Poverty and Inequality Mapping in the Commonwealth of Dominica

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Working Paper n. 66, December 2006

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1. Introduction

Poverty and inequality maps - spatial descriptions of the distribution of poverty and inequality - are most useful to policy-makers and researchers when they are finely disaggregated, i.e. when they represent small geographic units, such as cities, municipalities, districts or other administrative partitions of a country. In order to produce poverty and inequality maps, large data sets are required, which include reasonable measures of income or consumption expenditure and which are representative and of sufficient size at low levels of aggregation to yield statistically reliable estimates. Household budget surveys or living standard surveys covering income and consumption usually used to calculate distributional measures are rarely of such a sufficient size; whereas census or other sample surveys large enough to allow disaggregation have little or no information regarding monetary variables.

Often the required small area estimates are based on a combination of sample surveys and administrative data. In this proposal we aim at performing poverty and inequality mapping primarily using an alternative source of data: data from a Population Census, in conjunction with an intensive small-scale national sample survey.

The methodology adopted in the present work, combines census and survey information to produce finely disaggregated maps, which describe the spatial distribution of poverty and inequality in the country under investigation.

The basic idea is to estimate a linear regression model with local variance components using information from the smaller and richer sample data - in the case of the Commonwealth of Dominica, the Survey of Living Conditions (SLC) conducted in 2002 – in conjunction with aggregate information from the 2001 Population and Housing Census, supplemented by some other data sources present in the Commonwealth of Dominica.

The estimated distribution of the dependent variable in the regression model (monetary variable) can therefore be used to generate the distribution for any sub-population in the census conditional to the sub-population's observed characteristics. From the estimated distribution of the monetary variable in the census data set or in any of its sub-populations, an estimate has to be made of a set of poverty measures, such as the Sen (1976) and the Foster-Green-Thorbecke (Foster *et al.*, 1984) indices and a set of inequality measures such as the Gini coefficient and general entropy measures. To assess the precision of the estimates, standard errors of the poverty and inequality measures need to be computed using an appropriate procedure such as bootstrapping.

Three important aspects of this methodology should be noted at the outset. Firstly, information from the Census is required at micro (household and individual) level; however micro-level linkage between Census and survey data is not required. Secondly, the vector of covariates used in the regression model implies that those variables have to be present in both sources. Thirdly and most importantly, the common variables in the sources must be sufficiently comparable; comparability requires the use of common concepts, definitions and measurement procedures.

The paper is made up of seven Sections. After the present introduction, Section 2 describes the theory concerning the models involved in the poverty mapping, models which are then estimated in Section 3. Sections 4 and 5 report poverty and inequality measures and maps disaggregated at national and Parish levels and Village and Enumeration District levels respectively.

Section 6 describes how poor households have been identified and how a participatory assessment has been conducted, while policy recommendations to the Government of the Commonwealth of Dominica are summarised in Section 7.

2. Poverty mapping

The basic idea can be explained in a simple way. Having data from a smaller and a richer data-sample such as a sample survey and a census, a regression model of the target household-level variable, given a set of covariates based on the smaller sample, can be estimated. Restricting the set of covariates to those that can also be linked to households in the larger sample, the estimated distribution can be used to generate the

distribution of the consumption expenditure (y_h) for the population or sub-population in the larger sample given the observed characteristics. Therefore the conditional distribution of a set of welfare measures can now be generated and the relative point estimates and standard errors can be calculated.

Practically the methodology follows two steps:

a) the survey data are used to estimate a prediction model for the consumption (stage one);
b) simulation of the expenditure for each household of the census and poverty/inequality measures are derived with their relative prediction error (stage two).

The key assumption is that the model estimated from the survey data applies to census observation. Of course the assumption is most reasonable if the survey and census year is the same, unfortunately it is not our case, so when interpreting results we need to consider that the poverty estimates obtained refer to the census year.

2.1 Stage one: a prediction model for consumption

This step (Stage one) consists in developing an accurate empirical model of a logarithmic transformation of the household per-capita total consumption expenditure (rent and health expenditure excluded). Geographical differences in the level of prices should also be taken into account. In the model the covariates are variables defined in exactly the same way as in the smaller sample data (SLC) and in the census. Denoting by $\ln y_{ch}$ the logarithm consumption expenditure of household *h* in cluster *c*, a linear approximation to the conditional distribution of $\ln y_{ch}$ is considered:

$$\ln y_{ch} = E\left[\ln y_{ch} \mid x_{ch}^T\right] + u_{ch} = x_{ch}^T \beta + u_{ch} \quad [1]$$

Previous experience with survey analysis suggests that the proper model being specified has a complex error structure, in order to allow for a within-cluster correlation in the disturbances as well as heteroschedasticity. To allow for a within cluster correlation in disturbances, the error component is specified as follows:

$$u_{ch} = \eta_c + \varepsilon_{ch} \quad [2]$$

where η and ε are independent of each other and not correlated to the matrix of explanatory variables. Since residual location effects can highly reduce the precision of

welfare measure estimates, it is important to introduce some explanatory variables in the set of covariates, which explain the variation in consumption expenditure due to location. For this reason introducing the means of each covariate into the model covariates may be a good proposal.

Moreover, Elbers, Lanjouw and Lanjouw (2003) propose adopting a logistic model (named as Alpha Model) of the variance ε_{ch} conditional on a vector z of covariate (bounding the prediction between zero and a maximum A equal to *(1.05)*max(e_{ch})):

$$\ln\left[\frac{e_{ch}^2}{A-e_{ch}^2}\right] = z'_{ch}\,\alpha + r_{ch} \quad [3]$$

Let $\exp(z'_{ch}\,\alpha) = B$ and using the delta method the household specific variance is estimated as:

$$\hat{\sigma}_{ch}^2 = \left[\frac{AB}{1+B}\right] + \frac{1}{2}\mathrm{var}(r)\left[\frac{AB(1-B)}{(1+B)^3}\right] \quad [4]$$

The variance of σ_η^2 is normally estimated non-parametrically, allowing for heteroschedasticity in ε_{ch} (see Appendix 2 of Elbers, Lanjouw and Lanjouw, 2002).

2.2 Stage two: simulation

The parameter estimates obtained from the previous step are applied to the census data so as to simulate the expenditure for each household in the census. For each simulation a set of the first stage parameters is drawn from their corresponding distribution simulated at the first stage: the beta coefficients, $\tilde{\beta}$, are drawn from a multivariate normal distribution with mean $\hat{\beta}$ (the coefficients of the GLS estimation) and variance covariance matrix equal to the one associated with $\hat{\beta}$. Relating to the simulation of the residual terms $\hat{\eta}_c$ and $e_{c,h}$, assumption of any specific distributional form is normally avoided by drawing directly from the estimated residuals: for each cluster the residual drawn is $\tilde{\eta}_c$ and for each household $\tilde{\varepsilon}_{c,h}$. The simulated values are based on both the predicted logarithm of expenditure $x'_{c,h}\,\tilde{\beta}$, and on the disturbance terms $\tilde{\eta}_c$ and $\tilde{\varepsilon}_{c,h}$ using a bootstrap procedure:

$$\hat{y}_{c,h} = \exp\left(x_{c,h}^T\tilde{\beta} + \tilde{\eta}_c + \tilde{\varepsilon}_{c,h}\right) \quad [5]$$

The full set of simulated $\hat{y}_{c,h}$ values is used to calculate the expected value of each of the poverty measures considered. For each of the simulated consumption expenditure distributions a set of poverty and inequality measures is calculated, as is their mean and standard deviation over all the set of simulations.

3. Implementation of the method

3.1 Data sources: the 2001 Census and the 2002 Survey of Living Conditions

The poverty and inequality mapping in the Commonwealth of Dominica was conducted in the period December 2005 – February 2006; the reference year is 2001, the year of the collection of the Population and Housing Census, and is based on 22,359 households and 68,646 individuals.

The Census data set has been revised since the Country Poverty Assessment (June 2003), and the Central Statistical Office (CSO) of the Commonwealth of Dominica released the final version in December 2005. For the present work the authors had indirect access to the Census data through the Central Statistical Office during the two visits in the month of December 2005 and February 2006.

The Survey of Living Conditions was conducted in 2002; the questionnaire consisted of a single questionnaire with three sections (CPA):

Section 1 was concerned with basic housing characteristics (Part 1), household information (Part 2) and data on the demographic and economic characteristics of persons living in the household (Part 3);

Section 2 (the most important) collected data on household expenditure including food expences (Part 1), consumption of home production (Part 2), other recurrent household expenses (Part 3), clothing (Part 4), travel and transportation (Part 5), education and health (Part 6), recreation and leisure (Part 7), housing and household furnishing (Part 8), and other spending (Part 9);

Section 3 collected data on household income from employment, business, support from family, friends and government pensions.

Also for the SLC, the CSO revised the data set releasing an updated version in December 2005. This final version used in the present poverty mapping exercise was

based on 938 households. A full description of the construction of the final data set is reported in Betti *et al.* (2006).

The two sources of data should be fully analysed in order to identify the common concept and to construct the common variable to be compared. The original Census and SLC variables should be transformed in order to get comparable variables.

In principle some variables collected in the SLC survey may present some missing values; in such a case it is useful to impute them in order to avoid the loss of statistical units (and therefore degrees of freedom) in the estimation of the linear regression model with variance components. The imputation procedure proposed here is based on the "sequential regression multivariate imputation" (SRMI) approach adopted by the imputation software (IVE-ware, Raghunathan *et al.*, 2001).

3.2 A prediction model for consumption

This step consists in estimating the logarithm consumption expenditure model [1] (named Beta Model) allowing for a within-cluster correlation in the disturbances and allowing for heteroschedasticity. The disturbance term is specified as in [2] and it indicates a violation of assumptions for using the OLS in model [1], so a GLS regression is needed.

It seems to be reasonable that locations are related to household consumption, and it is plausible that some location effects might remain unexplained even with a rich set of regressors. For any, given disturbance variance, σ_{ch}^2, the greater the component due to the common part η_c, the less one gains benefits from selecting households belonging to the same enumeration area within each cluster. Since residual location effects can highly reduce the precision of welfare measure estimates, it is important to introduce some explanatory variables in the set of covariates, which explain the variation in consumption expenditure due to location. For this reason it is suggested that the means of each covariate calculated over the entire census households in each cluster are introduced into the model, as covariates. Means computed at cluster level in the census data set was inserted into the household survey dataset so as to have the possibility of inserting those variables in the first-stage regression specification.

The initial estimate of β in equation [1] is obtained from the OLS estimation. With consistent estimates of β the OLS residual $\hat{u}_{ch}$ (first-stage residual) can be decomposed into uncorrelated components as follows $\hat{u}_{ch} = \hat{u}_{c.} + (\hat{u}_{ch} - \hat{u}_{c.}) = \hat{\eta}_c + e_{ch}$, and used to estimate the variance of ε_{ch}.

In order to avoid forcing the parameter estimates to be the same for the whole country, preliminarily, separate regression models have been estimated for the urban-semi urban area and for the rural area. Specifying the different models, the whole procedure of poverty mapping has been performed. The results obtained were not reasonable, maybe because of the insufficient sample size in each partition.

After this previous analysis it was decided to perform the analysis considering one model for the whole sample survey.

Considering that the specification of the model has itself be affected by the choice of weighting/no weighting, it is important to decide if it is better to use the weighting system or not. In computing this test, under the null hypothesis, it is assumed that the regressions are homogeneous across strata, weighted and unweighted OLS estimator are unbiased, so the difference between them has an expectation of zero. Computing the variance-covariance matrix of the difference between the weighted and the unweighted OLS estimator the test can be computed. However, the easiest way to test the hypothesis is to run an "auxiliary" regression, where the covariates are the original covariates *X* and the product between the covariates and the weights (*WX=W*X*) and to use an F statistic to test the hypothesis H_0: $g=0$ (where *g* is the vector parameter of the *WX* matrix). This test is a special case of the Hausman test described in Deaton (1997); it has been applied using the encompassing model (the model having as regressors all the available variables, of course taking the multicollinearity problem into account). The Hausman test performed leads to the rejection of the null hypothesis (see Table 1), so we decided to use the household weights in the model specification.

Table 1: Hausman test of population weights H_0: $g=0$

Empirical F-test	DF	p-value	R^2_{OLS}	$Adj\text{-}R^2_{OLS}$
23.38	68	<0.0001	0.6468	0.6189

Specifying a multiple linear regression model starting with the encompassing model, we selected a set of significative household covariates; on the basis of those covariates, a set of significative interaction covariates has been inserted. Given that specification, in order to select the location variables, we estimate a regression of the total OLS residuals $\hat{u}_{ch}$, on cluster fixed effect and select those that best explain the variation at stratum level. These location variables are then added to the household level variable and to the selected interactions in order to define the final Beta Model; however, in our case, no location variable seems to be significant The results of this estimation step are in Table 2, the adjusted R square coefficient is quite satisfying, being about 0.62. In that model[1] the null hypothesis of homoschedastic errors (White, 1980) has been tested and the hypothesis has not been rejected; in order to have another proof of homoschedasticity of the error component, residual plots have been analysed and the test results have been confirmed. It follows that the estimation of the model for the variance of the idiosyncratic part of the disturbance $\sigma_{ch}^{\ 2}$ has been skipped.

As regard to the estimation of variance $\mathrm{var}\left(\sigma_{\eta}^{\ 2}\right)$, it is important to note that in order to estimate the variance of the location effect it is necessary to have more than two households within each cluster, otherwise it is not possible to estimate the variance within each cluster. To be surer, at the beginning of the procedure, we decided to re-define the cluster with more than four households per cluster. We can observe that the estimated share of the location component with respect to the total residual variance represented by Rho=$\frac{\sigma_{\eta}^{2}}{\sigma_{u}^{2}}$ accounts for less than 6% of the total variance, thus it has been decided to eliminate the location effect and thus the total residual is reduced to $u_{ch} = \varepsilon_{ch}$.

Having homoschedasticity in the residual, the estimation of the Alpha Model [3] has been skipped; furthermore, not having significant location effect, the GLS estimates are the same as the OLS estimate. Concluding stage 1, it is worth looking at of the estimated coefficient parameters (Table 2), in order to understand the effect of the covariates on the transformed equivalent expenditure.

[1] At present, the null hypothesis of omoschedasticity and the significance of the parameters have been tested with both the usual covariance matrix and the heteroschedasticity consistent covariance matrix.

Table 2 Beta Model: parameter estimates, standard errors and significance levels

Variable	parameter estimate	standard error	significance level (°)
Intercept	8.0000	0.098	***
DEC4	0.1718	0.065	***
DEC5	0.1630	0.066	**
DEC6	0.2776	0.067	***
DEC7	0.2834	0.070	***
DEC8	0.4595	0.072	***
DEC9	0.3963	0.082	***
DEC10	0.4830	0.109	***
URBAN_D	0.0425	0.054	
OWNER_A	0.1357	0.060	**
OWNER_B	0.1594	0.072	**
WALL_A	0.2077	0.045	***
WALL_B	0.1561	0.055	***
FUEL_A	0.1465	0.053	***
ROOMS_5	0.0859	0.062	
TV	0.1682	0.051	**
STOVE	0.1554	0.061	***
TELEPHONE	0.2593	0.049	***
WASHING	0.0988	0.043	**
VEHICLES	0.3381	0.057	***
SEX	-0.0863	0.042	**
CL_AGE_55_64	-0.1536	0.052	***
EDU_UNI	0.4038	0.092	***
WORK_PENS	0.2677	0.055	***
SIZE	-0.2032	0.031	***
SIZE2	0.069	0.003	**
NUM_0_5	0.054	0.036	
NUM_WORK	-0.047	0.029	
NUM_PENS	-0.1391	0.044	***
ELDEST_SON_AGE	-0.0042	0.002	**
TYPE_FAMD2	0.2190	0.068	***
PARISH_17	-0.1590	0.109	
PARISH_19	-0.2623	0.067	***
DEC10_ROOMS_5	0.3034	0.128	**
DEC9_ TYPE_FAMD2	0.4900	0.186	***
DEC10_ PARISH_17	-0.9144	0.559	***
DEC9_ PARISH_19	0.9181	0.331	***
DEC10_ NUM_0_5	0.2447	0.090	***
URBAN_D_VEHICLES	0.1709	0.92	*
Observations	**938**	**Clusters**	**117**
R-squared	**0.6382**	**Adj-R-squared**	**0.6229**
Sigma eta	**0.1271**	**RMSE**	**0.5235**
Rho	**0.0589**	$\text{var}(\sigma_\eta^2)$	**0.000054**

(°) *** p-value < 0.01
** 0.05 < p-value < 0.01
* 0.1 < p-value < 0.05

The covariate effects are quite reasonable: the parameters of the dummy variables indicating belonging to between the fourth and tenth decile of the income distribution (DEC4-DEC10) are very significant and have a positive value (most significant are the coefficients of DEC6-DEC10); being owner of the household and having the household rented privately (OWNER_A, OWNER_B) have a positive effect on the housing expenditure; having a household built with brick blocks, wood and concrete (WALL_A and WALL_B), as well as having five or more rooms (ROOMS_5), has a positive effect on the housing expenditure, as well as having gas, LPG and cooking gas (FUEL_A). A set of durable goods has a significant positive effect on the expenditure, particularly: a TV, a dish washer, a telephone, a washing machine, a vehicle.

With regard to the head of household characteristics, being a female (SEX), as well as belonging to the age class 55-64 years old (CL_AGE_55_64) has a negative effect on the expenditure; on the other hand, a head of household having a university education (EDU_UNI) has a reasonably positive effect on the expenditure as does a head of household working or having a pension (WORK_PENS).

With regard to the household characteristics, the expenditure increase as the household size increases (the variable AGE^2 is also significative, but the parabola has a maximum in AGE equal to 14.7), and the expenditure also increases if the number of household members having less than five years old increases. The increasing of the number of retired person (NUM_PENS) makes the expenditure lower (the effect is probably connected to the age of retired persons), the increasing age of the eldest son (ELDEST_SON_AGE) also has the same effect. Concluding with the household typology, being single and less than 65 years old makes the expenditure increase (TYPE_FAMD2). As far as the administrative partitions are concerned, living in St. David Parish (PARISH_19) makes the equivalent expenditure lower, this is reasonable given that the Carib territory is enclosed in this Parish. Let's consider now the interaction variables with positive effects:

- belonging to the tenth decile of the income distribution and having housing with five or more rooms (DEC10_ROOMS_5);
- belonging to the ninth decile of the income distribution and being single and less than 65 years old (DEC9_ROOMS_5_ TYPE_FAMD2);

- living in Paris 19 means belonging to the ninth decile of the income distribution (DEC9_ PARISH_19);
- living in an urban area and having a vehicle at disposal (URBAN_D_VEHICLES).

In the set of the interaction variables, the variable indicating a household belonging to the upper tail of the income distribution and living in Parish 17 has a negative effect (DEC10_ PARISH_17 the significance level of the coefficient is 90%, p-value =0.10).

The package ends step 1 by saving all datasets needed for the simulation in a "PDA" file. Furthermore, it provides a temporary SAS file (WORK.DDUMP) containing the residual component corresponding to cluster effect $\hat{\eta}_c$ (if significant) and to the idiosyncratic component $\hat{\varepsilon}_{ch}$.

3.3. Simulation of consumption expenditure

The parameter estimates obtained from the previous step are applied to the census data so as to simulate the expenditure for each household in the census. The simulated values are based on both the predicted logarithm of expenditure $x'_{ch}\,\tilde{\beta}$, and on the disturbance terms $\tilde{\eta}_c$ and $\tilde{\varepsilon}_{ch}$ using bootstrapped methods:

$$\ln \hat{y}_{ch} = \exp\left(x_{ch}^{T}\tilde{\beta} + \tilde{\eta}_c + \tilde{\varepsilon}_{ch}\right) \quad [6]$$

where $\tilde{\beta} \sim N(\hat{\beta}, \hat{\Sigma}_{\beta})$.

With regard to the distribution of the residual terms, the Povmap4 user has to analyse the residuals manually, in order to identify the best fitted distribution. In our analysis we have to consider only the idiosyncratic component $\hat{\varepsilon}_{ch}$. Computing a Kolmogorov Smirnov test of Normality, the normality Hypothesis is accepted at the 5% level (p-value=0.0429).

In the simulation step, the Beta coefficients, are drawn from a multivariate normal distribution with mean $\hat{\beta}$ and variance covariance matrix equal to the one associated to $\hat{\beta}$, and for each household the disturbance terms are drawn from a normal distribution having mean and variance equal to the one estimated on the survey data.

The simulation procedure has been repeated 100 times, each time drawing a new set of coefficients and disturbance terms and finally the simulated consumption expenditure. At the end of the procedure the YDUMP file will contain, for each household in the census, one hundred simulated household equivalent income.

Having this file for any given location (Parish, Villages) a set of poverty and inequality measures has been calculated, one for each of the simulated consumption expenditure distributions. Now, the means of the measures, calculated across the simulations, constitute the point estimates of the measures, the standard deviations across the simulation constitute the standard errors of these estimates.

4. Results: Maps at National and Parish level

4.1. Introduction

The procedure for estimating the poverty and inequality measures has been applied for the whole of Dominica and disaggregated at four levels:

a) Rural – urban level;
b) The 10 Parishes and the City of Roseau;
c) The 118 Villages;
d) The 295 Enumeration Districts;

For any given location, the means constitute the point estimates, while the standard deviations are the bootstrapping standard errors of these estimates.

Tables 3 and 4 report poverty and inequality measures and their bootstrapping errors for the whole of Dominica and are disaggregated at urban – semi urban and rural level, and by the ten Parishes and the town of Roseau.

The disaggregations are very useful for comparing these results to those obtained by the revised version of SLC (Betti *el al*., 2006) and reported in Table 5.

4.2. Results at National level

The incidence of Poverty in the Commonwealth of Dominica is very high. About 31% of households and 37% of individuals are below the poverty line. These results are in line with those obtained from the Survey of Living Conditions officially calculated in the Country Poverty Assessment (June 2003), where the corresponding values were

29% for households and 39% for individuals. As expected, the poorest households are also those with more family members. Anyway this gap between household and individuals in the population (census) seems to be smaller than in the survey.

It is clearly evident that the incidence of poverty in Dominica is one of the highest in the Caribbean area. However, the headcount ratio index (HCR) simply measures the proportion of the population below the poverty line, but does not take the intensity and the severity of poverty into account.

A measure of the intensity of poverty, the Poverty Gap Ratio (FGT(1), described in the Annex of this main Report) is about 11% for households and 14% for individuals.

This figure locates Dominica in an average position among the Caribbean countries; this could be interpreted as meaning that many of the poor families and individuals in Dominica are just below the poverty line. This is confirmed by the severity index (FGT(2) = Poverty Gap squared) which is about 5% for households and 7% for individuals, and by the Gini concentration index among the poor which is about 20% for both households and individuals.

Bearing this information in mind, policy makers should propose anti-poverty strategies so as to bring those many individuals just above the poverty line: noting the figures in Tables 3 and 4, these strategies should be quite inexpensive. For further details see Section 7 on policy recommendations. On the other hand, all the inequality measures (Gini, General Entropy and Atkinson) show large inequality in the consumption distribution, underlining large differences between the poor and the non-poor in the country. When disaggregating the country into urban, semi-urban and rural areas, the incidence, intensity and severity of poverty is increasing from urban to non-urban areas. Anyway, inequality in urban areas is still high, showing the presence of the majority of the very rich households and individuals.

4.3. Results at Parish level

Even if measures of the incidence of poverty are quite high in every Parish in Dominica, those measures show quite a high local heterogeneity: the Head Count Ratio ranges from 21-22% in St. George and St. Paul (26% for individuals) to 50% in St. David (58% for individuals). These figures are, in some cases, different from the figures from SLC and reported in the Country Poverty Assessment: the main reason could be identified in

the fact that estimates based on the Survey are affected by an enormous sampling error, since the sample size is significant for estimates at Country level, but not at Parish level. In fact, in some Parishes, the sample size is just above 20 households, so that the confidence interval of the Head Count Ratio can be so large as to invalidate any inference exercise. Another source of diversity is due to the different reference year: the estimates reported in the present Report are based on Census data and therefore refer to the Year 2001; while there can be little difference between the Head Count Ratio at Country level from 2001 and 2002, probably larger differences can occur when disaggregating at Parish level, since the economic situation changes according to different Parishes.

Table 3: Poverty and inequality indices at household level(%); Census, 2001

Partition	HCR	FGT(1)	FGT(2)	Gini	Ginipov	SEN	GE(0)	GE(1)	Atk	Eq_con
Dominica	30.91	10.96	5.33	43.99	19.05	8.76	33.58	34.13	51.87	7286
	5.01	2.32	1.32	0.92	1.08	2.26	1.50	1.78	1.39	878
Urban	19.89	6.32	2.86	43.18	17.09	4.53	32.38	32.54	52.74	9432
	4.16	1.61	0.82	1.08	1.04	1.35	1.66	1.99	1.52	1257
Semi urban	27.53	9.29	4.36	43.12	18.06	7.19	32.12	32.64	53.35	7703
	4.98	2.15	1.17	0.97	1.03	2.03	1.50	1.84	1.41	922
Rural	37.46	13.83	6.90	42.81	19.76	11.72	31.61	32.20	53.89	6123
	5.58	2.80	1.66	0.83	1.16	2.93	1.32	1.53	1.32	724
St. George (Roseau)	21.24	6.79	3.08	42.87	17.18	4.94	31.80	32.20	53.50	8938
	4.39	1.71	0.88	1.08	1.06	1.47	1.64	2.00	1.53	1181
Rest of St. George	21.50	7.08	3.28	43.85	17.68	5.14	33.64	33.45	51.31	9322
	4.05	1.71	0.92	1.31	1.24	1.46	2.04	2.52	1.74	1168
St. John	27.77	9.37	4.39	41.89	17.95	7.25	30.32	30.37	54.86	7440
	5.06	2.27	1.26	1.17	1.29	2.14	1.79	2.06	1.81	893
St. Peter	31.53	10.75	5.06	39.96	18.10	8.64	27.30	27.43	58.26	6450
	5.77	2.56	1.42	1.30	1.43	2.55	1.83	2.36	1.96	785
St. Joseph	30.04	10.20	4.81	41.71	18.17	8.10	29.92	30.26	55.50	6999
	5.39	2.34	1.28	1.05	1.09	2.29	1.60	1.87	1.61	843
St. Paul	22.45	7.40	3.42	44.36	17.62	5.41	34.33	34.39	50.91	9199
	4.21	1.72	0.91	1.19	1.03	1.50	1.90	2.25	1.69	1153
St. Luke	27.92	9.23	4.26	40.82	17.63	7.17	28.54	28.83	56.91	7126
	5.27	2.25	1.21	1.35	1.49	2.11	1.93	2.32	2.14	832
St. Mark	36.33	13.41	6.72	42.15	19.90	11.29	30.78	30.75	54.15	6174
	5.73	2.81	1.65	1.28	1.39	2.89	1.93	2.37	1.96	747
St. Patrick	40.90	15.29	7.70	41.27	20.01	13.37	29.27	29.63	56.11	5511
	5.97	3.02	1.81	0.90	1.22	3.30	1.37	1.60	1.49	655
St. David	49.86	20.03	10.55	42.31	21.35	18.72	30.61	31.93	55.48	4737
	6.32	3.66	2.34	1.16	1.34	4.27	1.77	2.29	1.72	572
St. Andrew	37.75	13.69	6.75	41.75	19.35	11.64	29.88	30.41	55.73	5938
	5.80	2.87	1.68	0.87	1.19	3.01	1.33	1.62	1.37	699

Table 4: Poverty and inequality indices at individual level(%); Census, 2001

Partition	HCR	FGT(1)	FGT(2)	Gini	Ginipov	SEN	GE(0)	GE(1)	Atk	Eq_con
Dominica	36.68	13.87	7.07	44.18	20.44	11.69	34.01	34.36	51.28	6438
	5.32	2.69	1.62	0.94	1.17	2.80	1.53	1.78	1.41	786
Urban	24.82	8.28	3.87	43.05	17.94	6.25	32.15	32.39	53.03	8230
	4.86	2.01	1.07	1.13	1.16	1.82	1.73	2.09	1.63	1106
Semi urban	32.17	11.48	5.62	43.08	19.18	9.30	32.20	32.38	52.99	6936
	5.28	2.46	1.41	0.95	1.13	2.46	1.48	1.74	1.42	844
Rural	44.23	17.56	9.22	43.29	21.32	15.72	32.43	32.93	53.00	5376
	5.76	3.21	2.02	0.84	1.26	3.57	1.36	1.50	1.36	644
St. George (Roseau)	26.41	8.85	4.16	42.58	18.05	6.81	31.34	31.80	53.98	7768
	5.12	2.13	1.15	1.07	1.18	1.98	1.62	1.96	1.59	1031
Rest of St. George	26.03	9.11	4.40	43.82	18.79	6.92	33.75	33.25	51.00	8289
	4.46	2.04	1.15	1.31	1.40	1.83	2.07	2.36	1.93	1048
St. John	34.48	12.38	6.06	42.12	19.08	10.20	30.61	30.78	54.73	6432
	5.63	2.77	1.64	1.09	1.47	2.83	1.64	1.87	1.67	773
St. Peter	36.17	12.80	6.19	39.73	18.76	10.74	27.08	27.34	58.55	5846
	6.52	2.96	1.68	1.55	1.58	3.14	2.15	2.93	2.27	717
St. Joseph	34.18	12.30	6.05	41.99	19.36	10.16	30.52	30.56	54.58	6447
	5.62	2.58	1.48	1.03	1.18	2.66	1.59	1.84	1.68	785
St. Paul	26.34	9.06	4.31	44.06	18.35	6.89	33.89	33.81	51.28	8242
	4.69	2.03	1.11	1.30	1.14	1.87	2.08	2.41	1.90	1063
St. Luke	32.67	11.30	5.40	40.19	18.43	9.19	27.78	27.94	57.60	6332
	5.92	2.66	1.49	1.41	1.65	2.64	2.04	2.25	2.45	745
St. Mark	43.60	17.28	9.10	42.52	21.41	15.44	31.52	31.76	53.36	5338
	6.10	3.32	2.08	1.40	1.59	3.65	2.17	2.65	2.34	662
St. Patrick	47.36	19.05	10.11	41.87	21.64	17.51	30.33	30.42	54.78	4905
	5.99	3.38	2.17	1.05	1.38	3.90	1.63	1.83	1.72	595
St. David	58.53	25.49	14.14	42.49	22.99	25.17	30.82	32.19	55.43	4013
	6.22	4.19	2.89	1.14	1.50	5.09	1.77	2.17	1.81	490
St. Andrew	43.66	16.92	8.74	42.14	20.76	15.11	30.58	31.01	54.88	5312
	5.96	3.22	2.00	0.87	1.33	3.58	1.36	1.56	1.46	632

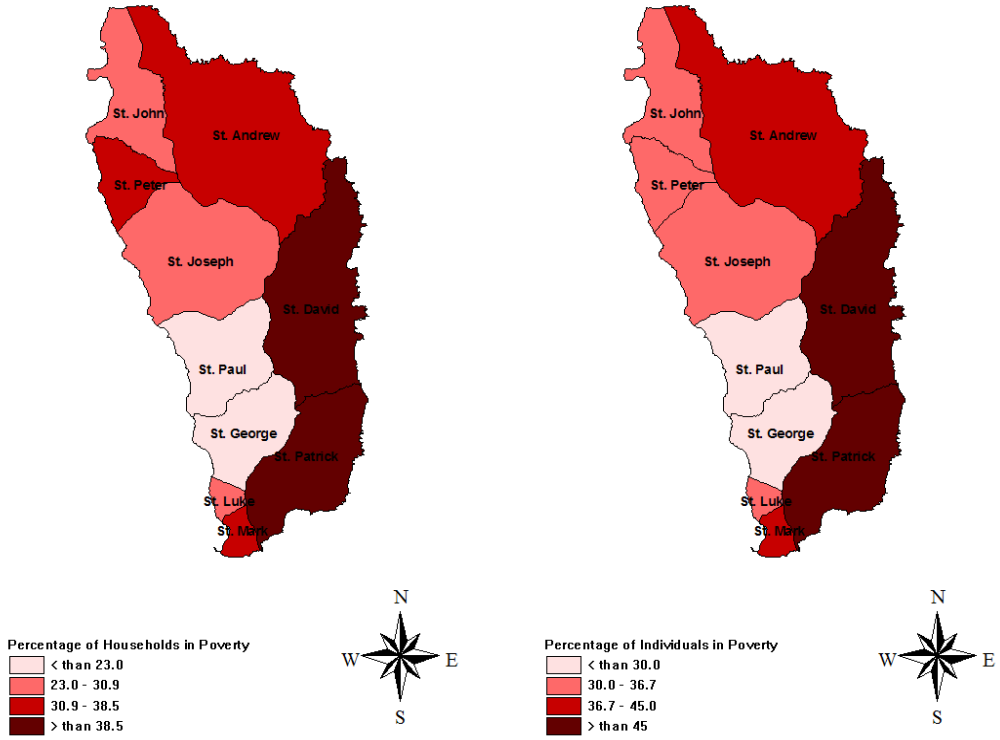
Table 5: Poverty indices at individual and household level(%); revised SLC, 2002

Code	Parish	# HHs	# Ind	% Poor HHs	% Poor Ind
10	Roseau	209	715	14.7	16.6
11	Rest of St. George	57	194	23.7	36.8
12	St. John	68	206	23.6	30.7
13	St. Peter	23	69	13.5	20.5
14	St. Joseph	83	243	27.9	35.3
15	St. Paul	98	360	22.0	31.3
16	St. Luke	21	69	10.4	17.1
17	St. Mark	28	79	39.1	52.5
18	St. Patrick	100	369	40.2	43.7
19	St. David	92	327	58.8	68.0
20	St. Andrew	159	529	23.6	27.5
Dominica		938	3160	27.0	33.5

Measures of poverty intensity and severity (FGT(1) and FGT(2)) give the same picture of the Parishes as the measure of incidence (Head Count Ratio). On the other hand, the three Parishes of St. George (including Roseau), St. John and St. Paul show quite high inequality with all the measures calculated. This confirms the fact that rich areas are still characterised by high inequality and therefore are still in a process of transition towards further development.

Figure 1 shows maps of percentage of households and individuals in poverty at Parish level. Other maps showing many other poverty and inequality indices are reported in the Annex, Figures A1-A8. In each map in this Section, Section 5 and in the Annex, the Parishes (or Enumeration Districts) are divided into four groups: the central threshold is usually indicated by the national average, so that it is possible to distinguish the Parishes (or Enumeration Districts) that are better off than the entire Dominica from those that are worst off than the average. Moreover the other two thresholds (the upper and the lower) have been found so that a similar number of Parishes (or Enumeration Districts) is located in the better or lower group.

Figure 1: Percentage of Households and Individuals in Poverty at Parish level.



5. Results: Maps at Village and Enumeration District level

The procedure for estimating the poverty and inequality measures has been applied for the whole of the country, for the Parishes and then disaggregated at Village level and Enumeration District level. The Central Statistical Office has provided the Authors with the software for producing maps at ED level, which are reported later in Section 5.2 and in the Annex.

5.1. Poverty and inequality measures at Village level

As in the case of Dominica and Parishes, for any given Village, the mean of the 100 simulations constitutes the point estimate, while the standard deviation is the bootstrapping standard error of these estimates. Moreover, the indicators have been computed at household and at individual level.

Tables 6 and 7 report poverty and inequality measures at household and individual level for Villages in the Parish of Roseau. For sake of space the estimates for Villages in Other Parishes are not reported here; anyway, the most important outcomes are emphasised so as to better target anti-poverty actions proposed in Section 7 regarding Policy Recommendation. We can start the analysis by detecting which are the poorest and the richest villages in the country.

Considering the Head Count Ratio and the average equivalent consumption[2] simultaneously and sorting the villages according to these two measures (obviously the former in increasing order and the latter in decreasing order, so as to have the poorest villages at the top of the stack), we find that both the measures indicate the Village of Gaulette River (Parish of St. David) as poorest, that is: Sim-Sim (Parish of St. David); Snake Coe, Morne Mahaut River (Parish of St. David); Salybia, St. Cyr, (Parish of St. David); Fond St. Jean, Fabre, Batchay (Parish of St. Patrick). Analogously both the measures indicate St. Arоment; Castle Comfort; Morne Daniel and Wall House as the richest villages. The strong relationship between the Head Count Ratio and the average equivalent consumption is quite reasonable, given that the poverty line is computed at national level. It is also interesting to observe that in the set of the poorest villages, just mentioned, the one presenting the biggest concentration and inequality measures (Gini,

[2] See Betti *et al.* (2006) for a full description of the equivalent consumption.

GE(0) and GE(1)) is the Salybia, St. Cyr Village, whilst in the set of the richest villages, the one presenting the bigger concentration and inequality measures (Gini, GE(0) and GE(1)) is the Morne Daniel Village.

If we repeat the same analysis at individual level, we can observe that ordering the Villages by the Head Count Ratio in decreasing order, at the top and at the bottom of the stack, there are, more or less, the same villages. However it is worth pointing out that the increasing of the head count ratio, considering household or individual level is really remarkable for the poorest villages. For example for the Rosalie, Newfoundland village the head count ratio at household level is 37.61, while at individual level it is 66.25, the absolute increase is really consistent, but the strong increasing of the relative indicator considering non poor villages like St. Arоment village and D`leau Chaud (Part) village is much more interesting; this remarkable increasing can mean that households with large families have large propensity to being poor.

The following analysis considers the village situation within each Parish, for example, the analysis is performed according to the Head Count Ratio at household level. Before considering each single parish, it is worth remembering that the Head Count Ratio at household level for the whole country is equal to 30.91.

In Roseau we observe the minimum Head Count Ratio (4.81) for the St. Arоment village moreover, six out of the fourteen villages present a head count ratio lower than the parish level (21.24), moreover only two out of the total villages (Yam Piece and Newtown) present a head count ratio slightly greater than the country level.

Also, considering the equivalent consumption, the village of St. Arоment performs very well; on the other hand, the inequality is still evident among the whole population (Gini=39.53) and among the poor (Ginipov=24.14).

The relative high value of percentage of poor households in Gutter Village (29.96) is smoothed by the relative low value of the severity index (FGT(2)=3.99), indicating that most of the poor families have an equivalent consumption just below the poverty line.

High inequality rates are present in the village of Luiseville/ Silver lake (Gini=48.04, GE(0)=41.68, GE(1)=39.64) and they are also accompanied by relative high values of the poverty measures, at least for the Roseau area (HCR=28.43, FGT(1)=11.13, FGT(2)=5.81).

Table 6: Household estimates and standard error. Roseau

Village	HCR	FGT(1)	FGT(2)	Gini	Ginipov	SEN	GE(0)	GE(1)	Atk	Eq_con
Bath Estate / Elmshall	15.45	4.44	1.86	42.15	15.33	3.01	30.35	31.32	55.58	10165
	4.01	1.33	0.62	1.82	1.57	1.03	2.70	3.38	2.62	1329
Citronier, Castle Comfort (seaside)	15.08	4.51	1.95	43.68	16.72	3.12	32.92	33.11	52.58	11012
	4.16	1.38	0.69	3.13	2.67	1.10	4.66	6.10	3.92	1570
Fond Cole	29.01	9.81	4.62	40.61	18.11	7.75	28.28	28.47	57.09	6897
	5.95	2.58	1.42	1.55	1.65	2.46	2.22	2.65	2.44	916
Fortune/Melville Battery	23.81	7.49	3.40	38.72	18.82	5.95	25.54	24.58	59.57	7539
	6.45	2.49	1.34	3.54	4.09	2.06	4.56	5.19	4.87	1104
Goodwill	15.60	4.62	2.00	41.26	16.06	3.17	29.43	29.30	55.52	10146
	3.92	1.34	0.65	1.48	1.48	1.07	2.16	2.76	2.16	1395
Gutter Village (in city of Roseau)	29.96	9.19	3.99	38.59	16.31	7.39	24.88	25.29	61.72	6544
	6.90	2.84	1.59	3.19	2.79	2.73	4.14	5.33	4.38	899
Kingshill	21.75	6.74	2.99	41.05	16.62	4.94	28.78	29.26	56.86	8272
	4.98	1.83	0.94	1.47	1.58	1.62	2.11	2.70	2.10	1131
Louisville/Silver Lake	28.43	11.13	5.81	48.04	21.53	8.72	41.68	39.64	43.52	9104
	5.25	2.65	1.71	3.21	2.64	2.49	5.68	6.60	4.37	1391
Newtown	33.09	11.15	5.25	40.82	18.21	9.21	28.34	29.18	57.61	6388
	6.20	2.66	1.46	1.93	1.62	2.66	2.71	3.61	2.73	832
Pottersville	19.99	6.33	2.85	42.78	17.16	4.55	31.62	31.78	53.61	9224
	4.36	1.65	0.86	1.94	1.86	1.38	2.91	3.68	2.83	1305
Roseau	21.85	6.96	3.16	40.48	17.15	5.11	28.24	28.15	56.80	8189
	4.67	1.87	0.98	1.32	1.48	1.61	1.86	2.29	1.93	1080
Simon Bolivar Housing Scheme	9.34	2.38	0.92	39.30	23.62	2.02	26.09	26.31	59.97	11722
	4.42	1.48	0.68	2.85	21.88	0.80	3.92	4.88	4.43	1806
St. Aroment	4.81	1.22	0.47	39.53	24.14	0.95	26.91	26.44	58.02	15843
	2.27	0.64	0.30	2.34	27.59	0.36	3.28	3.84	3.76	2592
Stock Farm	30.61	10.47	4.92	43.32	18.12	8.36	31.95	33.06	54.39	7158
	6.50	2.81	1.56	2.57	2.17	2.76	3.77	4.94	3.34	1094
Tarish Pit	28.33	9.44	4.38	40.61	17.80	7.40	28.07	28.30	57.64	7016
	5.85	2.55	1.46	2.51	2.47	2.38	3.42	4.33	3.48	990
Yam Piece	31.93	10.93	5.18	40.49	18.65	8.96	27.89	27.57	57.66	6537
	6.92	3.10	1.78	3.56	2.62	2.91	5.07	6.02	5.22	1001

In the rest of St. George we can observe a peculiarity: there are two villages presenting a very low Head Count Ratio and very high values of equivalent consumption expenditure (Castle Comfort and Wall House); the others are much more homogeneous, presenting values between 19.53 (Giraudel) and 34.31 (Bellevue Chopen); it should be noted that only one village shows a HCR greater than the country level.

It is also evident that the intensity and severity of poverty are particularly pronounced in the village of Bellevue Chopen: here there is also the presence of high inequality with a Gini concentration index equal to 44.45.

Large inequality is also present in a relatively non poor village, Wotten Waven; this is confirmed by the high value of the incidence of poverty: households below the poverty line are very poor and therefore the equivalent consumption distribution is very unequal.

In the Parish of St. John only the D`leau Chaud village has a small Head Count Ratio (10.39), the others range between 26.38 and 39.71; it is important to note that more than half the villages of the Parish have a Head Count Ratio greater than the indicator at country level.

The bad situation of the villages in this Parish is confirmed by the measures of incidence and severity of poverty.

In the Parish of St. Peter there are only four villages: only one of them (Dublanc/Bioche) has a head count ratio noticeably lower than the others.

Here note the high inequality among the poor households and the consequent high value of the Sen index, which is not very different from the rest of the Parish.

In general, equivalent consumption expenditures are not very high in the Parish.

In the Parish of St. Joseph the diffusion of poverty (HCR) seems to be quite homogenous, the average value for the Parish being 30.04%; four villages out of the ten present a Head Count Ratio greater than the indicator at Parish level and at Country level. This is also confirmed by the measures of intensity and severity of poverty (FGT(1) and FGT(2)).

It is important to note that in the village of Grand Savanne, where poverty is not very widely diffused (HCR=19.69), the household consumption is distributed very unequally, with a Gini concentration index equal to 42.83: this is the highest value among the villages in the Parish.

The Parish of St. Paul shows quite an important polarization: six out of thirteen villages show a Head Count Ratio lower than the Parish (22.45); in particular, the village of Morne Daniel presents a value (8.62) close to the minimum value of the indicator across all the villages; the other villages present values ranging between 23.74 (Pond Casse, Penrice, etc.) and 37.70 (Tarreau).

According to the Gini concentration index, inequality is particularly pronounced in the villages of Pond Casse, Pernice and Pont Casse; on the other hand, in the village of Warner, even if poverty is largely diffused (HCR=35.96), the household equivalent consumption is less unequally distributed compared to the rest of the Parish of St. Paul.

Table 7: Individual estimates and standard error. Roseau

Village	HCR	FGT(1)	FGT(2)	Gini	Ginipov	SEN	GE(0)	GE(1)	Atk	Eq_con
Bath Estate / Elmshall	19.11	5.64	2.40	40.97	15.48	3.97	28.67	29.54	57.30	8848
	4.86	1.70	0.83	1.79	1.88	1.40	2.59	3.17	2.72	1210
Citronier, Castle Comfort (seaside)	20.55	6.49	2.89	42.32	16.85	4.64	31.11	31.45	54.43	9010
	5.34	1.93	1.03	2.83	3.09	1.64	4.12	5.20	3.89	1249
Fond Cole	36.42	13.14	6.46	40.34	19.17	11.07	28.02	28.07	57.36	5902
	6.77	3.24	1.90	1.57	1.86	3.36	2.30	2.51	2.77	800
Fortune/Melville Battery	33.15	11.19	5.29	39.78	18.86	9.37	27.30	27.12	58.60	6349
	8.28	3.54	2.10	3.46	4.30	3.29	4.68	5.47	5.20	939
Goodwill	21.00	6.63	3.00	41.73	17.03	4.84	30.23	30.04	54.72	8840
	4.97	1.85	0.95	1.58	1.68	1.62	2.31	2.81	2.31	1230
Gutter Village (in city of Roseau)	35.97	11.49	5.12	36.42	16.29	9.61	22.45	22.89	64.62	5569
	8.19	3.71	2.18	2.94	3.13	3.76	3.66	4.35	4.56	740
Kingshill	27.10	8.92	4.14	41.31	17.64	6.90	29.33	29.79	56.22	7346
	5.64	2.23	1.22	1.42	1.89	2.15	2.11	2.65	2.39	1004
Louisville/Silver Lake	34.54	14.59	7.92	48.82	21.92	11.65	43.77	41.77	42.49	7993
	5.48	3.20	2.25	3.43	2.98	3.13	6.79	7.75	5.12	1284
Newtown	36.56	12.88	6.30	39.11	19.18	10.99	26.42	26.58	58.97	5723
	6.87	2.92	1.67	1.75	2.02	3.14	2.51	2.85	3.15	724
Pottersville	24.50	7.99	3.68	42.60	17.46	6.00	31.35	32.11	54.29	8094
	5.33	2.11	1.15	1.96	2.13	1.91	2.99	3.85	3.09	1141
Roseau	26.15	8.60	4.00	40.25	17.69	6.61	27.96	27.93	57.12	7325
	5.26	2.23	1.21	1.30	1.68	2.03	1.81	2.14	2.00	959
Simon Bolivar Housing Scheme	12.02	3.18	1.25	38.52	19.48	2.46	25.45	26.04	61.05	10332
	5.74	2.03	0.97	3.25	13.49	1.29	4.46	5.29	5.27	1648
St. Aroment	6.78	1.81	0.73	39.18	20.16	1.30	26.71	26.22	58.11	13923
	3.15	0.96	0.49	2.36	14.13	0.60	3.39	3.83	4.18	2270
Stock Farm	36.89	13.51	6.66	43.94	19.08	11.29	33.19	34.70	53.46	6383
	7.11	3.42	2.07	2.65	2.57	3.57	4.07	5.74	3.61	970
Tarish Pit	34.36	11.78	5.55	39.95	17.69	9.66	27.29	28.06	58.98	6125
	7.30	3.37	1.99	2.55	2.86	3.40	3.54	4.54	3.84	924
Yam Piece	37.36	13.41	6.52	39.42	18.68	11.26	26.84	26.49	58.91	5743
	7.78	3.75	2.26	3.43	3.11	3.70	4.93	5.30	5.62	856

The Parish of St. Luke consists of one village only (Pointe Michel) thus, the Head Count Ratios at Parish and village level are the same (27.92).

For this village all the considerations introduced in Section 4 for the Parish of St. Luke apply.

The Parish of St. Mark is made up of three villages: for all of them we can observe a Head Count Ratio significantly greater than the country level; the value of the indicator for the Gallion, Coulibrie Estate Village is particularly worrying. The diffusion of poverty is relatively high also in the villages of Scotts Head and Soufriere, where a participatory assessment was also conducted (see Section 6 below for details).

In the villages of the Parish the measures of intensity and severity of poverty are worrying as well. On the other hand, the villages do not seem to be very unequal; generally, the combined Sen index is quite high.

In the Parish of St. Patrick the average Head Count Ratio is quite relevant (40.9): eleven villages out of seventeen have a Head Count Ratio greater than the average value, moreover two villages, Dubic/ Stowe and Fond St. Jean, Fabre, Batchay respectively present a Head Count Ratio equal to 57.85 and 58.39.

The large diffusion of poverty in the Parish is also highlighted by the low levels in equivalent consumption expenditures, well below the country average.

The intensity of poverty is particularly pronounced in the village of Dubic/ Stowe, where the severity of poverty also reaches one of the highest values in the country (FGT(2)=15.18). In this village the equivalent consumption is not very low, but is distributed very unequally among the households, so that the Gini concentration index reaches the value of 52.76, well above the Parish and country average.

In the Parish of St. David the average Head Count Ratio is the greatest out of all the Parishes (49.94): of all the villages the minimum value is registered for San Sauver (35.45), half of the total number of the villages has a Head Count Ratio greater than 55%. This bad situation is also confirmed by the intensity and severity poverty measures. On the other hand, inequality is not particularly present in every village; villages of Morne Jaune, Snake Coe, Morne Mahaut River, Good Hope Dix-Pas, Tronto, seem to be unequal even if poverty is widely diffused (more than 50%).

In the Parish of St. Andrew the Head Count Ratio values are quite homogeneously distributed around the Parish average value (37.75). The village having the greater

percentage of poor people is the Caribe - Penville & Galba village (49.25), which is, on the other hand, one of the most equal villages.

5.2. Poverty and Inequality maps at Enumeration District level

In this Section, we analyse the Districts with respect to the Head Count Ratio at household level, Parish by Parish. A general consideration is due: in Roseau and in the Rest of St. George, in the Parishes of St. Peter and St Paul there are Districts presenting very low levels for the Head Count Ratio (below 10%), while in the Parishes of St. Luke, St. Mark, St. Patrick, St. David and St. Andrew the minimum HCR at district level is greater than 20%.

Let us now consider the situation District by District within each Parish.

Roseau (Parish of St. George) (minimum HCR=2.58, maximum HCR=36.57): the distribution of the HCR seems to be homogenous, in fact half the Districts present a Head Count Ratio lower than the indicator at Parish level and the remaining half an HCR greater than the Parish HCR.

Rest of St. George (minimum HCR=6.05, maximum HCR=41.91): seven districts out of seventeen show an HCR indicator lower than the Head Count Ratio at Parish level.

Parish of St. John (minimum HCR=10.39, maximum HCR=39.71): the distribution according to the Head Count Ratio seems quite homogenous, or better, there is about half the districts with the indicator lower than the Parish level and the other half with the indicator greater than the Parish level.

Parish of St. Peter (minimum HCR=17.38, maximum HCR=34.70): in this Parish two distinct groups of Districts seem to cohabit; there is one District showing a Head Count Ratio equal to 17.38% (ED 13022) and the other five Districts presenting an indicator ranging between 28.12 and 34.7.

Parish of St. Joseph (minimum HCR=11.2, maximum HCR=42.60): seventeen out of the total thirty-two Districts present a Head Count Ratio lower than the Parish level (30.04%), so the distribution seems to be quite homogenous.

Parish of St. Paul (minimum HCR=15.46, maximum HCR=42.35): even if the Head Count Ratio of this Parish is remarkably lower than the one in the Parish of St. Joseph (22.45 versus 30.04) the distribution, between these two Parishes, seems to be quite similar in terms of homogeneity.

Parish of St. Luke (minimum HCR=21.36, maximum HCR=31.70): the Parish is composed of six districts. We can observe a very small range between the maximum and the minimum HCR so the distribution seems to be really homogenous.

Parish of St. Mark (minimum HCR=22.19, maximum HCR=50.3): it is composed of nine Districts; according to the HCR we can observe two distinct groups. Five Districts present a Head Count Ratio ranging between 22.19 and 35.60. The other group, composed of EDs 17060, 17070, 17030 and 17040 present a very high level of HCR, ranging between 40.23% and 50.3%.

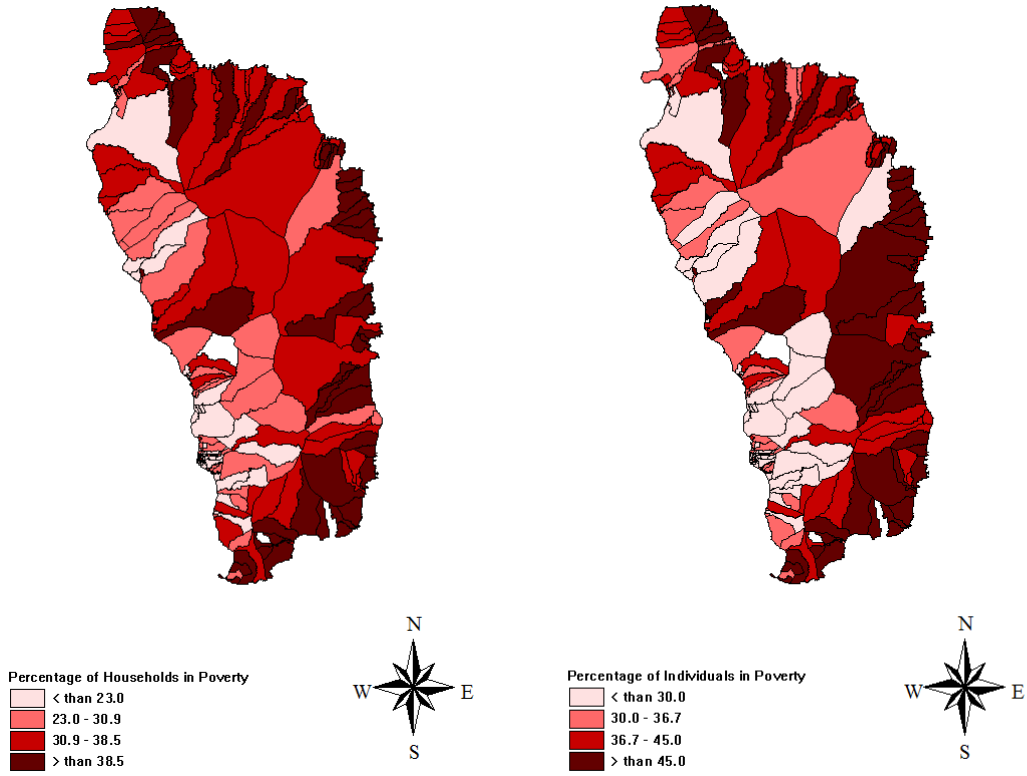
Parish of St. Patrick (minimum HCR=28.44, maximum HCR=58.39): the average Head Count Ratio at Parish level is really relevant (40.9). Even if the HCR distribution seems to be really homogenous at district level, it should be noted that the EDs 18122, 18210, 18260, 18160 and 18190 are the poorest, for them the percentage of poor is more than half of the total household.

Parish of St. David (minimum HCR=31.17, maximum HCR=64.24): the average Head Count Ratio is the greatest of all the Parishes (49.86) and the distribution seems to homogenous. There are fifteen out of twenty-eight Districts presenting a Head Count Ratio lower than the Parish level HCR, among the other thirteen Districts there is a percentage of poor households greater than 50% (EDs 19060, 19102, 19021, 19032, 19070, 19200, 19210, 19101, 19080, 19190, 19170, 19180).

Parish of St. Andrew (minimum HCR=27.75, maximum HCR=53.21): the HCR distribution is quite homogenous; two EDs (20332 and 20020) present percentages of poor households greater than 50%.

With regard to the distribution of the HCR at individual level and the comparison with the household level, the statements already made when analysing Parishes and Villages are still valid: in general the percentage of poor at individual level is greater than the corresponding household level. For this reason we avoid repeating a similar consideration, we need only say that the EDs 19190 and 19170, both belonging to the Parish of St. David, present a Head Count Ratio at individual level, which is greater than 70%. Figure 2 shows the maps corresponding to the percentage of poor households and individuals at ED level; other poverty and inequality measures are shown in Figures A9-A14 in the Annex.

Figure 2: Percentage of Households and Individuals in Poverty at ED level.



5.3. Decomposition of Inequality in Dominica

Table 8 reports decomposition of one of the general entropy class inequality measures (GE(1), Theil Index) into its within area and between area components at various levels of aggregation. By definition, all of the inequality is within group when the group in question is the whole country or is the rural area or urban area, and all of it is between groups when each household is considered as a separate group. GE(1) index is decomposable so that we are able to distinguish among the inequality due to differences between a certain level of disaggregated areas (Parishes, Villages, Enumeration Districts, etc…) and the inequality due to the differences between households present in the disaggregated area. From Table 8 we can see that in the whole country and in both rural and urban areas, a large portion of the inequality is due to within-group inequality, even when the groups are relatively small, such as Enumeration Districts. Approximately, 8% of the inequality in Dominica is between Parishes, 13,6% between Villages, and 17,2% between Enumeration Districts.

Table 8: Decomposition of the GE(1) inequality index (Theil).

Level of Decomposition	Number of Units	Within-Group Inequality	Between-Group Inequality	% Between-Group Inequality
Dominica	**1**	**34.36**	**0**	**0**
Urban – semi urban - rural	3	32.63	1.73	5.0
Parishes	10	31.68	2.68	8.0
Villages	118	29.68	4.68	13.6
Enumeration Districts	295	28.43	5.93	17.2

6. Identification of poor households and partecipatory assessment

6.1. Identification of poor households and individuals

Poverty and inequality measures have been presented for different levels of disaggregation: at rural – urban level, at Parish level, at Village level and finally at Enumeration District level.

The method proposed here allows reaching a finer level of disaggregation, up to household level: in fact the method provides simulated household equivalent consumption expenditure for each household of the Census.

Having a set of simulated household equivalent consumption for each household, we are able to compute the average household equivalent consumption for each household; if this value is below the poverty line we can conclude that the household is poor. For the average household equivalent consumption we are able to compute the bootstrap standard error, of course the greater the level of disaggregation considered, the greater the value of the standard error will be. Therefore at household level we can expect to have the largest standard error possible.

6.2. Participatory assessment

In order to verify the information derived from the quantitative assessment a participatory assessment was conducted. This was in the form of a field test, so as to test the methodology also at household level. The idea of the test was to visit households in some poor villages in the Parishes of St. David (Carib territory) and St. Mark in order to verify if it was reasonable to consider them in a status of poverty.

In order to conduct these field tests, from each village the consultants randomly selected a set of households classified as poor in the quantitative assessment; the selected units

were visited at home by the consultants as well as a local researcher from the Ministry of Finance and the National Statistical Office.

The results of the participatory assessment were absolutely consistent with the results of the quantitative assessment: all but one of the households visited showed a real status of poverty. Only one of them did not show real poverty status; however, talking with the household members they explained that the living conditions had recently changed because some members had found a new job. In conclusion, the field test gave very satisfying results even at household level.

7. Policy Recommendations

Even if the poverty and inequality exercise was completed in February 2006, it should be kept in mind that the reference year for the results is the year 2001, i.e. when the Census information was collected. For this reason the results cannot be used in monitoring poverty and in evaluating the framework for poverty reduction proposed in the Country Poverty Assessment (June, 2003) and undertaken by the Government of the Commonwealth of Dominica and also included in the Growth and Social protection Strategy (GSPS).

The CPA and GSPS have indicated the individual and household categories at risk of poverty and have proposed anti-poverty policies for those categories. The added value of the poverty mapping exercise consists in assessing WHO those individuals and households are and WHERE they live.

7.1. The medium-term Growth and Social Protection Strategy

According to the CPA and the medium-term Growth and Social Protection Strategy (GSPS) report, Dominica has an extensive social safety net consisting of several government and NGO-administered programmes. Generally, the CPA found that Dominica's social protection programmes targeted the poor, directly or indirectly, and were comprehensive in three ways:

- They involve activities that are developmental (i.e. that seek to directly increase individuals' capability to participate in economic activity), supportive (i.e. that

directly address the needs of poor and vulnerable groups) and preventative (i.e. that seek to prevent individuals from becoming poor).

- They cover all relevant sectors: agriculture, small business development, physical infrastructure and housing, education, health and social sectors.
- They target communities, households and individuals including the most vulnerable sub-groups of the poor – the elderly, disaffected youth, the disabled, drug abusers, the indigent, and households with family problems.

7.2. Integration of Poverty Reduction Policies and Programmes

The poverty mapping work could be useful for proposing anti-poverty policies or for integrating policies already proposed and undertaken by Poverty Reduction Policies and Programmes. Those policies or programmes could be implemented at least at three levels:

- short term: to individuals or households through economic / monetary support;
- medium term: to Enumeration Districts and Villages (projects at local level);
- long term: structural changes of the Country (education, training, investments with an eye on the sustainable growth).

7.2.1. Short term Policies and Programmes

At present, the public assistance programme (PA) is co-ordinated by the Social Welfare Division (SWD) and provides support to those individuals who live in households below the Household Indigent Line (HIL). For the year 2002, under this programme, recipients obtained EC$100 per month per family and $85 per month per child. A process of eligibility exists that includes a home visit and other examinations by SWD staff to ensure that applicants satisfy SWD criteria. Even if the CPA report has estimated that in Dominica about 10,000 individuals are indigent, this programme covers not more that 2,500 people (CPA, p. 107).

In order to improve the SWD criteria and to ensure a large coverage of the programme among the indigents, results from the poverty mapping could be used:

- first of all, to be eligible for the programme, an individual should belong to a household with a estimated consumption expenditure below the HIL;

- secondly, an informative campaign should be conducted in order to better inform potentially indigent people how, when and where to apply.

Alternatively, given its fiscal realities (GSPS) the Government could launch a new programme, the Household Direct Support Programme (HDSP):

Food supply (hot meals) to 1000 - 2000 households with very low consumption estimated with the poverty mapping exercise (after checking by means of a visit by government authorities) and with a large number of children present.

7.2.2. Medium term Policies and Programmes

Given the rich set of poverty and inequality measures provided by the poverty mapping, which are disaggregated at Village and Enumeration District level, the Government of the Commonwealth of Dominica could launch a new Programme, the Village (or Enumeration District) Direct Support Programme (VDSP or EDDSP):

- single out the 10 - 20 poorest Villages (Enumeration Districts) according to the HCR estimates produced by the poverty mapping exercise;
- single out the main characteristics and problems of the area (i.e. lack of schools, high unemployment rate, etc…) on the basis of information collected in the Census data or in other alternative sources;
- propose *ad hoc* projects for each village (ED) according to the characteristics of the area.

The information from the poverty mapping could also be used for monitoring Programmes undertaken by the Government. In fact some Programmes target some restricted areas on the basis of criteria or socio-economic indicators not necessarily related to poverty or just not up to date.

One example consists in the Small Project Assistance Team (SPAT), a community development NGO that has been providing support for socio-economic projects for the past 25 years, with some discontinued periods.

In year 2001 SPAT's main programme, the Community Animation Programme (CAP), was still covering four communities with socio-economic indicators (updated at year 1996) below the national average: Petite Savanne, Dublanc/ Bioche, Grand Fond and Grand Bay.

According to the poverty mapping 2001 HCR estimates (see Section 5.2 above), Petite Savanne, Grand Fond and Grand Bay villages experienced more than 50% of individuals in poverty, whereas in the Village of Dublanc/ Bioche less than one individual out of four lives in poverty.

The recommendation of this report is to invite the SPAT to continue its activities and to take into account the results produced by the poverty mapping at Village and Enumeration District level in order to launch new small projects.

Another medium-term Programme should also aim at attracting back into Dominica young people who have been educated abroad, so as not to loose investment in human resources. With the coming into effect of the CSME, Dominica will need to retain and attract highly skilled individuals. It will not only need those to function now in this competitive environment but will also need their specialised knowledge as it moves towards a knowledge economy.

7.2.3. Long term Policies and Programmes

Long term policies and programmes should be based on structural changes of the Country, particularly on education, training, employment and investments, with an eye to the sustainable growth.

This should be in line with the most important strategy to be implemented by the GSPS: The promotion of (sustainable) economic growth and job creation.

The Government should therefore continue to undertake the Basic Needs Trust Fund (BNTF) with the support of the Caribbean Development Bank. The BNTF plays and will continue to play in the future a very important role with regard to:

- economic and social infrastructure necessary for development;
- basic services or enhancement of;
- skills training to increase productivity and income.

Everything possible should also be done to implement the Dominica Social Investment Fund (DSIF). DSIF will not only provide direct cash support to individuals, households and communities at risk of poverty, but will also provide opportunities for employment and sustainable development.

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Figure A1: Poverty Gap Ratio of Households and Individuals at Parish level.

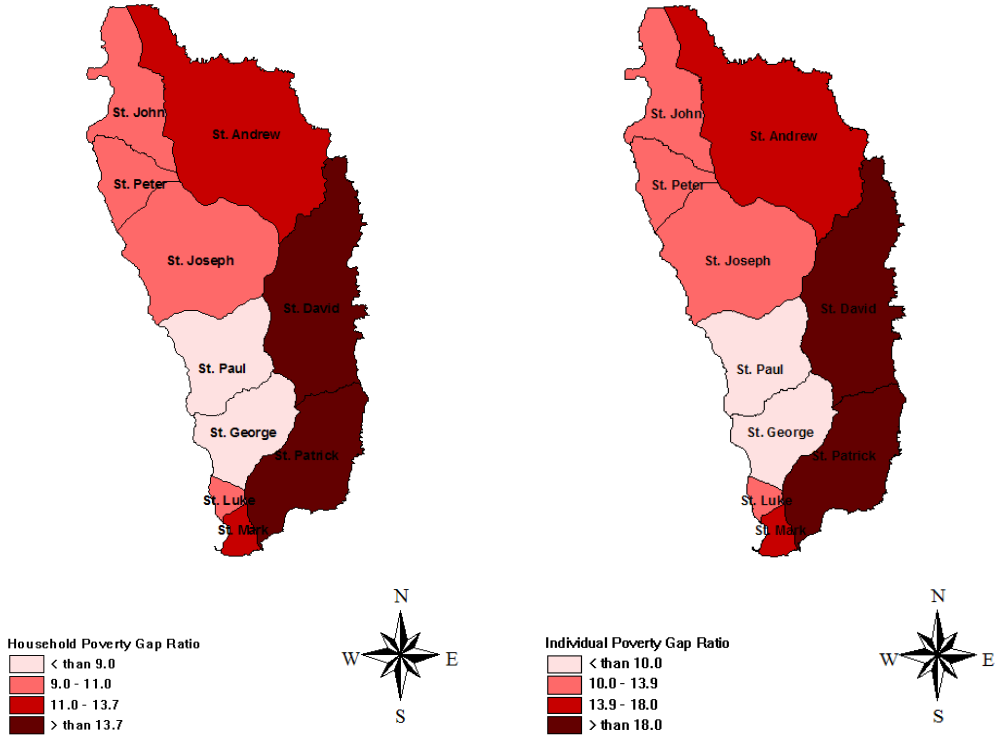

Figure A2: Household and Individual Poverty Severity Index at Parish level.

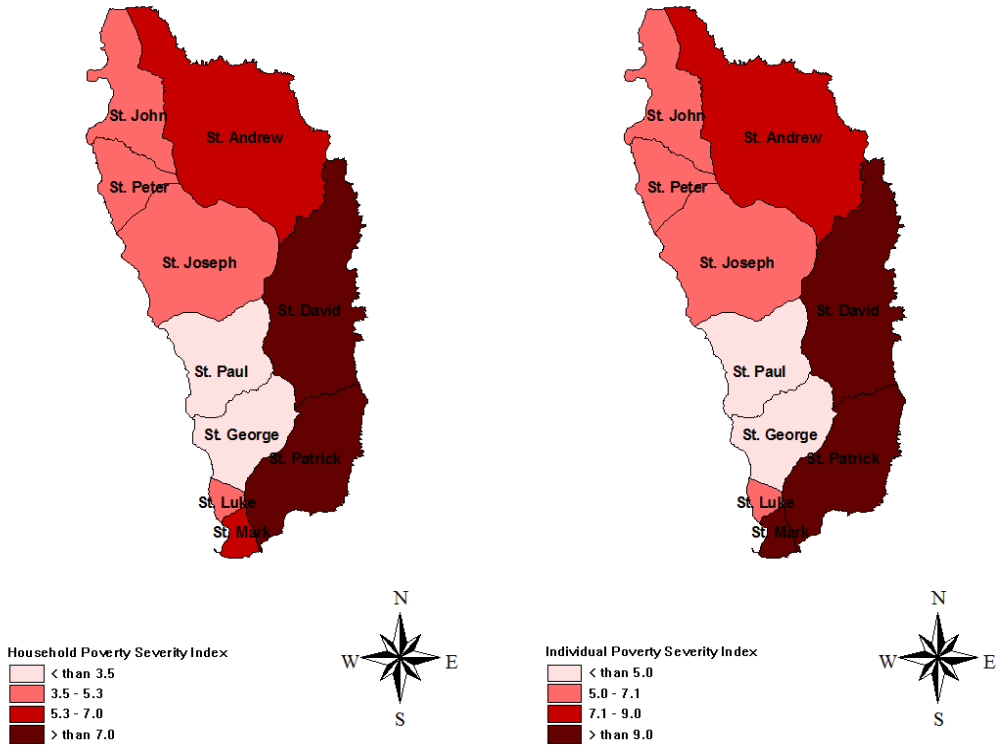

Figure A3: Household and Individual Gini Concentration Index at Parish level.

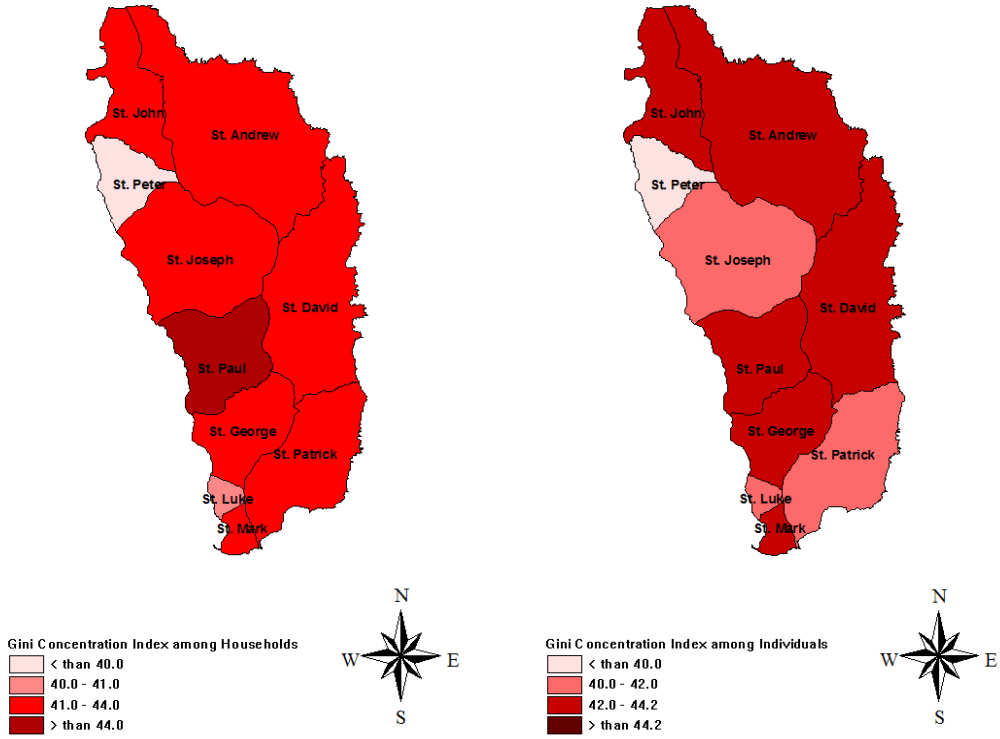

Figure A4: Gini Index among Poor Households and Individuals at Parish level.

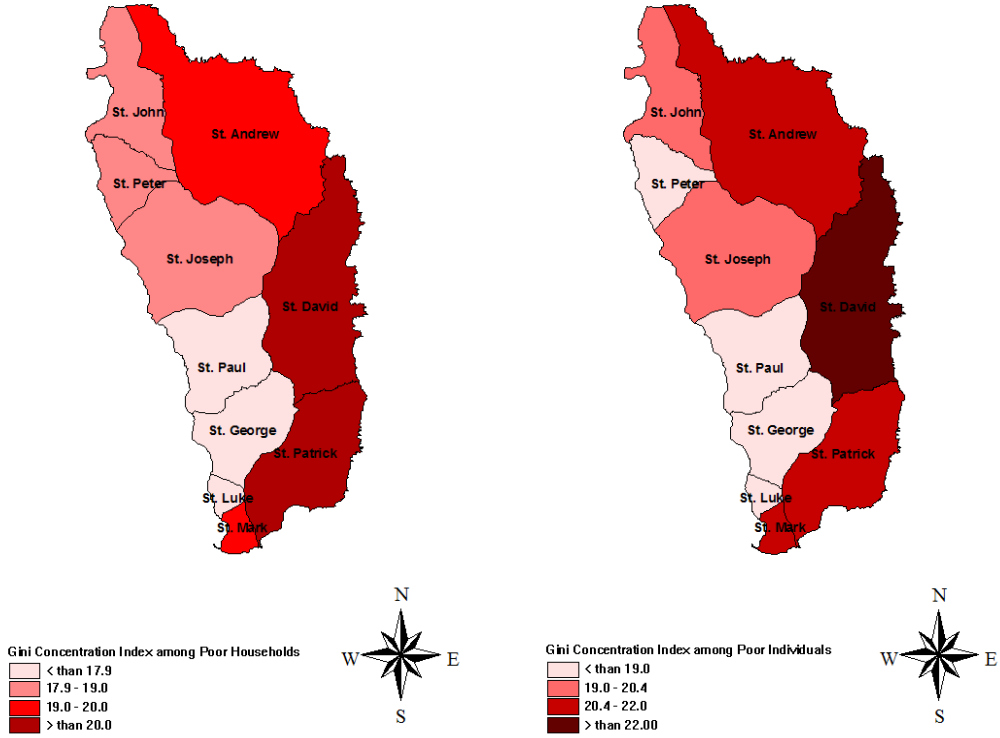

Figure A5: Sen Index among Households and Individuals at Parish level.

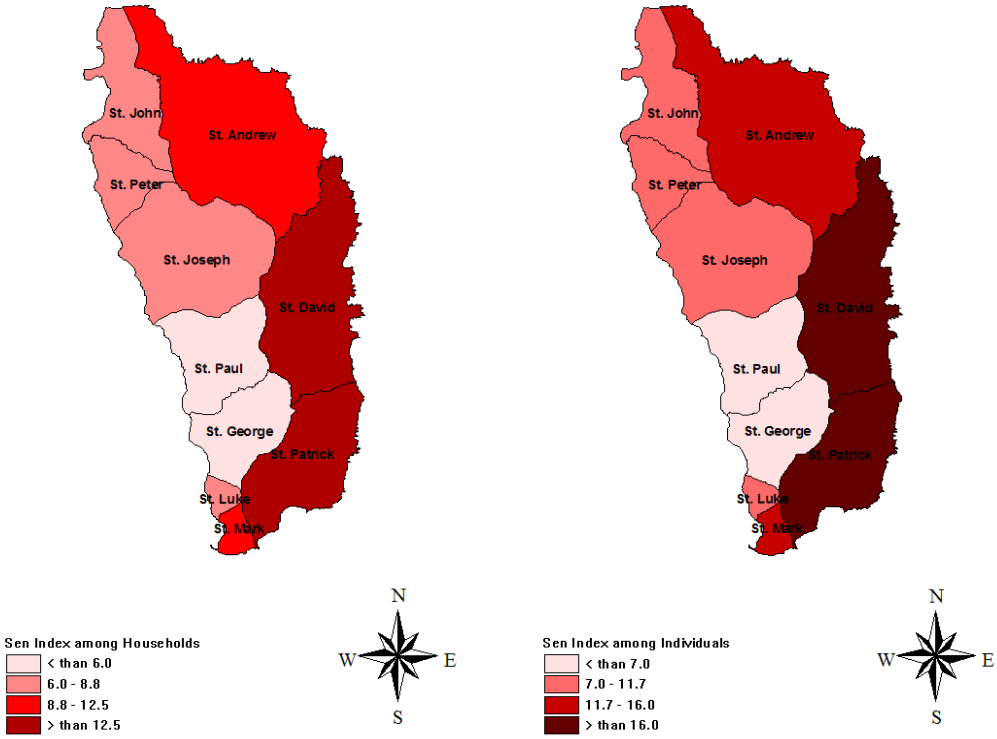

Figure A6: Household and Individual General Entropy of degree zero at Parish level.

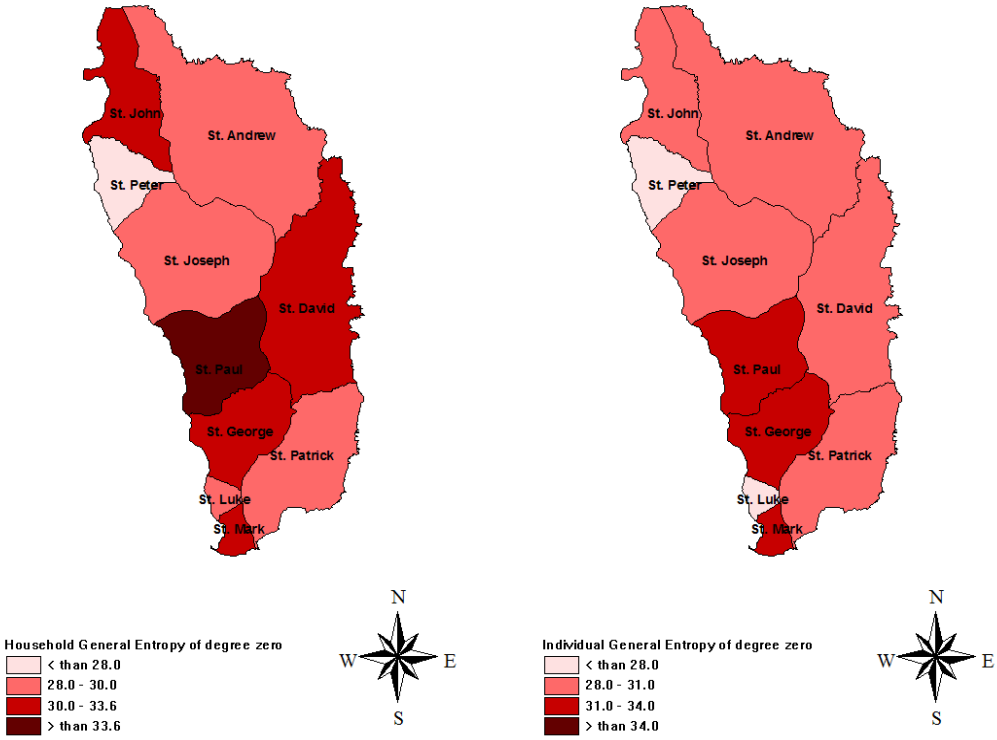

Figure A7: Household and Individual Theil Index at Parish level.

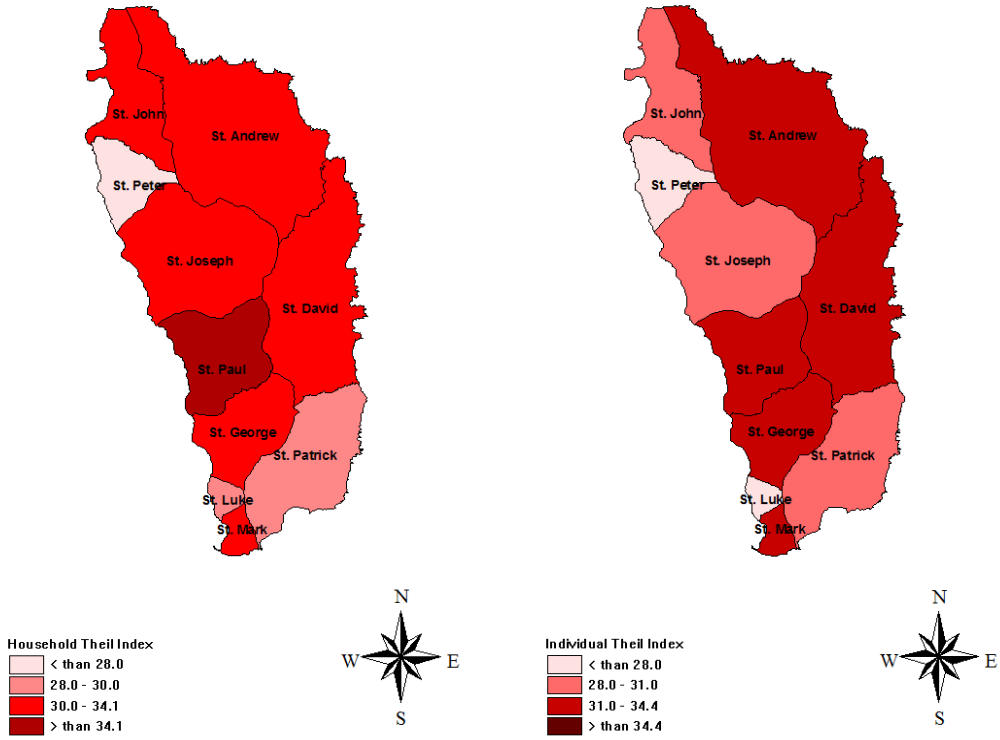

Figure A8: Household and individual equivalent consumption at Parish level.

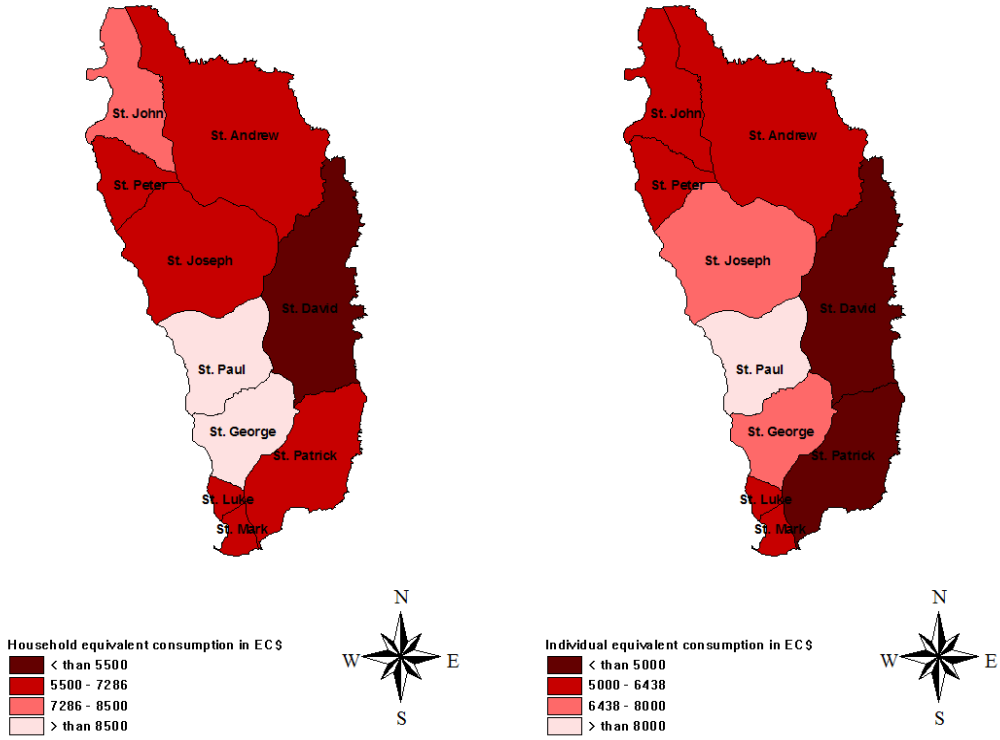

Figure A9: Poverty Gap Ratio of Households and Individuals at ED level.

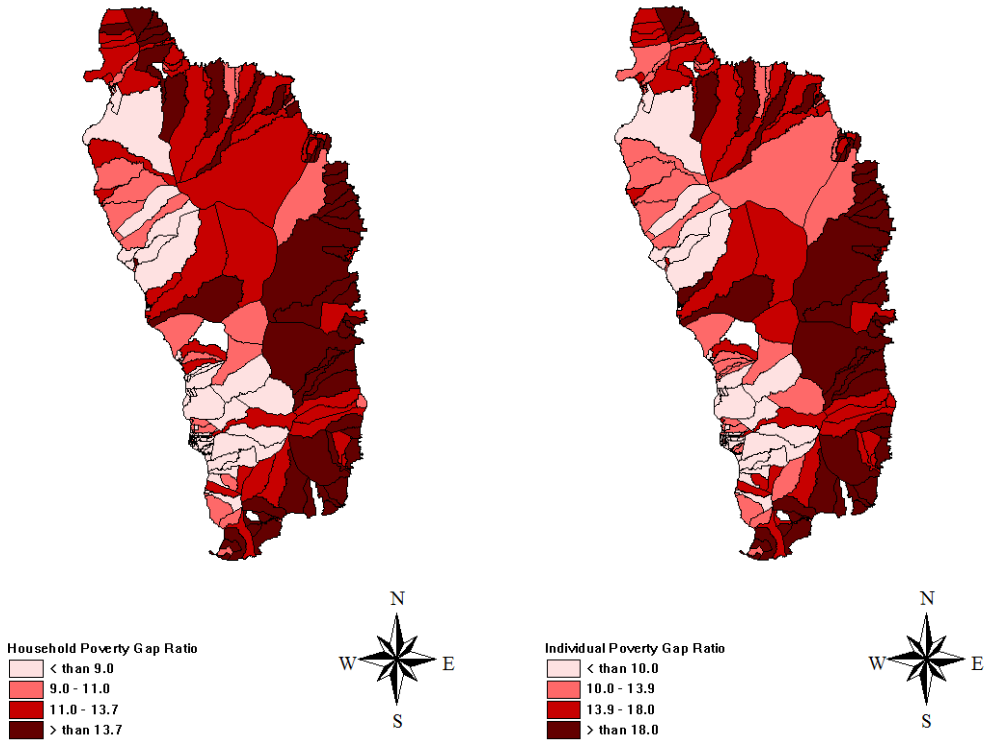

Figure A10: Household and Individual Poverty Severity Index at ED level.

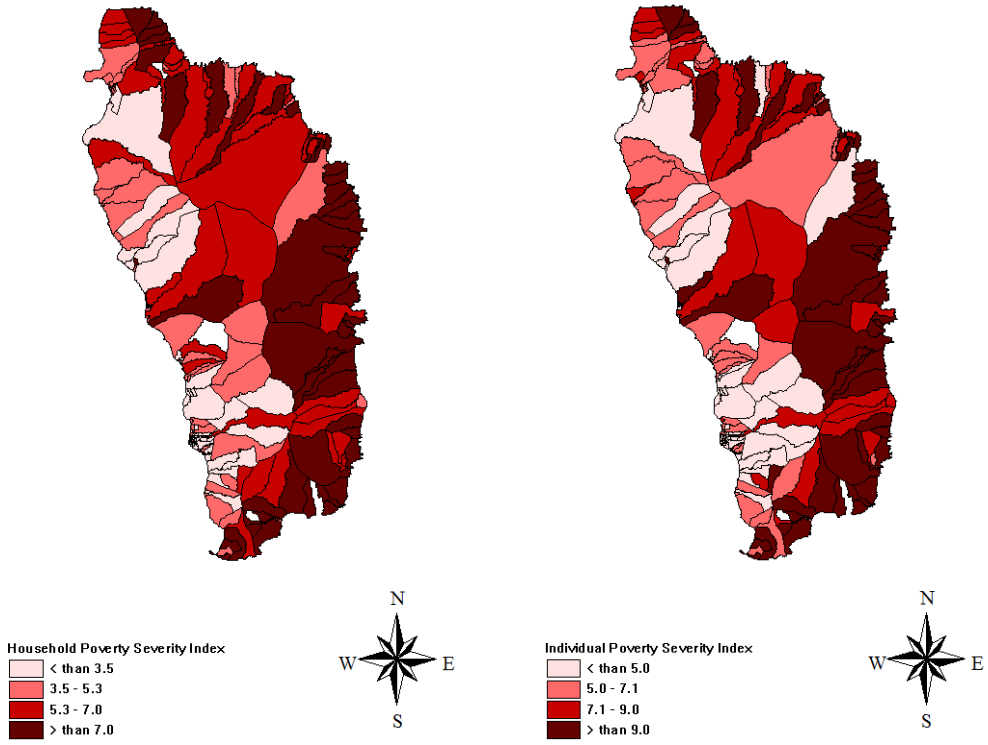

Figure A11: Household and Individual Gini Concentration Index at ED level.

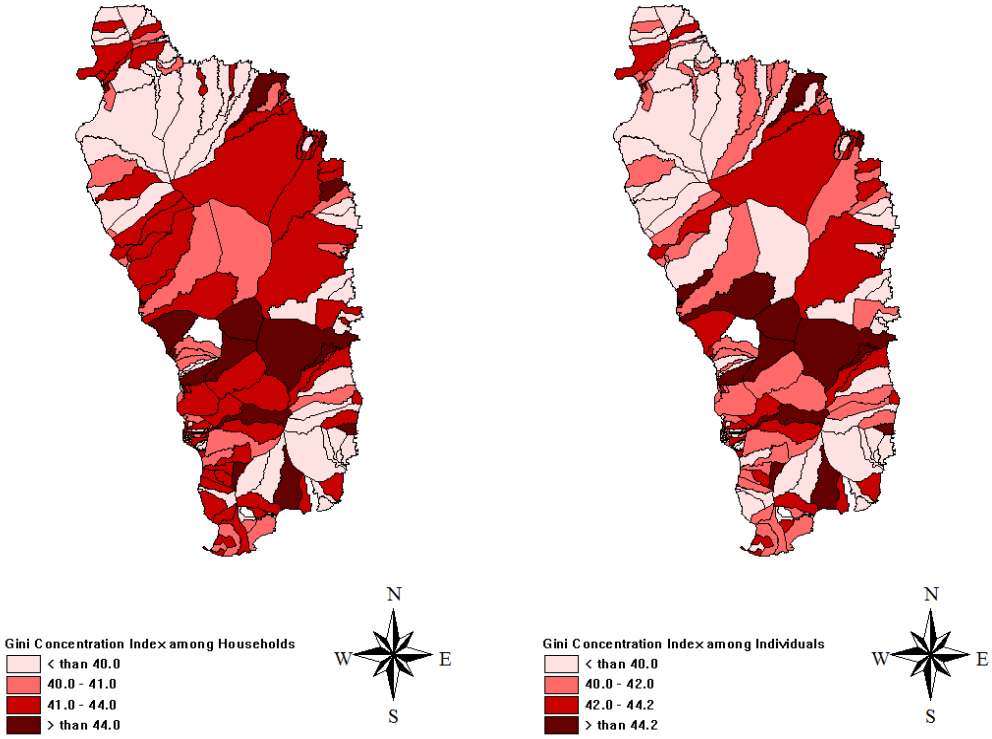

Figure A12: Gini Index among Poor Households and Individuals at ED level.

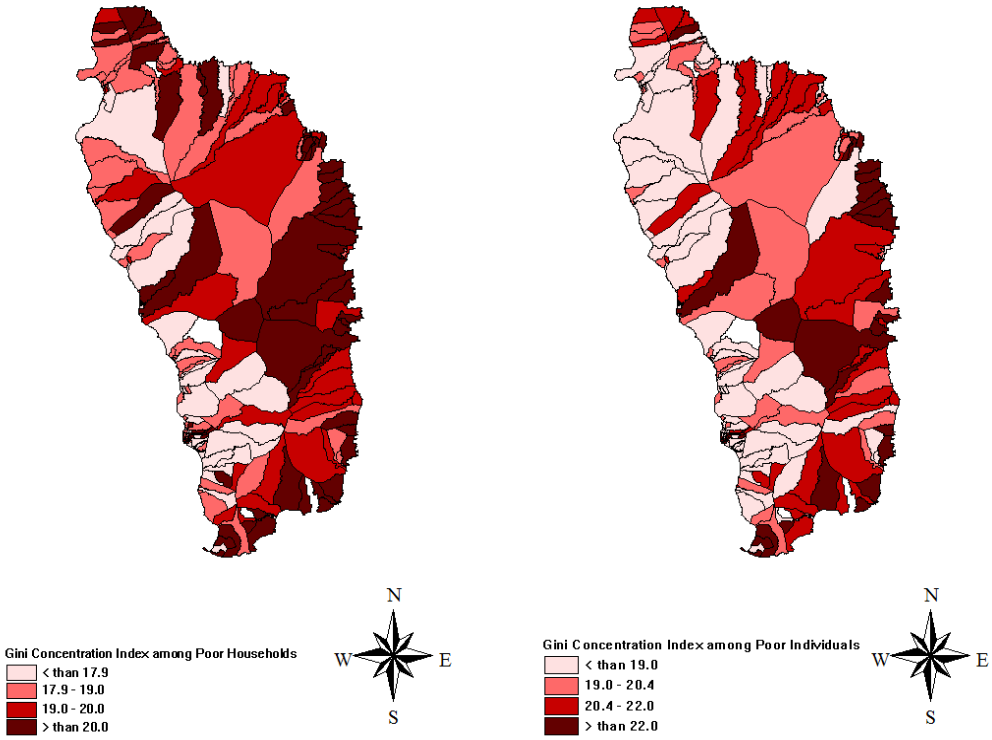

Figure A13: Sen Index among Households and Individuals at ED level.

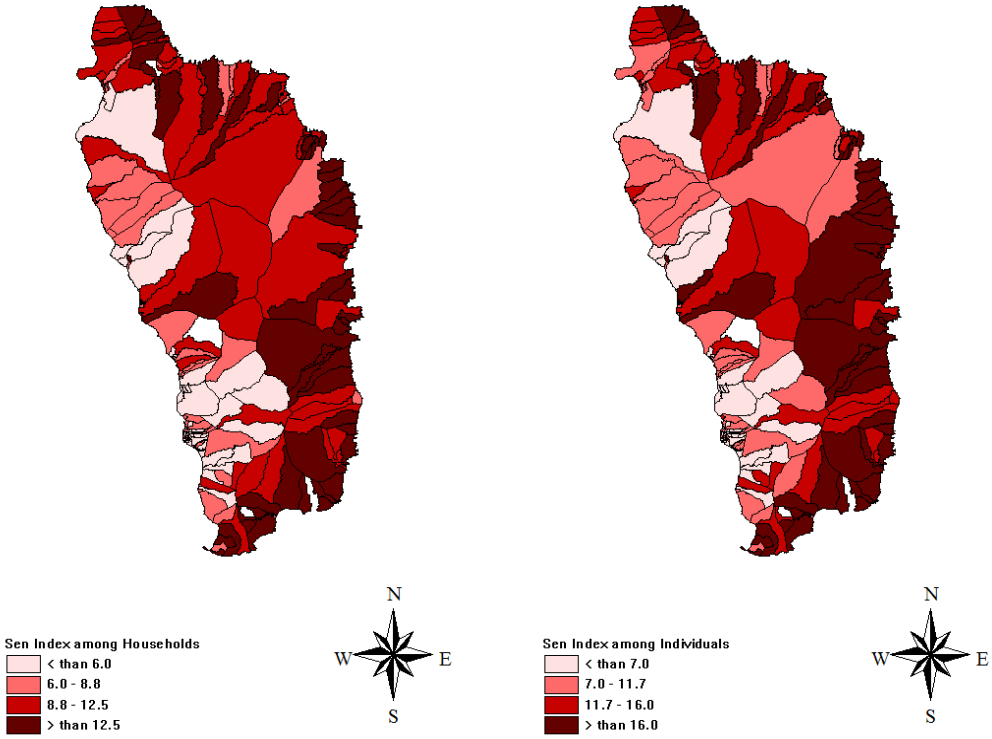

Figure A14: Household and Individual equivalent consumption at ED level.