Simple Poverty Scorecard® Poverty-Assessment Tool Morocco

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This document (and an updated one) is at `SimplePovertyScorecard.com`

Abstract

The Simple Poverty Scorecard-brand poverty-assessment tool uses 10 low-cost indicators from Morocco's 1998/9 National Household Living Standards Survey to estimate the likelihood that a household has consumption below a given poverty line. Field workers can collect responses in about ten minutes. The scorecard's accuracy is reported for a range of poverty lines. The scorecard is a practical way for pro-poor programs in Morocco to measure poverty rates, to track changes in poverty rates over time, and to segment clients for differentiated treatment.

Acknowledgements

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Simple Poverty Scorecard® Poverty-Assessment Tool

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

Indicator	Response	Points	Score
1. How many household members are ages 6 to 14?	A. Four or more	0	
	B. Three	3	
	C. Two	6	
	D. One	9	
	E. One	16	
2. Does the household own a color television?	A. No	0	
	B. Yes	9	
3. How many gas cylinders does the household own?	A. None, or one	0	
	B. Two	3	
	C. Three	7	
	D. Four or more	13	
4. Does the household use charcoal?	A. Yes	0	
	B. No	6	
5. Do all household members ages 6 to 25 attend school?	A. No	0	
	B. Yes	7	
	C. No members in this age range	12	
6. What is the household's type of residence?	A. Other	0	
	B. Modern urban detached house, apartment in an apartment building, condominium, or rural house of brick, stone, or concrete	5	
7. Does the residence have a washbasin?	A. No	0	
	B. Yes	11	
8. Did the household farm 6 or more Ha of land in the most recent growing season?	A. No	0	
	B. Yes	10	
9. Does the household own a stereo-cassette?	A. No	0	
	B. Yes	4	
10. Does the household own an auotmobile or a motorcycle?	A. No	0	
	C. Yes	14	

SimplePovertyScorecard.com   **Score:**

Outil de la marque « Grille de Notation de la Pauvreté™ »

Interview ID: _____		**Nom et prénom**	**Référence d'Identité**
Date d'entrevue: _____	Participant: _____		_____
Pays: MAR	Agent: _____		_____
Grille de notation: 001	Agence: _____		_____
Poids d'échantillonnage: _____	L'effectif des membres du ménage:		_____

Indicateurs	Réponses	Notes	*Score*
1. Combien de membres du ménage sont âgées de 6 à 14 ans ?	A. Quatre ou plus	0	
	B. Trois	3	
	C. Deux	6	
	D. Un	9	
	E. Aucun	16	
2. Les membres de votre ménage possédent-ils des T.V. couleur ?	A. Non	0	
	B. Oui	9	
3. Combien possèdez-vous de cylindres de gaz ?	A. Aucun, ou un	0	
	B. Deux	3	
	C. Trois	7	
	D. Quatre ou plus	13	
4. Utilisez-vous du charbon de bois dans votre logement ?	A. Oui	0	
	B. Non	6	
5. Vont-t-ils a l'école tous les membres du ménage âgées de 6 à 25 ans ?	A. Non	0	
	B. Oui	7	
	C. Il n'y pas des membres de 6 à 25 ans	12	
6. Quel es le type de logement occupé par le ménage ?	A. Touts autres	0	
	B. Maison rurale en dur, villa/niveau d'une villa, appartemente dans un inmueble, maison moderne de type urbain	5	
7. Disposez-vous d'un lavabo ?	A. Non	0	
	B. Oui	11	
8. Est-ce la superficie totale des parcelles cultivée par le ménage au cours de la compagne écoulée plus de 6 Ha?	A. Non	0	
	B. Oui	10	
9. Les membres de votre ménage possédent-ils des radio-cassettes ?	A. Non	0	
	B. Oui	4	
10. Votre ménage dispose-t-il d'un (ou plusieur) véhicule ou motorcycle ?	A. Non	0	
	B. Oui	14	

SimplePovertyScorecard.com *Score* :

Simple Poverty Scorecard® Poverty-Assessment Tool Morocco

1. Introduction

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

Rather than asking for hours on end about all possible consumption items ("How many carrots did your household eat last week? If you bought the carrots, what price did you pay? If you grew the carrots yourself, what price would they have fetched in the market? Now then, how many cabbages did your household eat last week? . . ."), the scorecard uses 10 simple indicators (such as "Does the household own a color television?" or "Does the household use charcoal?") to get a score that is highly correlated with poverty status as measured by the exhaustive consumption survey.

Indicators in the scorecard were derived from an analysis of 5,129 households in the *1998/9 Enquete Nationale sur les Niveaux de Vie des Ménages* (National Household Living Standard Survey, ENNVM). Indicators were selected to be:

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

All scorecard weights are positive integers, and scores range from 0 (most-likely to have consumption below a poverty line) to 100 (least-likely to have consumption below a poverty line). Field workers can compute scores by hand, on paper, in real time.

A participant's score corresponds to a "poverty likelihood", that is, the probability of having consumption under a poverty line. For a given group, the share of people under a poverty line is defined as their average poverty likelihood. For a given group over time, progress (or regress) is the change in the average poverty likelihood.

The scorecard here applies to all of Morocco. Evidence from India and Mexico (Schreiner, 2006 and 2005a) suggests that having separate scorecards for rural and urban provides only very small improvements in targeting accuarcy.

The scorecard is constructed and calibrated using Morocco's official poverty line. The same scorecard is also calibrated to the "extreme" poverty line used by USAID in its microenterprise projects, as well as the \$1.08/day and \$2.16/day international lines.

The scorecard objectively estimates the likelihood that Moroccan households have consumption below any of these four poverty lines. The scorecard satisfies the technical requirements for certification for the reporting required of USAID's microenterprise partners. In particular, for Morocco's official poverty line a household's estimated poverty likelihood is accurate within ± 12 percentage points with 90-percent confidence, and a group's estimated overall poverty rate is accurate within ± 1.6 percentage points.

2. Data and poverty lines

The analysis is based on the 5,129 households in Morocco's 1998/9 ENNVM.
This is the best, most recent available household consumption survey. A random
sample of one-half of surveyed households was used to construct the scorecard, one-
fourth was used to associate scores with estimated poverty likelihoods, and the final
one-fourth was used to measure accuracy (Figure 1).

The definition of Morocco's official poverty line starts with the consumption
required for 2,400 calories/adult/day. Using budget shares for food and non-food items
for households in the lowest consumption quintile of the 1984/85 ENNVM, the official
poverty line was defined as total annual per-capita consumption of households who just
met the caloric requirement (Direction de la Statistique, 2000). Adjusting for inflation,
the poverty line for 1998/9 is MAD3,922 in urban areas and MAD3,037 in rural areas
(Figure 2). By this line, the official poverty rate was 19.0 percent, with urban poverty
at 12.0 percent and rural poverty at 27.2 percent.

The scorecard is also calibrated to USAID's "extreme" poverty line, defined so as
to divide those people under the national line into two equal-sized groups. In Morocco,
this "extreme" line is MAD3,176.5 for urban and MAD2,385.6 for rural (Figure 1). By
definition, the "extreme" line produces person-level poverty rates that are half the
official rates.

The scorecard is also calibrated to the 1993 international purchase-power parity benchmarks of \$1.08/day and \$2.16/day. Using the methods in Sillers (2006) and Schreiner (2007), \$1.08/day is MAD1,619.2 for urban and MAD1,253.8 for rural. Less than 1 percent of Moroccans have consumption below \$1.08/day, so this line is not discussed in depth here.

The \$2.16/day line is MAD3,238.4 for urban and MAD2,507.6 for rural. This \$2.16/day line is very close (within about MAD60–120) to the USAID "extreme" line, so the rest of this paper focuses on the national line and on USAID's "extreme" line.

3. Scorecard construction

About 150 potential poverty indicators were prepared, including:

- Family composition (such as female headship and children in a given age range)
- Housing (such as type of construction and number of rooms)
- Education (such as highest grade completed and school attendance by children)
- Ownership of durable goods (such as televisions and automobiles)

Each indicator was first screened with the entropy-based "uncertainty coefficient" (Goodman and Kruskal, 1979) that measures how well it predicts poverty on its own. Figures 3 and 4 list (in English and French) the top 50, ranked by the uncertainty coefficients. Responses are ordered by the strength of their association with poverty.

Many indicators in Figures 3 and 4 are similar in terms of their association with poverty. For example, most households who have a washbasin also dispose of their waste water via a septic tank, cesspit, latrine, or sanitary sewer. If a scorecard already includes "has a washbasin", then "disposal of waste water" is more or less superfluous. Thus, many indicators strongly associated with poverty are not in the scorecard because they are similar to indicators that are already included.

The scorecard also aims to measure *changes* in poverty through time. Thus, some powerful indicators (such as ownership of a refrigerator) that are likely to change only in response to large changes in poverty were omitted in favor of slightly less-powerful indicators that are more likely to respond to small changes in poverty (such as ownership of a stereo-cassette player). Some other powerful indicators (such as "Does

the household pay property taxes?") were not selected because they are awkward to ask/answer or because they are difficult to verify.

The scorecard itself was constructed using Logit regression applied to the households randomly selected into the one-half construction sample (Figure 1). Indicator selection combined statistics with the judgment of an analyst with expertise in scoring and development. Starting with a scorecard with no indicators, each candidate indicator was added, one-by-one, to a one-indicator scorecard, using Logit to derive weights. The improvement in accuracy for each indicator was measured by the "c" statistic.[1]

After all indicators had been tested, one was selected based on several factors (Schreiner *et al.*, 2004; Zeller, 2004). These included 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 small changes in poverty status, variety vis-à-vis other indicators already selected, and observability/verifiability.

The selected indicator was then added to the scorecard, and the previous steps were repeated until 10 indicators were selected. Finally, the Logit coefficients were

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[1] "c" is a measure of a scorecard's ability to rank-order households. It is equivalent to the area under an ROC curve that plots the share of poor households (vertical axis) versus the share of all households ranked by score (horizontal axis). "c" can also be seen as the share of all possible pairs of poor and non-poor households in which the poor household has a lower score.

transformed into non-negative integers such that the lowest possible score is 0 (most likely to have consumption under the poverty line) and the highest is 100.

This algorithm is the Logit analogue to the stepwise "MAXR" in, for example, Zeller, Alcaraz and Johannsen (2005) and IRIS (2005a and 2005b). Like R^2 in a least-squares regression on consumption, "c" is a good general measure of general accuracy in a Logit regression on poverty status. The procedure here diverges from naïve stepwise in that expert judgment and non-statistical criteria were used along with statistical criteria to help select from the most-predictive indicators. This improves robustness and, more importantly, helps ensure that the indicators are simple and sensible and so likely to be accepted by users.

4. Scorecard use

As explained in Schreiner (2005b), the main goal is not to maximize accuracy but to maximize the likelihood of programs' using scoring appropriately. When scoring projects fail, the culprit is usually not inaccuracy but rather the failure of users to accept scoring and to use it properly (Schreiner, 2002). The challenge is not technical but human and organizational, not statistics but change management. "Accuracy" is easier—and less important—than "practicality".

The scorecard here was designed to help users to understand and trust it (and thus use it properly). While accuracy matters, it must be balanced against simplicity, ease-of-use, and "face validity". In particular, programs are more likely to collect data, compute scores, and pay attention to the results if, in their view, scoring avoids creating "extra" work and if the whole process in general seems to make sense to them.

This "practicality" focus naturally leads to a one-page scorecard that allows field workers to score households by hand in real time because it features:

- Only 10 indicators
- Only categorical indicators ("type of residence", not "asset value of house")
- User-friendly weights (non-negative integers, no arithmetic beyond simple addition)

Among other things, this simplicity enables "rapid targeting", such as determining (in a day) who in a village qualifies for, say, work-for-food, or ration cards.

The scorecard can be photocopied for immediate use. A field agent collecting data and computing scores on paper would:

- Read each question off the scorecard
- Circle the response and the corresponding points
- Write the points in the far-right column
- Add up the points to get the total score
- Implement program policy based on the score

4.1 Scores and poverty likelihoods

A score is not a poverty likelihood (that is, the estimated probability of having consumption under a poverty line), but each score is associated ("calibrated") with a poverty likelihood via a simple table (Figure 7 for the national line, Figure 8 for the USAID "extreme" line). For example, scores of 15–19 correspond to a poverty likelihood of 47.6 percent (national line) or 20.5 percent (USAID's "extreme" line).

Scores (sums of scorecard weights) are associated with poverty likelihoods (estimated probabilities of having consumption below a poverty line) via the "bootstrap" (Efron and Tibshirani, 1993):

- From the first one-fourth hold-out sample, draw a new sample of the same size *with replacement*
- For each score range, compute the share of people with the score who have consumption below a given poverty line
- Repeat the previous two steps 10,000 times
- For a given score range, define the poverty likelihood as the average across 10,000 samples of the shares of people with consumption below the given poverty line

These resulting poverty likelihoods are objective, that is, based on data. This calibration process produces objective poverty likelihoods *even for scorecards*

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constructed without data. In fact, scorecards of objective, proven accuracy are often

constructed *only* with qualitative judgment (Fuller, 2006; Caire, 2004; Schreiner *et al.*,

2004). Of course, the scorecard here was constructed with data. Some parties have

misunderstood the significance of the acknowledgement that some choices in scorecard

construction—as in any statistical analysis—are informed by the analyst's judgment.

That the use of this judgment is explicitly acknowledged in no way impugns the

objectivity of the poverty likelihoods, which depends on using data to calibrate scores

with poverty likelihoods, not on whether only data (and nothing else) was used to

construct scorecards.

Figures 9 and 10 depict the precision of estimated poverty likelihoods as point

estimates with 90-, 95-, and 99-percent confidence intervals. Confidence intervals are

the standard way to measure accuracy.

For the national line, the average poverty rate across bootstrap samples for

people with scores of 15–19 is 47.6 percent. (This average poverty rate is the poverty

likelihood associated with these scores.) In 90 percent of the 10,000 samples, this figure

is between 39.7–55.3 percent. In 95 percent of samples, it is 38.2–56.7; in 99 percent of

samples, it is 34.9–59.9.

Weighting by the people in each score range, the average 90-percent confidence

interval for the national line is ±5.3 percentage points, the 95-percent interval is ±6.3,

and the 99-percent interval is ±8.3 (Figure 11). The confidence intervals for USAID's

"extreme" line are somewhat narrower. USAID's line is almost the same as the

$2.16/day line, so they have similar confidence intervals. The $1.08/day line has very narrow intervals, but only because so few Moroccans have consumption under $1.08/day.

For the difference between estimated and true poverty likelihoods, Figures 12 and 13 depict average (mean) absolute differences and confidence intervals from 10,000 bootstrap samples on the second one-fourth hold-out sample. Weighting by the people in a score range, the mean absolute difference for the national line is 4.7 percentage points, with a 90-percent interval of ±11.9 percentage points, a 95-percent interval of ±14.1, and a 99-percent interval of ±18.4 (Figure 14). The intervals for the USAID "extreme" line are somewhat narrower.

This discussion so far looks at whether estimated poverty likelihoods are close to true poverty likelihoods. There is another aspect of accuracy: how well those with consumption below the poverty line are concentrated in low scores (or equivalently, how well those with consumption above the poverty line are concentrated in high scores). Ideally, a scorecard would assign all the lowest scores to people under the poverty line and all the highest scores to people above the poverty line. In reality, no scorecard is perfect, so some people under the poverty line have high scores, and vice versa.

ROC curves are standard tools for showing how well scorecards concentrate those with consumption below the poverty line in lower scores (Baulch, 2003; Wodon, 1997). They plot the share of households below and above the poverty line against the share of all households ranked by score.

What do the ROC curves in Figures 15 and 16 mean? Suppose a program sets a cut-off so as to target the lowest-scoring x percent of potential participants. The ROC curve then shows the share of those who are below and above the poverty line who would be targeted. Greater ability to rank households—with less leakage and less undercoverage—is signified by curves that are closer to the northwest and southeast corners of the graph.

In Figure 15, the two northwest (southeast) curves depict accuracy among those below (above) the national poverty line. As a benchmark, the external trapezoid shows the accuracy of a hypothetical perfect scorecard that assigns all of the lowest scores to people below the poverty line.

The inner lines represent the performance of the actual scorecard. They show, for example, that targeting the lowest-scoring 24 percent of cases would target 60 percent of all those below the national poverty line and 15 percent of all those above the line.

Figures 15 and 16 also report two other common measures of a scorecard's ranking ability. The first is the Kolmogorov-Smirnov statistic, the maximum distance between the two curves (50.2 for national, 50.7 for "extreme"). The second measure of ranking ability is the ratio of the area inside the ROC curves to the area inside the trapezoid of a hypothetical perfect scorecard (65.8 for national, 66.1 for "extreme").

Is this scorecard accurate enough for targeting? Errors due to scorecard inaccuracy are probably small relative to errors due to other sources (such as mistakes in data collection or fraud) and relative to the accuracy of other feasible targeting tools.

More importantly, accuracy is documented, so potential users can make their own decisions based on how they value errors of undercoverage (not targeting those below the poverty line) and leakage (targeting those above the poverty line).

4.2 Estimates of overall poverty rates

The estimated overall poverty rate is the average of the estimated poverty likelihoods of individuals.

For example, suppose a program had three participants on Jan. 1, 2007 who had scores of 20, 30, and 40, corresponding to poverty likelihoods (national line, Figure 7) of 31.8, 25.8, and 3.1 percent. The poverty rate is the participants' average poverty likelihood, that is, $(31.8 + 25.8 + 3.1) \div 3 = 20.2$ percent.

As a test, the scorecard was applied to 10,000 bootstrap replicates from the second one-fourth hold-out sample, comparing the estimated overall poverty rates with the true values. For the national poverty line, the mean difference was 2.18 percentage points, with a standard deviation of 0.98 (Figure 17). The 90-percent confidence interval around the mean was ±1.6 percentage points, the 95-percent interval was ±1.9 percentage points, and the 99-percent interval was ±2.5 percentage points. Accuracy was similar for USAID's "extreme" poverty line.

This means that subtracting 2.18 percentage points from a group's average poverty likelihood (national line) would give an unbiased estimate that, in 90 of 100 cases, would be within ±1.6 percentage points of the true overall poverty rate.

4.3   Progress out of poverty through time

For a given group, progress out of poverty over time is estimated as the change in its average poverty likelihood.

Continuing the previous example, suppose that on Jan. 1, 2007, the same three people (some of whom may no longer be participants) have increased their scores by five points each to 25, 35, and 45 (poverty likelihoods of 16.0, 7.1, and 6.5 percent, Figure 7). Their average poverty likelihood is now 9.9 percent, an improvement of 20.2 – 9.9 = 10.3 percentage points.

In a large group, this means that about 10.3 of every 100 crossed the poverty line. Given that 20.2 percent were below the poverty line when they started, about half $(9.9 \div 20.2 = 49.0$ percent) of those who were below the line ended up above the line.

Of course, this does not mean that program participation *caused* the progress; the scorecard just measures what happened, regardless of cause.

5. Setting targeting cut-offs

Potential participants with scores at or below a targeting cut-off are labeled *targeted* and treated—for program purposes—as if they have consumption below a given poverty line. Those with higher scores are *non-targeted* and treated—for program purposes—as if they have consumption above a given poverty line.

No scorecard is perfect, so some people who truly have consumption below a given poverty line may not be targeted, and some people who truly have consumption above a given poverty line may be targeted. Targeting is accurate to the extent that poverty status matches targeting status. Accuracy in turn depends in part on the targeting cut-offs; some cut-offs are more accurate for those below the poverty line, other cut-offs are more accurate for those above the poverty line.

Setting a cut-off requires trading off accuracy for those below versus above a poverty line. The standard technique for making this trade-off uses a *classification matrix* and a *net-benefit matrix* (SPSS, 2003; Adams and Hand, 2000; Salford Systems, 2000; Hoadley and Oliver, 1998; Greene, 1993).

5.1   Classification matrix

Given a targeting cut-off, there are four possible classification results:

A. Truly under the poverty line and correctly targeted (score at or below the cut-off)
B. Truly under the poverty line and mistakenly non-targeted (score above cut-off)
C. Truly above poverty line and mistakenly targeted (score at or below cut-off)
D. Truly above poverty line and correctly non-targeted (score above cut-off)

These four possibilities can be shown as a general classification matrix (Figure 18). Accuracy improves as there are more cases in A and D and fewer in B and C.

Figures 19 and 20 show the estimated number of Moroccans in each classification by score in the 1998/9 survey for the national and USAID "extreme" poverty lines. For example, with a cut-off of 15–19 and the national line, there are:

A. 13.1 people under the poverty line who are correctly targeted
B. 8.9 people under the poverty line who are mistakenly non-targeted
C. 10.7 people over the poverty line who are mistakenly targeted
D. 67.3 people over the poverty line who are correctly non-targeted

Targeting accuracy (and errors of undercoverage and leakage) depends on the selected cut-off. For example, if the cut-off were increased to 20-24, more people below the poverty line (but fewer people above the poverty line) are correctly targeted:

A. 16.6 people below the poverty line are correctly targeted
B. 5.5 people below the poverty line are mistakenly non-targeted
C. 18.1 people above the poverty line are mistakenly targeted
D. 59.9 people above the poverty line are correctly non-targeted

Whether a cut-off of 15–19 is preferred to one of 20–24 depends on net benefit.

5.2   Net-benefit matrix

Each of the four classification results is associated with a net benefit (Figure 21):

α. Benefit | below poverty line correctly targeted
β. Cost (negative net benefit) | below poverty line mistakenly non-targeted
γ. Cost (negative net benefit) | above poverty line mistakenly targeted
δ. Benefit | above poverty line correctly non-targeted

Given a net-benefit matrix and a classification matrix, total net benefit is:

$$\text{Total net benefit} = \alpha{\cdot}A + \beta{\cdot}B + \gamma{\cdot}C + \delta{\cdot}D.$$

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

- Select a net-benefit matrix based on its values and mission
- Compute total net benefits for each cut-off with the net-benefit matrix and Figure 19 or Figure 20 (depending on the poverty line)
- Select the cut-off with the highest total net benefit

The only non-trivial step is selecting a net-benefit matrix. Some common net-benefit matrices are discussed below. In general, however, each program should thoughtfully decide for itself how much it values successful targeting versus errors of undercoverage and leakage. Of course, any program that targets already uses (if only implicitly) a net-benefit matrix. It is healthy to go through a process of thinking explicitly and intentionally about how possible targeting outcomes are valued.

5.2.1 "Total Accuracy"

As an example net-benefit matrix, suppose a program selects the net-benefit matrix that corresponds to "Total Accuracy" (Figure 22, IRIS, 2005b). With this criterion, total net benefit is the number of people correctly classified:

$$\text{Total net benefit} \quad = 1 \cdot A + 0 \cdot B + 0 \cdot C + 1 \cdot D,$$
$$= A + D.$$

Grootaert and Braithwaite (1998) and Zeller, Alcaraz, y Johannsen (2005) use "Total Accuracy" to evaluate the accuracy of poverty-assessment tools.

Figures 23 and 24 show "Total Accuracy" for all cut-offs of the Morocco scorecard and the national and USAID "extreme" poverty lines. For the national line, total net benefit is greatest (80.9) for a cut-off of 10–14; at that point, targeting segment matches poverty status for about four in five Moroccans.

"Total Accuracy" weighs correct classifications for those below the poverty line the same as for those above the poverty line. If most potential participants are above the poverty line (as in Morocco) and/or if a scorecard is more accurate for those above the poverty line, then "Total Accuracy" might be high even if very few people below the poverty line are correctly targeted. Programs targeting those below the poverty line, however, probably value correctly targeting those below the poverty line more than they value correctly not targeting those above the poverty line.

A simple, transparent way to reflect this valuation is to increase the relative net benefit of correctly targeting those below the poverty line. For example, if a program values correctly targeting those below the poverty line twice as much as correctly not

targeting those above the poverty line, then α should be set twice as high as δ in the net-benefit matrix. Then the new optimal cut-off for the national poverty line is 15–19, the point where 2·A + D is highest.

5.2.2 "Poverty Accuracy"

A criterion that emphasizes solely the importance of correctly targeting those below the poverty line is "Poverty Accuracy" (Figure 25, IRIS, 2005b):

$$\text{Total net benefit} \quad = 1{\cdot}A + 0{\cdot}B + 0{\cdot}C + 0{\cdot}D,$$
$$= A.$$

Of course, correctly targeting those below the poverty line is rarely the sole criteria. In fact, Figures 23 and 24 show that "Poverty Accuracy" is greatest with a cut-off of 95–100. While targeting everyone does ensure that everyone below the poverty line is targeted and so minimizes *undercoverage* (third-to-last column of Figures 23 and 24), it also targets all those above the poverty line and so maximizes *leakage* (second-to-last column of Figures 23 and 24). A universal program may or may not be appropriate; the point here is to make explicit the implications of "Poverty Accuracy" as a criterion for choosing a targeting cut-off.

5.2.3 "Non-poverty Accuracy"

"Non-poverty Accuracy" counts only correct classifications of those above the poverty line (total net benefit is D). This is maximized by setting a cut-off of 0–4 and thus not targeting anyone (minimum leakage but maximum undercoverage).

5.2.4 "BPAC"

IRIS (2005b) proposes a new measure of accuracy called the "Balanced Poverty Accuracy Criterion". BPAC is meant to balance two goals:

- Accuracy of the estimated overall poverty rate
- "Poverty Accuracy"

According to IRIS (2005b), the first goal is optimized when undercoverage B is balanced by leakage C, and the second goal is optimized by maximizing A. Thus, BPAC maximizes A while making B as close to C as possible, normalizing the result by 100 x (A + B):

$$\text{Total net benefit} = [1 \cdot A + |1 \cdot B + (-1) \cdot C| + 0 \cdot D] \div [100 \text{ x } (A + B)],$$

$$= [A + |B - C|] \div [100 \text{ x } (A + B)].$$

The BPAC formula cannot be expressed in terms of a net-benefit matrix.

BPAC was invented because IRIS does not estimate poverty likelihoods. Instead, IRIS estimates consumption and then estimates the overall poverty rate as the share of people with estimated consumption below a given poverty line. This estimate is most accurate (that is, it matches the true value) when undercoverage B equals leakage C.

For the Moroccan scorecard and the national poverty line, BPAC is 51.6 (Figure 24); with the USAID "extreme" line, BPAC is 19.0 (Figure 25).

For a poverty-assessment tool (like the scorecard here) that estimates poverty likelihoods, however, BPAC is not meaningful. This is because the estimated overall poverty rate is the average of participants' estimated poverty likelihoods. These estimates are independent of whatever targeting cut-off a program might set. In

contrast, the targeting errors of undercoverage B and leakage C depend directly on the cut-off chosen. Thus, for scorecards that estimate poverty likelihoods, getting B close to C is not related to optimizing the accuracy of the estimated overall poverty rate and so is not related to the goals of BPAC.

5.3   Targeting status, poverty status, and being "poor"

There is a distinction between *targeting status* (score below a targeting cut-off) and *poverty status* (consumption below a poverty line). Poverty status is a fact that depends on whether consumption is under a poverty line as measured by a lengthy survey. In contrast, targeting status is a policy choice that depends on a cut-off and an inexpensive estimate of poverty likelihood. The purpose of the scorecard is to infer poverty status without incurring the high cost of directly measuring consumption.

Furthermore, the common-sense, qualitative meaning of the term "poor" may differ both from scoring's definition ("consumption below a poverty line") and from a program's definition ("score below a targeting cut-off"). This happens because poverty has aspects beyond consumption, and also because what people mean by "poor" in everyday usage is not based strictly on a specific consumption-based poverty line.

Nevertheless, Morocco's scorecard provides objective estimates using an consumption-based poverty line. Some people targeted by a program have consumption above the poverty line, as do some people who might be judged as "poor" by a common-sense, everyday standard. Each meaning of the term "poor" has an appropriate context, and scorecard users should be careful to distinguish among them.

6. Training, quality-control, and MIS

The technical aspects of scorecard construction and accuracy are important, but gaining the trust and acceptance of managers and field workers is even more important (Schreiner, 2002).

In particular, the field workers who collect indicators must be trained. If they put garbage in, the scorecard will put garbage out. To prevent abuse, on-going quality control of data is required.

At the least, programs should record in their management-information system the poverty likelihood along with a client identifier. Ideally, they would also record the score, the indicators, the values of the indicators, and the date scored. This will allow quick computation of average poverty likelihoods (as well as other analyses), both for a point in time and for changes through time (Matul and Kline, 2003).

7. Conclusion

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

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

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

The scorecard is built with data from the 1998/9 ENNVM and calibrated to four poverty lines (national, USAID "extreme", $1.08/day, and $2.16/day). Less than 1 percent of Moroccans spend less than $1.08/day, and the $2.16/day line is almost the same as the national line, so this paper focuses on the national line and the "extreme" line.

Out-of-sample bootstrap tests show that the estimates are both accurate and precise. For an individual's poverty likelihood, estimates are within 12 percentage points of the true value with 90-percent confidence (either national or USAID "extreme" line). For a group's overall poverty rate, estimates are within 1.6 percentage points of the true value with 90-percent confidence.

For targeting, programs can use the classification results reported here to select the best cut-off according to their values and mission.

Accuracy is important, but ease-of-use is even more important; a perfectly accurate scorecard is worthless if programs feel so daunted by its complexity that they never even try to use it. For this reason, the scorecard here is kept simple, using 10 indicators that are inexpensive to collect and that are straightforward to observe and verify. Indicator weights are all zeros or positive integers, and scores range from 0 (most likely to have consumption below the poverty line) to 100. Scores are related to poverty likelihoods via a simple look-up table, and targeting cut-offs are also simple to apply. Thus, field workers not only can understand the scorecard, but they can also use it to compute scores in the field, by hand, in real time.

In sum, the scorecard can help development programs in Morocco to target services to those with consumption below the poverty line, track participants' progress out of poverty through time, and report on participants' overall poverty rate.

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Figure 1: Households surveyed, people represented, and overall poverty rates for four poverty lines

| | | | % with expenditure below a poverty line | | | |
| | Households | People | | USAID | | |
Sub-sample	Surveyed	Represented	National	"extreme"	$1/day	$2/day
Constructing scorecards	2,554	13,898,849	18.5	10.1	0.7	11.2
Associating scores with likelihoods	1,288	6,940,805	19.1	9.2	0.6	10.0
Measuring accuracy	1,287	7,125,346	19.8	8.5	0.8	10.0
Total:	5,129	27,965,000	19.0	9.5	0.7	10.6

Source: *1998/99 Enquête Nationale sur les Niveaux de Vie des Ménages*.

Figure 2: Poverty lines for Morocco, 1998/9

| | Poverty line | | | |
| | | USAID | | |
Area	National	"extreme"	$1/day	$2/day
Urban	3922.0	3176.5	1619.2	3238.4
Rural	3037.0	2385.6	1253.8	2507.6
All Morocco:	3513.2	2811.2	1450.4	2900.8

Poverty lines are in units are dirhams per person per year.

Figure 3: Poverty indicators by uncertainty coefficient

	Uncertainty coefficient	Indicator (Answers ordered starting with those most strongly associated with poverty)
1.	1039	Does the household own a color television? (No; Yes)
2.	940	Does the household own a refrigerator (with or without a freezer compartment)? (No; Yes)
3.	887	What is the household's type of residence? (Other; Modern urban detached house, apartment in an apartment building, condominium, or rural house of brick, stone, or concrete)
4.	805	Does the residence have a washbasin? (No; Yes)
5.	803	How many people are in the household? (10 or more; 8 or 9; 7; 5 or 6; 4 to 1)
6.	778	Do all children ages 6 to 14 attend school? (No; Yes; No children 6-14)
7.	761	Does the household own a food processor? (No; Yes)
8.	739	How does the household dispose of sewage? (Other; septic tank, cesspit, or latrine; sanitary sewer)
9.	690	How many people aged 6 to 14 are in the household? (4 or more; 3; 2; 1; none)
10.	667	Does the household own a telephone (land-line or mobile)? (No; Yes)
11.	652	What is the household's principle source of drinking water? (public or private irrigation canal; artesian springs, for-pay wells, unmanaged public pumps, or others; Free wells, household water-collection point, streams, or none; piped to the residence, water seller, water truck, or private well)
12.	635	Do all children ages 6 to 11 attend school? (No; Yes; No children 6-11)
13.	618	What type of electric meter does the household have? (None (no electricity); shared; individual)
14.	614	Does the household use wood for cooking? (Yes; No)
15.	599	Does the household own an automobile or motorcycle? (No; Yes)
16.	585	Does the residence have a shower? (No; Yes)
17.	563	Does the residence have electricity? (No; Yes)
18.	554	Do all children ages 6 to 17 attend school? (No; Yes; No children 6-17)
19.	539	How does the household dispose of its garbage? (Other; Community trash dumpster, or pick-up by a municipal trash truck)
20.	519	Does the household burn wood? (Yes; No)
21.	511	Does the household own a stand-alone oven? (No; Yes)
22.	508	Do all girls ages 6 to 14 attend school? (No; Yes; No girls 6-14)
23.	502	Does the household use wood for cooking, heating water, or heating rooms? (Yes; No)
24.	501	Does the household use charcoal for cooking? (Yes; No)
25.	496	Does the household own a VCR? (No; Yes)

Source: *1998/9 Enquete Nationale sur les Niveaux de Vie des Ménages* by Morocco's Direction de la Statistique.

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

	Uncertainty coefficient	Indicator (Answers ordered starting with those most strongly associated with poverty)
26.	489	What is the highest education attained by a household member? (Less than first cycle of fundamental or primary; First cycle of fundamental or primary; Second cycle of fundamental or first cycle of secondary; Secondary or second cycle of secondary; Superior or higher)
27.	481	Does the household own a stereo-cassette player? (No; Yes)
28.	466	Does the household own a non-electric stove? (No; Yes)
29.	465	Has any household member received a diploma or had professional training? (No; Yes)
30.	464	Do all girls ages 6 to 17 attend school? (No; Yes; No girls 6-17)
31.	459	Does the household use charcoal for cooking, heating water, or heating rooms? (Yes; No)
32.	451	Does the residence have piped drinking water? (No; Yes)
33.	440	How many gas cylinders does the household own? (None or 1; 2; 3; 4 or more)
34.	438	How many household members worked as own-account farmers in the past seven days? (1 or more; none)
35.	416	Does the household use charcoal? (Yes; No)
36.	367	Do all girls ages 6 to 11 attend school? (No; Yes; No girls 6-11)
37.	362	Does the household pay property taxes? (No; Yes)
38.	356	Can the male head/spouse read and write in Arabic or in French? (No; Yes)
39.	351	Do all males ages 6 to 25 attend school? (No; Yes; No males 6-25)
40.	343	Can the female head/spouse read and write in Arabic? (No; Yes)
41.	335	Does the household have any donkeys? (Yes; Has some livestock, but no donkeys; Does not have any livestock)
42.	329	Can anyone in the household can read and write French? (No; Yes)
43.	327	Can anyone in the household can read and write in more than one language? (No; Yes)
44.	326	Do all females ages 6 to 25 attend school? (No; Yes; No females 6-25)
45.	309	Does the household have any goats? (Yes; Has livestock, but no goats; Does not have any livestock)
46.	307	Can the female head/spouse can read and write? (No; Yes)
47.	304	Did the household farm 6 or more hectares of land in the most recent growing season? (No; Yes)
48.	302	Does the household have any livestock? (Yes; No)
49.	300	Do all household members ages 6 to 25 attend school? (No; Yes; No household members 6-25)
50.	300	What is the education of the female head/spouse? (Less than first cycle of fundamental or primary; First cycle of fundamental or primary or higher, or no female head/spouse)

Source: *1998/9 Enquete Nationale sur les Niveaux de Vie des Ménages* by Morocco's Direction de la Statistique.

Figure 4: Indicateurs de la pauvreté pour leur coefficient d'incertitude

	Coefficient d'incertitude	Indicateur (Réponses en ordre pour l'association avec la pauvreté)
1.	1039	Les membres de votre ménage possédent-ils des T.V. couleur? (Non; Oui)
2.	940	Les membres de votre ménage possédent-ils des réfrigérateurs avec/sans casier de congélation? (Non; Oui)
3.	887	Quel est le type de logement occupé par le ménage? (Maison rural en pisé, pierres sèches, pierres couvertes de boue, autres, chambre dans un établissement/lieu non destiné initialement à l'habitat, maison traditionelle de type urbain, baraque et habitat sommaire; Maison rurale en dur, villa/niveau d'une villa, appartement dans un inmeuble, maison moderne de type urbain)
4.	805	Disposez-vous d'un lavabo? (Non; Oui)
5.	803	Combien de personnes habitent dans le ménage? (10 ou plus; 8 ou 9; 7; 5 ou 6; 4 à 1)
6.	778	Vont-t-ils à l'école touts les enfants du ménage âgés de 6 à 14 ans? (Non; Oui; Il n'y a pas des enfants âgés de 6 à 14 ans)
7.	761	Les membres de votre ménage possédent-ils des robots (mixeur, hachoir, presse-fruits)? (Non; Oui)
8.	739	Comment évacuez-vous vos eaux usées? (Jetées dans la nature, aucune, ou autres; Fosse septique, fosse d-aisance ou latrines; Egout)
9.	690	Combien de personnes âgées de 6 à 14 ans habitent dans le ménage? (4 ou plus; 3; 2; 1; Aucune)
10.	667	Disposez-vous du téléphone (mobile et/ou fixe)? (Non; Oui)
11.	652	Quelle est la source principale d'eau potable utilisée par votre ménage? (Source, oued, puits collectif non aménagé, bournes fontaines payantes, métfia collective ou privée, autres ou aucune; Réseau raccordé au logement, seguia, point d'eau collectif à ménage, bournes fontaines gratuites, vendeur d'eau, camion citerne, ou puits privé)
12.	635	Vont-t-ils à l'école touts les enfants du ménage âgés de 6 à 11 ans? (Non; Oui; Il n'y a pas des enfants âgés de 6 à 11 ans)
13.	618	Disposez-vous d'un compteur collectif ou individuel d'électricité? (Il n'y a pas d'électricité; collectif; individuel)
14.	614	Utilisez-vous du bois pour la cuisson? (Oui; Non)
15.	599	Votre ménage dispose-t-il d'un (ou plusier) véhicule ou motorcycle? (Non; Oui)
16.	585	Disposez-vous d'une douche? (Non; Oui)
17.	563	Disposez-vous de l'électricité? (Non; Oui)
18.	554	Vont-t-ils à l'école touts les enfants du ménage âgés de 6 à 17 ans? (Non; Oui; Il n'y a pas des enfants âgés de 6 à 17 ans)
19.	539	Comment votre ménage se débarrasse-t-il de ses ordures? (Jetée dans la nature; Poubelle communale de collecte des ordures, ramassage direct par le camion municipal, autres, ou aucune)
20.	519	Utilisez-vous du bois dans votre logement? (Oui; Non)
21.	511	Les membres de votre ménage possédent-ils des fours à gaz indépendants? (Non; Oui)
22.	508	Vont-t-elles à l'école toutes les jeunes filles du ménage âgées de 6 à 14 ans? (Non; Oui; Il n'y a pas des jeunes filles âgées de 6 à 14 ans)
23.	502	Utilisez-vous du bois dans votre logement pour la cuisson, pour chauffer l'eau, ou pour chauffer le local? (Oui; Non)
24.	501	Utilisez-vous du charbon de bois pour la cuisson? (Oui; Non)
25.	496	Les membres de votre ménage possédent-ils des enregistreurs vidéo (magnétoscopes)? (Non; Oui)

Source: *1998/9 Enquete Nationale sur les Niveaux de Vie des Ménages* par la Direction de la Statistique au Maroc.

Figure 4 (suite): Indicateurs de la pauvreté pour leur coefficient d'incertitude

	Coefficient d'incertitude	Indicateur (Réponses en ordre pour l'association avec la pauvreté)
26.	489	Quel est le plus haut niveau de scolarité que a atteint quelqu'un du ménage? (N'a pas atteint le premier cycle du fondamental ou primaire; Premier cycle du fondamental ou primaire; Deuxieme cycle du fondamental ou premier cycle du secondaire; Secondaire ou deuxieme cycle du secondaire, ou superieur ou plus)
27.	481	Les membres de votre ménage possédent-ils des radio-cassettes? (Non; Oui)
28.	466	Les membres de votre ménage possédent-ils des cuisinières non électriques? (Non; Oui)
29.	465	A-t-il quelqu'un dans le ménage qui a reçu un diplôme ou formation professionnelle? (Non; Oui)
30.	464	Vont-t-elles à l'école toutes les jeunes filles du ménage âgées de 6 à 17 ans? (Non; Oui; Il n'y a pas des jeunes filles âgées de 6 à 17 ans)
31.	459	Utilisez-vous du charbon du bois pour la cuisson, pour chauffer l'eau, ou pour chauffer le local? (Oui; Non)
32.	451	Votre logement est-il raccordé réseau d'eau potable? (Non; Oui)
33.	440	Combien possedez-vous de cylindres de gaz? (Aucun ou 1; 2; 3; 4 et plus)
34.	438	Combien des personnes dans le ménage ont travaillés au secteur privé agricole au cours des 7 derniers jours? (1 et plus; Aucun)
35.	416	Utilisez-vous du charbon de bois dans votre logement? (Oui; Non)
36.	367	Vont-t-elles à l'école toutes les jeunes filles du ménage âgées de 6 à 11 ans? (Non; Oui; Il n'y a pas des jeunes filles âgées de 6 à 11 ans)
37.	362	Est-ce que vous payez la taxe d-édilité? (Non; Oui)
38.	356	Sait-il le chef du ménage masculin lire et écrire l'arabe ou le français ? (Non; Oui)
39.	351	Vont-t-ils à l'école touts les garçons du ménage âgés de 6 à 25 ans? (Non; Oui; Il n'y a pas des garçons âgés de 6 à 25 ans)
40.	343	Sait-elle le chef du ménage feminin lire et écrire l'arabe? (Non; Oui)
41.	335	Est-ce votre ménage élève actuellement des anes? (Oui; On élève du bétail, mais pas des anes; On n'élève pas du bétail)
42.	329	A-t-il quelqu'un dans le ménage qui sait lire et écrire le français? (Non; Oui)
43.	327	A-t-il quelqu'un dans le ménage qui sait lire et écrire una langue moins que l'arabe ou le français? (Non; Oui)
44.	326	Vont-t-elles à l'école toutes les jeunes filles du ménage âgées de 6 à 25 ans? (Non; Oui; Il n'y a pas des jeunes filles âgées de 6 à 25 ans)
45.	309	Est-ce votre ménage élève des chèvres et cabris actuellement? (Oui; On élève du bétail, mais pas des chèvres et cabris; On n'élève pas du bétail)
46.	307	Sait-t-elle le chef du ménage feminin lire et écrire? (Non; Oui)
47.	304	Est-ce la superficie totale des parcelles cultivée par le ménage au cours de la campagne écoulée plus de 6 hectares? (Non; Oui)
48.	302	Est-ce votre ménage élève des bétail actuellement? (Oui; Non)
49.	300	Vont-t-ils à l'école touts les enfants du ménage âgés de 6 à 25 ans? (Non; Oui; Il n'y a pas des enfants âgés de 6 à 25 ans)
50.	300	Quel est le plus haut niveau de scolarité que le chef du ménage feminin a atteint? (N'a pas atteint le premier cycle du fondamental ou primaire; Premier cycle du fondamental ou primaire ou plus, ou il n'y pas de chef du ménage feminin)

Source: *1998/9 Enquete Nationale sur les Niveaux de Vie des Ménages* par la Direction de la Statistique au Maroc.

Figure 7: Scores and poverty likelihoods, national poverty line

Score	Poverty likelihood for people with score in range (%)	% of people <=score under line	% of people >score above line
0-4	84.2	84.2	78.8
5-9	67.1	71.9	80.5
10-14	54.6	61.0	84.0
15-19	47.6	55.1	88.3
20-24	31.8	47.8	91.6
25-29	16.0	40.2	93.1
30-34	25.8	37.7	97.2
35-39	7.1	33.7	98.2
40-44	3.1	30.1	98.5
45-49	6.5	28.5	99.7
50-54	1.0	26.3	100.0
55-59	0.0	25.0	100.0
60-64	0.0	24.1	100.0
65-69	0.0	23.0	100.0
70-74	0.0	22.4	100.0
75-79	0.0	22.1	100.0
80-84	0.0	22.1	100.0
85-89	0.0	22.0	0.0
90-94	0.0	22.0	0.0
95-100	0.0	22.0	0.0

Surveyed cases weighted to represent Morocco's population.

Based on *1998/99 Enquete Nationale sur les Niveaux de Vie des Ménages*

Figure 8: Scores and poverty likelihoods, USAID's "extreme" poverty line

Score	Poverty likelihood for people with score in range (%)	% of people <=score who are poor	% of people >score who are non-poor
0-4	68.6	68.6	90.2
5-9	46.7	52.9	91.6
10-14	26.3	36.1	93.4
15-19	20.5	29.3	95.2
20-24	11.8	23.8	96.4
25-29	7.7	19.9	97.2
30-34	13.5	18.8	99.5
35-39	1.4	16.6	99.7
40-44	1.1	14.7	100.0
45-49	0.0	13.7	100.0
50-54	0.0	12.6	100.0
55-59	0.0	12.0	100.0
60-64	0.0	11.6	100.0
65-69	0.0	11.1	100.0
70-74	0.0	10.7	100.0
75-79	0.0	10.6	100.0
80-84	0.0	10.6	100.0
85-89	0.0	10.6	100.0
90-94	0.0	10.6	100.0
95-100	0.0	10.6	100.0
Total:	10.6		

Surveyed cases weighted to represent Morocco's population.

Based on 1998/99 Enquete Nationale sur les Niveaux de Vie des Ménages

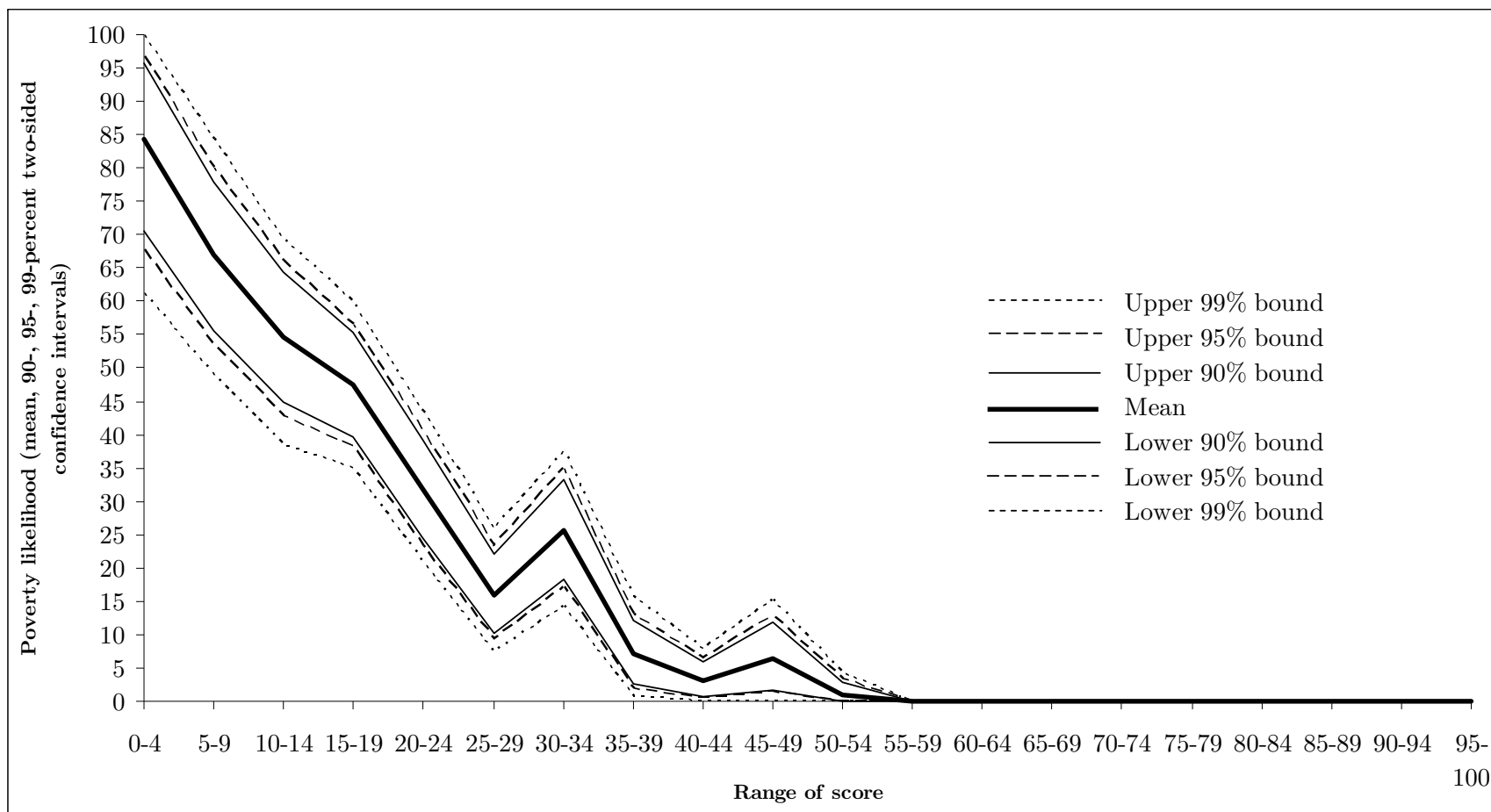# Figure 9: Confidence intervals for estimated poverty likelihoods, national poverty line

Figure 10: Confidence intervals for estimated poverty likelihoods, USAID "extreme" poverty line
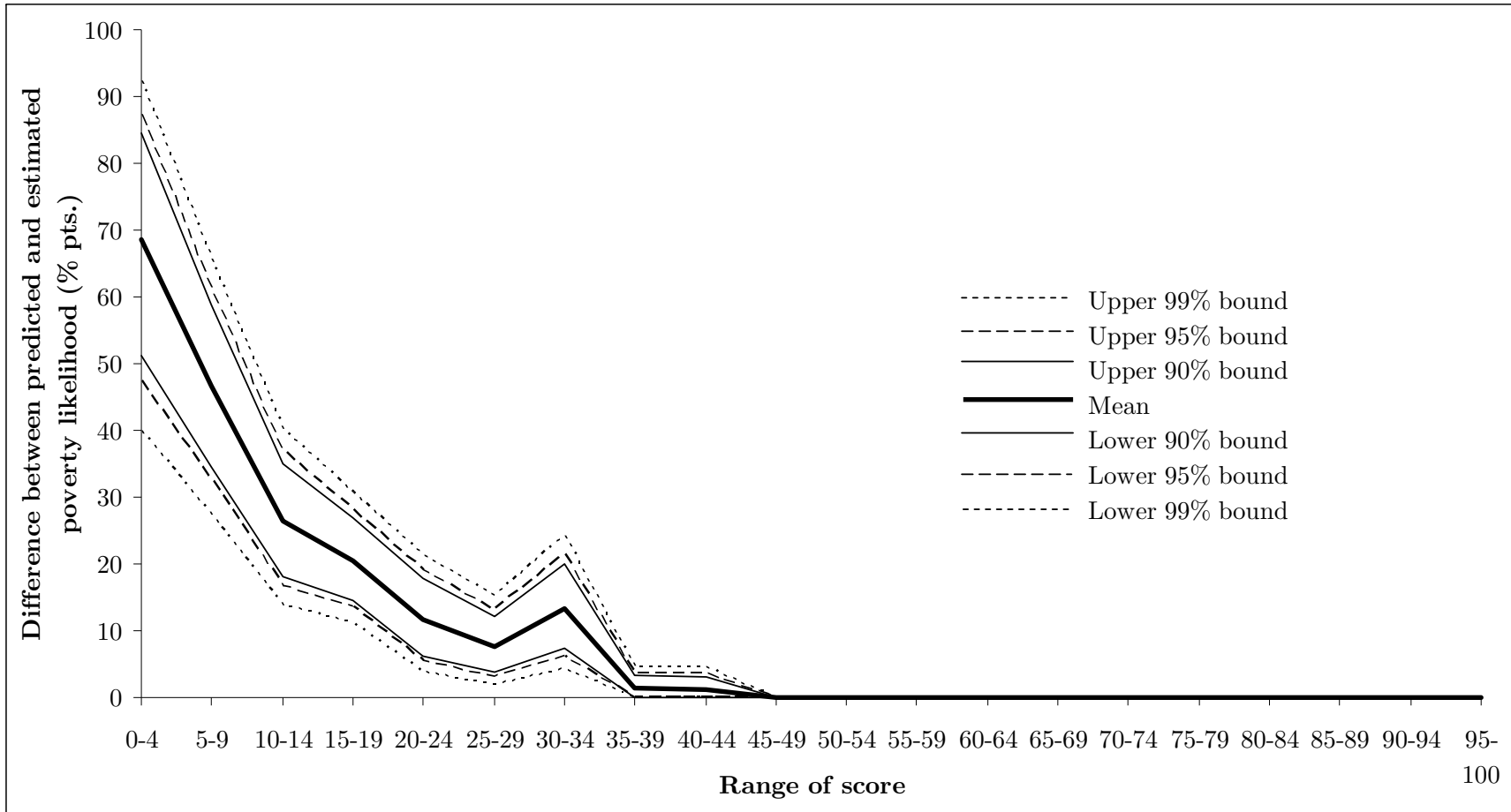
Figure 11: Bootstrapped confidence intervals for the estimated poverty likelihoods, associated with scores, all poverty lines

	Poverty line			
		USAID		
Confidence	National	"extreme"	$1/day	$2/day
90-percent	5.3	4.0	1.0	4.1
95-percent	6.3	4.7	1.2	5.0
99-percent	8.3	6.2	1.4	6.5

Intervals in units of +/- percentages points.

Figure 12: Bootstrapped differences between estimated and true poverty likelihoods, national poverty line
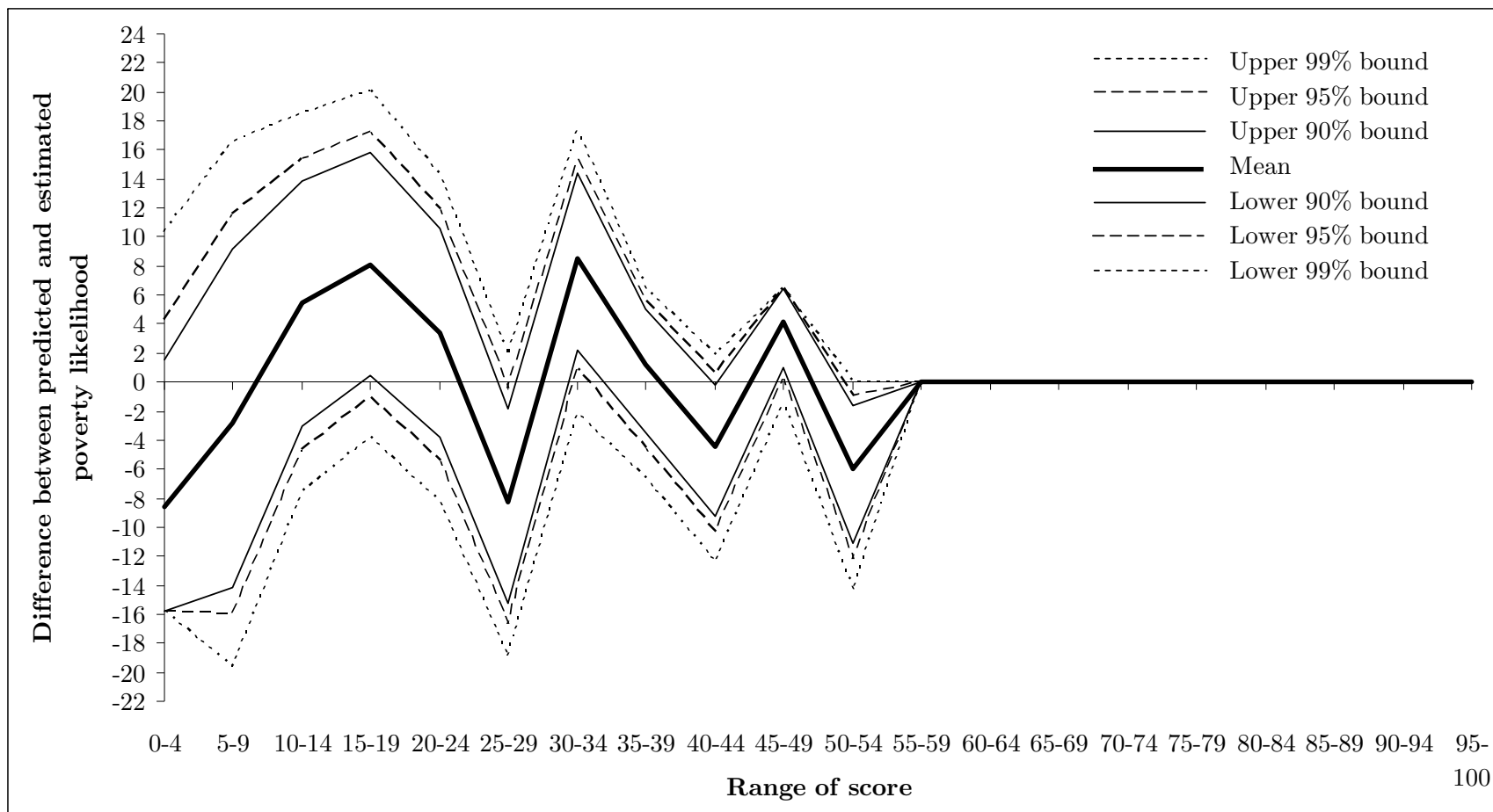
Figure 13: Bootstrapped differences between estimated and true poverty likelihoods, USAID "extreme" poverty line
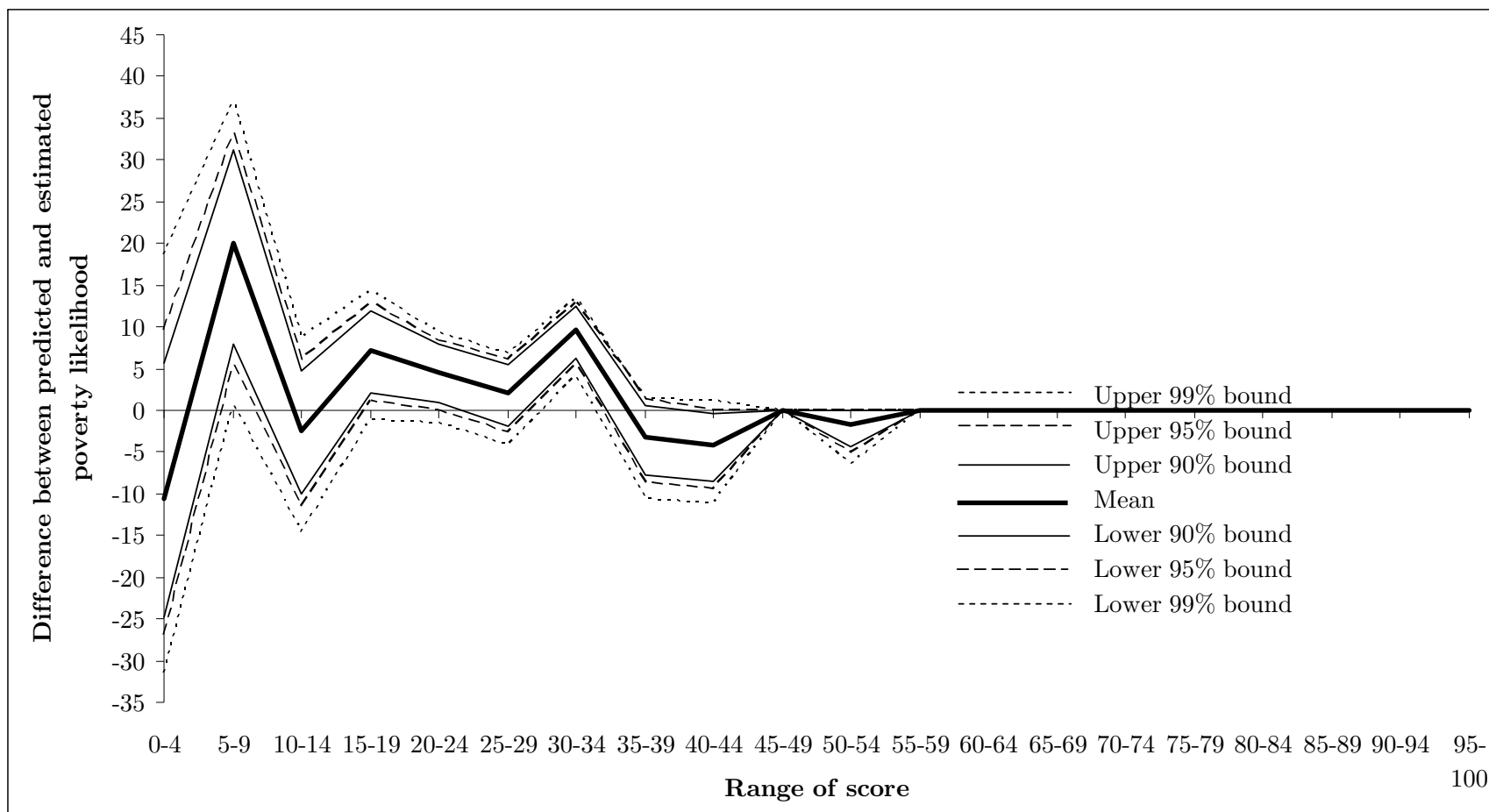
Figure 14: Bootstrapped confidence intervals for differences between estimated and true poverty likelihoods, national poverty line and USAID "extreme" poverty line

	Poverty line			
	National	USAID "extreme"	$1/day	$2/day
Distribution of differences (percentage points)				
Mean	4.7	5.2	2.3	4.7
Confidence intervals (+/- percentage points)				
90-percent	11.9	9.0	2.1	9.8
95-percent	14.1	10.7	2.5	11.7
99-percent	18.4	13.9	3.3	15.2

Based on *1998/99 Enquete Nationale sur les Niveaux de Vie des Ménages*

Figure 15: ROC curve of ability to rank-order households by poverty status, national poverty line
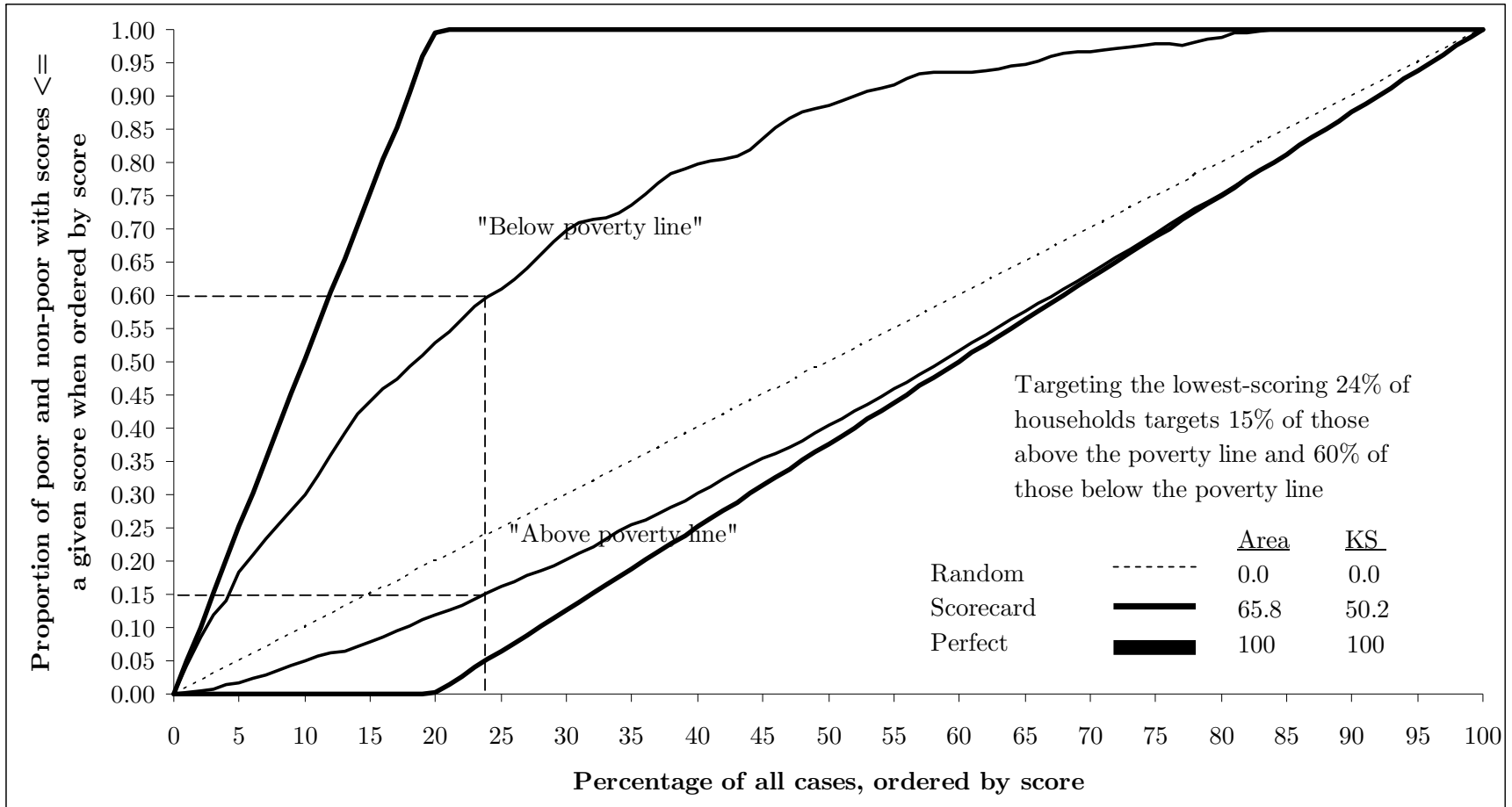
Figure 16: ROC curve of ability to rank-order households by poverty status, USAID "extreme" poverty line

Proportion of poor and non-poor with scores <= a given score when ordered by score

"Below poverty line"

"Above poverty line"

Targeting the lowest-scoring 16% of households targets 12% of those above the poverty line and 60% of those below the poverty line

		Area	KS
Random	---------	0.0	0.0
Scorecard	———	66.1	50.7
Perfect	▬▬▬	100	100

Percentage of all cases, ordered by score
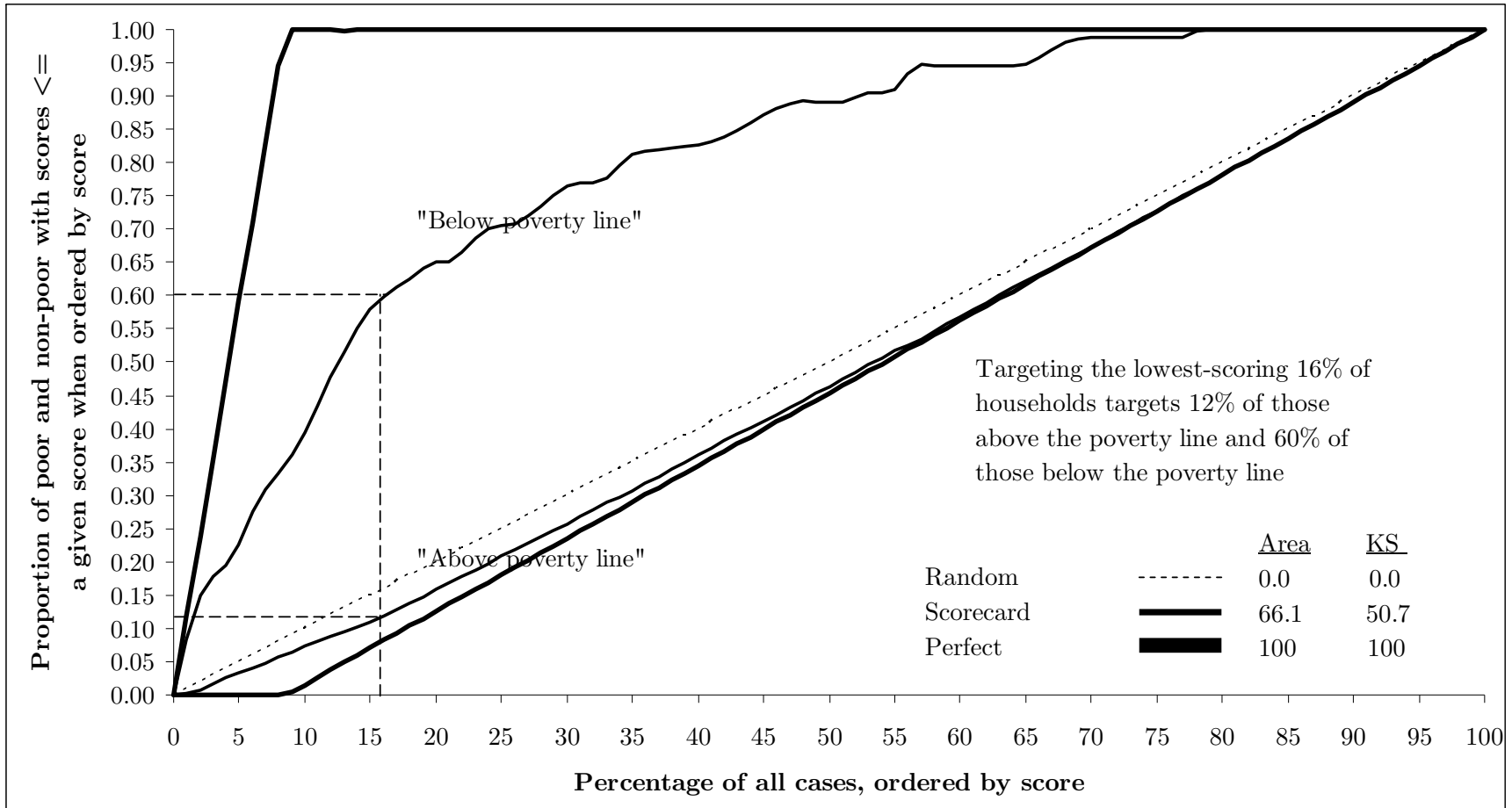
Figure 17: Bootstrapped estimates of accuracy of estimated overall poverty rates, all poverty lines

	Poverty line			
	National	USAID "extreme"	$1/day	$2/day
Distribution of differences (percentage points)				
Mean	2.18	2.13	0.19	1.49
Stardard deviation	0.98	0.72	0.25	0.77
Confidence intervals (+/- percentage points)				
90-percent	1.6	1.2	0.4	1.3
95-percent	1.9	1.4	0.5	1.5
99-percent	2.5	1.9	0.7	2.0

Based on *1998/99 Enquete Nationale sur les Niveaux de*

Figure 18: General classification matrix

		Targeting segment	
		Targeted	**Non-targeted**
True poverty status	**Above poverty line**	**A.** Under poverty line correctly targeted	**B.** Under poverty line mistakenly non-targeted
	Below poverty line	**C.** Above poverty line mistakenly targeted	**D.** Above poverty line correctly non-targeted

Figure 19: People by targeting classification and score, national poverty line

Score	A. Under poverty line correctly targeted	B. Under poverty line mistakenly non-targeted	C. Above poverty line mistakenly targeted	D. Above poverty line correctly non-targeted
0-4	1.2	20.9	0.2	77.7
5-9	3.5	18.5	1.4	76.6
10-14	8.2	13.9	5.2	72.7
15-19	13.1	8.9	10.7	67.3
20-24	16.6	5.5	18.1	59.9
25-29	18.3	3.7	27.2	50.7
30-34	20.8	1.2	34.4	43.5
35-39	21.4	0.7	42.0	36.0
40-44	21.6	0.4	50.2	27.7
45-49	22.0	0.1	55.3	22.7
50-54	22.0	0.0	61.7	16.3
55-59	22.0	0.0	66.2	11.8
60-64	22.0	0.0	69.3	8.7
65-69	22.0	0.0	73.8	4.2
70-74	22.0	0.0	76.5	1.4
75-79	22.0	0.0	77.6	0.4
80-84	22.0	0.0	77.9	0.0
85-89	22.0	0.0	78.0	0.0
90-94	22.0	0.0	78.0	0.0
95-100	22.0	0.0	78.0	0.0

Figures normalized to sum to 100.

Based on *1998/99 Enquete Nationale sur les Niveaux de Vie des Ménages*

Figure 20: People by targeting classification and score, USAID "extreme" poverty line

Score	A. Under poverty line correctly targeted	B. Under poverty line mistakenly non-targeted	C. Above poverty line mistakenly targeted	D. Above poverty line correctly non-targeted
0-4	1.0	9.6	0.4	89.0
5-9	2.6	8.0	2.3	87.1
10-14	4.8	5.7	8.6	80.8
15-19	7.0	3.6	16.8	72.6
20-24	8.2	2.4	26.4	63.0
25-29	9.1	1.5	36.5	53.0
30-34	10.4	0.2	44.8	44.6
35-39	10.5	0.1	52.9	36.5
40-44	10.6	0.0	61.3	28.1
45-49	10.6	0.0	66.6	22.8
50-54	10.6	0.0	73.1	16.3
55-59	10.6	0.0	77.6	11.8
60-64	10.6	0.0	80.8	8.7
65-69	10.6	0.0	85.2	4.2
70-74	10.6	0.0	88.0	1.4
75-79	10.6	0.0	89.1	0.4
80-84	10.6	0.0	89.4	0.0
85-89	10.6	0.0	89.4	0.0
90-94	10.6	0.0	89.4	0.0
95-100	10.6	0.0	89.4	0.0

Figures normalized to sum to 100.

Based on 1998/99 Enquete Nationale sur les Niveaux de Vie des Ménages

Figure 21: General net-benefit matrix

		Targeting segment	
		Targeted	**Non-targeted**
True poverty status	**Above poverty line**	α	β
	Below poverty line	γ	δ

Figure 22: "Total Accuracy" net-benefit matrix

		Targeting segment	
		Targeted	**Non-targeted**
True poverty status	**Above poverty line**	1	0
	Below poverty line	0	1

Figure 23: Total net benefit for some common net-benefit matrices and BPAC, national poverty line

Score	Total Accuracy (A + B)		Poverty Accuracy 100*A / (A+B)		Non-poverty Accuracy 100*D / (C+D)		Undercoverage 100*B / (A+B)		Leakage 100*C / (A+C)		BPAC (A-|B-C|)
	1	0	1	0	0	0	0	-1	0	0	x
	0	1	0	0	0	1	0	0	-1	0	[100/(A+B)]
0-4	78.9		5.3		99.7		94.7		15.8		-88.3
5-9	80.1		16.1		98.2		83.9		28.1		-61.5
10-14	80.9		37.1		93.3		62.9		39.0		-2.0
15-19	80.4		59.4		86.3		40.6		44.9		51.6
20-24	76.4		75.1		76.8		24.9		52.2		18.0
25-29	69.0		83.0		65.1		17.0		59.8		-23.5
30-34	64.3		94.4		55.8		5.6		62.3		-56.1
35-39	57.3		97.0		46.1		3.0		66.3		-90.5
40-44	49.3		98.1		35.6		1.9		69.9		-127.9
45-49	44.7		99.7		29.1		0.3		71.5		-150.6
50-54	38.3		100.0		20.9		0.0		73.7		-179.7
55-59	33.8		100.0		15.1		0.0		75.0		-200.1
60-64	30.7		100.0		11.1		0.0		75.9		-214.4
65-69	26.2		100.0		5.4		0.0		77.0		-234.6
70-74	23.5		100.0		1.8		0.0		77.6		-247.1
75-79	22.4		100.0		0.5		0.0		77.9		-252.0
80-84	22.1		100.0		0.1		0.0		77.9		-253.4
85-89	22.0		100.0		0.0		0.0		78.0		-253.6
90-94	22.0		100.0		0.0		0.0		78.0		-253.6
95-100	22.0		100.0		0.0		0.0		78.0		-253.6

All figures in percentage units.

Figure 24: Total net benefit for some common net-benefit matrices and BPAC, USAID "extreme" poverty line

Score	Total Accuracy (A + B)		Poverty Accuracy 100*A / (A+B)		Non-poverty Accuracy 100*D / (C+D)		Undercoverage 100*B / (A+B)		Leakage 100*C / (A+C)		BPAC (A-|B-C|)
	1	0	1	0	0	0	0	-1	0	0	x
	0	1	0	0	0	1	0	0	-1	0	[100/(A+B)]
0-4	89.9		9.1		99.5		90.9		31.4		-77.7
5-9	89.7		24.6		97.4		75.4		47.1		-28.8
10-14	85.7		45.7		90.4		54.3		63.9		19.0
15-19	79.6		65.7		81.2		34.3		70.7		-58.7
20-24	71.2		77.8		70.5		22.2		76.2		-149.4
25-29	62.0		85.7		59.2		14.3		80.1		-244.2
30-34	55.0		98.0		49.9		2.0		81.2		-323.4
35-39	47.0		99.1		40.9		0.9		83.4		-399.3
40-44	38.7		100.0		31.5		0.0		85.3		-478.8
45-49	33.4		100.0		25.5		0.0		86.3		-529.4
50-54	26.9		100.0		18.2		0.0		87.4		-590.5
55-59	22.4		100.0		13.2		0.0		88.0		-632.9
60-64	19.2		100.0		9.7		0.0		88.4		-662.6
65-69	14.8		100.0		4.7		0.0		88.9		-704.8
70-74	12.0		100.0		1.6		0.0		89.3		-730.7
75-79	10.9		100.0		0.4		0.0		89.4		-741.0
80-84	10.6		100.0		0.1		0.0		89.4		-743.9
85-89	10.6		100.0		0.0		0.0		89.4		-744.3
90-94	10.6		100.0		0.0		0.0		89.4		-744.3
95-100	10.6		100.0		0.0		0.0		89.4		-744.3

All figures in percentage units.

Figure 25: "Poverty Accuracy" net-benefit matrix

True poverty status		Targeting segment	
		Targeted	**Non-targeted**
	Above poverty line	1	0
	Below poverty line	0	0