A method to monitor poverty dynamics among microfinance clients: An example using survey data from Bangladesh

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Abstract—This article presents a practical methodology to monitor poverty changes among microfinance clients using available household panel data. As an example, it presents an estimation of the net number of people that rose above the $1/day poverty line while members of Grameen Bank and BRAC during 1990 to 2006. The proposed method contributes to on-going efforts from microfinance practitioners to verify whether their clients are moving out of poverty and validate management strategies aiming to target new poor clients, and increase their share of poor clients over time. Estimates show that about 6.6 million people rose above the $1/day poverty line in 1990-2006 while members of Grameen or BRAC. This represents about 40 percent of the total number of poor people that crossed this poverty line during the same time period at the national level, which validates targeting strategies to reach the poor. However, further research is needed to quantify how much of this reduction in poverty was due to the services provided by Grameen and BRAC.

Key words: microfinance, poverty reduction, poverty monitoring, Bangladesh

Introduction

Donors and practitioners in microfinance are concerned about poverty outreach. To this end, they have developed several tools for assessing current poverty levels among microfinance clients. An early example is CGAP's Poverty Assessment Tool (PAT) (CGAP, 2003). Almost a decade since the publication of this tool, new initiatives are taking form to monitor how client poverty levels change over time. This paper is a result of one such initiative and proposes a practical method to monitor these changes.

As is the case for tools like the PAT, the proposed method does not suggest anything about the impact that microfinance organizations have had on their clients. Rather, it simply estimates the net number of client households that have risen above the poverty line during a specific time frame. The accounting exercise shows actual changes of poverty levels among households served by microfinance organizations. These changes result from all the factors those clients are exposed to, including access to financial services. This bottom line matters because it allows practitioners and donors alike to verify those changes in poverty status among their clients or beneficiaries and question what are the drivers of these changes based on their local knowledge. This would enable them to adjust their management efforts accordingly in order to improve their targeting of the poor.

The poverty-monitoring efforts among donors and practitioners are currently going in parallel to those efforts in estimating the impact of microfinance on poverty. The latter topic is currently hotly debated as results found over the last 20 years are mixed (Odell, 2010). There is no clear consensus, despite of evidence from studies based on Randomized Control Trials in countries like India and the Philippines (Banerjee *et al.* 2009, Karlan and Zinman, 2010), which show no

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significant impact of access to microfinance services on key poverty indicators in the short run. Although these studies are able to convincingly address the sources of impact estimation bias, the debate remains as they have a limited ability to capture any long-term effects of access to financial services on household poverty.

While the debate on the impact of microfinance continues, donors and practitioners are confronted with the practical need to monitor changes in poverty status among clients. This paper proposes a new way to monitor changes in household poverty that is widely applicable given the growing availability of panel data. Estimates presented can be complemented by the impact study made by Pitt and Khandker (1998) and Khandker (2005), which used the same panel data as this paper. However, the latter impact studies make some estimation assumptions that are difficult to verify in practice (Roodman and Morduch, 2009).

Using World Bank/BIDS survey data from about 2,500 Bangladeshi households in 1991/2 and again in 1998/9, we estimate—using simple assumptions—the net number of households who rose above the $1/day poverty line from 1990 to 2006 while members of Grameen Bank and BRAC. The estimated figure is of 1.3 million households (573,563 for Grameen and 729,289 for BRAC). This paper presents the assumptions and methodology used to arrive at these figures and discusses some implications by transforming household figures into an estimate of number of people and comparing it to national trends.

Monitoring changes in poverty status among microfinance clients

This section describes an estimation of the net number of households who were poor when they joined the Grameen Bank or BRAC and who later, while still a member in 1990–2006, crossed $1/day poverty line.

The analysis was based on three basic data items:

1. The $1/day poverty line. This is adjusted for purchase-power parity and for inflation and expressed in terms of per-capita daily household expenditure in Taka.
2. A World Bank expenditure survey that visited the same set of Bangladeshi households first in 1991/2 and then again in 1998/9. The 1991/2 survey included 274 households that were members of Grameen Bank and 247 households that were members of BRAC. All households were weighted equally.
3. The number of active members at year-end for Grameen and BRAC.

From this data, four parameters were estimated using simple assumptions:

1. *Annual net rate of household exit from poverty (r)*. For a given organization, the rate of exit from poverty between 1991/2–1998/9 was taken as the net number of households who were members in both surveys and whose per-capita household expenditure went from less than $1/day to more than $1/day, divided by the total number of households who were members in both surveys, and converted to compound, annual terms. This rate r was 3.06% percent for Grameen and 3.56% percent for BRAC. The seven-year timeframe likely captures long-term effects of factors influencing poverty among households in the sample.

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2. *Average length of membership (m)*. The 1991/2 survey asked households how long they had been members. The 1998/9 survey recorded whether they were still members, but it did not record the year of drop-out for households who were no longer members. Of course, the 1998/9 did not record how long after the survey households would remain members. Average membership length was estimated assuming that any dropout between surveys happened immediately after the first survey and that anyone still a member in the second survey dropped out immediately after the second survey. This is conservative because it understates true membership length, which then understates the number of households who exited poverty. A household's microfinance membership was taken to be that of 1991/2 when all surveyed households had single membership, even though by 1998/9 some households had multiple or different memberships. Average membership length m was 11 years for Grameen and 8.72 years for BRAC.

3. *Number of new clients in year t (n_t)*. For Grameen, this was estimated as the difference between members at year-end and year-start, drawn from annual reports. For BRAC, n_t was estimated from annual reports for 1998–2006, based on data provided by BRAC for 1986–1994, and linearly interpolated for other years. Year-start membership figures naturally do not include dropouts from the previous year, thus n_t is net of dropouts.

4. *Share of new clients who are poor (p)*. This was estimated as the average share of clients who had been members for less than 1 year when surveyed in 1991/2 and 1998/9 and whose per-capita household expenditure in the survey data was below \$1/day. For Grameen, p was 66.0 percent, and for BRAC, it was 65.9 percent.

Given a microfinance organization i and assuming that r, m, and p are constant through time, the formula for the net number of households who rose above \$1/day in 1990–2006 is:

$$\sum_{t=1990-m_i}^{2006} \sum_{u=t}^{t+m_i} F(u) \cdot (n_{ti} \cdot p_i) \cdot r_i \cdot (1-r_i)^{u-t} ,$$

where

$$F(u) = \begin{array}{ll} 0 & if \quad u < 1990 \quad or \quad u > 2006 \\ 1 & otherwise \end{array}$$

The meanings of the parts of this formula are as follows:

- $(n_{ti} \cdot p_i)$ is the number of households who were estimated as poor when they joined a microfinance organization as part of the cohort of year t
- $r_i \cdot (1-r_i)^{u-t}$ is the rate at which households in cohort t are estimated to have exited from poverty in year u
- $F(u)$ is zero (0) for all years except 1990–2006, which means that households that exit poverty outside of that window are not counted

- The meaning of $\sum\limits_{t=1990-m_t}^{2006}$ is that households exiting from poverty are counted for all client cohorts with at least one year of membership in the 1990–2006 window

- The meaning of $\sum\limits_{u=t}^{t+m_i}$ is that, for a given client cohort t, households exiting from poverty are counted for all m_i years in which they are assumed to be members in the 1990–2006 window

The formula counts—in each year for each client cohort whose members are active at some point in 1990–2006—the number who leave poverty, supposing that all memberships have the average duration. This gives the net number of households who were poor when they joined and who rose above \$1/day while members between 1990–2006 as 573,563 with Grameen and 729,289 with BRAC.

A numerical example that walks the reader through the procedure to arrive to these final estimates is presented in the Annex available on-line, along with tables that show yearly figures for Grameen and BRAC, separately.

Key insights from the exercise

From the perspective of microfinance organizations like Grameen and BRAC, it is useful to conduct exercises like the one presented above to verify the direction and magnitude of aggregate poverty trends among their clientele and question how and why these may differ from national aggregates. This process can provide insights on client characteristics and validate management strategies designed to target the poor.

By multiplying the estimated number of households that crossed the poverty line by the average household size observed in both the 1991/2 and the 1998/9 surveys, we can transform the unit of analysis to number of people. This average household size is 5.08. Therefore the estimated net number of people who crossed the \$1/day poverty line while members of Grameen and BRAC is 6.6 million for the mentioned time period.

These figures can be compared to national trends in order to gain insights on client characteristics. The 2005 Income and Expenditure Survey for Bangladesh shows that the average household size in the country is 4.9, which is slightly below the one observed in our sample and may be a result of the tendency for larger household sizes among the targeted poor (Motlur, Matsui and Ikemoto, 2009). In addition, using information from the 2005 Poverty Reduction Strategy Papers by the Bangladesh Bureau of Statistics, the World Bank, and the Asian Development Bank, an estimate of the reduction in the total number of poor in Bangladesh between 1992 and 2005 can be obtained. This is equivalent to 11.7 million as shown in Table 1.

Table 1. Estimation of the reduction in the total number of people below $1/day in Bangladesh during 1992-2005.

Year	1992	1996	2000	2005
Population in Bangladesh [a]	120,613,392	130,610,358	140,766,909	153,122,039
% of population below $1/day[b]	42.70	34.40	33.70	26.00
Number of people below $1/day[c]	51,501,918	44,929,963	47,438,448	39,811,730
People crossing above $1/day[d]	11,690,188			
Annual net rate of people exiting poverty (%) [e]	1.82			

[a] World Development Indicators.
[b] 2005 Poverty Reduction Strategy Papers for Bangladesh as reported by McLeod (2007).
[c] Estimated by multiplying total population by the percentage of the population living below $1/day.
[d] Difference between the number poor in 1992 and 2005.
[e] Average compounded poverty exit rate implied in the reduction of poor people between 1992 and 2005.

These results suggest that changes in poverty status within the sample of microfinance clients seem to more or less follow national poverty trends. The poverty exit rate within the sample is positive as it is at the national level. In addition, it provides a general sense that a considerable share of the total number of the poor who crossed the $1/day poverty line in Bangladesh between 1990 and 2006 were members of Grameen and BRAC. Using the compounded annual poverty exit rate derived in Table 1, an estimated 15.3 million Bangladeshis crossed above $1/day from 1990 to 2006. By the estimates in this paper, about 40 percent of these people lived in households with members in Grameen or BRAC. Of course, this does not say anything on how much the services provided by these organizations contributed to this movement. But it enables Grameen and BRAC to confirm that their target clients are, first, moving out of poverty and, second, constituting a large share of those households exiting poverty at the national level.

This type of analysis can help microfinance organizations to validate current management strategies aiming to reach new poor clients and provide them with financial services. In the example of Grameen and BRAC, if the net number of poor clients moving above the poverty line would have been minute, zero, or negative, then this would have immediately raised a red flag in view that there is a very different trend at the national level. This would indicate either a low share of new clients who are poor or that poor clients are not leaving poverty as quickly as the typical poor person in Bangladesh. Such a result would justify a more detailed analysis on the specific factors influencing poverty levels among the clientele and a revision of targeting strategies.

Limitations

The estimation here is an approximation that attempts to use the imperfect data available in a useful way for microfinance practitioners. The limitations of the approximation include:

- This study is not an impact evaluation. The contribution of membership in Grameen and BRAC to those households that rose above the poverty line is not known, but it certainly did not cause all the exit from poverty estimated here

- In general, the analysis assumes that the samples for BRAC and Grameen are representative of their entire client base
- Given that these parameters are averages measured for the 1991/2–1998/9 timeframe, the main assumption is that they remain unchanged from 1998/9 until 2006. This implies that if the net rate of exit from poverty or the share of new clients who are poor decreased, then estimates are biased upwards. Similarly, if the average length of membership was greater which is likely the case—estimates are biased downwards. These biases counteract each other, and may or may not balance out.
- Exit from poverty outside the 1990–2006 window is not considered

Conclusion

We estimate that from those Bangladeshi households that were members of Grameen and BRAC, about 1.3 million of them left poverty between 1990 and 2006. This is equivalent to about 6.6 million people, or roughly 40% of the total number of poor that rose above the $1/day poverty line within the same time period at the national level. From the perspective of donors and practitioners, it is important first to verify if poverty has decreased among their clients and second to question the factors that caused this change. This paper provides a new method to estimate in a practical manner changes in poverty status among microfinance clients that can be applied widely given the growing availability of panel data. In addition, it verifies that there has been a reduction in poverty among households served by Grameen and BRAC and these households represent a significant share of the poor exiting poverty in Bangladesh. This suggests management strategies aiming to target the poor have been quite successful. But how much of this poverty movement can be attributed to microfinance? Further research is required to arrive to a broadly accepted answer. It is hoped that exercises like this one encourage leading practitioners to exploit their local knowledge about their clients in order to quantify the impact.

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Annex.

A numerical example.

Consider the cohort of 64,345 new members (n_t) entering BRAC in t = 1988 as shown in Table 1 (some of these numbers in following operations may differ due to rounding). We can think of group of households as cohort t = 1998. An estimated 65.9919 (p) percent of them were below \$1/day, so the number of new members who started poor ($n_t\cdot p$) was estimated as 64,345·0.659919 = 42,462.5.

The net annual exit rate from poverty r –estimated from 1991/2 to 1998/9– is 0.0356 (3.56 percent), so ($1-r$) is 0.9644.

In the cohort's first year, $u = t$ = 1988, therefore $(1-r)^{u-t} = (1-r)^{1988-1988} = 1$. The number of households that exit poverty is $(n_t\cdot p)\cdot r\cdot(1-r)^{u-t} = 42,462.5\cdot(0.0356)\cdot0.9644^0 = 1,511.7$. But these households are not counted because they are outside of the timeframe of interest: u = 1988 is before 1990, so $F(u) = 0$, and so:

Households counted as exiting in Year 1, Cohort 1988:
$$F(u)\cdot(n_t\cdot p)\cdot r\cdot(1-r)^{u-t} = 0\cdot42,462.5\cdot(0.0356)\cdot1 = 0.$$

In the cohort's second year, t is still 1988, but now u is 1989, so $(1-r)^{u-t} = (1-r)^{1989-1988} = (1-r)^1 = 0.9644$. The number of households that exit poverty is $(n_t\cdot p)\cdot r\cdot(1-r)^{u-t} = 42,462.5\cdot(0.0356)\cdot0.9644 = 1,457.8$. Again, these households are not counted because u = 1989 is before 1990. Therefore:

Households counted as exiting in Year 2, Cohort 1988:
$$F(u)\cdot(n_t\cdot p)\cdot r\cdot(1-r)^{u-t} = 0\cdot42,462.5\cdot(0.0356)\cdot 0.9644 = 0.$$

In the cohort's third year, t is still 1988, but now u is 1990, so $(1-r)^{u-t} = (1-r)^{1990-1988} = (1-r)^2 = 0.9644^2 = 0.9301$. Because u = 1990, $F(u) = 1$ and households exiting poverty are now counted:

Households counted as exiting in Year 3, Cohort 1988:
$$F(u)\cdot(n_t\cdot p)\cdot r\cdot(1-r)^{u-t} = 1\cdot42,462.5\cdot(0.0356)\cdot 0.9644^2 = 1,405.9.$$

For Cohort 1988's fourth through eighth years, the formula gives the following for the number of households counted as exiting poverty:

Year 4: $F(u)\cdot(n_t\cdot p)\cdot r\cdot(1-r)^{u-t} = 1\cdot42,462.5\cdot(0.0356)\cdot 0.9644^3 = 1,355.9.$

Year 5: $F(u)\cdot(n_t\cdot p)\cdot r\cdot(1-r)^{u-t} = 1\cdot42,462.5\cdot(0.0356)\cdot 0.9644^4 = 1,307.7.$

Year 6: $F(u)\cdot(n_t\cdot p)\cdot r\cdot(1-r)^{u-t} = 1\cdot42,462.5\cdot(0.0356)\cdot 0.9644^5 = 1,261.1.$

Year 7: $F(u)\cdot(n_t\cdot p)\cdot r\cdot(1-r)^{u-t} = 1\cdot42,462.5\cdot(0.0356)\cdot 0.9644^6 = 1,216.2.$

Year 8: $F(u) \cdot (n_t p) \cdot r \cdot (1-r)^{u-t} = 1 \cdot 42{,}462.5 \cdot (0.0356) \cdot 0.9644^7 = 1{,}172.9$.

All members of Cohort 1988 are assumed to drop out after $m = 8.7$ years, so for their final year:

Year 9: $F(u) \cdot (n_t p) \cdot r \cdot (1-r)^{u-t} = 1 \cdot 42{,}462.5 \cdot (0.0356) \cdot 0.9644^{7.7} = 1{,}143.5$

Overall, the number of BRAC households estimated to exit poverty in the 1990–2006 window is the sum of the number counted as exiting in each year (column 1998 in Table 1):

$0 + 0 + 1{,}405.9 + 1{,}355.9 + 1{,}307.7 + 1{,}261.1 + 1{,}216.2 + 1{,}172.9 + 1{,}143.5 = 8{,}863.2$.

This algorithm is applied to each cohort, and the total number of BRAC households estimated as exiting during the time window is the sum of the number who exited from each cohort (729,289).

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Table 1. BRAC: Number of households that crossed $1/day while members, by cohort and year

Year	Cohort → 1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Counted in year
New members:	975	2,303	5,445	12,870	30,421	49,998	64,345	89,400	94,585	143,385	82,358	176,516	210,464	271,963	351,433	454,125	586,824	578,227	410,658	-	-	574,788	500,396	166,268	391,062	5,248,809
1982	23																									23
1983	22	54																								76
1984	21	52	128																							202
1985	21	50	124	303																						497
1986	20	49	119	292	716																					1,196
1987	19	47	115	282	690	1,177																				2,330
1988	18	45	111	272	666	1,135	1,514																			3,761
1989	18	44	107	262	642	1,094	1,460	2,104																		5,730
1990	17	42	103	253	619	1,055	1,408	2,029	2,226																	7,752
1991		41	99	244	597	1,018	1,358	1,956	2,146	3,374																10,834
1992			97	235	576	981	1,310	1,887	2,070	3,254	1,938															12,347
1993				229	555	946	1,263	1,819	1,996	3,138	1,869	4,154														15,969
1994					541	913	1,218	1,755	1,925	3,026	1,802	4,006	4,953													20,137
1995						889	1,174	1,692	1,856	2,918	1,738	3,863	4,776	6,400												25,307
1996							1,144	1,632	1,790	2,814	1,676	3,725	4,606	6,172	8,270											31,829
1997								1,590	1,726	2,714	1,616	3,592	4,442	5,952	7,975	10,687										40,293
1998									1,682	2,617	1,559	3,464	4,283	5,739	7,691	10,306	13,810									51,150
1999										2,549	1,503	3,341	4,130	5,535	7,417	9,938	13,317	13,607								61,337
2000											1,464	3,222	3,983	5,337	7,152	9,584	12,842	13,122	9,664							66,370
2001												3,138	3,841	5,147	6,897	9,242	12,384	12,654	9,319	0						62,623
2002													3,742	4,964	6,651	8,912	11,943	12,203	8,987	0	0					57,401
2003														4,835	6,414	8,595	11,517	11,768	8,666	0	0	13,526				65,321
2004															6,248	8,288	11,106	11,348	8,357	0	0	13,044	11,776			70,168
2005																8,074	10,710	10,943	8,059	0	0	12,579	11,356	3,913		65,634
2006																	10,434	10,553	7,772	0	0	12,130	10,951	3,773	9,203	64,816
2007																		10,281	7,495	0	0	11,698	10,560	3,639	8,875	52,547
2008																			7,301	0	0	11,281	10,184	3,509	8,558	40,833
2009																				0	0	10,878	9,821	3,384	8,253	32,335
2010																					0	10,490	9,470	3,263	7,959	31,182
2011																						10,220	9,133	3,147	7,675	30,174
2012																							8,897	3,035	7,401	19,333
2013																								2,956	7,137	10,093
2014																									6,953	6,953
Counted in cohort:	17	83	299	960	2,888	5,802	8,875	14,359	17,418	26,404	15,166	32,505	38,756	50,081	64,715	83,626	108,062	96,198	60,825	0	0	51,279	34,082	7,686	9,203	729,289

Note: Cohort years with zero or very few non-poor households reflect the estimation that no or very few new members joined in that particular year.

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Table 2. Grameen: Number of households that crossed $1/day while members, by cohort and year

									Cohort																	
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Counted in year
New members:	15,000	25,579	62,731	50,571	57,494	96,079	138,606	158,953	192,824	182,291	332,593	358,989	181,696	48,052	-	205,797	87,857	-	19,500	225	95,705	616,730	890,171	1,466,990	1,248,250	6,532,683
1982	303																									303
1983	294	517																								812
1984	285	502	1,269																							2,056
1985	276	486	1,230	1,023																						3,016
1986	268	471	1,192	992	1,163																					4,087
1987	260	457	1,156	961	1,127	1,944																				5,905
1988	252	443	1,121	932	1,093	1,884	2,804																			8,528
1989	244	429	1,086	903	1,059	1,826	2,718	3,216																		11,483
1990	237	416	1,053	876	1,027	1,770	2,635	3,117	3,901																	15,032
1991	229	403	1,021	849	996	1,716	2,554	3,022	3,781	3,688																18,259
1992	222	391	989	823	965	1,664	2,476	2,929	3,666	3,575	6,728															24,428
1993		379	959	798	936	1,613	2,400	2,839	3,553	3,465	6,522	7,262														30,727
1994			930	773	907	1,563	2,327	2,752	3,444	3,359	6,322	7,040	3,676													33,094
1995				750	879	1,516	2,255	2,668	3,339	3,256	6,129	6,824	3,563	972												32,151
1996					852	1,469	2,186	2,586	3,237	3,157	5,941	6,615	3,454	942	0											30,440
1997						1,424	2,119	2,507	3,138	3,060	5,759	6,413	3,348	913	0	4,163										32,845
1998							2,054	2,430	3,042	2,966	5,583	6,216	3,246	885	0	4,036	1,777									32,236
1999								2,356	2,948	2,875	5,412	6,026	3,146	858	0	3,912	1,723	0								29,257
2000									2,858	2,787	5,246	5,841	3,050	832	0	3,792	1,670	0	394							26,472
2001										2,702	5,085	5,663	2,957	807	0	3,676	1,619	0	382	5						22,895
2002											4,930	5,489	2,866	782	0	3,564	1,569	0	371	4	1,936					21,511
2003												5,321	2,778	758	0	3,454	1,521	0	359	4	1,877	12,476				28,550
2004													2,693	735	0	3,349	1,475	0	348	4	1,819	12,094	18,008			40,525
2005														712	0	3,246	1,430	0	338	4	1,764	11,724	17,456	29,677		66,350
2006															0	3,147	1,386	0	327	4	1,710	11,365	16,922	28,768	25,252	88,880
2007																3,050	1,343		317	4	1,657	11,017	16,404	27,887	24,478	86,158
2008																	1,302		308	4	1,606	10,679	15,901	27,033	23,729	80,562
2009																			298	4	1,557	10,352	15,414	26,205	23,002	76,833
2010																			289	3	1,510	10,035	14,942	25,403	22,298	74,480
2011																				3	1,463	9,728	14,485	24,625	21,615	71,919
2012																					1,419	9,430	14,041	23,871	20,953	69,713
2013																						9,141	13,611	23,140	20,311	66,203
2014																							13,194	22,431	19,689	55,315
2015																								21,744	19,086	40,830
2016																									18,502	18,502
Counted in cohort:	688	1,590	4,952	4,868	6,561	12,735	21,007	27,208	36,907	34,891	63,658	68,711	34,777	9,197	0	36,339	14,170	0	2,520	25	9,105	47,659	52,386	58,445	25,252	573,653

Note: Cohort years with zero or very few non-poor households reflect the estimation that no or very few new members joined in that particular year. Cohorts prior to 1982 are not considered, and in any case they were very small cohorts relative to later years.

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