Targeting with the PPI®

METHODS AND RECOMMENDED PRACTICES

Organizations with a mission to serve the poor realize the importance of directing their services to those who need them most, so many specifically target the poorest. The PPI provides a quick, efficient means to target customers or clients based on their probable poverty level. Client selection can be based on PPI data alone or on a combination of criteria as part of a more complex screening process.

In this guide, we focus on using the PPI to estimate poverty for targeting purposes, though it is important to also consider other desirable client characteristics beyond their poverty when developing a targeting strategy. As a starting point, managers should ask themselves which characteristics are most important for potential clients to possess and whether targeting based on those characteristics will allow an organization to meet its goals. For example, if part of an organization's mission is to improve the lives of children, the number of children in a household would likely be a good screening criterion.

This guide explores different methods of using the PPI to target clients, discusses recommended targeting practices, and describes limitations to consider.

Starting out

The first step as mentioned above is to determine your organization's goals and whether targeting can serve those goals. Then set a cut-off poverty score for inclusion into a program. The PPI look-up table groups PPI scores into sets of five, and the highest number in each of these ranges is used as the cut-off score. A cut-off score divides households into two categories: those at or below the cut-off score that are more likely to be poor and those above it that are less likely to be poor.

It would be incorrect to conclude that all households with a score at or below a cut-off score are poor and those with a higher score are not. Targeting status and poverty status are not the same. Poverty status is a fact that reflects a household's expenditure falling below a poverty line but is very difficult to determine. In contrast, targeting status depends on an indirect measurement, in this case the PPI. Successful targeting occurs when those households truly at or below a poverty line are included into a program and those above a poverty line are excluded.[1]

The results of targeting depend on the PPI cut-off score used, as well as the inclusion of other targeting criteria. Any form of targeting with the PPI (or any other poverty measurement tool) will lead to four outcomes:

- **Inclusion:** Desired clients are correctly targeted.
- **Exclusion:** Undesired clients are correctly excluded from a program.
- **Undercoverage:** Desired clients are mistakenly excluded from a program.
- **Leakage:** Undesired clients are mistakenly targeted.

[1] Mark Schreiner. (2009) "A Simple Poverty Scorecard for Fiji", **http://www.microfinance.com/English/Papers/Scoring_Poverty_Fiji_2008_EN.pdf,** retrieved 15 June 2014.

Inclusion and exclusion are successful outcomes, while undercoverage and leakage are undesired outcomes. All four outcomes are inevitable using the PPI (or any other poverty-measurement tool) in practical implementations of a targeting strategy because while the PPI provides a great deal of information, it cannot determine with 100% certainty a household's poverty status. Because of this, organizations must understand each outcome before selecting a cut-off score. Effecting a change in one outcome will impact the others. For example, increasing inclusion will lower undercoverage, but it will raise leakage and lower exclusion. Inclusion and leakage move together, as do exclusion and undercoverage. Increasing one increases the other. Table 1 shows how changing one outcome will impact the other three outcomes.

Table 1: Impact of an increase or decrease in each outcome

		Inclusion	Exclusion	Undercoverage	Leakage
Increase	**Inclusion**	-	↓	↓	↑
	Exclusion	↓	-	↑	↓
	Undercoverage	↓	↑	-	↓
	Leakage	↑	↓	↓	-
Decrease	**Inclusion**	-	↑	↑	↓
	Exclusion	↑	-	↓	↑
	Undercoverage	↑	↓	-	↑
	Leakage	↓	↑	↑	-

Because the cut-off score excludes clients who score too high, making the cut-off score higher will result in more clients qualifying for the program, and as a by-product more undesirable clients will be included. Conversely, lowering the cut-off score will make the program more selective and can potentially exclude desirable clients. In other words, raising the cut-off score will increase inclusion and leakage, and lowering the cut-off score will increase exclusion and undercoverage.

The following questions must be asked when determining a cut-off score:

- At which point does providing services to an undesired, non-poor household outweigh the benefits of reaching an additional poor household?
- How comfortable are the organization and its employees with excluding a poor household (undercoverage) in order to avoid leakage?
- Are there other targeting criteria that could be paired with the PPI to improve targeting accuracy?

Furthermore, management must determine how the organization treats these two groups. For instance, the group more likely to be poor may be automatically included into the program while the other group is excluded. Alternatively, the group less likely to be poor could be screened again using another tool or other client characteristics to determine eligibility.

Selecting a cut-off score

Cut-off scores can be selected in one of two ways, which are discussed below. The first focuses on targeting outcomes and the second aims to achieve a desired poverty rate.

Targeting based on targeting outcomes	Targeting based on poverty rates
1. Assign net benefits and net costs to each of the four targeting outcomes. 2. Select a cut-off score that maximizes net benefit.	1. Choose a desired poverty rate. 2. Select the cut-off score that most closely approximates the desired poverty rate.

Using targeting outcomes to maximize net benefit

Above we explained four targeting outcomes: inclusion, exclusion, undercoverage and leakage. Different cut-off scores are associated with different levels of these outcomes. Since it would be useful to know the relative incidence of each of these four outcomes that one should expect using various cut-off scores, Mark Schreiner of Microfinance Risk Management, L.L.C. creates a table summarizing these outcomes for every PPI at all poverty lines. This table is included in each Design Documentation Memo. Table 2 below was extracted from the 2009 PPI for India and presents the percentages for each outcome when using various cut-off scores. These percentages were derived using a sample of the population on which the PPI was built.

Table 2: Target composition by cut-off score for Poverty Line*

Cut-off Score	Inclusion	Undercoverage	Leakage	Exclusion	Total Accuracy
4	1.3	17.1	0.4	81.2	82.5
9	3.7	14.8	1.8	79.7	83.4
14	7.0	11.4	4.8	76.8	83.8
19	10.4	8.0	9.9	71.7	82.1
24	12.6	5.9	15.9	65.7	78.2
29	14.7	3.7	23.8	57.7	72.4
34	16.4	2.0	33.4	48.2	64.6
39	17.3	1.1	41.6	40.0	57.3
44	17.9	0.5	49.4	32.2	50.1
49	18.2	0.2	55.9	25.7	43.9
54	18.3	0.1	61.8	19.8	38.1
59	18.4	0.0	66.9	14.7	33.0
64	18.4	0.0	71.3	10.3	28.7
69	18.4	0.0	74.5	7.1	25.5
74	18.4	0.0	77.0	4.6	23.0
79	18.4	0.0	79.1	2.5	20.9
84	18.4	0.0	80.4	1.2	19.6
89	18.4	0.0	81.2	0.4	18.8
94	18.4	0.0	81.6	0.0	18.4
100	18.4	0.0	81.6	0.0	18.4

Inclusion, undercoverage, leakage, and exclusion normalized to sum to 100.
This table was modified from Figure 10 of the Design Documentation Memo for India, found on page 97.

Take a moment to review the data in each of these columns. Note that each row's percentages for inclusion, undercoverage, leakage and exclusion sum to 100%. This table shows us, for any cut-off score, the expected percentage of each outcome when applied to a population. For example, using a cut-off score of 24, 12.6% of a population is expected to be correctly targeted as below the poverty line while 5.9% of the population is actually poor but excluded. Likewise, 15.9% of the population will be included into this program in spite of being above the poverty line (leakage) while 65.7% of the population will be correctly excluded (exclusion). The column "Total Accuracy" sums both inclusion and exclusion and is

included because it is a simple way to assess accuracy across all four possible targeting outcomes. Total Accuracy may not be sufficient for organizations that worry about undercoverage or who are unconcerned by excluding non-poor clients.

Step 1. Assign net benefits and net costs to each of the four targeting outcomes.

For each of these four outcomes, management assigns values that reflect the degree to which the outcome is viewed as acceptable or unacceptable. Doing so translates the mission and values of the organization into weights to be applied in targeting. These weights can be any value (e.g., 1 or 100) -- but their relative difference should reflect the values of the organization. For example, if inclusion is valued twice as much as exclusion, appropriate weights could be 1 and 2 or 5 and 10, as long as the weight for inclusion is double the weight for exclusion. Another way to think about it assigning weights is to ask yourself how many cases of leakage you are willing to accept to achieve one case of inclusion? Then that figure is the weight for inclusion, and 1 is the weight for exclusion. Typically you can get away with just putting weights on inclusion and exclusion (or equivalently, on undercoverage and leakage) and leaving the other weights at zero because the other two move more or less in sync.

Assigning weights to each of the four outcomes is a difficult step because it is subjective and requires careful consideration. Questions to be asked are: How important is successful inclusion? Is successful exclusion equally as important? Will leakage take too many resources away from those that could use them? Does undercoverage impact the effect of the program? These questions are illustrative of common concerns, but are not exhaustive.

It is important to remember that there will always be targeting errors with any poverty-measurement tool – none will succeed in causing only inclusion and exclusion with no errors.

Step 2. Review cut-off scores that lead to the highest net benefits and select the score that is most feasible.

Once these values, or weights, are determined, multiply them by the relevant percentages listed for each cut-off score. The sum of these products is called the net benefit[2] and is calculated as follows:

Net Benefit =	(	Inclusion Weight	x	Inclusion Percentage	)	–
	(	Undercoverage Weight	x	Undercoverage Percentage	)	–
	(	Leakage Weight	x	Leakage Percentage	)	+
	(	Exclusion Weight	x	Exclusion Percentage	)	

Because selection of a cut-off score can impact operations and practices, it is best to consider three or four cut-off scores with the highest net benefits – not just the one with the highest. The following should be considered for each of these cut-off scores:

- The estimated percentage of all households in a country that would be included. This provides some indication of scale. A very small percentage may indicate that there would not be enough households included into the program to sustain the program or reach the desired number of participants. Conversely, a very high percentage, say 80 or 90 percent, may indicate that targeting is not necessary. In this case, simply include everyone.
- The estimated percentage of included clients who are poor. This is an estimate of the poverty rate that will be achieved using this cut-off score. This is also known as *poverty concentration*[3].

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

- The estimated percentage of poor households in the country that would be targeted. This provides an indication of the degree that poor households could be reached. Programs cannot expect to achieve these numbers at these cut-off scores – they simply represent the percentage of poor within a country that would be targeted with this cut-off score.

Because these percentages are so important, Mark Schreiner provides a table of them in every Design Documentation Memo, replicated here from the 2009 India PPI as Table 3.

Table 3: Target analysis by cut-off score for Poverty Line

Cut-off Score	% All Households that Are Targeted	% Targeted That Are Poor	% of Poor that Are Targeted	Poor Households Targeted Per Non-Poor Household Targeted
4	1.7	76.1	7.2	3.2 : 1
9	5.5	66.5	19.9	2.0 : 1
14	11.8	59.5	38.1	1.5 : 1
19	20.3	51.4	56.7	1.1 : 1
24	28.5	44.1	68.1	0.8 : 1
29	38.5	38.1	79.8	0.6 : 1
34	49.8	33.0	89.2	0.5 : 1
39	58.9	29.4	94.0	0.4 : 1
44	67.3	26.6	97.1	0.4 : 1
49	74.1	24.6	98.8	0.3 : 1
54	80.1	22.9	99.5	0.3 : 1
59	85.3	21.6	99.8	0.3 : 1
64	89.7	20.5	99.8	0.3 : 1
69	92.9	19.8	99.9	0.2 : 1
74	95.4	19.3	100.0	0.2 : 1
79	97.5	18.9	100.0	0.2 : 1
84	98.8	18.6	100.0	0.2 : 1
89	99.6	18.5	100.0	0.2 : 1
94	100.0	18.4	100.0	0.2 : 1
100	100.0	18.4	100.0	0.2 : 1

Example of Net Benefits Approach

Let's use a quick example to walk through the process of selecting a cut-off score using the net benefit approach.

Weights on Outcomes for Total Accuracy			
Inclusion	Undercoverage	Leakage	Exclusion
1	0	0	1

Total Accuracy corresponds to setting equal weights to inclusion and exclusion and disregarding undercoverage and leakage. The highest Total Accuracy net benefit is at the cut-off score that correctly targets and correctly excludes the highest number of households.

Based on the weights given to each outcome in this example, looking at Table 2 we can see that a cut-off score of 14 provides the highest net benefit of 83.5, though cut-off scores of 4, 9 and 19 also provide very similar net benefits, so they too should be considered. An organization may also look at Table 3 regarding

[3] http://www.povertyindex.org/blog/scale-vs-concentration-poverty-outreach

targeting analysis and determine that a cut-off score of 19 is ideal because 1 in 5 households will be targeted and over 50% of those targeted are estimated to be poor.

It is important to keep in mind that the tables available in each PPI Design Documentation Memo prepared by Mark Schreiner are representative of an entire country. The figures in the table would change depending on the region of the country an organization is operating in, but they offer objective data with which to make more informed decisions.

Other examples of setting weights

The above example uses just one of many possible weights for the four targeting outcomes. There is endless list of possibilities for choosing values that best align with your organization. When setting weights, it does not pay to try to get too fancy. There is no right or wrong, and what makes sense and is simple is probably enough. The simple questions to ask are: Is inclusion twice as valued as exclusion? Three times? Equal? What should not be asked is something similar to "Is inclusion 2.34 times more valuable than exclusion?" Also, it is easier to make all the weights positive or zero and not to include negative values.

Below we explore two other examples with different weights.

AVOIDING EXCLUSION

Many pro-poor institutions have a mission to serve only the poor, so exclusion of households above a poverty line is important to ensure that services are given to those most likely to be below the poverty line. To the right we see a possible valuation for this scenario, with exclusion of the non-poor three times as important as inclusion.

Weights on Outcomes for Total Accuracy			
Inclusion	Undercoverage	Leakage	Exclusion
1	0	0	3

Table 4: Target analysis by cut-off score for and associated weights and net benefits

Cut-off Score	Inclusion	Weight	Undercoverage	Weight	Leakage	Weight	Exclusion	Weight	Net Benefit
4	1.3	1	17.1	0	0.4	0	81.2	3	163.7
9	3.7	1	14.8	0	1.8	0	79.7	3	163.1
14	7.0	1	11.4	0	4.8	0	76.8	3	160.6
19	10.4	1	8.0	0	9.9	0	71.7	3	153.8
24	12.6	1	5.9	0	15.9	0	65.7	3	144.0

By using the net benefit equation above, we are able to calculate the net benefit for each cut-off score with these weights. Table 4 shows the net benefits for cut-off scores up to 24. (We've truncated the table for simplicity. Calculating net benefits for the remaining cut-off scores would not impact this example.) Net benefit is maximized at a cut-off score of 4. At this cut-off score, the four outcomes are as follows:

- Inclusion: 1.3% are below the line and correctly targeted
- Undercoverage: 17.1% are below the line and mistakenly excluded
- Leakage: 0.4% are above the line and mistakenly targeted
- Exclusion: 81.2% are above the line and correctly excluded

Note that cut-off scores of 9 and 14 also produce similar net benefits. Looking at Table 4, an organization may decide that a cut-off score of 9 is ideal because the percentage of targeted households that are poor is quite high, but more households are targeted in general. Also note that targeting using a cut-off score of 4 would lead to targeting just 1.3% of all households, so an organization might find itself with too few clients or customers.

INCLUSION OF POOR AND NOT CONCERNED ABOUT LEAKAGE

Other programs and organizations are more concerned with reaching the poor and avoiding undercoverage. Possible values for this outcome are displayed at right.

Weights on Outcomes for Total Accuracy			
Inclusion	Undercoverage	Leakage	Exclusion
5	5	1	1

Table 5: Target analysis by cut-off score for Poverty Line and associated weights and net benefits

Score	Inclusion	Weight	Undercoverage	Weight	Leakage	Weight	Exclusion	Weight	Net Benefit
4	1.3	5	17.1	5	0.4	1	81.2	1	1.8
9	3.7	5	14.8	5	1.8	1	79.7	1	22.4
14	7.0	5	11.4	5	4.8	1	76.8	1	50.0
19	10.4	5	8.0	5	9.9	1	71.7	1	73.8
24	12.6	5	5.9	5	15.9	1	65.7	1	83.3
29	14.7	5	3.7	5	23.8	1	57.7	1	88.9
34	16.4	5	2	5	33.4	1	48.2	1	86.8
39	17.3	5	1.1	5	41.6	1	40.0	1	79.4
44	17.9	5	0.5	5	49.4	1	32.2	1	69.8
49	18.2	5	0.2	5	55.9	1	25.7	1	59.8
54	18.3	5	0.1	5	61.8	1	19.8	1	49.0

Cut-off scores of 24, 29 and 34 appear appropriate for this valuation. To determine which is best, turn again to Table 3. Since the program is most concerned with reaching the poor, a cut-off score of 34 appears most appropriate given the high percentage of poor households targeted.

Conclusion

There are many ratios that can be used to relate the four targeting outcomes. How the organization decides to distribute these values depends on its mission and values as well as resource constraints and project sustainability. Once values have been determined, an organization should assign net benefits and consider those scores that lead to the highest net benefit. Then the targeting analysis, shown here as Table 3, should be reviewed to understand the consequences of each score.

Setting a desired poverty rate

Another option used for selecting a cut-off score is first to determine a desired poverty rate and then to find the cut-off score that most closely approximates this rate. You'll recall that the third column of Table 3 lists the estimated percentage of included households that fall below the poverty line. This can be interpreted as an estimated expected poverty rate. This method is most apt for organizations that have already set their own poverty outreach goals.

When using this method, remember to use the targeting analysis table built specifically for this purpose and not the Poverty Look-up Table. The Look-up Table cannot be used to estimate a poverty rate among those targeting based off a cut-off score.

Step 1. Determine a desired poverty rate.

Step 2. Reference the targeting analysis table in the Design Documentation Memo or measure the PPI distribution and poverty rates in the specific area of the program or intervention.

Table 3 shows the percentages of households targeted that are poor at each cut-off score. These are the estimated expected poverty rates of a client base. Using this table is the most cost-effective, timely way to select a cut-off score when an organization has already set its poverty outreach target.

However, there are shortcomings that must be acknowledged. These poverty tables are nationally representative, but because poverty rates vary across a country and within subgroups, the accuracy of results will vary depending on how different the particular client base is from the population of the country as a whole.

Instead of using the nationally representative tables, you may choose to create a similar table of PPI score distributions and poverty rates for the particular region in which you work. To do so, take the following steps:

1. Administer the PPI to a random and representative sample of households in the area in which your organization works. To determine an appropriate sample size, use the sample-size calculator for your country, found on the webpage for your country at **www.povertyindex.org**.
2. Determine the percentage of all households that are at or below each of the cut-off scores. List these percentages in a table in a column titled “percentage of all households that are targeted.”
3. For each cut-off score, average the poverty likelihoods of all households for the chosen poverty line. List these averages in the same table used in step 2 in a column titled “percentage targeted that are poor.”
4. To determine the poverty rate of all households in the locality the program is interested in, average all households’ likelihoods of falling under the poverty line. This is not necessary to determine a cut-off score, but is easily determined.

After completing these steps, you will have a table that looks like the one at the right that is specific to your geographical area. **This is not required and may require substantial staff time and cost.** In most instances, errors from application to non-nationally representative samples will not be so great as to warrant a project like this. Your organization may decide to use the tables available in the Design Documentation Memo.

Step 3. Select the cut-off score that achieves the desired poverty rate using the table or distribution from Step 2.

Table 3 shows that cut-off score of 19 is necessary to maintain a 50% poverty rate. Note that 20.3% of all households will be targeted.

Let’s use this example to understand why the Poverty Look-up Table should not be used to determine a cut-off score. If we chose to select a cut-off score associated with approximately a poverty likelihood of 50% using the Poverty Look-up Table (a section of which is shown in Table 6), we would target households with scores less than 15. The estimated poverty rate for this cut-off is 59.5%, as shown in Table 3, much higher than the desired rate.

Table 6: Partial Poverty Look-up Table

PPI Score	Poverty Likelihood
0–4	73.7
5–9	63.5
10–14	53.5
15–19	38

Pairing the PPI with other criteria for targeting

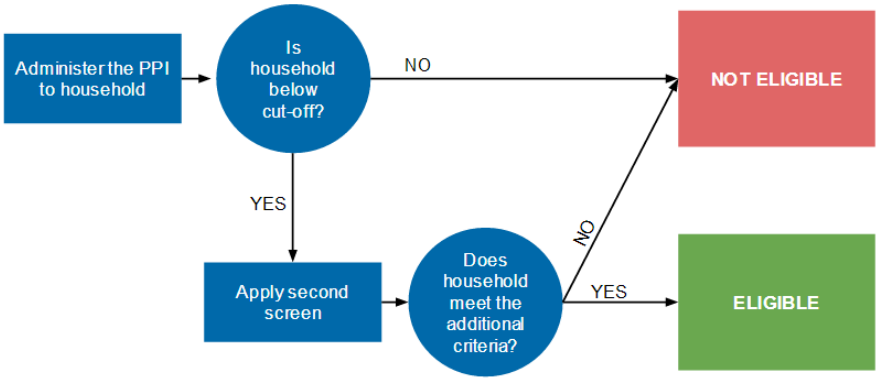
As mentioned, use of additional criteria, such as other demographic characteristics or the results from another poverty measurement tool, can help to improve the precision of an organization's targeting relative to its strategy. Many organizations have chosen to pair the PPI with other screening methods. The establishment of additional selection criteria helps to ensure that households selected into the program are truly the poorest based on the local context.

There are many ways to use the PPI in combination with other criteria. The first two examples apply the PPI as the first screen.

1. The PPI is administered; all targeted households are further screened.

Goal: Reduce leakage and increase exclusion.

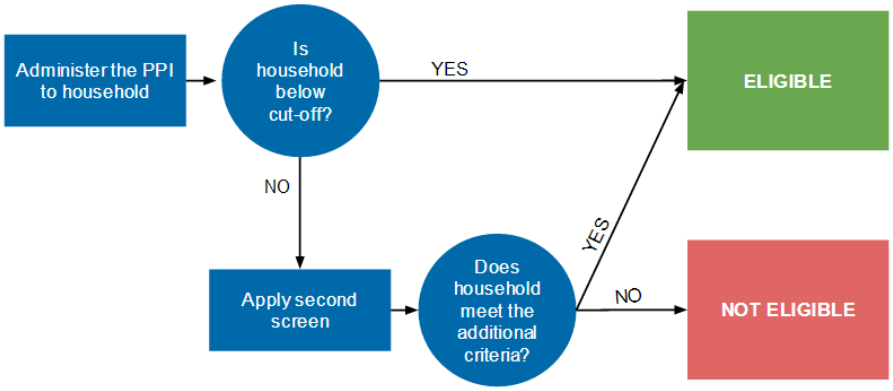
Consequence: The poverty rate will be greater than the estimated poverty rate in the targeting accuracy tables. The number of targeted households will decrease.



2. The PPI is administered; all excluded households are further screened.

Goal: Reduce undercoverage and increase inclusion.

Consequence: The poverty rate will be lower than estimated poverty rate. The number of targeted households will increase.



Alternatively, the PPI could be administered after the first screen is applied. The goal and consequences will be the same as those above, depending on whether targeted households or excluded households are further screened. Since more households will be evaluated using the first screen, it is recommended that the least time-consuming screen be applied first.

These two methods only employ two screens. Organizations may employ as many as they like, keeping in mind the target client that is desired. Doing so may increase cost, so organizations must weigh the incremental increase in precision to the increase in cost for applying an additional screen.

Conclusion

In each of the targeting methods discussed, there are trade-offs; a lower cut-off score will ensure higher poverty rates but lower inclusion and a higher cut-off score will result in lower poverty rates but greater inclusion. Furthermore, in general poverty status may be only one of multiple characteristics that determine a client's eligibility for acceptance. While there is no perfect method for targeting desired clients, but establishing a targeting strategy can help to focus your organization's outreach in ways that support its mission.