

CBMS as a Targeting Tool of Poverty Reduction Programs: Experience from Indonesia*

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I. Introduction

Targeting is one of the most crucial aspects in a poverty reduction program. Without an accurate targeting method, it is very likely for the program to experience widespread leakage, where the beneficiaries turn out to be non poor individuals, and undercoverage, where the program cannot reach every poor individual.¹ This means the program would not be effective in reducing poverty.

On the other hand, while targeting is very important, it is important to keep the cost of identifying the beneficiaries small relative to the program's benefits. Moreover, one should acknowledge that it is impossible to eliminate leakage and undercoverage. Therefore, the ideal targeting scheme in a poverty reduction program is one that is relatively affordable and sufficiently accurate.

In Indonesia, the national government continue to allocate a large amount of funds for its poverty reduction and assistance for the poor programs. It spent around US\$2.5 billion in 2006, with similar amount budgeted for 2007. The benefits that the poor receive are numerous: subsidized rice, school scholarship, free healthcare, and direct cash transfer. In addition to the benefits provided by the national government, district governments also allocate a substantial share of their budget for similar programs. Looking at the kind of benefits that the poor receive, there is a very large incentive to be considered as poor in Indonesia. This is especially true for non-poor families whose level of welfare is only slightly above the poor.

Despite the large amount of money for the programs, targeting of these programs has traditionally been based on weak, although relatively costly, methodologies. Two methodologies that are used to identify poor families are proxy means testing for the cash transfer program and simple checklist for the other programs. These methodologies have two main weaknesses. Firstly, the criteria used to identify poor families are uniform for large areas, district-level in the former and national-level for the latter. This means that they are not sensitive

* Contents of this paper is mainly taken from two research reports (Akhmadi et al 2006; Suryadarma et al 2005). See the references section for titles of the research reports.

1 This paper does not address the theory of targeting. See, for example, Sumarto & Suryahadi (2001) for a theoretical background on the issue.

to local poverty conditions. Secondly, the criteria are determined prior to the assessment, which means that everybody could tailor his or her responses during the assessment to be considered poor. These weaknesses are proven to reduce the impact of the programs. As an example, Sumarto & Suryahadi (2001) estimate that 75% of the subsidized rice program is received by non-poor families, while 50% of poor families do not benefit from it.

Given the importance of finding an affordable and reliable targeting system, in 2005 the SMERU Research Institute pilot-tested the use of Community Based Monitoring System (CBMS) for targeting purposes. This paper provides an overview of the system and its results. The rest of this paper is organized into the following. Section II describes the CBMS design. Section III provides the welfare indicators. Section IV contains description of the fieldwork. Section V discusses the statistical method chosen to analyze the data. Section VI lays out the results. The penultimate section mentions the verification of the results. Section VIII concludes.

II. CBMS Design

The CBMS in Indonesia eliminates the weaknesses of the currently employed targeting systems and builds on their strengths. There are four characteristics of the CBMS design. Firstly, it is a census of families, which means information of every family in the area is collected. Secondly, it involves locals as enumerators. The advantages of involving locals include a more accurate description of families because it is harder to provide false information; respondents feel more comfortable talking to familiar people compared to enumerators from outside the area; data collection can be undertaken simultaneously in all areas; and the cost of collecting data is lower compared to using professional enumerators.

The challenges, meanwhile, consists of having to provide rigorous training because some enumerators have no experience in conducting data collection. Furthermore, the system uses simple questionnaire because the majority of enumerators only have nine years of education. Hence, the questionnaire must be comprehensive but easy to be completed.

The third characteristic of the CBMS in Indonesia is that it determines the poverty criteria using the collected information. Thus, there is no ex-ante poverty criteria, which makes it harder if the respondents want to tailor their responses. The poverty criteria are determined using Principal Components Analysis (PCA), which is a statistical technique that identifies commonalities between variables and aggregate them (Zeller 2004). Further discussion regarding PCA is in Section V.

The final characteristic, meanwhile, is that the CBMS only measures relative poverty as opposed to absolute poverty, which requires the use of a poverty line. Relative poverty measure only informs a researcher the position of a family's welfare compared to other families in an area. Hence, the result of CBMS is a list that contains the rank of every family based on its welfare.

In conducting the pilot testing, SMERU collaborates with the National Family Planning Agency

(BKKBN), which is a government agency whose task is to monitor the implementation of the national family planning program. The main reason for working together with BKKBN is because it has staffs down to the village level and has been using locals to monitor the family planning activities. In the CBMS activity, the staffs at the village level serve as the supervisor during the data collection while most of the BKKBN enumerators are recruited as CBMS enumerators.

III. Welfare Indicators

The initial welfare indicators consist of 63 variables. A comprehensive list is needed because no welfare indicator is chosen ex-ante to be used for identifying poor families. The 63 variables covers the indicators listed in Table 1.

Table 1. Welfare Indicators Collected in CBMS

Type of Information	Indicators
<i>Demographic</i>	Age and sex of household head Marital status of household head Household size
<i>Education</i>	Education level of household head This household has a school-age member who is out of school
<i>Employment</i>	Number of working-age household members who are working Number of school-age household members who are working The spouse is working Occupation that provides the most income in this household This household receives income from outside the household
<i>Food Security</i>	Number of meals a day Staple food usually consumed Household members consume meat, chicken, or fish at least once a week
<i>Health</i>	Type and place of treatment sought during illness Main source of drinking water Whether drinking water is boiled Ownership of toilet facilities and type used Use of contraceptives among adult/married household members Incident of child and/or infant death in the family Whether Received routine antenatal and/or postnatal care from health officials during pregnancy for each child under 5 years old Each child under 5 years old has been immunized. Assistance during delivery for each child under 5 years old
<i>Asset Ownership</i>	Ownership status of house House size, number of rooms House material and characteristics Ownership of durable goods, including productive assets

Source of light
 Source of cooking fuel
 Number of farm animals
 Whether buy new clothing at least once a year
 Access to formal credit market in the last 5 years
 Savings

Political and Security Participation in last political process at national and local level
 Whether has been a victim of crime in last 12 months, type of crime
 Access to information (television, radio, newspaper)

IV. Fieldwork

CBMS is tested in four villages in two districts in Java: Cibulakan and Parakantugu Villages in the Cianjur District and Kedondong and Jungpasir villages in the Demak district. More than half of enumerators recruited had experience working with BKKBN. Each enumerator is responsible for collecting data in a hamlet, which on average consists of 60-90 families. In terms of education level, most enumerators have nine years of education, followed by 12 years and six years of education. Moreover, the majority are female, and the average age is 30 years.

Fieldwork began with training of the enumerators, which took place in each village. The contents of the training are familiarizing the enumerators with the questionnaire, interview techniques, and allocating locations for each enumerator. Actual data collection, meanwhile, started the next day. The average data collection length is two weeks in each village.

V. Statistical Method

As mentioned above, we choose a factor analysis method called Principal Components Analysis (PCA). In this method, the weight for each asset is determined by the data itself. Intuitively, principal components is a technique for extracting from a large number of variables those few orthogonal linear combinations of the variables that best capture the common information (Filmer & Pritchett 2001). In addition, Zeller (2004) stated that the major advantage of PCA is that it does not require a dependent or left-hand side variable (i.e. a household's consumption level or poverty status). However, PCA measures only relative poverty, whereas absolute poverty is measured by consumption level.

The first principal-component is the linear index of variables with the largest amount of information common to all of the variables. Based on the results of this analysis, households can be ranked from lowest to the highest socio-economic level. We follow Filmer and Pritchett (2001) in calculating the PCA index:

$$A_j = f_1 \times (a_{j1} - a_1) / (s_1) + \dots + f_N \times (a_{jN} - a_N) / (s_N) \quad (1)$$

where f_1 is the ‘scoring factor’ for the first asset determined by the method, a_{j1} is the j^{th} household’s value for the first asset and a_1 and s_1 are the mean and standard deviation of the first asset variable over all households.

VI. Results

Table 2 provides the scoring factor, mean, and standard deviation of the variables in Parakantugu. The mean is zero by construction. Since we are solely using binary variables, the increase in wealth index when a family moves from 0 to 1 in a variable can be shown by dividing the scoring factor with the standard deviation, as shown in the last column. For example, a family that purchases a refrigerator would have its index increase by 0.87. After calculating the scoring factor, it is straightforward to measure the rank of each family in the village compared to the others. The poorest family in Parakantugu has a wealth index of -4.18, while the richest family's wealth index is 12.07.

Table 2. Scoring Factor, Mean, and Standard Deviation of Family Characteristics in Parakantugu

Variable	Scoring Factor	Mean	Standard Deviation	Scoring Factor / Standard Deviation
Own refrigerator	0.259	0.098	0.298	0.87
Own telephone	0.247	0.065	0.247	1
Own fan	0.242	0.145	0.352	0.69
Own air conditioner	0.042	0.002	0.039	1.07
Own satellite dish	0.237	0.078	0.268	0.89
Own DVD/VCD player	0.237	0.194	0.395	0.6
Own color television	0.235	0.495	0.500	0.47
Own black/white television	-0.051	0.110	0.313	-0.16
Own radio	0.131	0.389	0.488	0.27
Own tape recorder	0.187	0.257	0.437	0.43
Own computer	0.091	0.005	0.073	1.24
Own sewing machine	0.152	0.088	0.284	0.54
Own cellular phone	0.096	0.009	0.096	1
Own other electronic device	0.186	0.071	0.257	0.72
Own motorcycle	0.210	0.222	0.416	0.5
Own car	0.101	0.018	0.132	0.77
Own bicycle	0.186	0.081	0.274	0.68
Own land	0.020	0.933	0.251	0.08
Own house	0.020	0.939	0.240	0.08

Own chicken	-0.032	0.414	0.493	-0.06
Own goat	-0.033	0.112	0.315	-0.1
Own cow	0.004	0.011	0.104	0.04
Family head is married	0.091	0.846	0.361	0.25
Family head is female	-0.085	0.127	0.333	-0.26
Family head education: elementary	-0.197	0.761	0.426	-0.46
Family head education: junior secondary school	0.120	0.136	0.343	0.35
Family head education: senior secondary school	0.137	0.061	0.240	0.57
Family head education: diploma	0.067	0.005	0.073	0.91
Family head education: university	0.105	0.011	0.104	1.01
Spouse education: elementary	-0.002	0.011	0.104	-0.02
Spouse education: junior secondary school	-0.114	0.649	0.478	-0.24
Spouse education: senior secondary school	0.131	0.132	0.338	0.39
Spouse education: diploma	0.152	0.043	0.204	0.75
Spouse education: university	0.106	0.005	0.068	1.56
Family head is working	0.080	0.950	0.219	0.36
Spouse is working	0.062	0.218	0.413	0.15
At least one school-age child is working	-0.001	0.006	0.079	-0.01
Family in agriculture sector	-0.032	0.071	0.256	-0.13
Family in industrial sector	-0.156	0.481	0.500	-0.31
Family in trade sector	-0.006	0.032	0.175	-0.03
Family in services sector	0.089	0.168	0.374	0.24
Family receiving transfer (unemployed)	0.125	0.247	0.432	0.29
Own savings	0.244	0.116	0.321	0.76
Received credit from a formal financial institution in the past three years	0.158	0.126	0.332	0.48
Mortgaged assets in the past three years	0.033	0.009	0.096	0.34
Had to sell assets to pay debts	0.023	0.011	0.104	0.23
Eat two meals a day	0.017	0.985	0.121	0.14
Eat meat at least once a week	0.071	0.951	0.216	0.33
Eat fish at least once a week	0.049	0.970	0.171	0.29
Eat egg at least once a week	0.025	0.980	0.141	0.18
Sought modern medical treatment when sick	0.080	0.900	0.300	0.27
Drink water from protected source	0.071	0.945	0.228	0.31
Use private toilet	0.176	0.670	0.470	0.37
Per capita family house size is more than 8 square	0.057	0.929	0.256	0.22

meters				
Live in dirt floor house	-0.032	0.003	0.056	-0.58
Experienced death of an infant in the past three years	-0.004	0.014	0.117	-0.03
Use electric light source	0.050	0.988	0.111	0.46
At least one school-age child dropped out of school	-0.009	0.118	0.323	-0.03
High dependency rate (more than half of family members are younger than 15 years old)	0.008	0.035	0.184	0.04
Most members buy new clothes at least once a year	0.164	0.487	0.500	0.33
Victim of crime in the past year	-0.004	0.003	0.056	-0.08
At least one family member voted in the last general election	0.039	0.987	0.114	0.34
See television or newspaper at least once a week	0.155	0.802	0.399	0.39
PCA Index		0.000	2.477	

Meanwhile, it is imperative to note that the most important feature of PCA is that it allows one to estimate local specific poverty indicators. Table 3 shows different poverty indicators in the four CBMS villages, and while in general asset ownership variables are the best predictors of poverty in each village, there are quite discernible differences in the types of asset. Furthermore, non-asset ownership variables that can predict poverty in Jungpasir are type of floor in house and owning private toilet. Meanwhile, in Kedondong, although in the same district as Jungpasir, sex of family head and his/her marital status are more important predictors than toilet type.

Table 3. Ten Highest-scoring Variables in CBMS Pilot Project Villages

<u>Jungpasir</u>		<u>Kedondong</u>	
Variable	Score	Variable	Score
Own fan	0.27	Own color television	0.28
Own color television	0.26	Own fan	0.26
Own DVD/VCD player	0.26	Own DVD/VCD player	0.25
Own tape recorder	0.25	Family head is female	-0.23
Own motorcycle	0.25	Own motorcycle	0.23
Own refrigerator	0.23	Own tape recorder	0.23
Own cellular phone	0.22	Family head is married	0.22
Use private toilet	0.21	Own bicycle or boat	0.22
Own other electronic device	0.19	Use private toilet	0.21
Own radio	0.19	Live in dirt floor house	-0.21
Live in dirt floor house	-0.19		
<u>Parakantugu</u>		<u>Cibulakan</u>	
Variable	Score	Variable	Score
Own refrigerator	0.26	Own refrigerator	0.26

Own telephone	0.25	Own color television	0.26
Own savings	0.24	Own cellular phone	0.26
Own fan	0.24	Own DVD/VCD player	0.23
Own satellite dish	0.24	Own fan	0.22
Own DVD/VCD player	0.24	Own savings	0.22
Own color television	0.24	Own tape recorder	0.20
Own motorcycle	0.21	Use private toilet	0.20
Family head education: elementary	-0.20	Eat meat at least once a week	0.18
Own tape recorder	0.19	Own motorcycle	0.18

There are also different significant poverty indicators in the villages in Cianjur. In Parakantugu, only one non-asset variable is in the top ten: education level of family head, while in Cibulakan consumption pattern is included in the ten most important variables. Thus, we have provided evidence that there are indeed different poverty indicators between villages. More importantly, these locally specific indicators can be unearthed using the methodology we employed.

VII. Verification of Results

The last step that should be undertaken is to ensure that the results could accurately poor families. Therefore, we verified the results through Focus Group Discussions with village residents in Cibulakan and Kedondong.

The verification shows that around 70%-80% of families considered poor by CBMS are also considered poor by the FGD participants. This means that leakage would be reduced to merely 20%-30% should CBMS be used as the targeting system, compared to 75% leakage that is experienced in the subsidized rice program (Sumarto & Suryahadi 2001).

VIII. Conclusion

The purpose of this pilot project is to introduce a better poverty monitoring system to policymakers in Indonesia. Given Indonesia's size, both geographical and population, it is important that the new monitoring system is easy to administer and can be expeditiously processed to provide the stakeholders with information on poverty conditions of an area.

Since poverty is very much a local phenomenon, the new system that this project introduces is sensitive to local poverty conditions and ensures that local residents play a significant role in carrying it out. Involvement of locals is important for another reason: the system can be conducted simultaneously in every village in Indonesia. This means that there is a possibility that data collection for the whole country can be finished in less than a month.

Since the main purpose is to identify poor families in a village, it is very important that the methodology used is able to do so. Since recording detailed family consumption expenditure is out of the

question, we employ 63 indicators as proxy for welfare. They range from asset ownership and health characteristics to political participation and access to information. We process these characteristics using the Principal Components Analysis method and calculate the welfare score of every family in the four villages. We find that asset ownership variables are the most significant welfare indicators, although education, health, and consumption patterns are also important.

In conclusion, we believe that our chosen methodology is successful in enabling us to identify the poor in every village. We have also demonstrated that given enough support and supervision, locals are able to conduct their own poverty monitoring.

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