

**A POVERTY MAP FOR GUYANA:  
BASED ON THE 2002 POPULATION AND HOUSING CENSUS**

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This brief note describes in detail the construction of a poverty map for Guyana based on the data available from the just completed 2002 Population and Housing Census of Guyana. Poverty maps such as the one constructed here are essential for identifying the geographic areas where poverty is relatively higher and for prioritizing interventions. It is important to keep in mind that this poverty map, useful as it may be for policy in its current form, provides only a partial picture on poverty in Guyana. This is because it is constructed based on the information that is available in the 2002 Census (related primarily to the access of households to basic services, such as water, electricity, and garbage disposal).

In order to obtain a more complete picture of the nature and incidence of poverty in Guyana, it is essential to complement this poverty map with a “consumption-based” poverty map when the 2005/2006 Household Budget Survey (HBS) is completed. The HBS will provide the opportunity to measure poverty in terms of household consumption which is considered by many to be a preferable measure of household welfare (relative to income). A poverty map based on the combination of the Census data and the HBS consumption, will provide much more reliable information about the geographic incidence and depth of poverty in Guyana.

For the purposes of checking the sensitivity of the results, two indices are constructed. Either one of these indices can be used to analyze the spatial distribution of poverty in Guyana by region as well as smaller geographic areas such as villages or even EDs using a computer “geographic information system” (GIS) data mapping facility. A disaggregation can also be made for urban and rural areas within regions.

The first index (more appropriately defined as a **Living Conditions Index (or LCI)**) summarizes

- the access and quality of a household’s source of water,
- source of drinking water,
- the type of toilet facility,
- the main method of garbage disposal,
- and the extent of crowding in the household (the number of people in the household divided by the number of bedrooms in the dwelling).<sup>2</sup>

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Specifically, all the possible responses/codes are classified into a level 1 (high quality) through level 5 (low quality) and each level is assigned a number of points (100 for level 1, 75 for level 2, 50 for level 3, 25 for level 4 and 0 for level 5 (no access). Table 1 below summarizes the classification of the coded responses for each variable into levels and the scores assigned to each variable and each level.

**Table 1:** The components of the Living Conditions Index (LCI)

Level	Water Supply Source	Drinking Water Source	Type of Toilet Facility	Type of Lighting	Method of Garbage Disposal	Crowding index
1	100	100	100	100	100	100
2	75	75	75	75	75	75
3	50	50	50	50	50	50
4	25	25	25	25	25	25
5	0	0	0	0	0	0

Notes: (h000=y denotes the relevant question number in the 2002 Census questionnaire while y denotes the code for the answer)

Water supply: Level 1= if h17=1|h17=4; Level 2=if h17=3|h17=5;

Level 3= h17=6|h17=7; Level 4= if h17=2; Level 5= if h17=8|h17=9.

Drinking Water Source: Level 1= if h18=7; Level 2= if h18=12;

Level 3= if h18=1|h18=2; Level 4= if h18=3|h18=4|h18=5|h18=6|h18=8;

Level 5= if h18=9|h18=10|h18=11|h18=13.

Type of Toilet Facility: Level 1= if h19=1; Level 2= if h19=2; Level 3= if h19=3,

Level 4= if h19=4; Level 5= if h19=5.

Type of Lighting: Level 1= if h111=4; Level 2= if h111=3; Level 3= if h111=1;

Level 4= if h111=2; Level 5= if h111=5;

Method of Garbage Disposal: Level 1= if h118=6; Level 2= if h118=2|h118=5;

Level 3= if h118=3; Level 4= if h118=4|h118=1; Level 5= if h118=7

Crowding Index: Level 1: one person or fewer to a bedroom; Level 2=between one and 2;

Level 3= between 2 and 3; Level 4=between 3 and 4; Level 5= more than 4.

For each of the 182,609 households in the 2002 Census, the value of the LCI is constructed as the simple sum of points across these six variables. The lower the sum, the poorer the household. The household-specific index is then be averaged by Census

<sup>2</sup> Additional variables that could be used for the LCI include (i) the main construction material of the outer walls and (ii) the main material used for roofing. About 95% of the dwellings reported using either wood, or concrete, or a combination of the two, as the main construction material of the outer walls; and 90% of the dwellings used sheet metal as the main material for roofing. Given the low variability of the roofing material and the inability to classify the construction material of the outer walls into low/high quality, these variables were not used for the construction of the LCI.

enumeration district (ED) or by village or by region to yield a picture of the relative quality of services by ED (2887 EDs), or by village, or by region (11 in total after separating Georgetown from region 4).

The second index (more appropriately termed an **Enumeration District Marginality Index EDM I**) is based on the following variables<sup>3</sup>:

- The proportion of adults (15 yrs of age or older) in the enumeration district (ED) who have either no education at all or did not complete primary schooling (illit2)
- The proportion of adults (15 yrs of age or older) in the enumeration district who work in the primary sector (inPsector)
- The proportion of children (6-14 yrs of age or older) in the enumeration district who do not attend school full-time (NOTattSFT)
- The proportion of dwellings in the enumeration district that report not having piped water as their main source of water supply (NOh2o) (or households with h17=8, 9, 2)
- The proportion of dwellings in the enumeration district that do not have a W.C. linked to sewer (NOtoilet) (or households with h19= 3, 4, 5)
- The proportion of dwellings in the enumeration district that do not report electricity as their main source of lighting (NOelec) (or households with h111=1, 2, 5)
- The proportion of dwellings in the enumeration district that report their main method of garbage disposal is not garbage collection service, compost, or burying (NOGserv) (or households with h118=1, 3, 4, 7)
- The average number of family members per bedroom in the enumeration district (Crowding)

After constructing these variables at the ED level, the EDM I is constructed using the method of principal components. Principal components analysis is a statistical technique for forming new variables which are linear combinations of the original variables.<sup>4</sup> The new variables are referred as the “principal components” and are uncorrelated with each other. Furthermore the first principal component accounts for the maximum variance in the data, the second principal component accounts for the maximum variance that has not been accounted for by the first principal component, and so on. It is hoped that only a few principal component would be needed to account for most of the variance in the data. Consequently, one would need to use only a few principal components rather than all of the variables.

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<sup>3</sup> The majority of the variables used in the construction of the EDM I are also used in other countries in LAC for constructing an Unsatisfied Basic Needs Index (UBNI).

<sup>4</sup> The STATA command used for the principal components analysis was “*factor NOh2o NOtoilet NOelec NOGserv OCI illit2 inPsector NOTattSFT [fw=Nhh], pcf*” where Nhh is the number of households in the ED. Using the number of people in the ED (Npop) in place of Nhh as an alternative weighting variable did not change the relative weights assigned to the variables comprising the EDM I.

The EDM I is the first principal component which is a weighted sum of the variables discussed above. The first principal component accounted for 41.89% of the total variance.<sup>5</sup> High values of the EDM I denote more marginal ED, whereas lower values denote less marginal or wealthier EDs). The total number of ED for which it was possible to calculate and EDM I was 2,743. The slightly lower number of EDs is due to the fact that in some of the EDs there were no children between 6 and 14 years of age.

There are some intrinsic differences between the LCI and the EDM I that are important to discuss in a bit more detail:

- The LCI is a number that is derived at the household level so, in principle, one can rank households within an ED, to the extent that this does not come into conflict with any confidentiality clauses associated with Census data. In contrast, since the EDM I is calculated at the ED level, the EDM I can be used to rank EDs (but not households within an ED).<sup>6</sup>
- In a more ideal situation, household welfare and poverty status in general can be measured by the level of household consumption or consumption expenditures of over a reference period. In the absence of a measure of household consumption, the EDM I may be considered as a “better” measure of poverty than the LCI. The reason for this is the fact that the calculation of the EDM I is based on wider variety of variables than that used in the calculation of the LCI. For example, the variables used to derive the EDM I include, level of education, school attendance of children, employment, and access to basic services. All of these variables are usually strongly correlated with the level of household consumption. In contrast, the LCI is limited by its focus on the access and quality of basic services.
- The weights assigned to the individual variables comprising the LCI are set to be arbitrarily equal. The advantage of this is that it allows measurement of the improvement in the living conditions from census year to census year. In contrast, the principal components method assigns different weights to variables.<sup>7</sup> Table 2 below lists the weights used to form the EDM I (or the first principal component). The lack of electricity (NOelec) has the highest weight (0.21777) while the absence of proper waste disposal service) has the lowest weight (0.13392).

Table 2: Weights (Scoring Coefficients)

Variable	Scoring Coefficients/Weights
NOh2o	0.19097
NOtoilet	0.21448
NOelec	0.21777

<sup>5</sup> The first and second principal components together account for 57% of the variance

<sup>6</sup> In principle, however, it is also possible to define the marginality index at the household level rather than at the ED level.

<sup>7</sup> If mean-corrected data are used then the relative variance of the variable has an effect on the weights used to form the principal component. Variables that have a high variance relative to other variables will receive a higher weight, and vice versa. To avoid the effect of the relative variance on the weights, STATA’s “factor” command automatically standardizes all the variables used in the analysis.

NOGserv	0.13392
Crowding	0.19512
illit2	0.19463
InPsector	0.20693
NOTattSFT	0.13900

The fact that the weights used to construct the EDM I are determined endogenously by a statistical method, gives rise to critical issues related the measurement of progress in living conditions over time. For example, if one were to measure changes in the poverty index (EDMI), from the 1992 to the 2002 Census, it is important to ensure that the EDM I is constructed by applying the same weights in both census years (either the weights obtained by applying the principal components method to the 1992 census or the 2002 census). Using the weights obtained from the principal components method applied separately in each census year is likely to result in different weights for the same variable in each census year, which, in turn, is likely to yield a misleading picture of the improvement in the living conditions of households.

Tables 3 and 4 below provide a comparison of the ranking of regions based on the two different indices. These rankings are based on weighted averages by region of the ED-level means of LCI and EDM I. The weights used were the number of households in the ED. These rankings did not change when we used the number of individuals in the ED as weight in place of the number of households in the ED.

**Table 3:** A Comparison of the ranking of Rural and Urban Areas based on the LCI and EDM I (means weighted by the number of households in the ED)

	Poverty Score based on LCII	Poverty Score based on EDM I
Rural	341	0.333
Urban	426	-0.782

**Table 4:** A Comparison of the ranking of regions based on the LCI and EDM I (means weighted by the number of households in the ED)

Based on LCI		Rank (Poorest on top less Poor at Bottom)	Based on EDM I	
Region 8	162	1	Region 1	2.125
Region 9	184	2	Region 9	2.049
Region 1	207	3	Region 8	1.982
Region 7	259	4	Region 7	1.023
Region 2	278	5	Region 2	0.583
Region 3	352	6	Region 5	0.303
Region 5	355	7	Region 3	0.234
Region 10	364	8	Region 6	0.188
Region 6	373	9	Region 4	-0.137

Region 4	375	10	Region 10	-0.299
Georgetown	453	11	Georgetown	-1.024

Clearly, the ranking of individual regions varies depending on the index used. However, both indices suggest that the 11 (including Georgetown) regions of Guyana can be classified into four groups: the bottom or very poor group (regions 8, 9, and 1), the lower middle or poor group (regions 7 and 2), the upper middle (or less poor) group (regions 3 and 5) and the wealthier group (regions 6, 4, 10 and Georgetown). Georgetown is by far the wealthier region independently of the index used.

Given that the two indices can also be estimated at the ED level the following annexes provide a listing of the ED's ranked by "poverty status" based on the LCI (table 5) and EDM I (table 6).

In addition to the composite poverty indices discussed above, specific variables available in the 2002 Census can also be of interest to individual Ministries in the Government of Guyana. For example, the proportion of 6-14 year old children not attending school is likely to be of interest in the Ministry of Education as it is the process of preparing its strategic plan for the next five years. A ranking of the 1282 villages in Guyana can help identify potential problem areas with a large number of school-aged children and a low proportion attending school. Similarly, a ranking of the villages in Guyana based on the proportion of households that report not having piped water as their main source of water supply (NOh2o) or of the proportion of dwellings that do not have a W.C. linked to sewer (NOtoilet) or no access to garbage collection service (NOGserv) may be of particular help to the Ministry of Water and Sanitation for prioritizing interventions. Table 7 below presents different rankings of all the villages in Guyana for these variables as well as for the variable (NOelec). Villages are sorted in a descending order meaning that villages where the proportion of the population with no access to the particular service is equal to one are placed at the top of the ranking whereas villages where all the households have access to the service are at the bottom of the table.