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Abstract

With the help of 2004-05 NSSO unit level consumption expenditure data the present paper tries to estimates the extent of inclusion and exclusion error which has been in the poverty policy discourse for long time. The state has been improving the methodology in order to reduce these errors but fails to do so even with the recent modification. As a result of this, the mismatch between the estimation of poor and identification of poor is visible significantly. With this background, this paper is an attempt to develop criteria of 'identification of poor' with simple, transparent and verifiable variables. Estimation shows that the prescribed criteria not only reduces the exclusion error significantly but also suggests for more inclusion of the real poor.

1. Introduction

With a view to ensure 'basic needs' through social assistance schemes, 'identification of poor' has been an important issue in India since 1980s. The issue has drawn considerable attention because of weak methodology and implementation failure leading to wrong targeting. Further, it continues to be in debate and discussion as there is an apprehension that, poor may not avail the benefits of high rate of growth, which is one of the most important objectives of India at present. There is every possibility of increasing gaps between haves and have-not in case the targeted growth is not translated into development. In order to maintain parity and providing minimum level of protection through social assistance schemes, therefore, 'proper identification of poor' is a challenge before the state, policy makers and civil society.

So far, criteria adopted for identifying the poor is non-transparent, cumbersome and often non-verifiable (Alkire and Seth 2008, and Sundaram 2003). Besides, political forces and power equation often influence the identification process. Thus, the vulnerable, powerless and forbidden households feel helpless in enrolling them in the poor category and misclassify as noon-poor (Hirway; 2003). Irrespective of adopting different methods and parameters for identifying poor in the last three surveys (1992, 1997 and 2002), the errors of exclusion and inclusion remain at a significant level. Ram *et al* (2009) estimated that 60 percent of the households at all India level in the abject deprivation group do not have a BPL card.[1] Data from the 61st round of the National Sample Survey (NSS) reveals that 15 per cent of the richest quartile of the non-poor and 23.5 per cent of the next to richest quartile households in rural areas possessed either AAY or BPL card. On the other hand, 51.4 percent of poorest quartile among the poor and 58.4 percent of the next to poorest quartiles does not possess either AAY or BPL card. The former kind of error can be termed as Type-I error (i.e., error of inclusion) and the later can be termed as Type-II error (i.e., error of exclusion). In other words, error of inclusion includes the non-poor in the poor category, while error of exclusion misclassifies the poor in the non-poor category.

The issue of 'identification of poor' is gaining momentum because of two reasons. First, a significant proportion of households estimated as poor by official poverty estimate of Planning Commission are not identified as poor as per the methodology adopted by the Ministry of Rural Development (MoRD). As a result of this, a significant difference has been observed between the 'estimated poor' and the 'identified poor'. Second, the issue remains unresolved even at the methodological level since the criteria adopted are not directly verifiable. So far, no satisfactory methodology has been explored to ensure inclusion of majority of the poor. Consequently, many poor households often do not hold either BPL or AAY card. Therefore, the benefits attached to such cards do not reach to the needy households. As articulated by the Expert Group, most poor are often excluded from BPL survey list because of their social, economic, political powerlessness, and geographical isolation. In total, they are of the view that the exclusion error is a direct function of weak bargaining power of the poor as a collective entity in Indian democracy.

The above errors in identification of poor give an impression of poor coordination among the State and civil society at planning, implementation and monitoring process. Theoretically, a higher proportion of the estimated poor by the Planning Commission should not be rejected by the MoRD based on some methodological ground. The above proposition raises a pertinent question that how to minimize the gap between the numbers of 'estimated poor' and 'identified poor'. Against this backdrop, this paper proposes an alternative methodology for identifying the poor with simple, transparent and verifiable criteria to minimize the level of error of exclusion. The present paper addresses these issues based on the 1997 BPL survey and recent unit level Consumption Expenditure Survey data (2004-05) of NSSO.

This paper proceeds as follows. The second section reviews methods implemented and suggested for identification of the poor. The third section analyses extent of Type-I and Type-II errors based on criteria adopted by MoRD and Planning Commission. The fourth section suggests an alternative methodology for identification of poor in rural areas. The estimated outcome of the methodology is shared in the fifth section followed by conclusions in the sixth section.

2. Why Identification of Poor was so Poor?

In 1992, the Ministry of Rural Development (MoRD) used self-reported income as the main parameter to identify the poor households. However, the underestimation of income by households has included more than the expected number of poor in the list. As a result, the generated BPL list looks bulky and it became a mix-up of poor and non-poor.

To overcome these difficulties it was suggested to use expenditure data in the next census. Thus, the 1997 BPL census used food expenditure rather than income figure, in addition to 'exclusion criteria'[2] and excluded the visibly non-poor in the first round. Subsequently, data on total consumption expenditure (both purchased from the market and home grown) was collected by interview method from the remaining families and per capita consumption expenditure was estimated for each family treating all members as identical unit. The per capita consumption expenditure was then compared with the concerned state poverty line estimated by the Planning Commission and the family is counted in the BPL group if its per capita consumption is within the norm set by the Planning Commission. However, the exclusion criteria were too stringent – poor families were excluded, poverty lines were not available for all states and even not uniform across states and district territories (Mehrotra and Mander 2009, Alkire and Seth, 2008). Besides, there was no scope of allowing new households to declare poor in the interim period before the next survey is instituted (Sundaram 2003).

Considering the above limitations, the 2002 BPL census shifted from exclusion criteria to 13 criteria method based on socio-economic indicators reflecting the quality of life in rural areas.[3] Each household was assigned a score of 0-4(based on their access or ownership in an ascending order) for each of thirteen score-able indicators, depending on their response to the question. The scores of the i^{th} household on all these parameters are then summed to

create an aggregate score S_i. Hence, the aggregate score of a household would be ranging from a minimum of zero to a maximum of fifty-two (symbolically, $0 \leq S_i \leq 52$). Finally, a household would be categorized as poor or non-poor based on the 'cut-off' score decided by the region and states. These 'cut-off' score could vary across States since the concerned State Governments were asked to restrict the percentage of poor households equivalent to the estimated poor by the Planning Commission for the year 1999-2000 with a plus minus 10 per cent margin. In other words, the States were given the flexibility of 10 per cent to account for the transitory poor. According to the 2002 BPL census, thus, household *i* is considered to be BPL if:

$$S_i = \Sigma H_{ij} \leq S_p^{\text{cut-off}}$$

where, i = 1.....to n and j = 1 13,

S_i = aggregate score of the i^{th} household,

H_{ij} = the i^{th} household on j^{th} indicator, and

$S_p^{\text{cut-off}}$ = State specific cut-off score.

Some State Government raised objections against the ceiling on the number of BPL households to be identified with the apprehension that it may suppress the number of actual poor and in turn, reduce the flow of funds from the centre. The forceful imposition of ceiling can reduce the gap between volume of identified and estimated poor at the cost of exclusion of many actual poor as evident from the significant level of Type-I and Type-II errors.

The methodology to identify the poor based on 13 point criteria of 2002 face severe criticism even before its implementation (Sundaram 2003, Hirway 2003, Jain 2004, Alkire and Seth 2008, Mehrotra and Mander 2009, and Himanshu, 2008). The key criticisms emerge from the literature are (1) lack of clarity in the criteria (2) methodological drawbacks in scoring and aggregation, (3) data quality and corruption, and (4) probability of wrong selection. In this paper, we primarily focus on the second criticism.

(i) Since the distance between response categories within each dimension is not necessarily equal, treating the ordinal response (0-4) like cardinal is misleading.

(ii) Since a one-point gain in one dimension can be compensated by an equivalent decrease in any other dimension, this makes a dimension completely irrelevant. For instance, if a family get food for only once a day, this situation gets nullify if the family happens to have quite a few items of clothing or do well in terms of any other dimension which is not as serious as not getting food.

(iii) Equal weight of dimensions can be treated as a poor description of poverty. For instance, not having one square meal a day throughout the year is treated equivalent to open defecation or not possessing electrical appliances.

(iv) No national poverty line is set. In practice, almost all States and in some cases districts set their own poverty line across the 52-points scale, such that the number of BPL households is equivalent or 10 per cent more than the proportion of poor declared by Planning Commission for the year 1999-2000. Thus, households are not declared as BPL in their States might be considered as BPL had they lived in a neighboring State.

(v) Though, the cap in the states' BPL estimate not exceeding 10 per cent more of the NSSO estimates 1999-2000 was imposed for fiscal reasons, it has been widely disputed across states.

(vi) The poor often has no access to unorganized credit market because of their inability to offer any acceptable collateral. But the highest score of "4" has been assigned to the household who is not indebted. Thus, the score attached to 'type of indebtedness' might have ruled out the poor from BPL category.

(vii) Since future is uncertain, 'preference of assistance' is also meaningless. People might have given wrong answer to get a favourable score.

3. Extent of Type-I and Type-II Errors

Identification of poor and distribution of AAY and BPL cards has relevance at policy level because once identified as below poverty line, households are eligible to obtain benefits from various social assistance programmes implemented by the central and the state government. The recent 61st round on consumption expenditure survey by NSS (2004-05) gives an insight into the magnitude and nature of exclusion and inclusion faced by the households' in terms of availing the cards. The 2004-05 consumption expenditure survey have the information on the possession of types of cards by the households along with other socio economic and consumption expenditure related variables. It is assumed that, households possessing either BPL or AAY cards are identified as poor by the MoRD. Whereas, households reported of spending less than the poverty line for the specified state and sector termed as poor by the Planning Commission. Therefore, there is a difference in opinion between these two agencies of state in the line of estimation and identification of poor. This discrepancy generates two unwanted errors as mentioned earlier, needs to address properly. At the all-India level, 70.5 per cent of rural households either possessed no card or having an APL card, are identified as non-poor by the MoRD (Table 1). Notably, only 39.6 per cent of the rural households estimated as poor using the official poverty estimation methodology of the Planning Commission possess either a BPL or AAY card. This means that 60.4 per cent of rural households, who are poor on the basis of consumption expenditure, are not identified by the MoRD as poor. In other words, the magnitude of Type-II error is 60.4 per cent. It was also estimated that 26.3 per cent of rural households belongs to non-poor category as per the consumption expenditure method are identified as poor by the MoRD. This implies that the volume of Type-I error is 26.3 per cent.

Table 1. Household's status and their access to BPL card

Type of households	No. of households having either AAY or BPL card	No. of households having other or no cards	Total number of households
Poor	14242308 (39.6)	21702062 ***(60.4)***	35944370
Non-poor	29956449 ***(26.3)***	84070915 (73.7)	114027364
Total	44198757 (29.5)	105772977 (70.5)	149971734

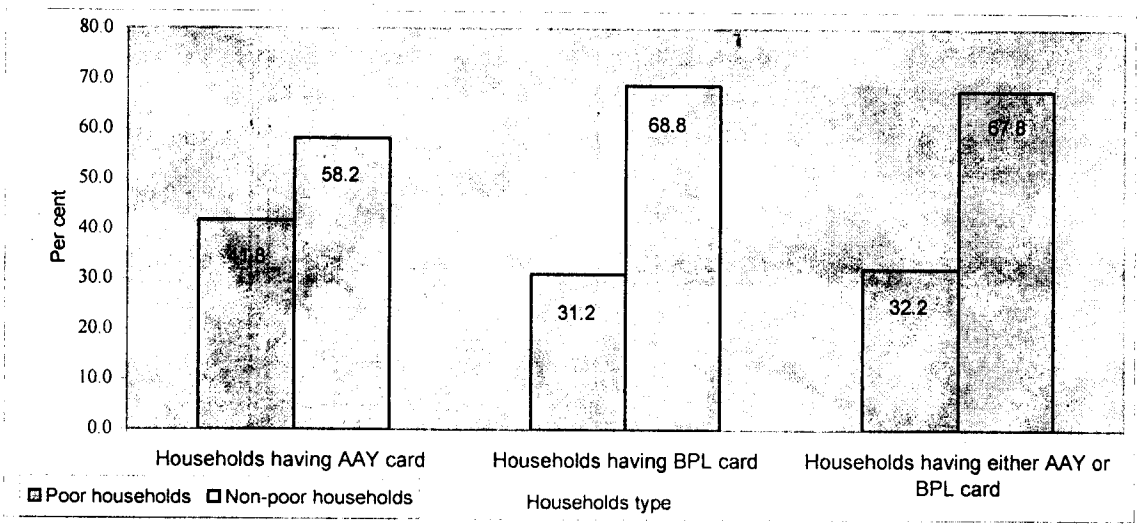
Note: (1) Figures are estimated using weight and state specific poverty line; (2) Figures in the parenthesis are percentage to respective total, (3) Missing numbers is excluded.

Sources: Estimated from unit level record, Consumption Expenditure Survey, NSSO, 2004-05.

Apparently, 29.5 per cent households in rural India possess either a BPL or AAY card which was 5 per cent more compared to the 2004-05 Planning Commission estimates. However, this was not true for all States. In poorer states like Bihar, Uttar Pradesh, Orissa, Jharkhand, Assam and Uttaranchal, the estimated number of poor households was more than that of households possesses card. For instance, in Bihar only 17.4 per cent of households having either BPL or AAY card whereas the estimated poor household was 38.1 per cent. The corresponding proportions were 12.3 and 19.8 per cent in Assam, 16.4 and 28.6 per cent in Uttar Pradesh, 25.8 and 40.8 per cent in Jharkhand, 25.7 and 35.7 per cent in Uttaranchal and 44.4 and 45 per cent in Orissa. However, for states like Andhra Pradesh, Karnataka, Gujarat, Kerala, Maharashtra and Himachal Pradesh, proportion of households possessed either BPL or AAY card is significantly more compared to the estimated percentage of poor households.

The consumption expenditure data based on 61st round of NSS estimates that a significant proportion of households falling below the official poverty line did not possess either a BPL or AAY card across states (Table 6). The proportion of such households was 79.2 per cent, the highest in Punjab and 28.4 per cent, the lowest in Karnataka. However, in the poorer states like Bihar, Uttar Pradesh, Jharkhand, Rajasthan, Uttaranchal, West Bengal, Chhatisgarh and Madhya Pradesh, the proportion of excluded poor households varies from 77.6 per cent to 51.2 per cent. Thus, the degree of Type-II error (those below the official poverty line were excluded) is quite prominent in these poorer states. Data given in Table 6 shows that the magnitude of Type-I error (non-poor being included) varies from 55.9 per cent to 9.3 per cent across states. Notably, in case of Andhra Pradesh and Karnataka, errors of inclusion of non-poor households are larger than errors of exclusion of poor.

Figure 1. Distribution of AAY and BPL cards among poor and non-poor households



Sources : As Table 1.

Figure 1 indicates the variation in the share of total card (AAY and BPL) among poor and non-poor. Of the total card distributed, only 32.2 per cent was allotted to the consumption poor and the remaining 67.8 per cent to the consumption non-poor households. Apparently, around 68.8 per cent of total BPL card was distributed among the non-poor households, while the share of poor households was only 31.2 per cent. More significantly, the AAY, which was initiated to provide food grains for the poorest among the BPL category households at super subsidized prices, 58.2 per cent of total AAY card is distributed to consumption non-poor. Based on the information depicted in Figure 1, it can be argued that the distribution of AAY and BPL cards has gone in favor of the non-poor compared to poor households. In this context, Ram *at al* (2009) are of the view that as the process of identification as well as distribution of BPL or AAY cards is often influenced by politically affluent person, the non poor benefit more than the poor irrespective of methodology adopted in identifying the poor. Hirway (2003) and Khera (2008) mention that the outright corruption ensures names of non-poor villagers in the BPL list.

4. Proposed Methodology

In order to address the methodological weakness in identifying the BPL households, this paper explores 'vulnerable criteria' approach using the consumer expenditure survey of NSS (61st round). The consumption expenditure survey of NSS, have the information on the possession of BPL card along with other socio-economic characteristics of household such as land ownership, occupation, social group, demographic and education. A household is defined as vulnerable if it bears at least one of the following criteria[4] :

1) household does not have own dwelling unit;

2) household with a single female member with 60 and more age;

3) households do not own any land and not self-employed in non-agriculture and no member is regular salary earner;

4) members of the household primarily work as agricultural and other labour having only homestead land with no regular salary earner;

5) household holds less than or equal to 2 hectares of standardize cultivable land[5] with no regular salary earner and primarily engaged in agricultural and other labour activities;

6) household belong to schedule caste and schedule tribe; and

7) household spend less than Rs.216.29 per capita on clothing.

In the first step, we assigned a value of 'one' when a household is having any of these criteria, otherwise 'zero' to prevent complete substitutability across dimensions. In the second step, the score of the i^{th} household in all 7 dimensions are then summed up to arrive at the aggregate score. The aggregate score of a household exposes the extent of vulnerability in terms of number of dimensions. But the BPL survey of MoRD does not revel it because the same aggregate score could be arrived from any combination of dimensions. This is due to the fact that the score for each dimension was not binary in nature.[6] Most significantly, we apply 'union approach' to identify the vulnerable households. In other words, a household is identified as vulnerable if it is exposed to at least one of the dimensions. On the other hand, a non-vulnerable household is one that does not score any value.

5. Outcome of Proposed Methodology

The proposed 'vulnerable criteria' (here in after, VC) include both poor and non-poor. While acknowledging the multidimensional nature of poverty, households coming under VC should be identified as poor by the MoRD. Table 2 reports the extent of vulnerable households and the coverage of poor and non-poor, based on consumption expenditure within the VC. Evidently, 26.8 per cent households who are consumption poor can be captured if 4^{th} criterion is adopted. The compulsory inclusion of scheduled caste and scheduled tribe households irrespective of their economic status, shows inclusion of 46.5 per cent consumption poor into the BPL list.[7] Similarly, 28.7 per cent of consumption poor households can be included in the BPL list on the basis of per capita expenditure on clothing (7^{th} criterion). Significantly, through 1^{st}, 2^{nd}, 3^{rd}, and 5^{th} criterion, 3.8 per cent, 0.7 per cent, 4.6 per cent and 11.4 per cent poor households can be included in the BPL list respectively.

The proposed methodology identifies 52.2 per cent of total number of households as vulnerable including 45.4 per cent consumption non-poor. Apparently, our estimate on vulnerable household corroborates with estimation of poor by Saxena Committee (2009) based on calorie intake. Of the total consumption poor cardholders, the share of vulnerable poor constitute 80.3 percent whereas, 63.1 per cent of the total consumption non-poor cardholders are found to be vulnerable (Table 2). In total, 68.6 per cent of the total cardholders are covered under vulnerable criteria. Thus, the proposed methodology, based on 'vulnerable criteria' covers a significant percentage of identified poor household.

Table 2. Extent of coverage of poor households under vulnerable criteria

Sl No. of the Criteria	Parameters based on vulnerability criteria	Identified Vulnerable Households (in %)		
		Poor	Non-Poor	Total
1st	Households not having own dwelling unit (VULN-1)	3.8	3.1	3.2
2nd	Single female member household in the 60 plus age group (VUNL-2)	0.7	1.3	1.2
3rd	Households do not own any land and not self employed in non-agriculture and no member is a regular salary earner (LULN-3)	4.6	3.6	3.9
4th	Agricultural or other labour households having homestead land only and no member is a regular salary earner (VULN-4)	26.8	15.2	18.0
5th	Households having ? 2 hectare of standardize cultivable land and primarily engaged in agricultural or other labour activity with no regular salary earner (VULN-5)	11.4	5.9	7.2
6th	Scheduled caste and scheduled tribe households (VULN-6)	46.5	27.9	32.3
7th	Households spending less than Rs.216.29 per capita per year on cloth* (VULN-7)	28.7	6.9	12.1
All	Total number of households having at least one or more parameters	73.9	45.4	52.2
Percentage of vulnerable poor households having either AAY or BPL card out of total AAY or BPL card holder who are consumption poor			80.3	
Percentage of vulnerable non-poor households having either AAY or BPL card out of total AAY or BPL card holder who are consumption non-poor			63.1	

Note: * The mean expenditure on clothing (ascending order) of the first quarter of the sample households.
Source: As Table 1.

The vulnerability of households by number of dimensions is presented in Table 3. The second and third rows report the percentage of consumption poor as well as non-poor who can be included in the list of MoRD as poor through the respective number of dimensions. For example, by following single dimension (any one) of the VC, it is possible to include 36.53 per cent of consumption poor households into the BPL list. Similarly, 26.93 per cent of the consumption poor households can be included in the BPL list by applying any two dimension of the VC. Apparently, only 26.13 per cent of rural poor households are not being captured by the VC. This can be termed as "estimated Type-II error".

Table 3. Indicators of the chosen dimensions under vulnerable criteria

Number of Dimension	0	1	2	3	4	5
Per cent of poor household in each number of dimension	26.13	36.53	26.93	9.50	0.90	0.01
Per cent of non-poor household in each number of dimension	54.59	30.07	12.41	2.71	0.22	0.00

Sources: As Table 1.

By using 'union approach', the proposed methodology identifies 73.87 per cent consumption poor households for the entitlement of either AAY or BPL card. Contrary to this, only 39.6 per cent of consumption poor households were distributed AAY/BPL card by MoRD. (Table 1). Since the proposed methodology able to identify a significant proportion of estimated poor households compared to the BPL census, it can thus reduce the extent of errors of exclusion if implemented.

The data in Tables 2 and 3 indicate a close correspondence between vulnerable criteria and household status (poor or non-poor). To confirm the magnitude of each indicator of the former on the status of the household, a multivariate logistic regression analysis was carried out. The general model is a binary choice model involving estimation of the probability of whether a household is poor or not is a function of a vector of explanatory variables included in the vulnerable criteria. If P is the probability of a household being poor, then

$$P = \left[1 + e^{\{-\beta X\}}\right]^{-1}$$

Where 'β' is a vector of the unknown coefficients and 'X' is a vector of covariates that affects the probability of household being poor. Thus, the general logistic model can further be expressed as

$$\log_e \left[P_i / 1 - P_i \right] = \beta X = \sum_{j=0}^{k} \beta_j X_{ij}$$

The above express the log odds of a household being poor as a linear function of the explanatory variables. We can interpret the odds ratio [Exp (β)] in terms of the change in odds i.e., if the value is greater than 1 then it indicates that as the predictor increases, the odds of the outcome occurring increase. Conversely, a value less than 1 indicates that as the predictor increases, the odds of the outcome occurring decrease. The estimated results are outlined in Table 4. Notably, all parameters expect VULN-2 reflect expected association and are significant.

Table 4. Results of logistic regression on consumption poor

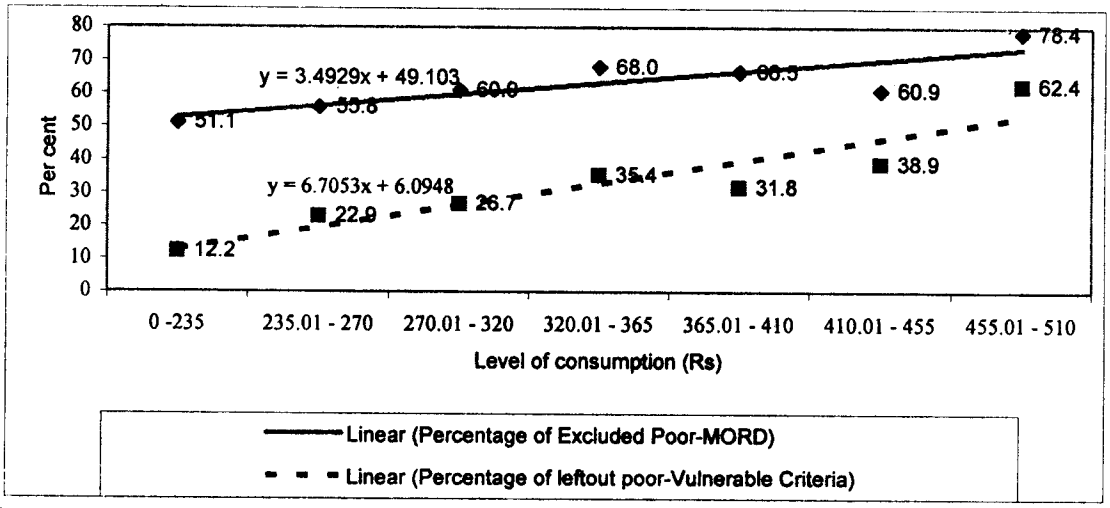
Dependent variable: whether the household is poor (0 = No, 1 = Yes)		
Variables	β coefficient	Exp (β)
Constant	1.33* (.06)	3.77
VULN-1	.27* (.07)	1.31
VULN-2	-.71*(.10)	.49
VULN-3	.23*(.06)	1.26
VULN-4	.52*(.03)	1.67
VULN-5	.64*(.04)	1.90
VULN-6	.33* (.02)	1.39
VULN-7	-.01* (.00)	.99
-2 Log likelihood = 59430.01		
R^2 = .18 (Cox & Snell), .29 (Nagelkerke)		
Model $\chi^2(7)$ = 15312.86, Number of observations = 78639 (unweighted sample)		

Note: 1) * Significant at 1 % level. 2) Figures in parentheses indicate Std. Error

The above analysis reveals that there is a positive relationship between households having no dwelling unit and being poor. For instance, *ceteris paribus*, the probability of such households being poor is 1.31 times higher than those households having dwelling unit. Single female member households with 60 and more years old are less likely to be poor as evident from the negative and significant coefficient of VULN-2. As expected, the landless households who are neither self-employed in non-agriculture nor any member is a regular salary earner, the probability of their being poor is 1.26 times more compared to other households. Similarly, an agricultural and other labour households having only homestead land with no regular salary earner is more likely to be poor, as evident from the positive and statistically significant coefficient of VULN-4. May be due to their limited control of productive resources and other social constraints, households from scheduled caste and scheduled tribe categories are more likely to be poor. Apparently, as capacity to spend on clothing increases, the probability of being poor decrease. Generally speaking, the results are consistent with theoretical expectation and draw a plausible picture of the household being poor or not. The significant chi-square clearly shows that the estimated model is having good fit.

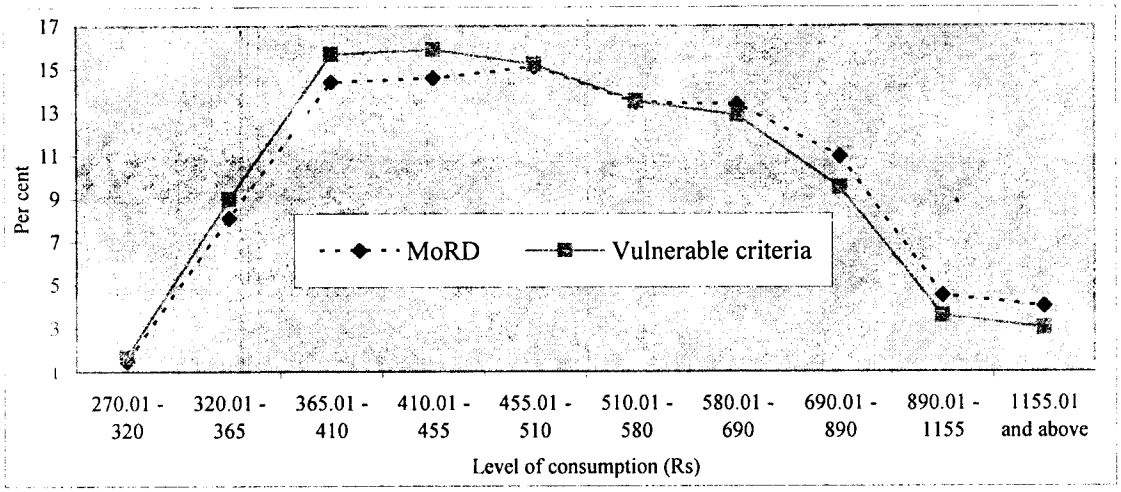
Notably, the "estimated Type-II error" (poor being excluded by VC) is 26.13 per cent (Table 3). The above findings raise a pertinent question that who are these excluded poor under VC? It is observed that 23.1 per cent and 48.7 per cent of such excluded poor households are self-employed in agriculture and non-agriculture. This indicates that such households seem to have suppressed their consumption expenditure perhaps to get enrolled them in the BPL category. Incidentally, out of total number of poor who are excluded under VC, 70.2 percent of them are also unidentified by the MoRD. A comparison between MoRD and VC suggest that, one unit increase in consumption expenditure lead to more exclusion by the latter criteria than the former (Figure 2).

Figure 2. Proportion of excluded poor based on MoRD and vulnerable criteria



Sources : As Table 1.

Figure 3. Distribution of non-poor AAY or BPL cardholders



Sources : As Table 1.

Figure 3 reports the distribution non-poor households having access to AAY or BPL cards across level of consumption expenditure. The estimation shows that relatively more per cent of non-poor cardholders are found at lower expenditure level (within the range of Rs.270.01-510) under VC compared to MoRD method. Whereas, the latter method includes more per cent of non-poor cardholders compared to the former at higher expenditure level (above Rs.510.01). It implies that the VC encourage inclusion of less better off and exclusion of better off non-poor households compared to MoRD.

Table 5. Share of non-poor out of total AAY or BPL cardholders across methods

Level of Consumption	Per cent of non-poor out of total AAY or BPL card distributed		
(Rs.)	MoRD	Vulnerable Criteria	Non-vulnerable
270.01 - 320	8.4	6.1	2.3
320.01 - 365	44.8	31.4	13.5
365.01 - 410	89.6	61.6	28.0
410.01 - 455	97.8	67.2	30.6
455.01 - 510	99.7	63.4	36.4
510.01 - 580	100	63.4	36.6
580.01 - 690	100	60.8	39.2
690.01 - 890	100	54.8	45.2
890.01 - 1155	100	50.0	50.0
1155.01 and above	100	47.4	52.6
Total households	67.8	42.8	25.0
Mean MPCE	584.4 (405.2)	557 (347.8)	631.3 (484.4)

Note: Figure in parenthesis stands for Standard Deviation
Sources: As Table 1.

Table 5 shows extent of non-poor household holding card out of total AAY or BPL card distributed across monthly per capita consumption expenditure (MPCE) classes. It is found that the per cent of non-poor cardholders increases with the increasing MPCE class under MoRD method. Apparently, all households above Rs 455 MPCE , possesses either BPL or AAY card as per MoRD method. On the other hand, except the first three slabs, the per cent of non-poor cardholders (out of total BPL and AAY card distributed) decreases with the increasing MPCE class under VC. This implies that the VC approach excludes the non-poor increasingly as the level of consumption expenditure goes up.

Interestingly, of the total BPL and AAY cards distributed, 67.8 per cent of it is allotted to the consumption non-poor households (Table 5). Had VC been adopted while identifying poor households, such figure would have reduced to 42.8 per cent. It implies that the remaining 25 per cent card is allotted to the non-vulnerable-non-poor households, which constitutes 36.9 per cent of Type-I error.

The data in Table 5 describes about three different group of non-poor, viz., (1) already enlisted under BPL census of MoRD; (2) as recommended by VC approach for their inclusion in the BPL list; and (3) as suggested by VC approach for their exclusion from the BPL list. What inference can be drawn from this data? In the context of existing Type-I and Type-II errors, there are certain justified reasons to accept the inclusion and exclusion of some non-poor households as suggested by VC. First, the VC suggest to include those non-poor household who comes under lower MPCE class and recommends to exclude the rest who falls under higher MPCE class. Second, the VC suggest to include 71.5 per cent of such households who primarily lead their livelihood from agricultural and other labour activities even if they are placed in consumption non-poor category. Third, the VC strongly recommends to exclude self-employed households who fall under relatively higher MPCE class. This suggests that the VC approach identifies relatively less well-off non-poor for their inclusion in the BPL category against the counterpart MoRD methodology.

6. State-level Analysis

The extent of errors in identifying the poor across states is reported in Table 6. Following observations can be made from this table. First, extent of Type-II error under MoRD method is quite high and varies across states. For instance, the level of such error is 79.2 per cent, in Punjab, the highest, and 28.4 per cent in Karnataka, the lowest. Second, the magnitude of Type-II error is higher compared to Type-I error in all states except Karnataka and Andhra Pradesh under MoRD methodology. Third, for all the states and union territories except Jammu & Kashmir, the magnitude of Type-II error is less compared to Type-I error in the VC method. Fourth, the extent of Type-II error is less in VC method against MoRD methodology. It implies that more per cent of consumption poor households are being deprived off from getting enrolled them into the BPL list under the latter methodology compared to the former. Fifth, since the VC approach suggest inclusion of consumption poor as well as border line consumption non-poor, the level of Type-I error looks high.

Table 6. Extent of errors at the state-level

Major states	Type-II Error		Type-I Error	
	MoRD	Vulnerable criteria	MoRD	Vulnerable criteria
Andhra Pradesh	38.5	17.9	55.9	52.7
Assam	75.5	33.0	9.3	43.7
Bihar	77.6	28.8	14.4	33.70
Gujarat	46.6	22.3	34.1	47.9
Haryana	65.4	25.2	16.6	35.9
Himachal Pradesh	51.5	26.6	14.1	39.3
Jammu and Kashmir	41.8	52.4	22.0	26.6
Karnataka	28.4	31.8	47.5	45.0
Kerala	53.3	22.8	27.5	42.1
Madhya Pradesh	51.2	20.7	26.8	47.8
Maharastra	48.2	30.9	29.2	39.9
Orissa	42.1	17.2	33.4	48.3
Punjab	79.2	9.5	11.3	51.3
Rajasthan	67.2	26.9	15.9	40.2
Tamil Nadu	70.8	18.7	18.1	54.5
Uttar Pradesh	74.6	34.7	12.8	37.1
West Bengal	57.7	19.4	26.7	55.1
Chhatishgarh	51.4	20.0	34.1	61.5
Jharkhand	67.2	27.6	20.9	51.2
Uttaranchal	58.1	44.2	16.7	34.3
Other States and UTs	35.5	15.5	20.5	67.6
Total	60.4	26.1	26.3	45.4

Sources: As Table 1.

As the VC proposes 52.2 per cent of rural households to be included in the BPL list, it would be interesting to see how many of them are already enlisted in such list by MoRD. Apparently, 39.7 per cent of the total vulnerable households had already possessed either AAY or BPL card. In other words, 61.3 per cent of such households need to be included (Table 7). The size of vulnerable households who are not covered in the BPL census varies across states between 83.2 per cent and 33.7 per cent. More importantly, such figures are quite high even in poorer states like Uttar Pradesh, Bihar, Rajasthan , Jharkhand, Uttaranchal, West Bangal, Chhatishgarh and Madhya Pradesh.

Table 7. Vulnerable households and their extent of coverage under BPL score method

Major states	Percentage of vulnerable households not having either AAY or BPL card	Non-vulnerable household having card as a per cent to vulnerable household without card*
Andhra Pradesh	37.1	104.5
Assam	83.2	10.5
Bihar	73.7	13.6
Gujarat	49.8	40.8
Haryana	70.5	23.6
Himachal Pradesh	76.6	21.8
Jammu and Kashmir	68.1	78.0
Karnataka	33.7	116.5
Kerala	55.9	36.3
Madhya Pradesh	56.7	26.9
Maharastra	52.9	50.5
Orissa	48.4	37.2
Punjab	79.6	2.24
Rajasthan	69.7	15.2
Tamil Nadu	76.2	13.4
Uttar Pradesh	75.2	15.3
West Bengal	62.4	19.4
Chhatishgarh	57.1	25.9
Jharkhand	68.9	17.4
Uttaranchal	63.8	39.4
Other States and UTs	68.6	9.1
Total	61.3	28.9

Sources: As Table 1.

7. Conclusions

This paper explores the possibility of a simple method for identification of households to declare them eligible to avail benefit from various social assistance schemes. Using the limited database, the study underlined the importance of revising the existing methodology which would give a better coverage of the actual poor, who have been left out under the prevalence method of MoRD. The proposed VC method attach binary values to each parameter (having a value of 1 in case the household affirm the concerned parameter, otherwise zero) and uses union approach to identify the vulnerable households. With this, the study tried to overcome some of the criticisms of existing methodology as discussed in section 2.

The estimation based on the proposed methodology not only reduces the number of unwanted households in the BPL list but also advocates for a larger coverage of the vulnerable poor. Since the vulnerable non-poor are relatively less well-off compared to non-vulnerable-non-poor, the estimated error of inclusion is justifiable. It is worth mentioning here that as the VC approach covers a significant proportion of households living below poverty line, it allows to reduce the gap between estimated and identified poor. It also suggests possibility of withdrawing cards (BPL or AAY) from non-vulnerable non-poor households for redistribution among the actual poor as identified by the VC approach.

Notes

[1] Abject deprivation has been defined as a situation where a household does not have any adult literate member, lives in a kachha house in rural areas and in kachha or semi-pucca in urban areas, no land in rural areas and no toilet facility in urban areas, no drinking water facility of his or her own, not owning any consumer durables such as a bicycle, television or radio and no electricity for his/her house. For detailed information see, Srinivasan and Mohanty (2002) and Ram *et al* (2009).

[2] A set of five questions viz., (1) whether operating more than 2 hectares of land; (2) whether having a 'pucca house' as defined in the population Census; (3) whether any resident member having annual income more than Rs.20,000 from salary or self-employment; (4) whether the household owns the following consumer durables including TV, refrigerator, ceiling fan, motorcycle/scooter and three wheelers; (5) whether owned farm equipment such as tractor, power tiller, combined thresher/harvester – were asked for each and every household in the village. If households answered in the affirmative to any of the five questions, they were declared to be 'visibly non-poor'.

[3] The thirteen indicators including size of landholding, type of house, availability of clothing per person, food security, sanitation, literacy, possession of consumer durables, means of livelihood, status of household labour, status of children between 6-14 years, type of indebtedness, reasons for migration and preference for assistance.

[4] These households may be poor or non-poor as defined by the Planning Commission.

[5] The standardized cultivable land of a household is estimated as follows: (Area under irrigated land × 1.5) + Area under unirrigated land.

[6] Attached a value of '1' or '0' for the presence or absent of an individual dimension.

[7] An expert committee set up by the Ministry of Rural Development headed by N.C. Saxena has also suggested to include all SC/ST households in the BPL list.

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