Testing Proxy Means Tests in the Field: Evidence from Vietnam

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Abstract

During 2005-2015, the poor households in Vietnam were identified by Ministry of Labor, Invalid and Social Affairs (MOLISA) using an approach that combined proxy means tests (PMT) and quick collection of income data. A set of indicators were used to identify the surely poor and surely non-poor households. Then, income data were collected using simple questionnaires for the remaining households to identify the poor households. However, measuring income using simple questionnaires can result in a large measurement error. In attempt to improve the poverty targeting, with the technical supports from the World Bank and General Statistics Office of Vietnam, MOLISA has improved the PMT method and used it to identify the poor households since 2015. Income data are no longer collected. This report documents the current poverty identification approach, and the process of movement from the income-PMT approach to the PMT approach in Vietnam.

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1. Introduction

Poverty reduction is an important development policy in all the countries. Accurate poverty targeting is a key condition for the success of support programs for the poor. In most countries, a household is classified as the poor if their welfare indicator such as income or consumption expenditure is lower than a threshold, which is called a poverty line (Deaton, 1997). Measurement of the poverty rate often relies on sample surveys of households, in which data on income or consumption expenditure of households are collected. Using these data and a defined poverty line, we can easily compute the poverty rate of areas or groups of population for which the household surveys are representative.

Identifying poor households for support programs is more challenging, especially in developing countries. It is impossible to survey expenditure or income for all the households in an area using income or expenditures using a detailed questionnaire. On the other hand, collection of income or expenditure using a simple questionnaire can result in inaccurate data.

Recently, the proxy means tests approach has been widely used to identify the poor as well as eligible people for a support program (Grosh and Baker, 1995; Ahmed and Bouis, 2002; Coady et al., 2004; Zeller et al., 2005; Benson et *al.,* 2006; Coady and Parker, 2009; Johannsen, 2009; Houssou et al., 2010; Vu and Baulch, 2011; Alatas et al., 2012). Instead of measuring an aggregate welfare indicator such income or consumption, this method measure proxy of the welfare indicator. The proxy indicators are strongly correlated with the welfare indicator, but more easily measured than the welfare indicator. Widely used proxy indicators are demographic variables of household members, characteristics of housing conditions, and ownership of basic durables and assets. Households will be ranked based on a score which is a weighted average of the proxy indicators. The weights can be estimated from regression of the welfare indicator such as income or consumption expenditure. These weights can be estimated using factor analysis or principal component analysis without data on income or consumption expenditure.

Households whose estimated score is below a given threshold are defined as the poor or eligible for a support program.

Vietnam has been successful in poverty reduction during the recent decades. A large number of poverty reduction programs have been implemented. These programs are more effective in poverty reduction if they can be well targeted at the poor. In Vietnam, the Ministry of Labor, Invalid and Social Affairs (MOLISA) identifies the poor households using the mean test, where a household is defined as the poor if their per capita income is below the income poverty line.

Since 2005, MOLISA has implemented a National Poverty Census every 5 years. In the 2010 Poverty Census, MOLISA used two types of questionnaires on basic assets and demography of households: one questionnaire to identify 'surely poor households' who lack most basic assets and labors, and another questionnaire to identify 'surely non-poor households' who have most expensive assets. Finally, income data were collected for remaining households who were not identified by the two types of questionnaires. The poor households included households whose per capita income was below the poverty line plus the 'surely poor households' (MOLISA, 2010).[2]

There are two problems with the 2005 poverty targeting. Firstly, the questionnaire to identify 'surely poor households' and 'surely non-poor households' is rather complicated. Secondly, household income data which are collected using the short-questionnaire income (two pages) can contain large measurement errors.

To improve the poverty targeting, MOLISA with technical supports from the World Bank and General Statistics Office of Vietnam revised the poverty targeting approach in 2015. During October-December 2015, MOLISA conducted a so-called Poverty Census to construct a list of the poor households for targeting of support programs in the 2016-2020 period. The poverty targeting of this census relies mainly on PMT to

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[2] MOLISA's income poverty line for the period 2011-2015 is 400 and 500 thousand VND/person/month for rural and urban areas, respectively.
This census also identified the near-poor households whose per capita income is slightly higher than the poverty lines. After identifying the poor and near-poor households, the census collected data on basic demographic characteristics and housing conditions of all the poor and near-poor households.

identify the poor households. The income data are not collected. Households are classified as poor by comparison of their computed scores with the poverty thresholds which are based on the income poverty lines. The poverty identification is also verified by village meetings. Another important point in the 2015 Poverty Census is that the PMT is used to set up the poverty rate of villages so that the poverty estimates are more comparable across local areas.

This report documents the process of the application of the PMT method in the 2015 Poverty Census of MOLISA. Researchers from MOLISA, GSO, Mekong Development Research Institute and World Bank worked closely together to development the list of proxy indicators and scores. The team under the supports from the World Bank and MOLISA also convince policy makers and local authorities by showing the advantages of the PMT methods through a series of discussion workshops.

This report is structured by seven sections. The second section reviews the poverty targeting in the 2010 Poverty Census. The third section presents the process of application of the PMT in the 2015 Poverty Census. The fourth section presents the technical issues in estimating the list and scores of proxy indicators in the PMT method. The fifth section presents the validation and testing of the PMT. The sixth section presents the final poverty targeting in the 2015 Poverty Census. Finally, the seventh section concludes.

2. The poverty targeting in the 2010 poverty census

2.1. Poverty targeting

In Vietnam, poor households are defined as those who have per capita income below the income poverty line. The national income poverty line for the 2011-2015 period is 400 and 500 thousand VND per person per month for rural and urban areas, respectively. Households whose per capita income are from these poverty lines and below are identified as the poor. In addition, the near poor poverty line is also defined: it's equal to 520 thousand VND and 650 thousand VND per person per month for rural and urban areas, respectively. The 2010 Poverty Census reports the national poverty rate of 14.2 percent. The national rate of the near poor households is 7.5%.

In October and November 2010, MOLISA implemented a National Census on Poverty to produce a list of all the poor households for the period 2011-2015. The PMT is combined with income data collection to identify the poor households. The main reason for PMT is to quickly identify the very poor or rich households. There is no need to collect income data for these households. Income data are collected for the remaining households.

The poverty identification process in 2010 is presented in Figure 1, and it can be decried by four basic steps as follows. In the first step, MOLISA applied a proxy means test which is called 'Questionnaire A' to collect information durables and production assets, and demography of households. There are four sections of this questionnaire. The first section 'A' includes questions on ownership of different groups of production assets. Each group of assets is attached different scores depending on the value of assets. The second section 'B" includes questions on ownership of durables, and the durables are also divided into different groups. Each group of assets is attached different scores depending on the value of assets. The section 'C' includes question on employment. The fourth section 'D' includes questions on difficulties of households, and each difficulty is also attached a score. The total score is computed based on the answers to these questions, and households whose score is above a given threshold are defined as 'surely non-poor' and those whose score is below another given threshold are defined as 'surely poor'.

In the second step, income data were collected using a simple questionnaire for remaining households who were not identified as the 'surely non-poor' as well as the 'surely poor' by the two-page questionnaires. Households who per capita income are below the poverty line are defined as the poor. The final poor households include the 'surely poor households' identified in the first step plus households with per capita income below the poverty line in the second step (MOLISA, 2010).[3]

In the third step, the list of the poor households is also discussed in village meetings. At this stage, the poverty rate of communes, districts and provinces can be adjusted so that they are comparable and consistent across areas. GSO's provincial

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[3] MOLISA's income poverty line for the period 2005-2010 is 200 and 260 thousand VND/person/month for rural and urban areas, respectively.

poverty rates are an important source for consideration in this adjustment. After that, the list of the poor households and the near-poor households is finalized.

Figure 1: The 2010 poverty targeting in Vietnam
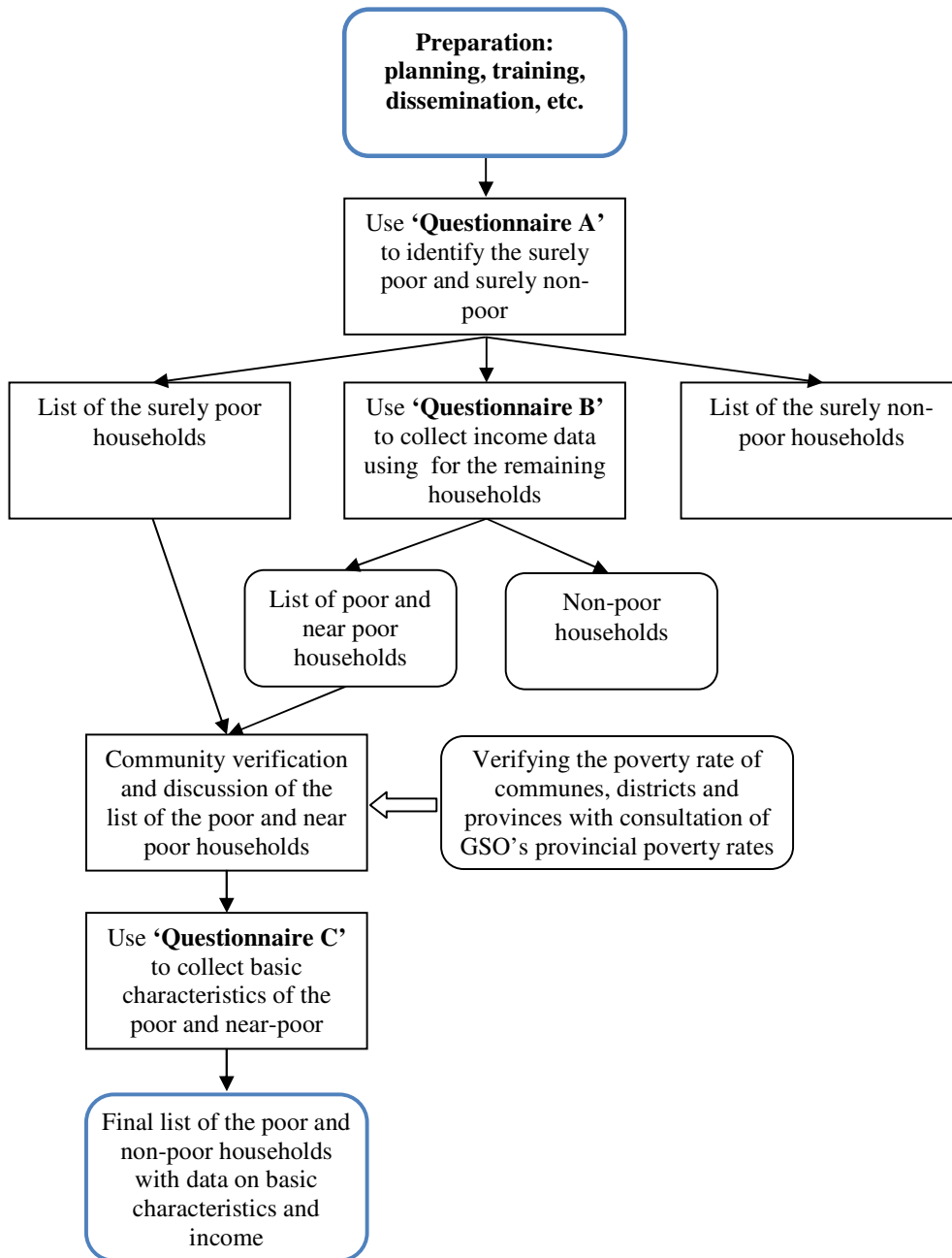
Source: MOLISA (2010)

Finally, questionnaire C is applied for the poor and near-poor to collect information on their basic characteristics.

Although the 2010 poverty identification procedure of MOLISA is carefully prepared and designed, it has three possible drawbacks. Firstly, the questionnaire 'A' of the poverty identification procedure is very complicated. It involves collection of data on a large number of items, then scoring households. If the local interviewers follow questionnaire 'A' strictly, they have to ask about 78 items including assets, housing, durable, land, livestock, health, education and household composition. Local communes cannot follow the procedure strictly. As a result, the actual poverty identification varies across communes.

Secondly, income questionnaires are very simple, which ask aggregate income on main activities. Nguyen (2005) shows that income data collected using MOLISA's simple questionnaire are much lower than income data in Vietnam Households Living Standard Surveys which are collected using a very detailed questionnaires (22 pages). The measurement error tends to be higher for poor households who have income from many irregular farm and non-farm sources.

Thirdly, households are aware of the purpose of the census, and some non-poor households might be willing to report low income to be included in the poor list so that they can be covered by several poverty reduction programs. There are many stories about households' willingness of being classified as the poor, since poor households can benefit from support programs (e.g., Tu, 2010, Ha and Xuan, 2013). Examining the local income data sets from 10 provinces, we find that around 10% of households reporting their per capita income level exactly equal to the income poverty line or near-poor lines.

2.1. Coverage and leakage rates

To assess the MOLISA poverty classification at the household level, we use data from the VHLSSs 2010 and 2012. In these VHLSSs, there is a question on whether a household is classified as the poor by the commune authority or MOLISA. In the 2012 VHLSS, there was 11.9 percent of households who were identified as the poor by MOLISA. To assess how well the MOLISA poverty targeting reach the income poor, we will examine whether

these MOLISA poor households are really poor by the income data. We consider income data, which are collected by the VHLSSs, are the benchmark. If households who are identified by the MOLISA poor list really have low income than other households, the MOLISA targeting method is well performed and targeted at the really poor households.

We first define the poor households by income data in VHLSSs. A household is defined as income poor if their per capita income or per capita expenditure is below an income threshold. In this study, the income poverty line is estimated at 660 thousand VND/person/month, respectively. For comparison with the MOLISA poor, this line is defined so that the proportion of income poor households is equal to 11.9 percent.

Table A.1 compares the proportion of the MOLISA poverty list and the list of the poor estimated from the income data in the VHLSSs. In addition to compare the poverty rate, we estimate the coverage and leakage rates of a poverty targeting method, which is the MOLISA poverty list in this case.

The coverage rate of a poverty targeting method is defined as follows:

$$Coverage = \frac{Income\ poor\ households\ correclty\ identified\ by\ the\ targeting\ method}{Income\ poor\ households}.$$

It's equal to the ratio of the number of income poor households who are correctly identified as the poor by the poverty targeting method to the total number of income poor households. The leakage rate of a poverty targeting method is defined as follows:

$$Leakage = \frac{Income\ poor\ households\ incorrectly\ identified\ the\ targeting\ method}{Households\ identified\ by\ the\ targeting\ method}.$$

It's equal to the ratio of the number of non-poor households but incorrectly identified as the poor by the poverty targeting method to the total number of households identified as the poor by the poverty targeting method. A perfect targeting will have the coverage rate of 100% and the leakage rate of 0 percent. Because we set up the income poverty rate equal to the rate of the MOLISA poor, the coverage rate and the leakage rate sum to around 100%.

In some studies, the exclusion error is estimated. It is also called under-corvarge rate, and equal to 100% minus the coverage rate (Coady et al., 2004). The leakage rate is also called the inclusion error (Coady et al., 2004).

Table 1 compares the MOLISA poor households and income poor households in the 2012 VHLSSs. The two methods give similar poverty rates. The coverage rate is around 54%. It means that in every 100 income poor households around 54 households are identified correctly by the MOLISA list. The leakage rate is around 45%. It means that around 100 MOLISA poor households, there are only 45 households who are also poor by income. The difference between the MOLISAL poor and income poor is larger for urban areas than rural areas and larger for Kinh than ethnic minorities.

It should be noted that Table 1 compares the poor in the 2012 poverty list and the income poor based on the 2012 data. The 2012 poverty list of MOLISA is constructed based on local authorities' assessment of household welfare in 2011. The 2012 VHLSS was conducted in several months in 2012 which asked households about their income during the past 12 months. Thus, there can be time difference between the 2012 MOLISA poverty line and the 2012 income data collected in the 2012 VHLSS. To examine whether time of data collect matters, we estimates the coverage and leakage rates for households with different month of interview. It shows that the coverage and leakage rates do not vary remarkably over interview months.

To assess the poverty identification in the 2010 Poverty Census, we use the 2010 VHLSS. It should be noted that the 2010 Poverty Census was conducted in October and November 2010 and the new list of poor households is used for the period 2011-2015. Meanwhile, the 2010 VHLSS was conducted in 2010 and it contains information on the poverty list of the older period. Thus the MOLISA poor households identified in the 2010 VHLSS are not the poor households in the current list of the period 2011-2015.

Table A.1: Commune list of poor households in 2006 and 2012

Groups	VHLSS 2012: Poverty status in 2012				VHLSS 2010: Poverty status in 2011				VHLSS 2006: Poverty status in 2006			
	Commune poor list (%)	Income poverty rate (%)	Coverage rate (%)	Leakage rate (%)	Commune poor list (%)	Income poverty rate (%)	Coverage rate (%)	Leakage rate (%)	Commune poor list (%)	Income poverty rate (%)	Coverage rate (%)	Leakage rate (%)
Kinh/Ethnic minorities												
Kinh	7.9	7.0	45.4	59.6	7.8	8.5	37.6	65.7	11.1	10.0	47.0	57.8
Ethnic minorities	38.6	45.7	62.6	25.8	44.9	40.4	60.1	33.2	32.0	39.7	53.3	34.0
Rural/Urban												
Rural	15.3	16.1	54.1	43.2	16.4	16.0	48.7	50.1	16.3	16.8	50.2	48.3
Urban	3.6	2.4	48.5	67.7	3.0	4.2	39.8	71.4	5.9	4.2	37.4	73.6
Region												
Red River Delta	6.1	6.0	47.3	53.1	6.4	6.3	33.8	66.0	8.0	10.9	35.6	51.4
Northern Mountains	24.5	29.7	59.0	28.7	29.2	23.4	53.4	33.5	18.4	21.0	49.4	43.5
Central Coast	14.4	15.9	53.2	41.4	17.0	15.7	46.1	49.9	20.0	19.4	58.8	43.0
Central Highlands	16.1	16.8	58.7	38.5	17.1	19.3	48.6	56.9	20.1	19.9	51.6	48.8
Southeast	5.6	1.6	82.4	76.9	2.0	6.5	60.1	81.0	6.9	4.3	33.5	79.5
Mekong Delta	11.8	10.9	43.8	59.4	11.4	13.3	51.1	56.0	12.8	9.6	49.8	62.6
Month interview												
4	11.6	11.8	54.3	46.4								
6	13.7	11.9	47.8	45.2					14.8	13.5	48.6	46.9
7					13.4	12.7	45.0	52.5	10.1	11.2	49.8	55.2
9	10.3	11.7	56.9	49.8	12.5	12.7	48.5	52.4	11.7	13.7	53.9	54
10									13.3	13.3	43	57
11												
12	12.3	11.9	57.5	40.4	12.0	12.7	51.4	51.3				
Total	11.9	12.0	53.8	45.4	12.7	12.7	48.1	52.1	13.4	13.3	49.1	51.4

Source: authors' estimation from VHLSSs 2006, 2010, and 2012

To deal with the above problem, we use the panel data of VHLSS 2010 and VHLSS 2012. In the 2012 VHLSS, there is a question on the MOLISA poverty status of households in 2011. We merged this information with the income level of households in the 2010 VHLSS to assess the poverty targeting of the 2010 Poverty Census. The middle panel of Table 1 presents this comparison. The coverage rate and leakage rates are 48% and 52%, respectively.

In addition, we also apply the same way to examine the coverage and leakage rates in the MOLISA poverty list in the 2006 VHLSS. We also find similar estimates as the 2012 VHLSS. The coverage rate is around 50%, and the leakage rate is also about 50%.

3. The application of the PMT in the 2015 Poverty Census

To improve the poverty targeting, MOLISA with technical supports from the World Bank and General Statistics Office of Vietnam revised the poverty targeting approach in 2015. There are two important issues that receive attention from MOLISA:

- Firstly, collection of income data using two-page questionnaires can result measurement errors.

- The poverty targeting should be improved by either improving the short-questionnaires to collect income reduce the measure errors or improving the PMT method.

The PMT method is illustrated using data from Vietnam Household Living Standard Survey 2012. Participants into these workshops are mainly from MOLISA in Hanoi. They agree that the poverty targeting in 2015 should be improved. Income data should not be collected, but the PMT needs to have high coverage of the poor and low leakage to the non-poor. There are three main suggestions from these workshops:

- Firstly, the PMT must be estimated using the most recent VHLSS, that is the 2014 one. GSO would provide access to this data set and also technical supports.

- Secondly, the PMT should be tested in local areas. The purpose of this test is to examine whether households, local staffs and interviewers of the Poverty Census are able to follow the PMT method to identify the poor households. In addition, it

11

needs to verify whether income data and poverty status predicted using the PMT method are more accurate than those estimated from income data quickly collected using the two-pages questionnaires.

- Thirdly, the PMT should be designed so that it receive consensus from local staffs. It must be consulted with the local staffs from provinces.

After the above workshops, researchers from GSO (led by Lo Thi Duc), and researchers from the Institute of Labour Science and Social Affairs (Pham Bao Ha and Pham Minh Thu) joined the searchers from the World Bank. The team used the 2014 VHLSS to estimate the PMT. Proxy indicators are selected so that they are strongly correlated with log of per capita income, and scores of proxy indicators are estimated using OLS regressions of log of per capita.

The new PMT method was then presented in a workshop in Binh Thuan, a Southern province of Vietnam, in January 2015. Not only staffs from MOLISA and GSO but also local staffs from provinces attended the workshops. Overall, participants agree to drop income data collection in the Poverty Census, since that kind of income data contains high measurement errors. There were several suggestions:

- The PMT should include more variables of assets, since local staffs argue that production assets such as livestock and crop land are much more correlated with income. Actually, the PMT indicators are already selected so that they are strongly correlated with income using the 2014 VHLSS. Variables such as housing conditions are more correlated with income. However, local participants still wants to have more variables of production assets such as livestock and crop land in the model.

- There are 6 regions in Vietnam. Each region should have each list of PMT indicators, since the income model differs for regions. Urban and rural areas should have different income models.

After the workshop in Binh Thuan, the team revised the PMT model. They also conducted a pilot test in two provinces, Quang Nam and Dak Lak, to verify the PMT method and

examine whether the local staffs and households can follow it. Overall, the PMT method works quite well in the field. During April to May 2015, the team presented the PMT method and results from the pilot surveys in two more workshops that were organized in Da Nang, and a city in the central of Vietnam, and in Vinh Phuc, and Northern province in Vietnam. The final list and scores of the PMT indicators were finalized and approved by MOLISA in June 2015.

4. The PMT method in the 2015 Poverty Census

4.1. Poverty targeting in the 2016-2020 period

A new point in the poverty targeting in the 2016-2020 period is a combination of income and multidimensional poverty. Poverty is measured in terms of not only monetary dimensions but also other non-monetary dimensions. Le at al. (2015) shows that there was a small overlap between multidimensional poverty and income as well as expenditure poverty. Even within the same households, children can be more vulnerable than adults. For instance, Nguyen (2016) shows that children in migrating can have high expenditure but less cognitive skills than those in non-migrating households. The government of Vietnam takes into account multidimensional poverty in poverty targeting in the new period 2016-2020.

Households are defined into the poor and near-poor based on not online income poverty lines but also multidimensional poverty lines (see Government of Vietnam, 2015). More specifically:

- Income poverty lines which are VND 700,000 and VND 900,000 per person per month in rural and urban areas respectively, and near-poverty lines which are VND 1,300,000 and VND 1,000,000 per person per month in rural and urban areas respectively.

- The multidimensional poverty index (MPI) is comprised of five dimensions – health, education, housing, water and sanitation and access to information. To measure the level of deprivation on these five dimensions, a social service score is calculated using the following 10 indicators: having health insurance, using health

13

services, education degree of adults, school enrolment of children, housing quality, living areas, drinking water, hygienic latrines, using information service, access to information. Each indicator receive a score of 10. A household with access to the 10 indicators have the maximum scores of 100. A household is considered lacking access to social services if they are deprived of at least three indicators. It means that a household is considered as multidimensionally poor if their social service score is below 30.

Household are classified as follows:

- Poor households who meet one of the two criteria:

  o Have income from the income poverty line and below (i.e., VND 700,000 for rural households; and VND 900,000 for urban households).

  o Have income from the income poverty line and no more than the near-poverty line (i.e., above VND 700,000 and no more than VND 1,000,000 for rural households; and above VND 900,000 and no more than VND 1,300,000 for urban households), and the service score below 30.

- Near-Poor households who have income from the income poverty line and no more than the near-poverty line (i.e., above VND 700,000 and no more than VND 1,000,000 for rural households; and above VND 900,000 and no more than VND 1,300,000 for urban households), and the service score from 30 and above.

Table 2 summarizes the identification of the poor and near-poor households in the 2016-2020 period.

Table 2: Income and multidimensional poverty line used for targeting

MPI ⟍ Income poverty line	Social service score below 30	Social service score no less than 30
No more than the income poverty line	Poor	Poor
Above the income poverty line and no more than the income near-poverty line	Poor	Near-Poor
Above the income near-poverty line	Non-Poor	Non-Poor

Source: Government of Vietnam (2015).

4.2. Estimation of income models

The proxy indicators and scores are estimated by a GSO team led by Lo Thi Duc. Data used for estimation is from the 2014 Vietnam Household Living Standard Survey (VHLSS). This data set includes very detailed data on individuals, households and communes. Individual data consist of information on demographics, education, employment, health, migration. Household data are on durables, assets, production, income and expenditures, and participation in government's programs. There are 46,335 households in this data set. This 2014 VHLSS is representative for rural/urban areas and 6 geographic regions.

Income data are collected by GSO using very detailed questionnaires (22 pages in section 4 of VHLSS). Household income can come from any source. More specifically, income includes income from agricultural and non-agricultural production, salary, wage, pensions, scholarship, income from loan interest and house rental, remittances and social transfers. Income from agricultural production comprises crop income, livestock income, aquaculture income, and income from other agriculture-related activities.

Table 3 presents the final models of the PMT which include six models for six rural regions, and one model for the urban area of the whole countries. In the urban model, dummies of regions are added. Regarding the selection of proxy indicators, there are important issues:

- Proxy indicators are selected so that they are strongly correlated with log of per capita income.

- They are also easy to understand and collect data. All variables are converted to dummies so that the scoring is simple. There are no discrete or continuous variables.

- The selection of control variables is based on backward and forward stepwise to achieve high R-squared. According to comments from participants from the consultation workshops, who are mainly from MOLISA and GSO in provinces, more production assets such as livestock and crop land are added to models. Since the team includes some more production asset variables and uses just dummies, the final models are not those which have the highest R-squared. However, R-squared is relatively high, ranging from 0.42 to 0.66 (see the below Table 3).

4.3. Estimations of scores

After income models are estimated using the 2014 VHLSS, there are two remaining important issues. Firstly, the estimated coefficients of explanatory variables in Table 3 need to be converted into score and used to predict poverty status of households. Secondly, thresholds of scores corresponding to income poverty lines and income near-poverty lines are also estimated.

It should be noted that we cannot predict per capita income, Y_i, by applying the natural exponential function to the fitted value of $\ln(Y_i)$, since $E(\ln(Y)) \neq \ln(E(y))$. There are several ways to estimate Y_i. The first method is to predict a random value for ε_i using the predicted distribution of residuals from model (1). The second method is to applied a correction term to the predicted log of per capita expenditure. For example, if we assume ε_i follow a normal distribution with homoscedastic variance, $N(0, \sigma)$, then we can

estimate $\hat{y}$ by $\exp(\hat{\sigma}^2/2)\exp\left[\hat{\ln}(y)\right]$. However, these methods cannot be applied by local staffs in the field.[4]

For simplicity in application of the PMT method in local areas, the team converted income poverty and near-poverty line to scores using the approach percentile corrected prediction values based on the empirical cumulative distribution of actual income and the cumulative distribution of the predicted log of income (Hentchel et al., 2000; Kakwani and Son, H., 2006; Johannsen, 2006). Firstly, the scores of proxy indicators are estimated by multiplying the coefficients in Table 2 with 100. The scores are also rounded so that they are multiples of five, i.e. equal to 5, 10, 15, and so on. Secondly, the thresholds of scores are computed so that the poverty rate and near-poverty rates that are estimated based on the computed scores of households and these thresholds are equal to those computed directly from the income data in the 2014 VHLSS. The thresholds are estimated as follows:

- The poverty thresholds corresponding to the poverty lines of VND 700,000 in rural areas and VND 900,000 in urban areas are 120 scores and 140 scores, respectively.

- The near-poverty thresholds corresponding to the poverty lines of VND 1,000,000 in rural areas and VND 1,300,000 in urban areas are 150 scores and 175 scores, respectively.

After the thresholds are computed, the scores of proxy indicators are revised again so that the intercepts are removed and the poverty rate of regions computed directly from the income data are similar to the poverty rate estimated using the computed scores. The intercepts are allocated to scores of explanatory variables. Explanatory variables with higher magnitudes received higher allocations. Table 3 presents the final scores of the PMT in the 2015 Poverty Census.

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[4] Another way is to estimate model of per capita income as $Y = exp(Xb)$ using Poisson models. However, when we tried this model, it is not good at estimating the income level and poverty rate compared with the estimation of log model.

Table 3. OLS regression of log of per capita income

Explanatory variables	Rural regions						Urban
	Red River Delta	Midlands and Northern Mountains	Northern and Coastal Central	Central Highland	Southeast	Mekong River Delta	
Household has one member	0.7244***	0.8735***	0.6983***	0.7646***	0.5796***	0.5103***	0.7314***
	(0.0654)	(0.0640)	(0.0492)	(0.1063)	(0.0789)	(0.0564)	(0.0342)
Household has two members	0.5363***	0.6608***	0.5245***	0.4758***	0.4424***	0.4077***	0.4923***
	(0.0549)	(0.0374)	(0.0352)	(0.0617)	(0.0497)	(0.0395)	(0.0250)
Household has three members	0.3672***	0.4888***	0.4060***	0.4004***	0.3345***	0.2924***	0.3315***
	(0.0541)	(0.0307)	(0.0321)	(0.0491)	(0.0397)	(0.0337)	(0.0217)
Household has four members	0.2377***	0.3245***	0.2869***	0.3420***	0.2235***	0.2114***	0.2148***
	(0.0513)	(0.0260)	(0.0287)	(0.0392)	(0.0346)	(0.0302)	(0.0196)
Household has five members	0.1284**	0.1797***	0.1652***	0.1661***	0.0805**	0.1423***	0.1413***
	(0.0517)	(0.0258)	(0.0296)	(0.0390)	(0.0350)	(0.0309)	(0.0202)
Household has six members	0.0751	0.1085***	0.0791**	0.0641		0.0568	0.0372*
	(0.0540)	(0.0268)	(0.0320)	(0.0461)		(0.0348)	(0.0219)
Have no dependent members	0.1457***	0.1206***	0.1493***	0.1743***	0.1999***	0.2088***	0.1583***
	(0.0190)	(0.0190)	(0.0182)	(0.0367)	(0.0325)	(0.0199)	(0.0130)
Have one dependent members	0.0600***	0.0561***	0.0964***	0.1429***	0.0556**	0.1264***	0.0688***
	(0.0146)	(0.0158)	(0.0153)	(0.0290)	(0.0249)	(0.0163)	(0.0107)
At least a member with college/university	0.0743***	0.1262***	0.1446***		0.1916***	0.1479***	0.1476***
	(0.0196)	(0.0267)	(0.0242)		(0.0341)	(0.0292)	(0.0114)
At least a member with vocational degree	0.0327*	0.0939***	0.0359		0.0571		0.0236**
	(0.0187)	(0.0230)	(0.0232)		(0.0402)		(0.0113)
At least a member with upper-secondary degree				0.0632**	0.0847***	0.0522***	
				(0.0281)	(0.0210)	(0.0175)	
Having a member working in public sectors	0.1518***	0.4561***	0.2050***	0.3101***	0.0385	0.1761***	0.1224***
	(0.0202)	(0.0264)	(0.0253)	(0.0372)	(0.0288)	(0.0264)	(0.0122)
Having a member working in private firms/organizations	0.2255***	0.3162***	0.2338***	0.1352***	0.2397***	0.1758***	0.1127***
	(0.0151)	(0.0204)	(0.0162)	(0.0403)	(0.0236)	(0.0176)	(0.0099)
Having a member working in non-farm sector	0.2104***	0.3137***	0.2099***	0.1325***	0.0340	0.1049***	0.0642***
	(0.0145)	(0.0154)	(0.0134)	(0.0264)	(0.0213)	(0.0151)	(0.0106)
Having a member receiving pensions	0.1831***	0.3165***	0.2711***	0.2331**	0.1583**	0.2695***	0.0308**
	(0.0225)	(0.0280)	(0.0301)	(0.1071)	(0.0763)	(0.0535)	(0.0139)
Having more than one member receiving pensions	0.3536***	0.4822***	0.4694***	0.3226***	0.1728***	0.3881***	0.1495***

Explanatory variables	Rural regions						Urban
	Red River Delta	Midlands and Northern Mountains	Northern and Coastal Central	Central Highland	Southeast	Mekong River Delta	
	(0.0391)	(0.0520)	(0.0544)	(0.0777)	(0.0650)	(0.1027)	(0.0179)
Solid wall of house		0.0722***	0.2061***	0.0860***			0.0829***
		(0.0170)	(0.0225)	(0.0300)			(0.0200)
Solid pillar of house	0.1886**	0.0288		0.0649	0.0940**	0.0834***	
	(0.0816)	(0.0178)		(0.0450)	(0.0477)	(0.0168)	
Per capita living area from 8 to less than 20 m2				0.1208***			
				(0.0307)			
Per capita living area from 20 to less than 30 m2	0.0457***	0.0401**	0.0763***	0.2301***	0.0664***	0.1081***	0.0492***
	(0.0169)	(0.0184)	(0.0166)	(0.0456)	(0.0231)	(0.0180)	(0.0113)
Per capita living area from 30 to less than 40 m2	0.0441**	0.0876***	0.0912***	0.3266***		0.1311***	0.0630***
	(0.0222)	(0.0260)	(0.0265)	(0.0551)		(0.0247)	(0.0151)
Per capita living area from 40 m2 and above	0.1252***	0.2294***	0.1788***	0.4684***	0.1062**	0.2614***	0.1736***
	(0.0279)	(0.0429)	(0.0290)	(0.0694)	(0.0460)	(0.0343)	(0.0155)
Monthly electricity consumption of household 25-49 kWh	0.2721***	0.1127***	0.1736***	0.1722***		0.1055***	0.1045***
	(0.0401)	(0.0182)	(0.0262)	(0.0400)		(0.0299)	(0.0406)
Monthly electricity consumption of household 50-99 kWh	0.3659***	0.2277***	0.3209***	0.2688***	0.0800*	0.1804***	0.2078***
	(0.0404)	(0.0214)	(0.0275)	(0.0429)	(0.0431)	(0.0301)	(0.0381)
Monthly electricity consumption of household 100-149 kWh	0.4515***	0.3163***	0.3778***	0.3944***	0.1542***	0.2498***	0.2838***
	(0.0442)	(0.0280)	(0.0305)	(0.0519)	(0.0464)	(0.0348)	(0.0393)
Monthly electricity consumption of household >= 150 kWh	0.5362***	0.3488***	0.4761***	0.5323***	0.1901***	0.3150***	0.3656***
	(0.0448)	(0.0332)	(0.0350)	(0.0604)	(0.0477)	(0.0375)	(0.0395)
Piped water and purchased water for drinking	0.1161*		0.1136***		0.1572***	0.0575***	0.1281***
	(0.0664)		(0.0172)		(0.0323)	(0.0215)	(0.0352)
deep well water for drinking	0.0944	0.1419***	0.0402***		0.1280***	0.0525**	0.1282***
	(0.0668)	(0.0227)	(0.0146)		(0.0251)	(0.0216)	(0.0362)
protected well or purified water for drinking	0.0875	0.0517***		0.0909***		0.0710***	0.0749**
	(0.0663)	(0.0142)		(0.0233)		(0.0250)	(0.0363)
Septic tank or semi-septic tank latrine	0.1415***	0.0843***	0.1546***	0.1882***	0.1850***	0.0988***	0.1923***
	(0.0379)	(0.0203)	(0.0195)	(0.0333)	(0.0330)	(0.0156)	(0.0230)
Other improved latrines	0.0707*	0.0528***	0.0925***	0.1164***	0.2172***	0.0789***	0.0696***
	(0.0382)	(0.0167)	(0.0194)	(0.0382)	(0.0375)	(0.0301)	(0.0267)
Color TV(s)	0.0628**	0.0881***	0.0401	0.1119***	0.0981*		0.0412
	(0.0307)	(0.0224)	(0.0259)	(0.0401)	(0.0501)		(0.0260)

| Explanatory variables | Rural regions | | | | | | Urban |
	Red River Delta	Midlands and Northern Mountains	Northern and Coastal Central	Central Highland	Southeast	Mekong River Delta	
Music rack of various kinds	0.0931***		0.0989***		0.0485*	0.0839***	0.0757***
	(0.0228)		(0.0184)		(0.0263)	(0.0184)	(0.0123)
Motorbike(s)	0.1726***	0.1537***	0.1905***	0.2295***	0.2816***	0.1848***	0.2295***
	(0.0259)	(0.0196)	(0.0195)	(0.0435)	(0.0534)	(0.0177)	(0.0175)
Refrigerator(s)	0.1160***	0.1032***	0.1652***	0.1315***	0.0773***	0.1188***	0.1073***
	(0.0163)	(0.0182)	(0.0167)	(0.0377)	(0.0282)	(0.0187)	(0.0144)
Air conditioner(s)	0.1807***	0.1067	0.1275***		0.1686***	0.2567***	0.1684***
	(0.0262)	(0.0717)	(0.0491)		(0.0531)	(0.0527)	(0.0123)
Washing machine(s), (clothes-) drying machine(s)	0.1111***	0.1102***	0.1616***	0.1654***	0.1564***	0.1309***	0.1037***
	(0.0192)	(0.0307)	(0.0257)	(0.0418)	(0.0237)	(0.0287)	(0.0110)
(Bath) water heater(s)	0.0974***	0.1407***	0.0845***	0.1181***	0.1579***	0.1480**	0.0636***
	(0.0167)	(0.0291)	(0.0255)	(0.0457)	(0.0503)	(0.0653)	(0.0118)
Microwave oven(s), baking oven(s)	0.1613***		0.1643***	0.2285**	0.1696***	0.1541***	0.1649***
	(0.0391)		(0.0581)	(0.1098)	(0.0482)	(0.0596)	(0.0142)
Ship(s), boat(s), junk(s), outer part with a motor			0.2568***			0.0838***	0.1307**
			(0.0987)			(0.0274)	(0.0597)
Lands around house from 300 m2 and above					0.0830		
					(0.0527)		
Annual crop land from 5000 m2 and above		0.0609***				0.1188***	
		(0.0159)				(0.0178)	
Perennial crop land 1000 to less than 5000 m2			0.0784				
			(0.0482)				
Perennial crop land from 5000 m2 and above		0.1776***	0.0998***	0.1471***	0.1545***		
		(0.0335)	(0.0373)	(0.0260)	(0.0288)		
Aquaculture water surface from 5000 m2 and above	0.1276	0.1795	0.1465***	0.5125***		0.1452***	
	(0.0978)	(0.1188)	(0.0564)	(0.0648)		(0.0355)	
Have at least a buffalo or cow or horse		0.1379***	0.0976***	0.1599**			
		(0.0309)	(0.0235)	(0.0643)			
Have more than one buffalo or cow or horse	0.1718***	0.2683***	0.1746***	0.2545	0.2350**	0.1910***	
	(0.0569)	(0.0392)	(0.0404)	(0.1563)	(0.1136)	(0.0440)	
Have 5-10 pigs or sheep, or goats		0.0721***	0.1133***			0.0776*	
		(0.0223)	(0.0246)			(0.0465)	
Have more than 10 pigs or sheep, or goats	0.1745***	0.2132***	0.1885***	0.2063***	0.0819	0.2862***	

Explanatory variables	Rural regions						Urban
	Red River Delta	Midlands and Northern Mountains	Northern and Coastal Central	Central Highland	Southeast	Mekong River Delta	
	(0.0235)	(0.0300)	(0.0326)	(0.0588)	(0.0538)	(0.0418)	
Have at least 100 geese, chicken, ducks, birds	0.0755***	0.1633***	0.1567***	0.1591**		0.0707**	
	(0.0195)	(0.0229)	(0.0298)	(0.0690)		(0.0307)	
Have aquaculture production	0.0681***	0.0481***	0.0551**			0.0590***	0.1486***
	(0.0210)	(0.0152)	(0.0262)			(0.0206)	(0.0318)
Red River Delta (excluding Hanoi and Hai Phong)							0.0668***
							(0.0167)
Northern and Coastal Central (excluding Da Nang)							0.0343**
							(0.0150)
Central Highland							0.1512***
							(0.0221)
Southeast (excluding HCM city)							0.2406***
							(0.0189)
Mekong River Delta (excluding Can Tho)							0.1592***
							(0.0188)
Cities: Hanoi, Hai Phong, Da Nang, TP. HCM, Can Tho							0.2208***
							(0.0150)
Constant	5.7988***	5.7423***	5.6751***	5.6317***	6.2526***	6.3323***	6.0378***
	(0.1054)	(0.0346)	(0.0414)	(0.0639)	(0.0865)	(0.0443)	(0.0564)
Observations	6,992	5,862	7,220	2,221	2,650	7,128	13,865
R-squared	0.437	0.656	0.559	0.625	0.415	0.389	0.523

Robust standard errors in parentheses. Sampling weights and cluster correlation are accounted.
*** p<0.01, ** p<0.05, * p<0.1.
Source: GSO's estimates from the 2014 VHLSS.

Table 3. Final scores of proxy indicators

Explanatory variables	Rural regions						Urban
	Red River Delta	Midlands and Northern Mountains	Northern and Coastal Central	Central Highland	Southeast	Mekong River Delta	
Household has one member	75	75	70	75	70	65	80
Household has two members	60	65	50	50	55	55	55
Household has three members	40	50	40	40	45	45	40
Household has four members	30	30	30	35	30	35	25
Household has five members	20	20	15	15	20	30	20
Household has six members	15	10	10	5	10	20	10
Have no dependent members	15	10	15	20	20	20	15
Have one dependent members	5	5	10	15	5	15	5
At least a member with college/university	10	15	15	10	20	15	15
At least a member with vocational degree	5	10	5	5	15	5	0
At least a member with upper-secondary degree	0	0	0	5	10	5	0
Having a member working in public sectors	25	45	25	30	25	20	10
Having a member working in private firms/organizations	20	25	20	15	5	10	5
Having a member working in non-farm sector	20	30	25	25	15	25	5
Having a member receiving pensions	35	50	45	30	25	40	15
Having more than one member receiving pensions	0	5	20	10	0	0	10
Solid wall of house	15	5	0	5	10	10	0
Solid pillar of house	0	0	0	15	10	15	10
Per capita living area from 8 to less than 20 m2	5	10	10	25	15	25	15
Per capita living area from 20 to less than 30 m2	5	15	15	35	15	30	15
Per capita living area from 30 to less than 40 m2	15	35	25	45	20	40	25
Per capita living area from 40 m2 and above	30	20	25	20	10	25	20
Monthly electricity consumption of household 25-49 kWh	40	35	45	30	20	30	30
Monthly electricity consumption of household 50-99 kWh	50	50	55	40	25	40	40
Monthly electricity consumption of household 100-149 kWh	55	50	70	55	25	45	45
Monthly electricity consumption of household >= 150 kWh	15	20	10	15	20	10	20
Piped water and purchased water for drinking	10	15	5	10	15	5	15
deep well water for drinking	10	5	0	10	0	5	5
protected well or purified water for drinking	15	15	15	20	20	15	20
Septic tank or semi-septic tank latrine	5	10	10	10	15	10	5
Other improved latrines	10	15	5	10	20	15	15

	Rural regions						Urban
Explanatory variables	Red River Delta	Midlands and Northern Mountains	Northern and Coastal Central	Central Highland	Southeast	Mekong River Delta	
Color TV(s)	10	0	10	0	5	10	10
Music rack of various kinds	50	50	50	50	50	50	50
Motorbike(s)	15	15	20	25	30	20	25
Refrigerator(s)	10	10	15	15	10	10	10
Air conditioner(s)	20	10	15	10	15	25	15
Washing machine(s), (clothes-) drying machine(s)	10	10	15	15	15	15	10
(Bath) water heater(s)	10	15	10	10	15	15	5
Microwave oven(s), baking oven(s)	15	10	15	25	15	15	15
Ship(s), boat(s), junk(s), outer part with a motor	0	0	25	0	0	10	15
Lands around house from 300 m2 and above	5	5	5	5	15	5	0
Annual crop land from 5000 m2 and above	5	10	5	5	5	15	0
Perennial crop land 1000 to less than 5000 m2	5	10	15	5	5	5	0
Perennial crop land from 5000 m2 and above	10	20	20	15	15	10	0
Aquaculture water surface from 5000 m2 and above	15	20	15	20	0	15	0
Have at least a buffalo or cow or horse	0	15	10	15	0	0	0
Have more than one buffalo or cow or horse	15	25	15	25	25	20	0
Have 5-10 pigs or sheep, or goats	0	5	10	0	0	10	0
Have more than 10 pigs or sheep, or goats	15	20	20	20	10	25	0
Have at least 100 geese, chicken, ducks, birds	10	15	15	15	0	5	0
Have aquaculture production	5	5	5	0	0	5	0
Red River Delta (excluding Hanoi and Hai Phong)							20
Northern and Coastal Central (excluding Da Nang)							5
Central Highland							15
Southeast (excluding HCM city)							25
Mekong River Delta (excluding Can Tho)							15
Cities: Hanoi, Hai Phong, Da Nang, TP. HCM and Can Tho							30

Source: GSO's estimates from the 2014 VHLSS.

5. Validation of the PMT

The PMT can be tested in the 2014 VHLSS by comparing the poor households identified by the income data and the poor households predicted by the PMT. To evaluate a targeting method, we can use the coverage rate and the leakage rate.

The PMT method can be tested in the 2014 VHLSS by comparing the poor households identified by the income data and the poor households predicted by the PMT. According to the GSO team, the PMT reach the poor very well. The coverage rate ranges from 70% to 85% by regions and the leakage rate ranges from 15% to 30%.

There are more requirements to validate the PMT method that is used in the 2015 Poverty Census. Firstly, MOLISA wants to test how the PMT can work in reality. They want to test whether households, local staffs and interviewers of the Poverty Census are able to follow the PMT method to identify the poor households. Secondly, it needs to verify whether income data and poverty status predicted using the PMT method are more accurate than those estimated from income data quickly collected using the two-pages questionnaires. This aims to convince ones, who believe income data collected by short questionnaires, to use the PMT. It requires income data collected using detailed questionnaire as well as income data collected using two-page questionnaire on the same households. Poverty status and income data estimated from the detailed questionnaires are considered as the benchmark in assessing two-page questionnaire income and PMT income.

A key question is how to have both income data collected using detailed questionnaire and income data collected using two-page questionnaire on the same households. We are not able to re-interview households sampled in the 2014 Vietnam Household Living Standard Survey (VHLSS),[5] since the time lag between the final round of the 2014 VHLSS (December 2014) and the pilot survey. In addition, the 2014 VHLSS

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[5] VHLSSs are nationally representative surveys which are conducted by General Statistics Office of Vietnam every two years. Income data are collected in VHLSSs using very detailed questionnaires.

covered a large number of enumeration areas, and it's very costly to resample the 2014 VHLSSs.

Fortunately, we have a household survey which was conducted from the Central Highlands Poverty Reduction Project. This project is implemented in 130 poor communes in 26 districts of 6 provinces, including Kon Tum, Gia Lai, Dak Lak, Dak Nong, Quang Nam and Quang Ngai. In order to collect information which aids the project design and implementation, Ministry of Planning and Investment and World Bank decided to implement a baseline survey in the project provinces. The Baseline Survey will collect information from households, commune officials and local authority in 260 communes, of which 130 communes are in project areas (treatment group) and 130 communes selected are in non-project areas (control group). The baseline survey sampled 3648 households in 260 communes. The baseline survey was conducted in January and February 2015 by Mekong Development Research Institute (MDRI), Vietnam. The survey contains income data collected by a detailed questionnaire which is very similar to the 2014 VHLSS's questionnaire. Other data on demography, durable, housing condition, etc. are also collected in this survey. This survey is called the Central Highlands Project Baseline Survey and abbreviated as the 2015 CHPBS below.

Based on the 2015 CHPBS, a pilot survey was conducted in March 2015 by the MDRI to verify the PMT. This survey sampled 795 households who were also covered in the 2015 CHPBS. There are 263 and 532 households were sampled from Quang Nam and Dak Lak, respectively. This survey collected income data using two-page questionnaires and data on basic demography, durable and house of households. These basic data are used in the PMT method to predict income and poverty status of households. In the following presentation, this survey is called the proxy-mean test pilot survey (the 2015 PMT-PS).

The 2015 PMT-PS are conducted by two groups of interviewers. The first is MDRI's interviewer team. This team is well trained and has experiences in conducting several large-scale household surveys. This team use Tablet-PC in data collection. The second group includes village heads, who are not professional interviewers. They use

paper questionnaires. Table 5 presents the income data in the 2015 PMT-PS that were collected by long- and short- questionnaires. It shows that income collected by short-questionnaire is lower than income collected by long-questionnaire regardless of interviewers.

Table 5. Income data collected by short- and long-questionnaires

Interviewers	Per capita income collected using long questionnaires (thousand VND/month)	Per capita income collected using short questionnaires (thousand VND/month)	The average of the absolute difference (thousand VND)	Percentage of the absolute difference
	$\sum_{i=1}^{n} Y_{L\_i} \Big/ n$	$\sum_{i=1}^{n} Y_{S\_i} \Big/ n$	$\sum_{i=1}^{n} \left| Y_{L\_i} - Y_{S\_i} \right| \Big/ n$	$\sum_{i=1}^{n} \left| Y_{L\_i} - Y_{S\_i} \right| \Big/ \sum_{i=1}^{n} Y_{L\_i}$
MDRI's interviewers	994.6	750.5	658.3	66.2
Village heads	749.5	570.9	519.3	69.3
All sample	877.4	664.7	591.9	67.5

Table 6 estimates the coverage and leakage rates of poverty identification using income data collected from short-questionnaire and the PMT method. The benchmark is the poverty status of households estimated using income data collected from long-questionnaire and income poverty line. For comparison, we adjust the poverty line and score thresholds so that the poverty rate estimated using income data collected from short-questionnaire and the poverty rate estimated using the PMT methods are the same. Interestingly, income data collected using short-questionnaire and the PMT methods produce very similar estimates of the coverage and leakage rates.

Table 6. Coverage and leakage rates

Interviewers	Coverage rate (%)		Leakage rate (%)	
	Using income collected by short questionnaire	Using Prediction from PMT	Using income collected by short questionnaire	Using Prediction from PMT
MDRI's interviewers	86.4%	85.2%	13.6%	14.8%
Village heads	67.2%	68.5%	32.8%	31.5%
All sample	73.7%	74.1%	26.3%	25.9%

The pilot test also shows that households and local staffs were able to use the PMT method in poverty targeting. Most of them found the PMT more transparent than income data collection.

6. Poverty targeting in the 2015 Poverty Census

The final poverty targeting in the 2015 Poverty Census is summarized in Figure 2 and can be described in several steps as follows.

Figure 2: The 2015 poverty targeting in Vietnam
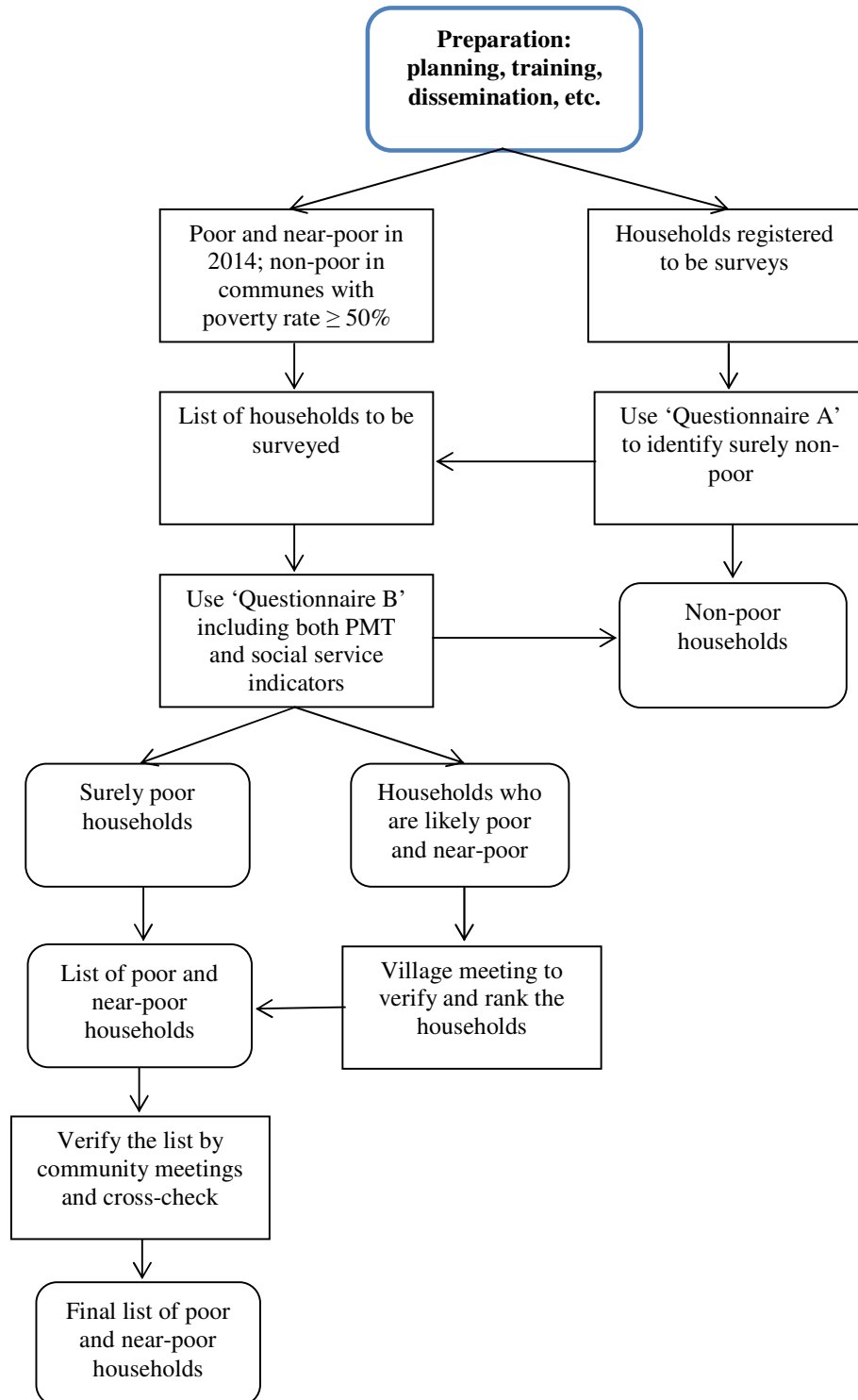
Step 1: Preparing the list of households to be surveyed

The Poverty Census did not survey all the households in the country. It focused in low income households. Households who were poor and near-poor in 2014 or lived in communes with the poverty rate from 50% and above were included in the poverty survey. Other households can register to be included in the poverty survey. For registered households, 'Questionnaire A' was used to identify surely non-poor. There are nine items in this questionnaire:

- Households have car/motorbike/motor-boat
- Households have fridge/air-conditioner
- Household have washing machine
- Households have lands, factor and machines for rent.
- Households consume 100 kWh and more per month.
- Living area per capita from 30 m2 and above
- Households have at least a member working in public sectors or having pensions
- Households have at least a member having college university and above, and being currently employed.

If a household have at least three items out of nine above items, they are considered as the non-poor. The nine items are constructed from the 2014 VHLSS, in which more than 90% of households who have at least three items are non poor. However, some poor households still have three or more items. To increase the coverage, local authorities can still include a household who have at least three items into the list of surveyed households if they find the household has a probability of being poor.

Step 2: Collecting data on PMT and multidimensional poverty

After having the list of surveyed households, local authorities applied 'Questionnaire B' to collect data on the PMT indicators and social services (multidimensional poverty) from these households. Aggregate scores were computed for all the households.

Step 3: Computing the poverty rate of villages and village meetings

As mentioned above, the thresholds of scores that are corresponding to income poverty lines are as follows:

- The poverty thresholds corresponding to the poverty lines of VND 700,000 in rural areas and VND 900,000 in urban areas are 120 scores and 140 scores, respectively.

- The near-poverty thresholds corresponding to the poverty lines of VND 1,000,000 in rural areas and VND 1,300,000 in urban areas are 150 scores and 175 scores, respectively.

Firstly, local authorities estimate the percentage of households who have their PMT score equal and below the above thresholds. They estimate the poverty and near-poverty rates of their villages, denoted by P_v. The poverty rate of a small area can be estimated using the PMT method with reasonable standard errors like the poverty mapping method of Elbers (2002; 2003). However, estimation of poverty status of each household is associated with a high standard error. There can be high inclusion errors for households who have scores around the thresholds. To solve this problem, households with scores within a bandwidth of 10% to 15% higher or lower than the thresholds were verified by community meetings. Households in a village ranked and selected the poorest households among the surrounding households, and the number of poor households were selected so that the final poverty of the village was equal to the estimated poverty rate, P_v.

Step 4: Verifying and finalizing the poor and near-poor list

The list of the poor and near-poor households is published in villages and communes. It can be verified by local authorities. If there are no complaints, the list will be finalized.

7. Conclusions

For poverty reduction, it is necessary to provide the poor with support programs. Identification of the poor households is challenging since there are no reliable data on income or expenditure for all the households. In Vietnam, the 2015 Poverty Census applied the PMT to identify the poor households. Compared with previous poverty targeting, there three important improvements. Firstly, the proxy indicators and scores are

constructed based on empirical analysis from the household surveys. Secondly, income data collection is dropped. Thirdly, the poverty rate of villages is computed based on the PMT so that the poverty rate is comparable across villages. Thus, compared with previous poverty targeting, the 2015 poverty targeting is expected to produce more transparent poverty identification and more comparable poverty estimates over localities and time. Although the PMT is simple in terms of technical issues, application of it in reality is not simple. It requires cooperation from different organizations, especially MOLISA and GSO with supports from the Work Bank. The PMT needs to be simple so that households and local staffs can easily understand it.

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