CONCEPT, MEASUREMENT AND RECTIFICATION OF DEPRIVATION BASED ON REAL DIMENSIONS

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INTRODUCTION

For more accurate assessment of an individual's well-being or deprivation, one may need to identify the various 'real' dimensions of well-being and asses the individual's overall well-being or deprivation on the basis of the individual's achievements in terms of these dimensions. Also, even if one considered income to be an accurate indicator of overall well-being or deprivation, for policy purposes one may still need information about achievements or deprivations of an individual or a community in terms of specific real indicators of well-being. Governments tend to avoid incorporating housing deprivation in poverty estimates probably to bury the infrastructural inadequacy. This paper claims that housing deprivation is necessary and can be easily estimated by simple procedures.

Though the objective of this paper is similar to that of Sundaram & Tendulkar (1995) and that of Dutta & Pattanayak (1999), there are a few differences too. First, Sundaram & Tendulkar (1995) studied the problem on a large scale mainly on inter-state basis while this paper would like to confine itself to only a single village so that the study is more focused. Second, this paper has a different conceptual structure regarding aggregation of individual indices. Finally, this project attempts to find a rule, a formula, which will be of immense help to distribute funds and aid relating to housing deprivation at the grass-root level.

OBJECTIVE

The objective of this paper is to discuss and formulate a methodology by which one can measure housing deprivation in a locality as a step forward to add on to overall well-being of an individual or household. Though it requires a broader study 'real aspects' of the standard of living, over time, in this village, this paper believes that this may also be of independent interest as a case study insofar as: (i) it seeks to grapple with the problem of multidimensional deprivation in the context where much information is likely to be qualitative

rather than quantitative; and (ii) to the best of my knowledge, there are not much detailed case studies of housing deprivation in India.

The policy makers need a readymade formula so that they can formulate rectification measures easily and accurately. But rectification and development funds are very limited in developing countries and hence such limited funds have to be judiciously economized so that the deprivation levels can be reduced the maximum. The objectives in brief are as follows:

a) To estimate the shelter deprivation levels of each household of a village
b) To estimate the shelter deprivation levels of each group (similar households in a village)
c) To estimate the shelter deprivation level of the entire village
d) To generate a rule by which development fund for rectification of shelter deprivation can be distributed amongst villages
e) To generate a rule by which development fund for rectification of shelter deprivation can be distributed amongst groups in villages
f) To generate a rule by which development fund for rectification of shelter deprivation can be distributed amongst households in villages

That is, the attributes for which the deprivation levels are high are to be identified and given priority in allocation of funds. First the policy maker has to decide which village has to be given how much funds. Next, he has to decide, which group of people should be given the priority. Finally, it is to be identified, which household amongst the group has to be preferred.

METHODOLOGY

At first a shelter deprivation index has be to formulated by considering shelter achievements by households on the basis of say 4 criteria viz. adequacy (A), sanitation (S), environment (E) and comfort (C). This project considers a particular unique set of attributes (for a sample see annexure – I) for each criterion, the achievement levels of which has to be enumerated for each household. For an attribute **x**, the different possible qualitative levels have to be specified. As for example, for the criterion **A** (Structural Adequacy) and a_1 (condition of the roof), one can consider four levels of achievements listed in ascending order:

       i) Very poor and will leak if it rains ($a_1.1$)
       ii) Roof will partly leak in some parts of the house ($a_1.2$)
       iii) Roof will not leak but still needs repair ($a_1.3$)
       iv) Good ($a_1.4$)

In general, for any given attribute x, one has to distinguish in quantitative terms, **t[x]** levels of possible achievements (x.1), (x.2), …, (x.t[x]). In

Appendix I, we identify the different qualitative levels of achievements for the other attributes. For every attribute x, a qualitative 'benchmark' level, b[x] has to be specified, such that any household that falls short of that benchmark is deprived in terms of x. As for the condition of the roof a_1, we consider the achievement level $a_1.4$ to be the benchmark so that any household achieving only $a_1.1$, $a_1.2$ and $a_1.3$ will be considered to be deprived in terms of condition of the roof. Thus b[a_1] is $a_1.4$. All such qualitative data can be quantified by the famous Borda Rule. Once derived a measure of housing deprivation of every individual in the group, the process to measure the housing deprivation of the group is similar to measuring income poverty of a group, given the percentage shortfall of each individual from the poverty threshold. For this, the three measures can be used, the **Sen Measure**, the **Quadratic Measure** and the **Simple Average.**

HOW TO RECTIFY THE DEPRIVATION?
Data has to be collected for the required attributes and this data has to be processed as stated above for estimation of Shelter Deprivation Index according as the above method. Having found that for a particular village being severely deprived in terms of housing with deprivation levels of about 60%(say) from the benchmark scores, it is of utmost importance that the policy makers start their action right away. But rectification and development funds are very limited in developing countries and hence such limited funds have to be judiciously economized so that the deprivation levels can be reduced the maximum. That is, the attributes for which the deprivation levels are high are to be identified and given priority in allocation of funds. A comparative static analysis is of great help in this respect. This analysis can be done in the following manner. Force the ill-performed attributes one-by-one to their benchmark levels and note the change in the overall deprivation levels. Now, try this for every permutation and combination of such attributes. Each such combination will have a corresponding net ability to reduce overall deprivation and will also have a particular cost. These abilities and costs are to be ranked and tabulated. Now, if the policy maker wants to reduce the level of deprivation to a particular level, he can allocate the corresponding fund. On the other hand, it the policy maker wants to minimize deprivation by spending a particular level of money, he can easily find the combination of change in attributes for that amount of money. Hence, such combination of attributes has to be ranked both in terms of net deprivation levels and in terms of total costs. It is however to be noted that some of the attributes have to be rectified individually for which some of the persons achieve less. There are some other

attributes (*like tap water facility*) which is of public good nature for which simultaneous consumption applies.

COMPARATIVE STATIC ANALYSIS IN RANKING DEPRIVATION RECTIFYING POLICIES.

The criteria for which the dwellers are worse-off can be easily seen from the charts but the charts do not portray the position of the individual criteria. To know the relative position of the criteria we have to rank these criteria in terms of the average deprivation levels as shown Table 1.

Table 1:   AVERAGE DEPRIVATION LEVELS OF EACH ATTRIBUTE

CRITERION	Attribute Codes	Attribute Names	Average Deprivation Levels
STRUCTURAL ADEQUACY	a1	condition of ROOF	0.67
	a2	condition of WALL	0.44
	a3	condition of FLOOR	0.37
SANITATION	s1	Quality of drinking water	0.50
	s2	Quality of water for bathing and washing	1.00
	s3	Toilet Facilities	1.00
ENVIRONMENT	e1	Stagnant Water	0.63
	e2	Garbage	0.33
	e3	Cattle/Other animals	0.15
COMFORT	c1	Presence of Electricity	0.99
	c 2	Drinking Water Source	0.52
	c 3	Bath Water Source	1.00

We now tabulate the change in the deprivation level when an attribute or a combination of attributes is upgraded to the benchmark levels. The choice of the attribute combinations is done by taking those attributes first which have the highest level of deprivation and then adding on the next deprived attribute. For instance, we consider s2, s3 and c3 first (*as they have highest level of deprivation 1.0*) and then we take the combination s2+s3+c3+c1 (*because c1 is the next worst attribute*). This has been shown in table 5.24 below. Note that we consider only ***Sen's Measure*** of deprivation with trade-off and w(c) = 1/7. It is admitted that there are other ways of combining policies which at most can be done in $^{17}C_1+^{17}C_2+\ldots\ldots\ldots^{17}C_{12}$ ways taking different combinations of the 12 attributes. However, we consider the idea that each badly performing attribute has to be treated first in order to rectify the better performed one. Another aspect that needs to be mentioned is that the rectifying policies are taken only to reach the benchmark levels and not beyond the benchmark level. For example, out of the 5(say) achievement levels (c2.1 to c2.5) for the

attribute c2 of which the achievement level c2.3 is the benchmark, improvement is sought only up to the level c2.3 and not up to c2.5.

Table 2:   DEPRIVATION LEVELS FOR RECTIFICATION MEASURES

Combination Sl. No.	Attribute Combinations	Sen's Measure considering d'' and $w(c)=^1/_7$	% improvement in the deprivation level
-	Actual Situation	0.61	-
co1	s3	0.51	16.39%
co2	s3+s2	0.42	31.15%
co3	s3+s2+c3	0.40	34.43%
co4	s3+s2+c3+c1	0.38	39.99%
co5	s3+s2+c3+c1+a1	0.36	44.98%
co6	s3+s2+c3+c1+a1+e1	0.34	54.26%
co7	s3+s2+c3+c1+a1+e1+c2	0.28	63.10%
co8	s3+s2+c3+c1+a1+e1+c2+s1	0.21	68.57%
co9	s3+s2+c3+c1+a1+e1+c2+s1+a2	0.20	75.21%
co10	s3+s2+c3+c1+a1+e1+c2+s1+a2+a3	0.15	80.01%
co11	s3+s2+c3+c1+a1+e1+c2+s1+a2+a3+e2	0.11	94.97%
co12	s3+s2+c3+c1+a1+e1+c2+s1+a2+a3+e2+e3	0.08	100.00%

Though s2, s3 and c3 have equal average levels of deprivations, we consider the order as s3, s2 and c3 because it has been obtained that they reduce the Sen's measure to 0.51, 0.52 and 0.58 respectively when considered individually. Table 2 shows how various combinations of rectification of attributes can reduce the overall deprivation of the group. The last column also shows the cumulative percentage improvement in the deprivation levels for each such combination. On knowing the cost of each policy combination of the rectification measures, a policy curve can be plotted with % of improvement on one axis and cost of such combination on the other. This policy curve can determine the cost of the desired policy combination on one hand and also on the other hand it can determine the best policy combination for a desired level of budget. For instance, to rectify aqua deprivation upto 40%, one has to implement the policy combination s3+s2+c3+c1 costing Rs.2,80,000. Conversely, Rs.4,70,000 can rectify up to 80% aqua deprivation requiring a policy combination of s1+s2+s3+c1+c2+c3+a1+a2+a3+e1. This has been shown in the following figure.

Policy Curve
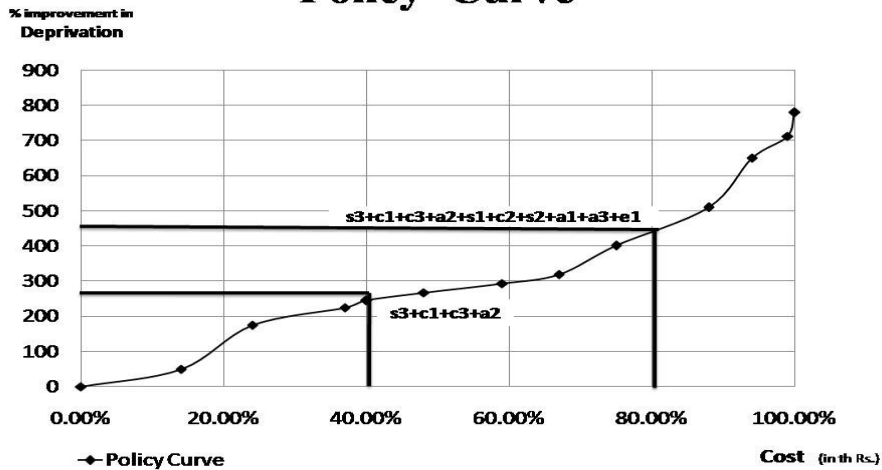
CONCLUSION

To allocate development funds correctly, a proper estimation of deprivation is needed and choice of target groups has to be chosen uniquely for each area concerned. This project thus prepares a list of possible combinations of policy prescriptions by which a policy maker, such as the government, can find the extent of rectification of shelter deprivation of a group given its allotment of budget. The policy maker can however also calculate the cost of a rectification package for a desired level of decrease in such deprivation.

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Appendix – I

CRITERION	Attribute Codes	Attribute Names	Achievement Levels		Benchmark Levels
STRUCTURAL ADEQUACY	**a1**	Availability of Drinking Water	a1.1	from POND/RIVER	a1.4
			a1.2	from WELL	
			a1.3	from TUBE WELL	
			a1.4	from TAP supplied by the Civic Body	
	a2	Availability of Water for Bathing	a2.1	from POND/RIVER	a2.4
			a2.2	from WELL	
			a2.3	from TUBE WELL	
			a2.4	from TAP supplied by the Civic Body	
	a3	Availability of Water for Washing	a3.1	from POND/RIVER	a3.4
			a3.2	from WELL	
			a3.3	from TUBE WELL	
			a3.4	from TAP supplied by the Civic Body	
SANITATION	**s1**	Quality of drinking water	s1.1	from POND/RIVER	s1.3
			s1.2	from WELL/HAND PUMP	
			s1.3	from PIPE	
	s2	Quality of water for bathing and washing	s2.1	from POND/RIVER	s2.4
			s2.2	partially from POND/RIVER and partially from WELL/HAND PUMP	
			s2.3	from WELL/HAND PUMP	
			s2.4	from PIPE	
	s3	Toilet Facilities	s3.1	not within house premises	s3.2
			s3.2	within house premises	
ENVIRONMENT	**e1**	Stagnant Water	e1.1	near the house	e1.2
			e1.2	not near the house	
	e2	Garbage	e2.1	around the house	e2.2
			e2.2	not around the house	
	e3	Cattle/Other animals	e3.1	in proximity	e3.2
			e3.2	not in proximity	
COMFORT	**c1**	Presence of Electricity	c4.1	NO Electricity	c4.3
			c4.2	PARTIAL Electricity	
			c4.3	FULL Electricity	
	c2	Drinking Water Source	c6.1	more than 1 km.	c6.3
			c6.2	1/2 km. to 1 km.	
			c6.3	Less than 1/2 Km.	
	c3	Bath Water Source	c7.1	more than 1 km.	c7.3
			c7.2	1/2 km. to 1 km.	
			c7.3	Less than 1/2 Km.	