.6	45.7	3.1	14.5	32.9	60.8	84.9
	Rural	Line			10.44	17.30	25.96	34.61	11.18	4.59	7.34	9.18	18.35	30.98
		Rate	HHs	724	15.5	35.5	59.9	74.4	17.7	1.7	6.6	12.4	39.8	68.9
		Rate	People		17.7	41.0	66.8	80.7	20.5	2.1	8.1	14.4	45.1	75.2
	Overall	Line			11.73	19.32	28.98	38.64	13.70	5.12	8.19	10.24	20.49	34.58
		Rate	HHs	1,097	11.3	28.1	52.4	67.8	14.4	1.7	5.2	8.9	31.4	61.9
		Rate	People		12.5	32.1	58.0	74.2	16.1	2.0	6.6	10.3	35.8	68.0
2013	Urban	Line			11.73	19.32	28.98	38.64	13.70	5.12	8.19	10.24	20.49	34.58
		Rate	HHs	1,097	11.3	28.1	52.4	67.8	14.4	1.7	5.2	8.9	31.4	61.9
		Rate	People		12.5	32.1	58.0	74.2	16.1	2.0	6.6	10.3	35.8	68.0
	Rural	Line			8.58	17.09	25.64	34.19	6.35	4.53	7.25	9.06	18.13	30.60
		Rate	HHs	428	21.4	41.5	58.0	68.7	11.8	4.5	16.6	22.4	45.5	64.8
		Rate	People		24.5	46.3	65.9	75.1	13.7	5.2	18.0	25.5	50.6	72.6
	Overall	Line			6.75	11.84	17.76	23.67	6.35	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	226	45.0	55.2	59.3	72.6	40.9	16.3	30.2	39.7	56.1	67.7
		Rate	People		52.8	64.7	70.5	82.8	48.2	17.2	35.8	47.0	66.8	78.8

Table 2 (Cochabamba) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			8.58	17.09	25.64	34.19	6.35	4.53	7.25	9.06	18.13	30.60
		Rate	HHs	428	21.4	41.5	58.0	68.7	11.8	4.5	16.6	22.4	45.5	64.8
		Rate	People		24.5	46.3	65.9	75.1	13.7	5.2	18.0	25.5	50.6	72.6
	Rural	Line			6.75	11.84	17.76	23.67	6.35	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	226	45.0	55.2	59.3	72.6	40.9	16.3	30.2	39.7	56.1	67.7
		Rate	People		52.8	64.7	70.5	82.8	48.2	17.2	35.8	47.0	66.8	78.8
	Overall	Line			7.89	15.12	22.69	30.25	6.35	4.01	6.42	8.02	16.04	27.07
		Rate	HHs	654	30.6	46.8	58.5	70.2	23.0	9.0	21.9	29.1	49.6	65.9
		Rate	People		35.1	53.2	67.6	77.9	26.6	9.7	24.7	33.6	56.7	74.9
2011	Urban	Line			12.25	24.40	36.60	48.80	12.49	6.47	10.35	12.94	25.87	43.68
		Rate	HHs	1,029	6.6	30.8	53.9	69.1	6.7	1.7	5.3	7.3	33.8	64.1
		Rate	People		8.3	36.8	60.9	75.3	8.4	2.0	6.5	9.0	40.6	70.5
	Rural	Line			9.56	16.78	25.17	33.56	12.49	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	522	30.9	49.2	66.2	76.2	39.1	12.4	21.4	28.1	51.0	72.2
		Rate	People		38.4	56.7	72.6	81.5	47.0	16.4	27.2	35.0	58.6	77.4
	Overall	Line			11.31	21.74	32.61	43.48	12.49	5.76	9.22	11.53	23.05	38.91
		Rate	HHs	1,551	14.5	36.8	57.9	71.5	17.2	5.2	10.5	14.0	39.4	66.8
		Rate	People		18.8	43.8	65.0	77.5	21.9	7.0	13.8	18.1	46.9	72.9
2013	Urban	Line			13.26	26.40	39.60	52.80	12.79	7.00	11.20	14.00	28.00	47.26
		Rate	HHs	1,485	9.4	29.5	51.3	65.5	8.6	2.3	6.4	10.4	32.5	59.7
		Rate	People		12.0	35.0	56.8	71.6	10.9	2.5	8.1	13.4	38.4	65.0
	Rural	Line			10.16	17.83	26.74	35.65	12.79	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	332	24.4	50.5	67.5	78.2	36.7	7.3	15.9	21.6	52.5	73.8
		Rate	People		28.2	54.0	70.6	82.1	40.9	10.5	18.9	25.0	55.1	76.8
	Overall	Line			12.27	23.65	35.48	47.31	12.79	6.27	10.03	12.54	25.08	42.34
		Rate	HHs	1,817	14.4	36.5	56.7	69.7	18.0	4.0	9.5	14.1	39.1	64.4
		Rate	People		17.2	41.1	61.3	75.0	20.5	5.0	11.5	17.1	43.7	68.8

Table 2 (Oruro) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			7.87	12.88	19.32	25.76	5.77	3.41	5.46	6.83	13.66	23.05
		Rate	HHs	240	13.9	35.8	54.9	66.6	6.6	0.9	5.8	11.4	37.1	63.3
		Rate	People		15.5	40.4	60.9	72.8	7.6	0.7	6.3	12.8	41.5	69.4
	Rural	Line			6.75	11.84	17.76	23.67	5.77	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	144	60.4	70.1	78.8	80.8	47.7	30.2	43.8	54.0	71.8	80.7
		Rate	People		72.8	78.6	86.1	87.7	59.5	37.6	52.2	68.1	79.7	87.7
	Overall	Line			7.44	12.48	18.72	24.96	5.77	3.31	5.29	6.62	13.23	22.34
		Rate	HHs	384	34.0	50.6	65.3	72.7	24.4	13.6	22.3	29.9	52.1	70.9
		Rate	People		37.5	55.1	70.6	78.5	27.5	14.9	23.9	34.1	56.2	76.4
2011	Urban	Line			9.95	17.89	26.83	35.78	9.99	4.74	7.59	9.49	18.97	32.02
		Rate	HHs	364	8.9	32.2	52.5	63.8	9.4	1.5	5.8	8.3	35.6	60.2
		Rate	People		10.7	35.5	57.3	68.6	11.4	1.6	6.7	10.0	39.2	65.6
	Rural	Line			9.56	16.78	25.17	33.56	9.99	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	216	36.8	64.1	76.6	82.8	39.8	12.2	22.8	34.8	68.2	80.5
		Rate	People		43.0	69.5	83.4	88.6	45.4	18.3	29.9	41.0	73.3	86.4
	Overall	Line			9.80	17.47	26.21	34.95	9.99	4.63	7.41	9.27	18.53	31.28
		Rate	HHs	580	20.9	45.9	62.8	71.9	22.5	6.1	13.1	19.7	49.6	68.9
		Rate	People		22.8	48.2	67.1	76.1	24.1	7.8	15.4	21.6	52.0	73.4
2013	Urban	Line			11.02	19.82	29.74	39.65	11.28	5.26	8.41	10.51	21.02	35.49
		Rate	HHs	311	2.5	15.8	34.0	55.3	2.8	0.7	1.4	2.2	18.1	45.2
		Rate	People		2.8	18.7	37.8	62.2	3.2	0.5	1.3	2.5	21.2	51.1
	Rural	Line			10.16	17.83	26.74	35.65	11.28	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	179	25.1	45.6	66.9	75.0	28.3	7.3	15.2	21.0	47.7	71.5
		Rate	People		34.8	53.8	76.6	83.8	37.8	12.9	22.6	32.1	56.6	80.8
	Overall	Line			10.71	19.10	28.65	38.21	11.28	5.06	8.10	10.13	20.26	34.19
		Rate	HHs	490	11.3	27.4	46.8	63.0	12.7	3.3	6.8	9.5	29.7	55.4
		Rate	People		14.3	31.4	51.9	70.0	15.7	5.0	9.0	13.2	34.0	61.8

Table 2 (Potosí) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			7.87	11.85	17.77	23.69	2.23	3.14	5.02	6.28	12.56	21.20
		Rate	HHs	189	27.5	42.2	59.6	70.2	1.4	4.1	12.9	19.7	44.1	64.7
		Rate	People		33.2	50.1	67.8	78.2	1.8	4.8	16.7	24.5	52.2	71.9
	Rural	Line			6.75	11.84	17.76	23.67	2.23	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	257	72.9	79.7	83.3	86.7	49.1	55.4	64.5	69.6	80.4	86.7
		Rate	People		78.8	87.1	90.3	92.4	55.9	63.6	70.7	74.6	88.0	92.4
	Overall	Line			7.14	11.84	17.76	23.68	2.23	3.14	5.02	6.28	12.56	21.19
		Rate	HHs	446	56.7	66.3	74.8	80.8	32.1	37.1	46.1	51.8	67.5	78.9
		Rate	People		62.8	74.2	82.4	87.5	37.0	43.0	51.8	57.0	75.5	85.2
2011	Urban	Line			10.86	19.53	29.29	39.06	4.87	5.18	8.28	10.36	20.71	34.96
		Rate	HHs	367	15.5	36.5	55.5	67.1	4.7	5.3	8.5	13.8	38.5	64.0
		Rate	People		19.6	43.0	64.2	75.6	5.2	5.7	10.2	17.9	45.8	73.1
	Rural	Line			9.56	16.78	25.17	33.56	4.87	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	442	57.4	73.4	81.5	88.5	38.7	36.9	48.7	55.1	75.1	85.2
		Rate	People		66.3	81.1	87.6	93.9	49.7	48.1	59.1	64.4	82.5	90.9
	Overall	Line			10.03	17.77	26.65	35.54	4.87	4.71	7.54	9.42	18.84	31.81
		Rate	HHs	809	42.4	60.2	72.2	80.8	26.5	25.6	34.3	40.3	62.0	77.6
		Rate	People		49.5	67.4	79.2	87.3	33.7	32.8	41.5	47.7	69.3	84.5
2013	Urban	Line			11.81	21.24	31.86	42.48	5.85	5.63	9.01	11.26	22.53	38.02
		Rate	HHs	216	13.5	30.8	49.0	65.1	6.5	5.6	9.1	13.1	32.5	59.4
		Rate	People		13.1	33.0	53.7	71.9	5.8	4.6	8.2	12.5	34.8	66.1
	Rural	Line			10.16	17.83	26.74	35.65	5.85	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	240	53.5	72.7	82.5	89.6	36.0	31.6	40.7	48.7	74.5	86.4
		Rate	People		58.5	74.0	85.4	93.8	44.4	41.1	50.0	56.5	76.0	90.5
	Overall	Line			10.83	19.22	28.82	38.43	5.85	5.09	8.15	10.19	20.38	34.40
		Rate	HHs	456	38.3	56.7	69.7	80.3	24.8	21.7	28.7	35.1	58.4	76.1
		Rate	People		40.0	57.4	72.5	84.9	28.7	26.2	33.0	38.6	59.2	80.6

Table 2 (Tarija) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			8.58	16.99	25.49	33.99	6.86	4.51	7.21	9.01	18.02	30.42
		Rate	HHs	261	15.0	39.4	56.9	70.9	9.8	2.6	11.4	15.7	42.8	66.7
		Rate	People		15.7	44.5	62.6	75.9	9.8	1.8	11.2	16.1	47.8	71.9
	Rural	Line			6.75	11.84	17.76	23.67	6.86	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	84	64.8	80.6	82.7	87.5	64.8	25.7	39.2	56.7	80.6	86.3
		Rate	People		70.9	89.2	90.2	94.9	70.9	34.8	48.5	66.6	89.2	93.5
	Overall	Line			7.99	15.34	23.01	30.68	6.86	4.07	6.51	8.13	16.27	27.46
		Rate	HHs	345	29.2	51.2	64.3	75.7	25.6	9.2	19.4	27.4	53.6	72.3
		Rate	People		33.4	58.8	71.4	82.0	29.4	12.4	23.2	32.3	61.1	78.8
2011	Urban	Line			12.54	24.84	37.26	49.67	13.10	6.58	10.54	13.17	26.34	44.46
		Rate	HHs	455	6.6	29.3	50.0	67.2	7.3	1.6	4.8	7.6	31.3	60.8
		Rate	People		7.6	33.2	56.5	72.6	8.3	2.2	5.8	8.6	35.3	66.2
	Rural	Line			9.56	16.78	25.17	33.56	13.10	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	154	31.1	54.1	74.3	83.0	43.6	10.2	21.5	29.7	57.3	81.7
		Rate	People		36.0	60.0	80.9	87.5	49.6	13.8	23.8	35.1	62.9	86.1
	Overall	Line			11.65	22.44	33.65	44.87	13.10	5.95	9.52	11.90	23.79	40.16
		Rate	HHs	609	13.7	36.5	57.0	71.8	17.8	4.1	9.6	14.0	38.8	66.9
		Rate	People		16.1	41.2	63.7	77.0	20.6	5.6	11.1	16.5	43.5	72.1
2013	Urban	Line			13.22	26.17	39.26	52.35	14.61	6.94	11.10	13.88	27.76	46.85
		Rate	HHs	682	0.7	9.7	33.6	51.2	1.3	0.2	0.4	0.9	12.4	44.4
		Rate	People		1.0	12.8	42.6	61.2	1.8	0.3	0.7	1.1	16.4	54.0
	Rural	Line			10.16	17.83	26.74	35.65	14.61	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	204	8.4	26.3	46.9	63.7	19.0	0.9	2.5	6.1	29.5	57.0
		Rate	People		12.5	32.6	54.8	73.6	24.8	1.8	4.3	9.7	37.8	65.7
	Overall	Line			12.14	23.24	34.86	46.48	14.61	6.16	9.86	12.32	24.64	41.60
		Rate	HHs	886	3.4	15.5	38.3	55.6	7.5	0.4	1.2	2.7	18.4	48.8
		Rate	People		5.0	19.8	46.9	65.6	9.9	0.8	1.9	4.2	23.9	58.1

Table 2 (Santa Cruz de la Sierra) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			9.07	17.86	26.79	35.72	9.25	4.74	7.58	9.47	18.94	31.97
		Rate	HHs	575	16.5	46.6	65.1	74.0	17.0	4.4	10.5	18.3	49.4	70.1
		Rate	People		20.0	55.0	73.7	81.1	20.8	4.9	13.1	22.2	57.8	78.0
	Rural	Line			6.75	11.84	17.76	23.67	9.25	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	95	51.9	74.2	77.9	85.7	56.8	18.5	29.9	41.9	75.4	80.4
		Rate	People		59.3	81.8	85.3	91.3	64.0	24.2	37.3	49.5	83.2	87.8
	Overall	Line			8.55	16.50	24.76	33.01	9.25	4.38	7.00	8.75	17.50	29.54
		Rate	HHs	670	23.3	51.9	67.6	76.3	24.7	7.2	14.3	22.8	54.4	72.1
		Rate	People		28.8	61.0	76.3	83.4	30.5	9.3	18.6	28.4	63.5	80.2
2011	Urban	Line			12.39	24.39	36.59	48.79	15.34	6.47	10.35	12.93	25.87	43.67
		Rate	HHs	1,457	6.8	29.1	51.6	65.0	10.7	1.8	4.1	7.5	31.8	59.7
		Rate	People		8.5	34.5	58.9	72.2	13.0	2.1	5.2	9.3	37.8	67.5
	Rural	Line			9.56	16.78	25.17	33.56	15.34	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	389	15.4	32.6	48.9	63.5	29.3	4.9	8.9	12.6	35.1	58.7
		Rate	People		21.1	39.8	57.4	73.6	35.4	6.5	12.2	17.9	42.6	68.7
	Overall	Line			11.78	22.74	34.11	45.47	15.34	6.03	9.64	12.06	24.11	40.70
		Rate	HHs	1,846	8.7	29.9	51.0	64.7	14.7	2.5	5.1	8.6	32.5	59.5
		Rate	People		11.2	35.7	58.6	72.5	17.8	3.1	6.7	11.1	38.9	67.8
2013	Urban	Line			13.11	25.80	38.70	51.60	15.38	6.84	10.94	13.68	27.36	46.19
		Rate	HHs	1,643	5.5	21.7	41.3	55.7	8.2	1.5	4.1	6.1	23.6	50.7
		Rate	People		7.0	26.5	48.5	63.5	10.3	1.4	5.0	7.7	29.0	58.5
	Rural	Line			10.16	17.83	26.74	35.65	15.38	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	375	12.4	27.5	49.5	63.4	23.5	1.9	6.2	9.8	31.9	58.1
		Rate	People		16.4	35.1	60.8	73.8	30.3	2.6	8.4	12.9	39.7	70.5
	Overall	Line			12.55	24.29	36.44	48.59	15.38	6.44	10.31	12.88	25.76	43.49
		Rate	HHs	2,018	6.7	22.7	42.7	57.1	10.9	1.6	4.5	6.8	25.1	52.0
		Rate	People		8.8	28.2	50.8	65.5	14.1	1.7	5.7	8.7	31.0	60.7

Table 2 (Beni) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			9.07	17.86	26.79	35.72	9.57	4.74	7.58	9.47	18.94	31.97
		Rate	HHs	236	19.6	50.6	69.2	76.9	21.3	5.6	14.4	21.0	53.7	73.8
		Rate	People		25.6	60.7	80.5	88.0	27.6	7.2	19.4	27.2	63.6	85.4
	Rural	Line			6.75	11.84	17.76	23.67	9.57	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	50	23.2	51.1	65.2	72.3	26.9	7.3	8.5	16.0	51.2	72.0
		Rate	People		35.3	67.3	80.4	85.6	40.1	7.2	8.9	22.4	67.5	85.1
	Overall	Line			8.38	16.06	24.09	32.12	9.57	4.26	6.81	8.52	17.03	28.75
		Rate	HHs	286	20.7	50.7	68.0	75.5	23.0	6.1	12.6	19.4	52.9	73.2
		Rate	People		28.5	62.7	80.5	87.3	31.3	7.2	16.2	25.7	64.8	85.3
2011	Urban	Line			10.94	21.53	32.29	43.06	11.71	5.71	9.13	11.42	22.83	38.54
		Rate	HHs	370	13.6	38.5	60.9	77.1	15.8	3.7	10.1	15.2	41.7	69.5
		Rate	People		14.4	43.9	66.3	83.2	17.7	3.6	10.9	16.7	47.4	75.4
	Rural	Line			9.56	16.78	25.17	33.56	11.71	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	108	25.8	44.0	62.8	74.4	30.5	10.5	21.1	24.1	47.2	67.8
		Rate	People		33.8	59.0	78.5	85.9	40.1	14.3	28.0	32.2	62.5	81.9
	Overall	Line			10.54	20.16	30.23	40.31	11.71	5.34	8.55	10.69	21.37	36.08
		Rate	HHs	478	17.3	40.2	61.5	76.2	20.3	5.8	13.5	17.9	43.4	69.0
		Rate	People		20.0	48.3	69.8	84.0	24.1	6.7	15.8	21.2	51.8	77.3
2013	Urban	Line			11.36	22.36	33.54	44.72	13.97	5.93	9.48	11.86	23.71	40.02
		Rate	HHs	305	6.7	31.1	49.4	66.3	13.0	1.5	5.0	7.7	34.9	60.3
		Rate	People		8.8	37.8	58.8	74.1	16.5	2.2	6.2	10.1	43.1	68.8
	Rural	Line			10.16	17.83	26.74	35.65	13.97	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	105	13.5	43.2	58.9	76.7	25.6	4.1	6.9	12.5	44.2	70.1
		Rate	People		18.9	51.6	67.7	85.1	32.4	6.3	9.3	16.9	52.7	78.0
	Overall	Line			11.03	21.13	31.70	42.26	13.97	5.60	8.96	11.21	22.41	37.83
		Rate	HHs	410	8.4	34.2	51.8	69.0	16.3	2.2	5.5	8.9	37.3	62.9
		Rate	People		11.5	41.5	61.3	77.1	20.8	3.3	7.1	11.9	45.7	71.3

Table 2 (Pando) Poverty lines and poverty rates (for households and people) by urban/rural/overall in 2007, 2011, and 2013

Year	Area	Line or rate	HHs or People	n	National				Poorest half	International 2005 PPP				
					Food	100%	150%	200%	< 100% Natl.	$1.25	$2.00	$2.50	$5.00	$8.44
2007	Urban	Line			9.07	17.86	26.79	35.72	6.50	4.74	7.58	9.47	18.94	31.97
		Rate	HHs	61	7.2	19.4	37.2	51.7	1.5	0.0	2.9	8.6	20.8	44.6
		Rate	People		7.8	20.4	43.1	59.1	1.7	0.0	3.7	10.5	23.1	51.4
	Rural	Line			6.75	11.84	17.76	23.67	6.50	3.14	5.02	6.28	12.55	21.19
		Rate	HHs	59	42.3	51.3	68.4	68.5	30.0	4.7	16.7	25.1	51.3	68.5
		Rate	People		49.6	58.5	79.4	79.4	37.1	4.9	24.7	33.1	58.5	79.4
	Overall	Line			7.87	14.74	22.11	29.49	6.50	3.91	6.25	7.82	15.63	26.39
		Rate	HHs	120	24.2	34.9	52.3	59.8	15.3	2.3	9.6	16.6	35.6	56.2
		Rate	People		29.4	40.1	61.9	69.6	20.0	2.5	14.5	22.2	41.4	65.9
2011	Urban	Line			14.06	27.68	41.52	55.36	12.46	7.34	11.74	14.68	29.35	49.55
		Rate	HHs	188	7.7	28.8	48.9	63.3	7.1	3.9	6.8	7.7	30.3	56.8
		Rate	People		7.8	35.8	58.9	72.0	7.4	3.1	6.6	7.8	37.5	65.6
	Rural	Line			9.56	16.78	25.17	33.56	12.46	4.45	7.12	8.90	17.80	30.04
		Rate	HHs	179	23.3	38.0	52.1	57.5	29.7	9.6	16.7	21.5	39.8	55.0
		Rate	People		25.6	43.8	61.5	65.6	33.7	10.8	19.1	24.1	46.5	63.6
	Overall	Line			11.95	22.56	33.85	45.13	12.46	5.98	9.57	11.96	23.93	40.39
		Rate	HHs	367	14.6	32.9	50.3	60.7	17.2	6.4	11.2	13.9	34.6	56.0
		Rate	People		16.2	39.5	60.1	69.0	19.8	6.7	12.5	15.5	41.7	64.7
2013	Urban	Line			14.41	28.36	42.53	56.71	11.05	7.52	12.03	15.04	30.07	50.76
		Rate	HHs	220	5.6	17.0	32.3	46.2	3.4	1.0	3.4	5.6	18.4	40.9
		Rate	People		6.7	23.5	40.9	57.3	3.9	1.0	3.9	6.7	25.4	51.2
	Rural	Line			10.16	17.83	26.74	35.65	11.05	4.73	7.56	9.45	18.91	31.91
		Rate	HHs	247	21.4	40.7	54.5	67.8	25.4	9.5	15.9	18.8	41.1	61.8
		Rate	People		27.2	48.3	63.5	76.1	31.6	11.6	20.3	24.1	48.6	70.1
	Overall	Line			12.23	22.95	34.42	45.89	11.05	6.08	9.73	12.17	24.33	41.08
		Rate	HHs	467	12.5	27.3	42.0	55.7	13.0	4.7	8.9	11.4	28.3	50.1
		Rate	People		17.2	36.2	52.5	66.9	18.1	6.4	12.3	15.6	37.3	60.9

Table 3: Poverty indicators

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
1,216	What is the main construction material of the floors of the residence? (Dirt, or other; Bricks, or cement; Wood planks, hardwood floors or parquet, tile (mosaic, stone, or ceramic), or rugs or carpets)
1,142	In the past week, what was the main occupation of the female head/spouse? (Skilled agricultural, forestry, and fisheries worker, or plant and machine operator or assembler; Crafts and related trades worker, elementary occupation, or not otherwise classified; Does not work; Services and sales worker; No female head/spouse; Armed forces, manager, professional, technician or mid-level professional, or clerical support worker)
1,102	What is the main fuel or energy source used for cooking? (Firewood, dung/manure, *taquía*, kerosene, or other; LPG from a cylinder; Piped-in natural gas, electricity, or does not cook)
959	What is the highest level and grade that the female head/spouse has passed? (None, literacy course, or pre-school/kindergarten; Old system: Basic (1 to 4 years); Old system: Basic (5 years); Old System: Intermediate (1 to 3 years); Previous system: Primary (1 to 8 years) or secondary (1 to 4 years); Old system: Secondary (1 to 3 years); Old system: Secondary (4 years); Current system: Primary (1 to 6 years) or secondary (1 to 6 years), Adult education (any system) or alternative (EJA, EPA, ESA, ETA) and special education; No female head/spouse; Post-secondary)
921	In the past week, did any household members work in their main occupation as managers, professionals, technicians and associate professionals, or clerical support workers? (No; Yes)
891	To where does the waste from the bathroom, toilet, or latrine drain? (Sewer system; Septic tank; Closed pit; Straight on the ground (street/stream/river), other, or does not know)
885	Is the main source of drinking water piped? (No; Yes)
885	In the past week, how many household members worked in their main occupation as skilled agricultural, forestry, or fisheries workers? (Two or more; One; None)

Table 3 (cont.): Poverty indicators

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
885	In the past week, what was the main occupation of the male head/spouse? (Skilled agricultural, forestry, or fishery worker; Elementary occupation, or occupation not otherwise classified; No male head/spouse; Does not work; Plant and machine operator or assembler; Crafts and related trades worker; Services or sales worker; Armed forces, manager, professional, technicians or associate professional, or clerical support worker)
884	In the past week, how many household members worked in their main occupation as something other than skilled agricultural, forestry, or fishery worker or as an unskilled laborer? (None; One; Two; Three or more)
880	Do the members of you household usually use a flush toilet? (No; Yes)
869	Does the household own, possess, or have the use of a refrigerator or freezer? (No; Yes)
851	In their main occupation in the past calendar week, how many household members worked as white- or blue-collar employees? (None; One; Two or more)
849	In her main occupation in the past week, the female head/spouse had what occupational status? (Worker in a family business or unpaid apprentice/intern, or member of a producer cooperative; Self-employed; Does not work; Domestic worker, or laborer; No female head/spouse; Employee, or boss or owner (regardless of whether she draws a salary))
832	Does the household own, possess, or have the use of a television? (No; Yes)
826	In the past week, how many household members worked in their main occupation as skilled agricultural, forestry, or fisheries workers or as unskilled laborers? (Two or more; One; None)
787	In their main occupation in the past week, how many household members worked as employees? (None; One; Two or more)

Table 3 (cont.): Poverty indicators

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
781	What is the highest level and grade that the male head/spouse has passed? (None, literacy course, or pre-school/kindergarten; Old system: Basic (1 to 4 years); Old system: Basic (5 years); Old System: Intermediate (1 to 3 years); Old system: Secondary (1 to 3 years); Old system: Secondary (4 years); Previous system: Primary (1 to 8 years) or secondary (1 to 4 years); No male head/spouse; Current system: Primary (1 to 6 years), secondary (1 to 6 years), or adult/special education (or any type in any system); Post-secondary)
730	The bathroom, toilet, or latrine is . . .? (Used only by this household; Shared with other households; There is no bathroom, toilet, or latrine)
730	What type of toilet arrangement do the members of the household usually use? (None/bush/field; Open-pit latrine (no solid floor), latrine with solid floor, composting toilet, flush toilet or flush latrine, or other)
689	What is the mother tongue of the female head/spouse? (Something other than Spanish; Spanish; No female head/spouse)
684	What is the main construction material of the walls of the residence? (Adobe or mud, wattle and daub, cane, palm leaves, logs, stone, or other; Wood, bricks, cinder blocks, or reinforced concrete)
667	What is the main construction material of the roof of the residence? (Straw, cane, palm leaves, or mud; Corrugated tin sheets, or other; Shingles (cement/clay/fiberglass); Reinforced concrete tiles)
651	Is the main source of drinking water piped? (No; Yes)
636	In his main occupation in the past week, the male head/spouse had what occupational status? (Self-employed; Does not work, member of a producer cooperative, worker in a family business or unpaid apprentice/intern, or domestic worker; No male head/spouse; Laborer; Employee; Boss or owner (regardless of whether he draws a salary))
633	Does the household own, possess, or have the use of a computer (laptop or tablet PC, etc.)? (No; Sí)
596	How many household members are 17-years-old or younger? (Four or more; Three; Two; One; None)
586	How many household members are 18-years-old or younger? (Four or more; Three; Two; One; None)

Table 3 (cont.): Poverty indicators

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
580	How many household members are 16-years-old or younger? (Four or more; Three; Two; One; None)
573	How many household members are 15-years-old or younger? (Four or more; Three; Two; One; None)
572	How many household members are 19-years-old or younger? (Four or more; Three; Two; One; None)
532	Does the residence use electricity for lighting? (No; Yes)
527	Does the household own, possess, or have the use of a clothes washer? (No; Yes)
505	Does the household own, possess, or have the use of a living-room set? (No; Yes)
487	How many household members are 14-years-old or younger? (Three or more; Two; One; None)
485	Can the female head/spouse read and write? (No; Yes; No female head/spouse)
474	How many household members are 13-years-old or younger? (Three or more; Two; One; None)
459	What is the language that the male head/spouse learned to speak as a child? (Something other than Spanish; No male head/spouse; Spanish)
453	Does the household own, possess, or have the use of a stove (gas, electric, etc.)? (No; Yes)
403	How many household members are 12-years-old or younger? (Three or more; Two; One; None)
400	Does the household own, possess, or have the use of a radio or radio-cassette player, or stereo or a hi-fi system? (None; Only radio or radio-cassette player; Only stereo or a hifi system; Both)
396	Does the household own, possess, or have the use of a stereo or a hifi system? (No; Yes)
370	Are the interior walls of the residence plastered? (No; Yes)
362	In the current (school) year, were all household members ages 6 to 14 enrolled in any class or course of studies in an educational institution of any kind? (No; Yes; No members of these ages)
354	In their main occupation in the past week, how many household members were self-employed? (Two or more; One; None)
339	In their main occupation in the past week, were the male head/spouse or the female head/spouse self-employed in non-agriculture? (Yes; No)
339	In the current (school) year, were all household members ages 6 to 13 enrolled in any class or course of studies in an educational institution of any kind? (No; Yes; No members of these ages)

Table 3 (cont.): Poverty indicators

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
336	In the current (school) year, were all household members ages 6 to 15 enrolled in any class or course of studies in an educational institution of any kind? (No; Yes; No members of these ages)
326	In the current (school) year, were all household members ages 6 to 12 enrolled in any class or course of studies in an educational institution of any kind? (No; Yes; No members of these ages)
324	In the current (school) year, were all household members ages 6 to 16 enrolled in any class or course of studies in an educational institution of any kind? (No; Yes; No members of these ages)
315	In the current (school) year, were all household members ages 6 to 11 enrolled in any class or course of studies in an educational institution of any kind? (No; Yes; No members of these ages)
275	In the current (school) year, were all household members ages 6 to 17 enrolled in any class or course of studies in an educational institution of any kind? (No; Yes; No members of these ages)
259	How many members does the household have? (Seven or more; Six; Five; Four; Three; Two; One)
253	Does the household own, possess, or have the use of a motorcycle (for its personal use) or an automobile (for its personal use)? (No; Yes)
235	In the current (school) year, were all household members ages 6 to 18 enrolled in any class or course of studies in an educational institution of any kind? (No; Yes; No members of these ages)
226	Does the household own, possess, or have the use of an automobile (for its personal use)? (No; Yes)
177	In which department does the household live? (Chuquisaca; La Paz, Cochabamba, or Pando; Santa Cruz, Potosí, or Beni; Oruro, or Tarija)
176	How many household members are 7-years-old or younger? (Two or more; Two; One; None)
142	What is the tenancy status of the household in its residence? (Provided by friends or relatives, rented by providing landlord with an interest-free loan, or other; Owned free-and-clear; Rented, owned with an outstanding mortgage, or provided free in exchange for services)
137	Can the male head/spouse read and write? (No; No male head/spouse; Yes)
136	What kind of residence does the household live in? (Hut/shack, improvised or mobile housing, or shelter not intended for human habitation; Detached house; Rooms in a rooming house or around a courtyard; Apartment)

Table 3 (cont.): Poverty indicators

Uncertainty coefficient	Indicator (Responses ordered starting with those linked with higher poverty likelihoods)
136	What is the current marital status of the female head/spouse? (Widow; Cohabiting; Married; Separated; Single, never-married; No female head/spouse; Divorced)
118	How many rooms does the household occupy, not counting bathrooms, kitchen, laundry rooms, garages, storage rooms, or rooms used for business? (One or two; Three; Four; Five or more)
113	Durante la semana pasada, ¿trabajó algún miembro del hogar en su ocupación principal como trabajador no calificado? (Sí; No) In the past week, did any household member work in their main occupation as an unskilled laborer? (No; Yes)
99	In the past week, did the female head/spouse work for at least one hour? (No; Yes; No female head/spouse)
99	What is the current marital status of the male head/spouse? (Widower; Cohabiting; Married; No male head/spouse; Single, never-married, separated, or divorced)
53	Does the household own, possess, or have the use of a motorcycle (for its personal use)? (No; Sí)
45	Of the rooms occupied by the household, how many are used only for sleeping? (None, or one; Two; Three or more)
31	In the past week, how many household members worked for at least one hour? (None; One; Two; Three or more)
25	Does the household own, possess, or have the use of a radio or radio-cassette player? (No; Yes)
5	Is there a room dedicated to cooking? (No; Yes)
3	In the past calendar week, did the male head/spouse work for at least one hour? (No; No male head/spouse; Yes)

Source: 2013 Encuesta de Hogares and 100% of the national poverty line

Tables for
100% of the National Poverty Line

(and Tables Pertaining
to All Poverty Lines)

Table 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	100.0
5–9	100.0
10–14	97.8
15–19	91.1
20–24	83.1
25–29	81.7
30–34	78.9
35–39	63.9
40–44	55.0
45–49	44.1
50–54	35.5
55–59	31.6
60–64	21.4
65–69	12.9
70–74	10.2
75–79	6.8
80–84	2.1
85–89	1.7
90–94	0.0
95–100	0.0

Table 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	107	÷	107	=	100.0
5–9	209	÷	209	=	100.0
10–14	1,349	÷	1,379	=	97.8
15–19	1,426	÷	1,566	=	91.1
20–24	2,015	÷	2,426	=	83.1
25–29	2,423	÷	2,964	=	81.7
30–34	3,387	÷	4,292	=	78.9
35–39	3,754	÷	5,871	=	63.9
40–44	3,732	÷	6,786	=	55.0
45–49	3,624	÷	8,227	=	44.1
50–54	3,319	÷	9,355	=	35.5
55–59	4,026	÷	12,750	=	31.6
60–64	2,617	÷	12,235	=	21.4
65–69	1,439	÷	11,142	=	12.9
70–74	914	÷	8,965	=	10.2
75–79	420	÷	6,186	=	6.8
80–84	83	÷	3,867	=	2.1
85–89	22	÷	1,310	=	1.7
90–94	0	÷	296	=	0.0
95–100	0	÷	66	=	0.0

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

Table 6 (100% of the national line): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 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	–0.5	1.2	1.5	1.9
15–19	–1.4	2.8	3.2	4.2
20–24	+0.4	3.1	3.7	4.7
25–29	+8.6	3.3	3.9	5.7
30–34	–3.8	3.1	3.3	3.9
35–39	–1.4	2.7	3.3	4.5
40–44	–6.8	4.8	5.0	5.5
45–49	+2.0	2.5	3.2	4.3
50–54	+1.3	2.4	2.8	3.7
55–59	–2.3	2.3	2.7	3.7
60–64	0.0	1.7	2.0	2.7
65–69	–4.9	3.5	3.7	4.1
70–74	+1.7	1.2	1.4	1.8
75–79	+0.2	1.3	1.5	2.1
80–84	–1.3	1.3	1.5	2.0
85–89	–3.1	2.8	3.2	3.9
90–94	–6.0	6.2	6.9	8.2
95–100	0.0	0.0	0.0	0.0

Table 7 (100% of the national line): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	–2.6	66.8	76.9	87.5
4	–0.9	36.1	42.2	55.5
8	–1.1	26.6	31.0	42.4
16	–1.4	20.2	23.0	32.1
32	–1.1	13.6	16.4	21.9
64	–1.2	9.9	12.0	15.6
128	–1.0	7.1	8.2	10.5
256	–1.1	5.0	6.0	7.5
512	–1.1	3.6	4.2	5.5
1,024	–1.0	2.5	3.0	3.9
2,048	–1.0	1.8	2.2	2.8
4,096	–0.9	1.3	1.5	1.8
8,192	–1.0	0.9	1.1	1.4
16,384	–0.9	0.7	0.8	1.0

Table 8: 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, 2013 scorecard applied to the 2013 validation sample

	Poverty line									
		National			Poorest half	International 2005 PPP				
	Food	**100%**	**150%**	**200%**	**< 100% natl.**	**$1.25**	**$2.00**	**$2.50**	**$5.00**	**$8.44**
Estimate minus true value	–1.0	–0.9	+0.3	+1.4	–0.3	–0.1	–0.8	–0.9	–0.7	+2.0
Precision of difference	0.6	0.7	0.6	0.6	0.6	0.4	0.5	0.5	0.7	0.6
α factor for precision	1.21	1.05	1.00	0.97	1.14	1.28	1.25	1.16	1.05	1.00

Results pertain to the 2013 scorecard applied to the 2013 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.

Table 9: Average differences between estimates and true values for changes in poverty rates between two points in time, precision, and the α factor for precision, 2013 applied to the 2013 validation sample (baseline) and to all of the 2011 or 2007 data (follow-up)

			Poverty line								
	Year		National				International 2005 PPP				
	Baseline	Follow-up	Food	100%	150%	200%	$1.25	$2.00	$2.50	$5.00	$8.44
Estimated change minus true change											
	2013	2007	–6.8	–5.7	–0.9	+1.7	–1.7	–2.8	–5.5	–6.0	0.0
	2013	2011	+2.0	+0.9	–0.4	–0.2	+1.4	+1.3	+1.1	+0.5	–0.9
Precision of estimated change minus true change											
	2013	2007	0.9	1.0	1.0	0.9	0.6	0.8	0.8	1.0	0.9
	2013	2011	0.7	0.9	0.9	0.9	0.5	0.6	0.7	0.9	0.9
α factor for precision of estimated change											
	2013	2007	1.30	1.12	1.11	1.06	1.40	1.37	1.29	1.10	1.09
	2013	2011	1.09	1.02	1.00	1.00	1.16	1.17	1.08	1.00	1.01
2013 scorecard is applied to 2013 validation sample (baseline) and all 2011 or all 2007 data (follow-up).											
Differences between estimates of changes and true changes 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.											

Table 10 (All poverty lines): Possible targeting outcomes

		Targeting segment	
		Targeted	**Non-targeted**
True poverty status	**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

Table 11 (100% of the national line): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0.1	34.5	0.0	65.4	65.5	–99.4
≤9	0.3	34.3	0.0	65.4	65.7	–98.2
≤14	1.7	32.9	0.0	65.4	67.1	–90.3
≤19	3.1	31.5	0.1	65.3	68.4	–81.6
≤24	5.1	29.5	0.6	64.8	69.9	–68.9
≤29	7.2	27.4	1.5	63.9	71.1	–54.3
≤34	10.5	24.1	2.4	63.0	73.5	–32.2
≤39	14.1	20.5	4.8	60.7	74.7	–4.9
≤44	17.9	16.7	7.7	57.7	75.6	+25.8
≤49	21.3	13.3	12.5	52.9	74.2	+59.5
≤54	24.6	10.0	18.6	46.9	71.5	+46.3
≤59	28.4	6.2	27.6	37.9	66.2	+20.2
≤64	31.2	3.4	37.0	28.5	59.7	–6.9
≤69	33.0	1.6	46.3	19.1	52.1	–34.0
≤74	33.9	0.7	54.4	11.1	45.0	–57.3
≤79	34.3	0.2	60.1	5.3	39.6	–73.9
≤84	34.5	0.1	63.8	1.6	36.1	–84.7
≤89	34.5	0.0	65.1	0.3	34.9	–88.3
≤94	34.6	0.0	65.4	0.1	34.6	–89.1
≤100	34.6	0.0	65.4	0.0	34.6	–89.3

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

Table 12 (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 income 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), 2013 scorecard applied to the 2013 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	0.1	100.0	0.3	Only poor targeted
≤9	0.3	100.0	0.9	Only poor targeted
≤14	1.7	98.1	4.8	51.7:1
≤19	3.3	95.5	9.0	21.1:1
≤24	5.7	89.0	14.6	8.1:1
≤29	8.7	82.7	20.7	4.8:1
≤34	12.9	81.2	30.4	4.3:1
≤39	18.8	74.7	40.6	2.9:1
≤44	25.6	69.9	51.7	2.3:1
≤49	33.8	63.0	61.6	1.7:1
≤54	43.2	57.0	71.2	1.3:1
≤59	55.9	50.7	82.0	1.0:1
≤64	68.2	45.8	90.3	0.8:1
≤69	79.3	41.6	95.4	0.7:1
≤74	88.3	38.4	98.1	0.6:1
≤79	94.5	36.3	99.3	0.6:1
≤84	98.3	35.1	99.8	0.5:1
≤89	99.6	34.7	100.0	0.5:1
≤94	99.9	34.6	100.0	0.5:1
≤100	100.0	34.6	100.0	0.5:1

Tables for the Food Poverty Line

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

If a household's score is . . .	. . . then the likelihood (%) of being below the poverty line is:
0–4	100,0
5–9	98,0
10–14	85,4
15–19	81,4
20–24	65,8
25–29	61,0
30–34	45,3
35–39	31,0
40–44	20,9
45–49	16,8
50–54	9,4
55–59	7,5
60–64	4,7
65–69	3,2
70–74	3,0
75–79	2,8
80–84	0,6
85–89	0,0
90–94	0,0
95–100	0,0

Table 6 (Food line): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 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	+0,6	3,1	3,5	4,7
10–14	+4,6	4,5	5,6	6,9
15–19	+6,7	4,5	5,3	7,0
20–24	–4,5	4,3	4,7	6,2
25–29	+8,9	3,8	4,6	5,8
30–34	+0,9	3,4	4,1	5,2
35–39	+2,2	2,7	3,2	3,9
40–44	–11,9	7,3	7,5	8,0
45–49	+2,1	1,8	2,1	2,7
50–54	–1,9	1,7	1,8	2,3
55–59	–4,7	3,3	3,5	3,8
60–64	–0,2	0,9	1,0	1,3
65–69	–0,8	0,9	1,1	1,3
70–74	–1,1	1,0	1,1	1,5
75–79	+1,6	0,5	0,6	0,8
80–84	–0,8	0,9	1,1	1,4
85–89	–1,9	1,7	1,8	2,2
90–94	–6,0	6,2	6,9	8,2
95–100	0,0	0,0	0,0	0,0

Table 7 (Food line): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	–1,5	57,1	78,1	85,3
4	–0,9	34,1	40,9	55,3
8	–1,2	24,4	29,6	39,8
16	–1,3	17,6	21,4	27,7
32	–1,4	12,0	14,4	19,3
64	–1,1	9,1	10,9	13,8
128	–1,0	6,1	7,1	9,1
256	–1,1	4,4	5,1	6,7
512	–1,1	3,2	3,8	4,9
1.024	–1,0	2,2	2,7	3,8
2.048	–1,0	1,6	2,0	2,6
4.096	–1,0	1,1	1,4	1,8
8.192	–1,0	0,8	0,9	1,2
16.384	–1,0	0,6	0,7	0,9

Table 11 (Food line): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0,1	15,7	0,0	84,2	84,2	–98,9
≤9	0,3	15,5	0,1	84,1	84,4	–96,4
≤14	1,4	14,4	0,3	83,9	85,3	–80,6
≤19	2,5	13,3	0,8	83,5	86,0	–63,5
≤24	4,1	11,7	1,6	82,6	86,7	–38,0
≤29	5,5	10,3	3,1	81,1	86,6	–10,2
≤34	7,4	8,4	5,6	78,6	86,0	+28,7
≤39	8,9	6,8	9,9	74,3	83,3	+37,5
≤44	10,7	5,1	14,9	69,3	80,1	+5,9
≤49	12,0	3,8	21,9	62,3	74,3	–38,5
≤54	13,0	2,8	30,2	54,0	67,0	–91,0
≤59	14,1	1,7	41,8	42,4	56,5	–164,6
≤64	14,8	1,0	53,4	30,8	45,6	–238,0
≤69	15,2	0,6	64,1	20,1	35,3	–305,8
≤74	15,6	0,2	72,7	11,6	27,2	–360,0
≤79	15,7	0,1	78,8	5,4	21,1	–398,6
≤84	15,8	0,0	82,6	1,6	17,4	–422,8
≤89	15,8	0,0	83,9	0,3	16,1	–430,9
≤94	15,8	0,0	84,1	0,1	15,9	–432,7
≤100	15,8	0,0	84,2	0,0	15,8	–433,1

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

Table 12 (Food 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 income 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), 2013 scorecard applied to the 2013 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	0,1	59,9	0,4	1,5:1
≤9	0,3	81,8	1,6	4,5:1
≤14	1,7	81,2	8,7	4,3:1
≤19	3,3	76,9	15,9	3,3:1
≤24	5,7	72,3	26,0	2,6:1
≤29	8,7	63,9	35,0	1,8:1
≤34	12,9	57,0	46,7	1,3:1
≤39	18,8	47,5	56,6	0,9:1
≤44	25,6	41,9	67,9	0,7:1
≤49	33,8	35,3	75,7	0,5:1
≤54	43,2	30,1	82,3	0,4:1
≤59	55,9	25,3	89,5	0,3:1
≤64	68,2	21,7	93,6	0,3:1
≤69	79,3	19,2	96,3	0,2:1
≤74	88,3	17,7	98,9	0,2:1
≤79	94,5	16,6	99,4	0,2:1
≤84	98,3	16,0	99,7	0,2:1
≤89	99,6	15,8	99,9	0,2:1
≤94	99,9	15,8	100,0	0,2:1
≤100	100,0	15,8	100,0	0,2:1

Tables for
150% of the National Poverty Line

Table 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	100,0
5–9	100,0
10–14	100,0
15–19	97,8
20–24	93,1
25–29	92,7
30–34	92,2
35–39	85,2
40–44	75,9
45–49	66,6
50–54	61,2
55–59	58,9
60–64	42,6
65–69	33,5
70–74	27,2
75–79	17,4
80–84	8,0
85–89	5,9
90–94	3,0
95–100	0,0

Table 6 (150% of the national line): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 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	+4,6	2,7	3,1	4,2
20–24	+1,6	2,2	2,7	3,5
25–29	+5,7	2,4	2,8	3,9
30–34	+0,3	1,7	1,9	2,7
35–39	+1,7	2,0	2,4	3,1
40–44	–3,2	2,7	2,9	3,3
45–49	–2,4	2,4	2,8	3,8
50–54	+7,7	2,6	3,1	4,0
55–59	+2,4	2,2	2,6	3,6
60–64	–7,0	4,7	4,9	5,4
65–69	+0,8	2,2	2,8	3,6
70–74	–1,7	2,6	3,2	4,2
75–79	+1,7	1,9	2,3	3,0
80–84	+1,7	1,7	2,0	2,6
85–89	–2,4	3,2	3,7	5,0
90–94	–3,0	6,2	6,9	8,2
95–100	0,0	0,0	0,0	0,0

Table 7 (150% of the national line): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	–2,6	66,6	74,4	90,0
4	+0,5	38,5	46,1	55,9
8	+0,1	27,4	32,6	42,5
16	–0,2	20,9	24,2	30,1
32	–0,1	14,5	17,6	22,7
64	0,0	10,4	12,4	16,1
128	+0,1	7,3	8,7	10,8
256	+0,2	5,1	6,2	8,2
512	+0,2	3,8	4,6	6,4
1.024	+0,3	2,6	3,2	4,2
2.048	+0,3	1,9	2,3	3,0
4.096	+0,3	1,3	1,6	2,2
8.192	+0,3	0,9	1,1	1,4
16.384	+0,3	0,6	0,8	1,0

Table 11 (150% of the national line): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0,1	53,2	0,0	46,7	46,8	–99,6
≤9	0,3	53,0	0,0	46,7	47,0	–98,8
≤14	1,7	51,6	0,0	46,7	48,4	–93,6
≤19	3,2	50,2	0,1	46,6	49,7	–88,0
≤24	5,4	48,0	0,3	46,3	51,7	–79,3
≤29	7,9	45,4	0,7	45,9	53,8	–69,0
≤34	11,8	41,6	1,2	45,5	57,2	–53,7
≤39	16,5	36,8	2,3	44,4	60,9	–33,8
≤44	21,6	31,7	4,0	42,7	64,4	–11,4
≤49	27,2	26,2	6,6	40,0	67,2	+14,4
≤54	32,6	20,7	10,6	36,1	68,7	+42,1
≤59	39,5	13,8	16,4	30,2	69,8	+69,2
≤64	45,7	7,7	22,5	24,2	69,8	+57,8
≤69	49,4	3,9	29,9	16,8	66,2	+43,9
≤74	51,8	1,5	36,5	10,2	62,0	+31,6
≤79	52,9	0,4	41,5	5,1	58,1	+22,1
≤84	53,2	0,1	45,1	1,5	54,7	+15,4
≤89	53,3	0,0	46,3	0,3	53,7	+13,2
≤94	53,3	0,0	46,6	0,1	53,4	+12,6
≤100	53,3	0,0	46,7	0,0	53,3	+12,5

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

Table 12 (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 income 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), 2013 scorecard applied to the 2013 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	0,1	100,0	0,2	Only poor targeted
≤9	0,3	100,0	0,6	Only poor targeted
≤14	1,7	100,0	3,2	Only poor targeted
≤19	3,3	97,1	5,9	33,9:1
≤24	5,7	94,4	10,1	16,8:1
≤29	8,7	91,3	14,8	10,5:1
≤34	12,9	90,9	22,0	9,9:1
≤39	18,8	87,8	31,0	7,2:1
≤44	25,6	84,6	40,6	5,5:1
≤49	33,8	80,3	51,0	4,1:1
≤54	43,2	75,5	61,1	3,1:1
≤59	55,9	70,6	74,1	2,4:1
≤64	68,2	67,0	85,6	2,0:1
≤69	79,3	62,3	92,6	1,7:1
≤74	88,3	58,7	97,1	1,4:1
≤79	94,5	56,0	99,2	1,3:1
≤84	98,3	54,1	99,7	1,2:1
≤89	99,6	53,5	100,0	1,2:1
≤94	99,9	53,4	100,0	1,1:1
≤100	100,0	53,3	100,0	1,1:1

Tables for
200% of the National Poverty Line

Table 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	100,0
5–9	100,0
10–14	100,0
15–19	100,0
20–24	96,2
25–29	96,2
30–34	96,1
35–39	94,0
40–44	86,0
45–49	83,9
50–54	78,7
55–59	75,3
60–64	61,4
65–69	51,2
70–74	43,2
75–79	29,1
80–84	19,0
85–89	11,2
90–94	3,0
95–100	0,0

Table 6 (200% of the national line): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 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	+3,6	2,1	2,4	3,1
20–24	+0,1	1,7	2,0	2,4
25–29	+0,9	1,5	1,8	2,3
30–34	+2,0	1,4	1,8	2,3
35–39	+3,3	1,6	1,9	2,5
40–44	–4,1	2,8	2,9	3,1
45–49	+1,5	2,0	2,3	3,1
50–54	+6,5	2,5	2,9	3,6
55–59	+4,2	2,0	2,4	3,2
60–64	–5,8	3,9	4,1	4,5
65–69	+2,6	2,4	2,8	3,7
70–74	+2,2	2,6	3,1	4,3
75–79	+2,3	2,4	2,8	3,9
80–84	+7,2	2,1	2,7	3,3
85–89	–6,9	5,9	6,6	7,8
90–94	–4,9	6,2	7,3	9,4
95–100	0,0	0,0	0,0	0,0

Table 7 (200% of the national line): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	–2,9	66,0	77,4	87,5
4	+0,5	35,4	43,5	53,3
8	+1,0	26,1	29,9	37,5
16	+1,1	18,7	22,8	29,8
32	+1,3	13,1	15,1	19,4
64	+1,3	9,3	10,9	13,6
128	+1,2	6,5	7,7	10,0
256	+1,3	4,5	5,4	7,3
512	+1,3	3,4	4,1	5,2
1.024	+1,4	2,5	2,9	3,8
2.048	+1,4	1,6	2,0	2,7
4.096	+1,4	1,2	1,5	1,9
8.192	+1,4	0,8	1,0	1,2
16.384	+1,4	0,6	0,7	0,9

Table 11 (200% of the national line): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0,1	66,3	0,0	33,6	33,7	–99,7
≤9	0,3	66,1	0,0	33,6	33,9	–99,0
≤14	1,7	64,7	0,0	33,6	35,3	–94,9
≤19	3,2	63,2	0,0	33,6	36,8	–90,2
≤24	5,6	60,8	0,1	33,5	39,0	–83,1
≤29	8,3	58,1	0,3	33,3	41,6	–74,4
≤34	12,3	54,0	0,6	33,0	45,3	–61,9
≤39	17,6	48,8	1,2	32,4	50,0	–45,2
≤44	23,5	42,8	2,1	31,6	55,1	–26,0
≤49	30,3	36,0	3,5	30,1	60,5	–3,3
≤54	37,5	28,9	5,7	27,9	65,4	+21,5
≤59	46,4	19,9	9,5	24,1	70,5	+54,2
≤64	54,6	11,8	13,6	20,0	74,6	+79,5
≤69	60,0	6,4	19,3	14,3	74,2	+70,9
≤74	63,7	2,7	24,6	9,1	72,8	+63,0
≤79	65,6	0,8	28,9	4,7	70,3	+56,5
≤84	66,1	0,2	32,2	1,4	67,5	+51,5
≤89	66,3	0,0	33,3	0,3	66,7	+49,8
≤94	66,4	0,0	33,6	0,1	66,4	+49,4
≤100	66,4	0,0	33,6	0,0	66,4	+49,3

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

Table 12 (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 income 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), 2013 scorecard applied to the 2013 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	0,1	100,0	0,2	Only poor targeted
≤9	0,3	100,0	0,5	Only poor targeted
≤14	1,7	100,0	2,6	Only poor targeted
≤19	3,3	98,6	4,8	69,8:1
≤24	5,7	97,6	8,4	41,5:1
≤29	8,7	96,2	12,5	25,1:1
≤34	12,9	95,2	18,6	20,0:1
≤39	18,8	93,4	26,5	14,1:1
≤44	25,6	91,9	35,4	11,4:1
≤49	33,8	89,7	45,7	8,7:1
≤54	43,2	86,8	56,5	6,6:1
≤59	55,9	83,0	69,9	4,9:1
≤64	68,2	80,1	82,2	4,0:1
≤69	79,3	75,6	90,3	3,1:1
≤74	88,3	72,2	96,0	2,6:1
≤79	94,5	69,4	98,8	2,3:1
≤84	98,3	67,2	99,6	2,1:1
≤89	99,6	66,6	100,0	2,0:1
≤94	99,9	66,4	100,0	2,0:1
≤100	100,0	66,4	100,0	2,0:1

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

Table 4 (Poorest half below 100% of national): 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	82,3
10–14	76,1
15–19	73,5
20–24	67,2
25–29	58,0
30–34	41,0
35–39	30,2
40–44	22,4
45–49	17,5
50–54	11,7
55–59	8,0
60–64	5,2
65–69	3,8
70–74	3,8
75–79	2,8
80–84	0,6
85–89	0,0
90–94	0,0
95–100	0,0

Table 6 (Poorest half below 100% of national): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 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	–15,0	8,8	8,8	8,8
10–14	–1,8	4,9	5,8	7,4
15–19	+4,3	4,8	5,6	7,4
20–24	–2,8	4,0	4,8	6,4
25–29	+11,2	4,0	4,7	5,9
30–34	–3,0	3,5	4,0	5,2
35–39	+2,8	2,5	2,9	4,1
40–44	–7,8	5,3	5,5	6,0
45–49	+6,7	1,4	1,7	2,2
50–54	+0,4	1,4	1,7	2,1
55–59	–4,6	3,2	3,4	3,8
60–64	–0,8	1,0	1,1	1,5
65–69	–0,9	1,0	1,1	1,4
70–74	–0,4	0,9	1,1	1,6
75–79	+1,6	0,5	0,6	0,8
80–84	–0,8	0,9	1,1	1,4
85–89	0,0	0,1	0,1	0,1
90–94	–6,0	6,2	6,9	8,2
95–100	0,0	0,0	0,0	0,0

Table 7 (Poorest half below 100% of national): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	–0,7	64,6	76,4	84,8
4	+0,4	31,2	38,1	52,6
8	+0,1	22,9	26,4	38,2
16	–0,3	17,2	20,7	26,7
32	–0,4	11,8	13,6	19,7
64	–0,4	8,5	10,0	13,2
128	–0,3	5,9	7,1	9,0
256	–0,5	4,1	5,0	6,7
512	–0,4	3,0	3,6	4,8
1.024	–0,4	2,1	2,6	3,5
2.048	–0,3	1,6	1,9	2,4
4.096	–0,3	1,1	1,2	1,6
8.192	–0,3	0,7	0,9	1,2
16.384	–0,3	0,6	0,7	0,9

Table 11 (Poorest half below 100% of national): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0,1	15,8	0,0	84,0	84,0	–98,9
≤9	0,3	15,6	0,1	83,9	84,2	–96,4
≤14	1,3	14,6	0,4	83,6	84,9	–81,0
≤19	2,4	13,5	0,9	83,1	85,5	–64,5
≤24	4,0	11,9	1,7	82,3	86,3	–39,4
≤29	5,3	10,6	3,4	80,6	85,9	–12,6
≤34	7,1	8,8	5,8	78,2	85,4	+26,1
≤39	8,8	7,1	9,9	74,1	82,9	+37,5
≤44	10,7	5,2	14,8	69,2	79,8	+6,6
≤49	11,6	4,2	22,1	61,9	73,6	–38,9
≤54	12,8	3,1	30,3	53,7	66,6	–90,4
≤59	14,0	1,9	41,8	42,2	56,3	–162,9
≤64	14,8	1,1	53,2	30,8	45,6	–234,9
≤69	15,3	0,5	63,9	20,1	35,5	–301,8
≤74	15,7	0,2	72,4	11,6	27,3	–355,8
≤79	15,8	0,1	78,5	5,5	21,3	–394,2
≤84	15,9	0,0	82,4	1,7	17,5	–418,2
≤89	15,9	0,0	83,7	0,3	16,2	–426,4
≤94	15,9	0,0	83,9	0,1	16,0	–428,2
≤100	15,9	0,0	84,0	0,0	15,9	–428,6

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

Table 12 (Poorest half below 100% of national): 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 income 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), 2013 scorecard applied to the 2013 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	0,1	59,9	0,4	1,5:1
≤9	0,3	81,8	1,6	4,5:1
≤14	1,7	77,8	8,3	3,5:1
≤19	3,3	73,0	15,0	2,7:1
≤24	5,7	69,9	25,0	2,3:1
≤29	8,7	60,9	33,2	1,6:1
≤34	12,9	55,1	44,9	1,2:1
≤39	18,8	46,8	55,4	0,9:1
≤44	25,6	41,6	67,0	0,7:1
≤49	33,8	34,4	73,3	0,5:1
≤54	43,2	29,7	80,7	0,4:1
≤59	55,9	25,1	88,3	0,3:1
≤64	68,2	21,8	93,4	0,3:1
≤69	79,3	19,3	96,6	0,2:1
≤74	88,3	17,8	99,0	0,2:1
≤79	94,5	16,7	99,5	0,2:1
≤84	98,3	16,1	99,9	0,2:1
≤89	99,6	15,9	99,9	0,2:1
≤94	99,9	15,9	100,0	0,2:1
≤100	100,0	15,9	100,0	0,2:1

Tables for
the $1.25/day 2005 PPP Poverty Line

Table 4 ($1.25/day 2005 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	100,0
5–9	75,9
10–14	67,3
15–19	50,9
20–24	36,4
25–29	24,0
30–34	13,6
35–39	7,3
40–44	4,8
45–49	3,7
50–54	2,0
55–59	2,0
60–64	1,5
65–69	1,4
70–74	1,4
75–79	1,4
80–84	0,6
85–89	0,0
90–94	0,0
95–100	0,0

Table 6 ($1.25/day 2005 PPP): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 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	+17,5	14,4	16,9	22,1
10–14	+3,7	5,6	6,5	9,6
15–19	+4,3	5,4	6,5	8,5
20–24	–8,3	6,4	7,0	7,8
25–29	+9,6	3,2	3,9	5,0
30–34	–6,3	4,7	4,9	5,3
35–39	+0,7	1,5	1,8	2,3
40–44	–5,2	3,5	3,7	4,1
45–49	+1,1	0,7	0,9	1,1
50–54	–0,5	0,8	1,0	1,2
55–59	+1,1	0,3	0,4	0,5
60–64	+0,8	0,3	0,3	0,5
65–69	–0,3	0,6	0,8	1,0
70–74	+0,2	0,5	0,6	0,8
75–79	+0,8	0,4	0,5	0,6
80–84	–0,6	0,8	1,0	1,3
85–89	0,0	0,0	0,0	0,0
90–94	–6,0	6,2	6,9	8,2
95–100	0,0	0,0	0,0	0,0

Table 7 ($1.25/day 2005 PPP): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 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	28,3	58,3	74,7
4	–0,4	25,1	32,6	45,1
8	–0,6	17,3	21,1	27,5
16	–0,4	12,3	15,0	20,8
32	–0,3	8,3	9,9	13,7
64	–0,2	6,4	7,5	9,9
128	–0,1	4,2	5,1	6,5
256	–0,2	3,1	3,6	4,4
512	–0,2	2,2	2,6	3,2
1.024	–0,2	1,5	1,7	2,4
2.048	–0,1	1,1	1,3	1,8
4.096	–0,1	0,8	0,9	1,1
8.192	–0,1	0,5	0,6	0,9
16.384	–0,1	0,4	0,5	0,6

Table 11 ($1.25/day 2005 PPP): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0,1	5,6	0,0	94,3	94,3	–97,0
≤9	0,2	5,5	0,1	94,2	94,3	–91,3
≤14	1,0	4,7	0,7	93,6	94,7	–52,1
≤19	1,8	3,9	1,5	92,8	94,5	–12,1
≤24	2,7	3,0	2,9	91,4	94,1	+47,8
≤29	3,1	2,6	5,6	88,7	91,8	+2,3
≤34	3,8	1,9	9,2	85,1	88,9	–60,9
≤39	4,1	1,6	14,7	79,6	83,8	–157,0
≤44	4,6	1,1	21,0	73,3	77,9	–267,7
≤49	4,8	0,9	29,0	65,3	70,2	–407,9
≤54	5,1	0,6	38,1	56,2	61,2	–567,9
≤59	5,2	0,5	50,7	43,6	48,8	–788,4
≤64	5,4	0,4	62,8	31,5	36,8	–1.000,8
≤69	5,5	0,2	73,8	20,5	26,0	–1.193,5
≤74	5,6	0,1	82,7	11,6	17,2	–1.348,7
≤79	5,6	0,1	88,8	5,5	11,1	–1.456,4
≤84	5,7	0,0	92,6	1,7	7,3	–1.523,5
≤89	5,7	0,0	93,9	0,3	6,0	–1.546,4
≤94	5,7	0,0	94,2	0,1	5,8	–1.551,3
≤100	5,7	0,0	94,3	0,0	5,7	–1.552,5

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

Table 12 ($1.25/day 2005 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 income 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), 2013 scorecard applied to the 2013 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	0,1	59,9	1,1	1,5:1
≤9	0,3	56,9	3,1	1,3:1
≤14	1,7	61,4	18,2	1,6:1
≤19	3,3	53,9	30,8	1,2:1
≤24	5,7	48,3	48,1	0,9:1
≤29	8,7	35,6	53,9	0,6:1
≤34	12,9	29,1	65,9	0,4:1
≤39	18,8	22,1	72,7	0,3:1
≤44	25,6	18,0	81,0	0,2:1
≤49	33,8	14,3	85,0	0,2:1
≤54	43,2	11,7	88,8	0,1:1
≤59	55,9	9,4	91,9	0,1:1
≤64	68,2	7,9	93,8	0,1:1
≤69	79,3	6,9	96,4	0,1:1
≤74	88,3	6,4	98,3	0,1:1
≤79	94,5	6,0	99,0	0,1:1
≤84	98,3	5,8	99,7	0,1:1
≤89	99,6	5,7	99,7	0,1:1
≤94	99,9	5,7	100,0	0,1:1
≤100	100,0	5,7	100,0	0,1:1

Tables for
the $2.00/day 2005 PPP Poverty Line

Table 4 ($2.00/day 2005 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	100,0
5–9	96,8
10–14	77,3
15–19	64,1
20–24	53,9
25–29	38,4
30–34	22,9
35–39	16,2
40–44	14,1
45–49	11,5
50–54	4,7
55–59	4,3
60–64	2,8
65–69	2,2
70–74	2,2
75–79	2,0
80–84	0,6
85–89	0,0
90–94	0,0
95–100	0,0

Table 6 ($2.00/day 2005 PPP): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 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	–0,5	3,1	3,5	4,7
10–14	+6,5	5,3	6,6	8,4
15–19	+8,0	5,3	6,6	9,0
20–24	–6,3	5,2	5,8	6,8
25–29	+3,8	3,8	4,5	6,2
30–34	–8,8	6,0	6,3	7,0
35–39	+1,5	2,0	2,4	3,1
40–44	–3,3	2,8	3,0	3,7
45–49	+4,9	1,2	1,5	1,8
50–54	–1,4	1,3	1,4	1,8
55–59	–5,6	3,7	3,9	4,3
60–64	+0,6	0,5	0,6	0,8
65–69	–0,6	0,8	0,9	1,3
70–74	–0,2	0,7	0,8	1,0
75–79	+1,3	0,4	0,5	0,6
80–84	–0,8	0,9	1,1	1,4
85–89	0,0	0,0	0,0	0,0
90–94	–6,0	6,2	6,9	8,2
95–100	0,0	0,0	0,0	0,0

Table 7 ($2.00/day 2005 PPP): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 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	50,0	66,9	81,0
4	–0,6	28,2	36,4	50,6
8	–0,7	21,0	26,2	35,1
16	–0,8	15,7	18,8	24,1
32	–0,8	10,6	12,6	17,0
64	–0,8	7,9	9,4	12,4
128	–0,7	5,5	6,4	8,3
256	–0,8	3,9	4,5	5,9
512	–0,8	2,9	3,5	4,4
1.024	–0,8	2,0	2,4	3,2
2.048	–0,8	1,4	1,7	2,3
4.096	–0,8	0,9	1,1	1,5
8.192	–0,8	0,7	0,8	1,1
16.384	–0,8	0,5	0,6	0,8

Table 11 ($2.00/day 2005 PPP): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0,1	10,4	0,0	89,5	89,6	–98,4
≤9	0,3	10,2	0,1	89,5	89,7	–94,5
≤14	1,2	9,2	0,5	89,1	90,3	–72,0
≤19	2,1	8,3	1,1	88,4	90,5	–48,5
≤24	3,5	7,0	2,2	87,3	90,8	–12,2
≤29	4,4	6,0	4,2	85,3	89,8	+25,1
≤34	5,7	4,7	7,2	82,3	88,1	+31,1
≤39	6,6	3,8	12,2	77,3	84,0	–16,5
≤44	7,5	2,9	18,1	71,5	79,0	–72,8
≤49	8,1	2,3	25,7	63,9	72,0	–145,5
≤54	8,7	1,7	34,5	55,1	63,8	–229,4
≤59	9,5	1,0	46,4	43,1	52,6	–343,8
≤64	9,8	0,6	58,3	31,2	41,0	–457,6
≤69	10,1	0,4	69,2	20,3	30,4	–561,6
≤74	10,3	0,1	77,9	11,6	21,9	–645,0
≤79	10,4	0,1	84,1	5,5	15,9	–703,5
≤84	10,4	0,0	87,9	1,7	12,1	–740,0
≤89	10,4	0,0	89,2	0,3	10,8	–752,5
≤94	10,5	0,0	89,5	0,1	10,5	–755,2
≤100	10,5	0,0	89,5	0,0	10,5	–755,8

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

Table 12 ($2.00/day 2005 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 income 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), 2013 scorecard applied to the 2013 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	0,1	59,9	0,6	1,5:1
≤9	0,3	81,8	2,5	4,5:1
≤14	1,7	72,6	11,8	2,7:1
≤19	3,3	65,2	20,3	1,9:1
≤24	5,7	61,5	33,4	1,6:1
≤29	8,7	51,3	42,4	1,1:1
≤34	12,9	44,3	54,8	0,8:1
≤39	18,8	35,2	63,3	0,5:1
≤44	25,6	29,4	71,9	0,4:1
≤49	33,8	24,1	77,8	0,3:1
≤54	43,2	20,2	83,3	0,3:1
≤59	55,9	17,0	90,8	0,2:1
≤64	68,2	14,4	93,9	0,2:1
≤69	79,3	12,7	96,5	0,1:1
≤74	88,3	11,7	98,8	0,1:1
≤79	94,5	11,0	99,3	0,1:1
≤84	98,3	10,6	99,8	0,1:1
≤89	99,6	10,5	99,8	0,1:1
≤94	99,9	10,5	100,0	0,1:1
≤100	100,0	10,5	100,0	0,1:1

Tables for
the $2.50/day 2005 PPP Poverty Line

Table 4 ($2.50/day 2005 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	100,0
5–9	97,6
10–14	83,9
15–19	76,6
20–24	63,3
25–29	56,4
30–34	36,5
35–39	25,7
40–44	18,8
45–49	15,9
50–54	8,5
55–59	6,7
60–64	4,4
65–69	3,4
70–74	3,4
75–79	2,9
80–84	0,6
85–89	0,0
90–94	0,0
95–100	0,0

Table 6 ($2.50/day 2005 PPP): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 validation sample

	Difference between estimate and true value			
		Confidence interval (±percentage points)		
Score	Diff.	90-percent	95-percent	99-percent
0–4	0,0	0,0	0,0	0,0
5–9	+0,3	3,1	3,5	4,7
10–14	+3,1	4,5	5,6	6,9
15–19	+1,9	4,5	5,3	7,0
20–24	–6,9	5,5	5,9	6,5
25–29	+5,4	3,7	4,5	5,9
30–34	–1,2	3,3	3,9	5,2
35–39	+1,0	2,6	3,0	3,7
40–44	–6,7	4,6	4,8	5,4
45–49	+3,1	1,6	2,0	2,6
50–54	–0,8	1,3	1,6	2,0
55–59	–5,5	3,7	3,9	4,2
60–64	+1,0	0,7	0,8	1,1
65–69	–0,5	0,9	1,0	1,3
70–74	–0,3	0,8	1,0	1,3
75–79	+1,8	0,5	0,6	0,8
80–84	–0,8	0,9	1,1	1,4
85–89	–1,9	1,7	1,8	2,2
90–94	–6,0	6,2	6,9	8,2
95–100	0,0	0,0	0,0	0,0

Table 7 ($2.50/day 2005 PPP): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	–1,2	60,3	74,8	83,3
4	–0,5	31,4	38,4	54,5
8	–0,7	23,3	28,6	39,5
16	–0,9	16,3	19,4	26,5
32	–1,1	11,7	13,5	17,9
64	–0,9	8,4	10,2	13,7
128	–0,8	5,6	6,5	9,0
256	–0,9	4,1	4,8	6,4
512	–0,9	3,0	3,7	4,6
1.024	–0,9	2,1	2,5	3,5
2.048	–0,9	1,5	1,9	2,6
4.096	–0,9	1,0	1,2	1,7
8.192	–0,9	0,8	0,9	1,2
16.384	–0,9	0,5	0,6	0,9

Table 11 ($2.50/day 2005 PPP): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0,1	14,5	0,0	85,4	85,5	–98,8
≤9	0,3	14,3	0,1	85,4	85,7	–96,1
≤14	1,4	13,2	0,3	85,1	86,5	–78,9
≤19	2,5	12,0	0,8	84,7	87,2	–60,3
≤24	4,1	10,4	1,6	83,9	88,0	–32,6
≤29	5,5	9,0	3,2	82,3	87,8	–2,7
≤34	7,1	7,5	5,9	79,6	86,7	+37,6
≤39	8,4	6,1	10,4	75,0	83,4	+28,4
≤44	9,9	4,7	15,7	69,7	79,6	–8,1
≤49	11,0	3,5	22,8	62,7	73,7	–56,9
≤54	12,0	2,6	31,2	54,3	66,2	–114,7
≤59	13,1	1,5	42,8	42,6	55,7	–194,7
≤64	13,6	0,9	54,6	30,9	44,5	–275,3
≤69	14,0	0,5	65,3	20,1	34,1	–349,2
≤74	14,4	0,2	73,9	11,6	25,9	–408,4
≤79	14,4	0,1	80,0	5,4	19,9	–450,4
≤84	14,5	0,0	83,8	1,6	16,1	–476,6
≤89	14,5	0,0	85,1	0,3	14,9	–485,4
≤94	14,5	0,0	85,4	0,1	14,6	–487,4
≤100	14,5	0,0	85,5	0,0	14,5	–487,8

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

Table 12 ($2.50/day 2005 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 income 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), 2013 scorecard applied to the 2013 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	0,1	59,9	0,4	1,5:1
≤9	0,3	81,8	1,8	4,5:1
≤14	1,7	81,2	9,5	4,3:1
≤19	3,3	76,9	17,2	3,3:1
≤24	5,7	72,3	28,3	2,6:1
≤29	8,7	63,5	37,8	1,7:1
≤34	12,9	54,6	48,6	1,2:1
≤39	18,8	44,6	57,8	0,8:1
≤44	25,6	38,6	68,0	0,6:1
≤49	33,8	32,6	75,8	0,5:1
≤54	43,2	27,7	82,4	0,4:1
≤59	55,9	23,4	90,0	0,3:1
≤64	68,2	19,9	93,5	0,2:1
≤69	79,3	17,6	96,3	0,2:1
≤74	88,3	16,3	98,8	0,2:1
≤79	94,5	15,3	99,3	0,2:1
≤84	98,3	14,7	99,7	0,2:1
≤89	99,6	14,6	99,9	0,2:1
≤94	99,9	14,5	100,0	0,2:1
≤100	100,0	14,5	100,0	0,2:1

Tables for
the $5.00/day 2005 PPP Poverty Line

Table 4 ($5.00/day 2005 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	100,0
5–9	100,0
10–14	100,0
15–19	91,1
20–24	84,9
25–29	84,5
30–34	81,5
35–39	67,3
40–44	57,6
45–49	47,4
50–54	40,0
55–59	35,3
60–64	23,7
65–69	15,8
70–74	12,3
75–79	7,2
80–84	2,1
85–89	1,7
90–94	0,0
95–100	0,0

Table 6 ($5.00/day 2005 PPP): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 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	+1,7	1,2	1,5	1,9
15–19	–2,2	2,7	3,1	4,2
20–24	+2,3	3,1	3,7	4,7
25–29	+8,5	3,1	3,9	5,2
30–34	–4,0	3,1	3,3	3,7
35–39	–1,9	2,6	3,0	3,9
40–44	–5,2	4,0	4,2	4,6
45–49	–2,6	2,7	3,2	4,3
50–54	+1,4	2,4	2,9	3,8
55–59	–1,1	2,3	2,8	3,5
60–64	+0,1	1,7	2,1	3,0
65–69	–3,4	2,8	2,9	3,3
70–74	+3,5	1,2	1,4	1,9
75–79	–0,3	1,3	1,7	2,2
80–84	–1,4	1,4	1,5	2,0
85–89	–3,1	2,8	3,2	3,9
90–94	–6,0	6,2	6,9	8,2
95–100	0,0	0,0	0,0	0,0

Table 7 ($5.00/day 2005 PPP): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	–2,5	67,0	77,5	88,7
4	–0,6	36,8	43,2	58,2
8	–0,8	26,3	31,5	42,0
16	–1,0	19,4	23,1	31,6
32	–0,8	13,6	15,8	21,0
64	–0,9	10,0	11,6	15,1
128	–0,9	6,9	8,4	11,4
256	–0,8	5,1	5,9	7,6
512	–0,9	3,5	4,2	5,3
1.024	–0,8	2,6	3,0	3,9
2.048	–0,8	1,8	2,2	3,0
4.096	–0,7	1,2	1,5	1,9
8.192	–0,7	0,9	1,1	1,4
16.384	–0,7	0,7	0,8	1,0

Table 11 ($5.00/day 2005 PPP): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0,1	36,9	0,0	63,0	63,1	–99,4
≤9	0,3	36,7	0,0	63,0	63,3	–98,3
≤14	1,7	35,3	0,0	63,0	64,6	–90,9
≤19	3,1	33,9	0,1	62,9	66,0	–82,7
≤24	5,1	31,9	0,6	62,4	67,5	–70,9
≤29	7,3	29,7	1,4	61,6	68,9	–57,0
≤34	10,7	26,3	2,2	60,8	71,5	–36,0
≤39	14,5	22,5	4,3	58,7	73,3	–9,8
≤44	18,5	18,5	7,1	55,9	74,4	+19,2
≤49	22,3	14,7	11,5	51,5	73,8	+51,8
≤54	26,0	11,0	17,2	45,8	71,8	+53,5
≤59	30,2	6,8	25,8	37,2	67,4	+30,4
≤64	33,3	3,7	34,8	28,2	61,5	+5,8
≤69	35,3	1,7	44,0	19,0	54,3	–19,0
≤74	36,3	0,7	52,0	11,0	47,2	–40,6
≤79	36,7	0,2	57,7	5,3	42,0	–56,0
≤84	36,9	0,1	61,4	1,6	38,5	–66,0
≤89	37,0	0,0	62,7	0,3	37,3	–69,4
≤94	37,0	0,0	62,9	0,1	37,1	–70,1
≤100	37,0	0,0	63,0	0,0	37,0	–70,3

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

Table 12 ($5.00/day 2005 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 income 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), 2013 scorecard applied to the 2013 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	0,1	100,0	0,3	Only poor targeted
≤9	0,3	100,0	0,9	Only poor targeted
≤14	1,7	98,1	4,5	51,7:1
≤19	3,3	96,1	8,5	24,9:1
≤24	5,7	89,4	13,7	8,5:1
≤29	8,7	83,8	19,6	5,2:1
≤34	12,9	83,0	29,0	4,9:1
≤39	18,8	77,3	39,3	3,4:1
≤44	25,6	72,3	50,0	2,6:1
≤49	33,8	66,0	60,3	1,9:1
≤54	43,2	60,2	70,2	1,5:1
≤59	55,9	53,9	81,6	1,2:1
≤64	68,2	48,9	90,1	1,0:1
≤69	79,3	44,5	95,4	0,8:1
≤74	88,3	41,1	98,0	0,7:1
≤79	94,5	38,9	99,3	0,6:1
≤84	98,3	37,5	99,8	0,6:1
≤89	99,6	37,1	100,0	0,6:1
≤94	99,9	37,0	100,0	0,6:1
≤100	100,0	37,0	100,0	0,6:1

Tables for
the $8.44/day 2005 PPP Poverty Line

Table 4 ($8.44/day 2005 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	100,0
5–9	100,0
10–14	100,0
15–19	100,0
20–24	94,4
25–29	94,4
30–34	94,4
35–39	90,5
40–44	83,0
45–49	78,3
50–54	72,7
55–59	69,3
60–64	55,4
65–69	44,4
70–74	36,3
75–79	23,0
80–84	16,4
85–89	10,7
90–94	3,0
95–100	0,0

Table 6 ($8.44/day 2005 PPP): Average differences between estimated and true poverty likelihoods for households by score range, with confidence intervals, from 1,000 bootstraps of n = 16,384, 2013 scorecard applied to the 2013 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	+3,6	2,1	2,4	3,1
20–24	+1,1	2,1	2,5	3,3
25–29	+1,6	1,9	2,2	3,0
30–34	+0,4	1,5	1,8	2,4
35–39	+1,6	1,7	2,0	2,8
40–44	–2,4	2,1	2,3	2,8
45–49	+0,3	2,1	2,5	3,3
50–54	+8,8	2,6	3,0	4,0
55–59	+4,1	2,1	2,5	3,5
60–64	–1,5	2,4	2,9	3,6
65–69	+2,1	2,3	2,8	3,5
70–74	+1,4	2,6	3,1	4,1
75–79	+3,0	2,2	2,6	3,3
80–84	+6,8	2,0	2,4	3,3
85–89	+0,9	3,4	4,0	5,8
90–94	–3,0	6,2	6,9	8,2
95–100	0,0	0,0	0,0	0,0

Table 7 ($8.44/day 2005 PPP): Average differences between estimated poverty rates and true values for a group at a point in time by sample size, with confidence intervals, for 1,000 bootstraps of various sample sizes, 2013 scorecard applied to the 2013 validation sample

Sample Size	Difference between estimate and true value			
		Confidence interval (±percentage points)		
n	Diff.	90-percent	95-percent	99-percent
1	–1,6	68,2	77,6	85,4
4	+2,0	37,5	44,2	55,5
8	+1,9	26,6	30,7	38,6
16	+1,5	19,3	23,3	30,8
32	+1,6	13,9	16,2	21,5
64	+1,7	10,2	11,8	15,0
128	+1,6	6,8	8,0	10,6
256	+1,8	4,9	5,8	7,7
512	+1,8	3,6	4,3	5,7
1.024	+1,9	2,6	3,0	4,0
2.048	+1,9	1,8	2,1	2,9
4.096	+2,0	1,3	1,5	2,1
8.192	+2,0	0,9	1,0	1,4
16.384	+2,0	0,6	0,8	1,0

Table 11 ($8.44/day 2005 PPP): Percentages of households by cut-off score and targeting classification, along with the hit rate and BPAC, 2013 scorecard applied to the 2013 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	0,1	60,8	0,0	39,1	39,2	–99,6
≤9	0,3	60,6	0,0	39,1	39,4	–99,0
≤14	1,7	59,2	0,0	39,1	40,8	–94,4
≤19	3,2	57,7	0,0	39,0	42,3	–89,4
≤24	5,5	55,4	0,2	38,9	44,4	–81,7
≤29	8,2	52,7	0,5	38,6	46,8	–72,4
≤34	12,2	48,7	0,8	38,3	50,5	–58,8
≤39	17,3	43,6	1,6	37,5	54,8	–40,8
≤44	22,9	38,0	2,7	36,4	59,3	–20,4
≤49	29,3	31,6	4,5	34,6	63,9	+3,7
≤54	35,7	25,2	7,5	31,6	67,3	+29,5
≤59	43,8	17,1	12,1	27,0	70,9	+63,8
≤64	51,1	9,8	17,1	22,0	73,1	+72,0
≤69	55,8	5,1	23,5	15,6	71,4	+61,4
≤74	58,9	2,0	29,4	9,7	68,6	+51,7
≤79	60,3	0,6	34,1	5,0	65,3	+44,0
≤84	60,7	0,2	37,6	1,5	62,2	+38,3
≤89	60,9	0,0	38,7	0,3	61,2	+36,4
≤94	60,9	0,0	39,0	0,1	61,0	+35,9
≤100	60,9	0,0	39,1	0,0	60,9	+35,8

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

Table 12 ($8.44/day 2005 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 income 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), 2013 scorecard applied to the 2013 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	0,1	100,0	0,2	Only poor targeted
≤9	0,3	100,0	0,5	Only poor targeted
≤14	1,7	100,0	2,8	Only poor targeted
≤19	3,3	98,6	5,3	69,8:1
≤24	5,7	96,4	9,0	26,7:1
≤29	8,7	94,5	13,4	17,2:1
≤34	12,9	94,0	20,0	15,6:1
≤39	18,8	91,7	28,3	11,1:1
≤44	25,6	89,5	37,6	8,5:1
≤49	33,8	86,6	48,1	6,5:1
≤54	43,2	82,6	58,6	4,8:1
≤59	55,9	78,4	72,0	3,6:1
≤64	68,2	74,9	83,9	3,0:1
≤69	79,3	70,3	91,6	2,4:1
≤74	88,3	66,7	96,7	2,0:1
≤79	94,5	63,9	99,0	1,8:1
≤84	98,3	61,8	99,7	1,6:1
≤89	99,6	61,1	100,0	1,6:1
≤94	99,9	60,9	100,0	1,6:1
≤100	100,0	60,9	100,0	1,6:1