SOCIAL VULNERABILITY MEASUREMENT IN THE CARIBBEAN SUB-REGION – A PILOT TEST

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Introduction

The Economic Commission of Latin America and the Caribbean (ECLAC), Sub-Regional Headquarters for the Caribbean has been charting the course of initiatives geared towards the pursuit of evidence-based research targeting social policy in the Sub-Region. Since 2000, the process has been gaining momentum resulting in a number of interventions that are expected to strengthen the delivery of social statistics needed to support evidence-based social policy. In accordance with such a thrust, the ECLAC has embarked upon the establishment of a regional database project targeting a host of data covering a broad range of social phenomena. In 2001, the ECLAC published a document entitled *Quality of Life – A Compendium of Social Statistics of Five Caribbean Countries (1995-2001)* as a first step towards mounting a fully searchable social database within its Secretariat. The document contains a host of social statistics traversing a number of social concerns in five Caribbean countries – Belize, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines.

By virtue of its mandate, the Social Affairs Division within ECLAC has sought to enhance social conditions and social equity within institutional spheres across the twenty-three countries and associated states that fall within its jurisdiction. Towards this end, it has been leading initiatives tantamount to a paradigmatic shift promoting the full-scale adoption of evidence-based approaches to social policy decision-making. In the quest to establish fully searchable databases of socio-demographic statistics for all of its member states, it was essential for countries to achieve the following: (i) an improvement of social indicators to inform social policy and (ii) an enhanced capacity among their policy-makers to formulate, implement and evaluate social policies. A principal intention is that the database would provide policy-makers with platform for undertaking comparative analyses in domains such as social equity, living standards, gender relations and intra-familial violence. Moreover, it was expected that the proposed statistical database should permit initiatives directed towards measuring, monitoring and evaluating vulnerability status at sub-national and national levels within member countries and associated states of the ECLAC.

At national levels, the importance of measuring vulnerability status is manifest in efforts to gauge countries' needs for financial assistance and aid from funding and donor agencies. In some instances, there may be countries where high levels of economic growth and high prospects for human development are concomitant with low levels of poverty but where severe threats impact negatively upon their state of vulnerability. This paper is primarily concerned with the determination of social vulnerability at national levels within the Caribbean Sub-Region and is predicated upon such vulnerability as an attribute that is critical in determining the survival of sustainable development processes. Despite earlier efforts to measure vulnerability predicated upon economic and environmental phenomena across nations, there has been no corresponding effort targeting vulnerability in the context of societal structures. This paper is based upon a proposed model that has been advanced to measure social vulnerability at national levels (St. Bernard, 2003a, 2003b and 2004).

Conceptualizing Vulnerability

Social systems are potentially exposed to constant processes of change, whether qualitative or quantitative. Such change can also be tantamount to improvement or degradation of social systems. In the social development literature, sustainability is a time-dependent process spawning a response that at the very least, reflects some measure of preservation with regard to structure and properties of social systems. Further, sustainability is predicated upon responses to systems that rather than being mismanaged and/or disfigured, are constructively amended and/or enhanced to ensure that they optimally serve the needs of future generations. To the extent that such time dependent processes are threatened, a social system can be rendered vulnerable. In the context of social systems, vulnerability can be defined as the flipside of sustainability. Such a position has been argued in St. Bernard (2003a).

Chambers and Conway (1991) refer to the idea of a "livelihood" as "a means of living and the capabilities, assets and activities required for it". They have defined social sustainability as "the ability of a human unit (individual, household or family) to cope with and recover from stresses and shocks, to adapt to and exploit changes in its physical, social and economic environment, and

to maintain and enhance capabilities for future generations". In his conception of social sustainability, Barbier (1987) treats with the symbolic aspects of social systems and social institutions. Specifically, he defines social sustainability as "the ability to maintain desired social values, traditions, institutions, cultures, or other social characteristics". In keeping with the notion of social vulnerability as the converse of social sustainability, one may embrace the definition advanced by Chambers and Conway and surmise that social vulnerability is the inability of human units (individuals, households or families) to cope with and recover from stresses and shocks, their inability to adopt to and exploit changes in physical, social and economic environments and their inability to maintain and enhance future generations. Such situations may also be due mainly to a state of "anomie" that is reflected in a breakdown of the symbolic aspects underlying the sustenance of social systems as articulated by Barbier.

In measuring economic vulnerability[1], Briguglio (1995) interpreted vulnerability as "fragility and lack of resilience in the face of outside forces". His primary focus was to measure economic fragility and the inability to resist or be resilient in the face of external threats in the form of shocks and stresses[2]. It hinges upon the idea that vulnerability in any of its forms, is a function not only of a system's susceptibility to decay or degradation but also its ability to protect itself or recover having been exposed to stresses and shocks from outside forces. In the contexts of economic and environmental vulnerability, the stresses and shocks from outside forces are often sudden and produce instantaneous change that renders systems vulnerable. In contrast, the stresses and shocks that impact upon social systems may not necessarily be sudden. They are often evolutionary and produce change that poses eventual threats that render systems vulnerable. In a similar vein, Wratten (1994) defined vulnerability as a state of defenselessness, insecurity and exposure to risk, shocks and stress.

[1] According to Briguglio (1995), economic vulnerability is measured by a composite index that is computed as a result of averaging five sub-indices that are as follows: trade openness (exports, imports as a ratio of GDP), export concentration, peripherality (transport and freight costs in relation to foreign trade), energy dependence (imported energy as a ratio of energy consumed) and financial dependence (aid or international debt as a ratio of GDP).

[2] Chambers and Conway (1991) define shocks as "impacts which are typically sudden, unpredictable, and traumatic, such as fires, floods, storms, epidemics, thefts, civil disorder and wars". Stresses, on the other hand, are "pressures which are typically cumulative, predicatable and variously continuous or cyclical, such as seasonal shortages, rising populations, declining soil fertility, and air pollution".

Gordon and Spicker (1999) note that "vulnerability relates to risk". They claim that people are vulnerable to poverty when they are more at risk than others. This paper, however, recognizes that vulnerability is a complex, multifaceted construct that transcends exposure to productive processes and poverty. Chambers (1989) emphasized the importance of being able to make a distinction between poverty and vulnerability, a distinction that could be easily overlooked despite the fact that individuals, households, communities and nations may exhibit high levels of vulnerability despite not being afflicted by a high prevalence of poverty. In accordance with Moser (1996), vulnerability can be evaluated in relation to risks associated with prospective changes in "the well being of individuals, households or communities in the face of a changing environment". She notes that such environmental change is due to threats that can be described as ecological, economic, social and political, and may either be long term or seasonal. This implies that the prospect of a lower well being is associated with greater vulnerability. Moser also recognizes that vulnerability is a function, not only of the threats to resisting but also the threats to recovering in response to the negative effects associated with the different categories of environmental changes. She associates vulnerability with asset ownership so that a greater proliferation of favourable assets is associated with a lower risk of exposure to vulnerability. For Moser, the primary units of analysis have been the individual, the household and the community.

St. Bernard (2003a) articulated a theoretical framework that informed the proposed methodology for the establishment of a social vulnerability index. The framework relied upon the structural functionalist paradigm targeting social systems as units of analysis. In the context of this paper, the unit of analysis is a nation that is considered to be a social system deemed to be in equilibrium to the extent that there is an "intrinsic harmony" between the functions of its systemic parts. Such a state of equilibrium is likely to facilitate the sustenance of order and the survival of the whole. Insofar as the nation has a number of functional arms, any systemic analysis of the nation as a social system with its functional arms, has to gauge the system in accordance with its status relative to being in perfect equilibrium – a state that is consistent with full consensus between the parts and thus capable of ensuring the survival of the system. At any given point in time, a social system is in perfect equilibrium if its functional parts are capable of fully responding to threats that

could impair its ability to sustain itself and survive. According to earlier discussions, vulnerability has been defined as a state of "defenselessness" and insecurity in the face of threats to a social system. Thus, in cases where social systems and social institutions attain perfect equilibrium, one may infer that such systems and institutions are not socially vulnerable. Since the attainment of perfect equilibrium is deemed to be elusive, social vulnerability becomes a characteristic feature of social institutions and systems insofar as they are inherently incapable of fully responding to threats that could impair their abilities to sustain themselves and survive.

Measuring Vulnerability – Early Attempts

During the mid-1980s, vulnerability was popularized and gained attention as a result of deliberations at a Conference on Small States held in Malta. By the late 1980s, serious consideration was directed towards the construction of a vulnerability index. During April-May 1994, the United Nations Conference on Small Island Developing States (SIDS) was convened in Barbados placing vulnerability concerns as central points of focus. During the 1990s, there had been a number of attempts to measure vulnerability focusing on its economic dimension (Briguglio 1995; 1997 and 1998, Crowards and Coulter 1999 and Guillaumont 1999), its environmental dimension (Ribot et al 1996 and Kaly et al 1999) and natural disasters (Pelling and Uitto 2001 and Crowards 2000). A review of the literature is indicative of regional variations in researchers' substantive thrusts with regard to measuring vulnerability. In the Mediterranean, for example, the thrust has been overwhelmingly towards the development of methodologies to measure economic vulnerability as opposed to environmental vulnerability in the South Pacific. In the Caribbean Sub-region, the ECLAC has been cognizant of the need to promote and foster social development initiatives and as such, has been a fore-runner in shaping the agenda for measuring social vulnerability.

For the moment, the ECLAC is primarily concerned with measuring vulnerability at national levels. Within the broader Latin American Region, there have been known efforts directed towards determining vulnerability status in other contextual circumstances. CEPAL (1994) raises the issue of child vulnerability and defines it as the probability of overcoming innate problems encountered within poor and indigent homes to the extent that they pose threats to children's social development. From the standpoint of individuals and families, social vulnerability has been

defined in accordance with their capability or incapability to adjust to sudden shocks in social systems. According to CEPAL (2000), the resources and assets of individuals and households assume the form of work, human capital, productive resources, social capital and family relationships, each of which can be evaluated qualitatively and quantitatively in contributing towards assessments of vulnerability as it relates to units such as individuals, households and families.

The Functionalist Paradigm: Social Vulnerability and Sub-National Domain

In establishing the proposed social vulnerability index, the methodological framework is predicated upon stakeholders' roles and responses that mix and combine in five sun-national domains to facilitate the survival and attainment of equilibrium within the nation as a whole. The five sub-national domains include ***education, health, security, social order and governance, resources allocation, and communications architecture***. Within each of these key domains, the roles and responses of the stakeholders produce outcomes that may be interpreted as functional if they are consistent with prospects for the survival of the system or dysfunctional if they are consistent with the likely onset of pathological conditions. For the purposes of this paper, social vulnerability is discussed in the context of defenselessness and insecurity resulting from threats encountered within specific social institutional settings. St. Bernard (2003a) adopted a SWOT framework in further operationalizing social vulnerability. In accordance with such a framework, it was acknowledged that social institutional settings have their strengths and weaknesses. Moreover, it was noted that interactions between their strengths and weaknesses are likely to be complemented by opportunity structures and may permit nations as social systems to overcome their threats. In the Caribbean Sub-Region, it is highly likely that several countries face a common set of threats but their strengths, weaknesses and opportunity structures are likely to vary resulting in differential outcomes. These outcomes are likely to be captured in accordance with selected indicators that could be standardized and combined linearly to yield social vulnerability indices.

For each of the five sub-national domains, Box 1 shows the key indicators that are highly likely to reflect outcomes that adequately tap the essence of vulnerability as it relates to the interaction between implicit strengths, weaknesses, opportunities and threats. In addition to being considered

relatively high in face validity, specific criteria were embraced in the choice of indicators for each of the sub-national domains. In particular, a great deal of attention was placed upon assuring that the data were part of routine data collection, readily available and consistent with methodological antecedents that made allowances for harmonization. The choice of indicators and their configuration within the proposed index also embraced the criterion of simplicity which was an essential feature in the approach adopted by Briguglio (1995). The computation of the index hinges upon the availability of indicators that rely upon requisite data items that should be included in core datasets. Since such indices are likely to be used for inter-spatial and inter-temporal comparisons, it is important that the relevant input data satisfy a number of criteria - simplicity, transparency and parsimony (St. Bernard, 2002).

Box 1. Proposed Indicators of Social Vulnerability According to Sub-National Domains

Education:
- The proportion of the population 20 years and over with exposure to tertiary level education **[E1]**.
- The proportion of the population 20 years and over that has successfully completed secondary education (i.e. highest level of educational attainment being a minimum of 5 GCE 'O' Level or CXC Basic Subjects or equivalent secondary school leaving qualifications) **[E2].**
- Adult literacy rate - population aged 15 years and over **[E3]**.

Health:
- Life expectancy at birth **[H1]**.

Security, social order and governance:
- Indictable crimes per 100,000 population **[S1]**

Resources allocation:
- Proportion of all children (under 15 years) belonging to the two poorest quintiles **[R1]**.
- Proportion of working age population (15-64) belonging to the two poorest quintiles with no more than primary school education **[R2]**.
- Proportion of the population (15 years and over) belonging to the two poorest quintiles with no medical insurance coverage **[R3]**.
- Proportion of the population belonging to the two poorest quintiles and living in households where the head was not employed **[R4]**.

Communications Architecture:
- Computer literacy rate – population aged 15 years and over **[C1]**.

Source: St. Bernard (2003a)

Within each of the sub-national domains, the interplay between strengths, weaknesses, opportunities and threats yield outcomes that are captured by the proposed indicators. Logically speaking, such outcomes assume the form of constructs that are tapped on the basis of single or multiple indicator formats and combined to construct the requisite index. Essentially, indices usually assume the form of linear combinations of items or characteristics, all of which are influenced in one way or another by some underlying construct of interest. In combining the indicators, a number of studies have recommended and embraced the assignment of equal weight to the different items (Briguglio, 1995; Crowards and Coulter, 1999; Morris, 1979; UNDP, 1991 and Ogwang, 1994). From a philosophical standpoint, the paper hypothesizes that the various constructs constitute different dimensions of social vulnerability and as such can be linearly combined to reflect variability in vulnerability status. In the long run, the proposed methodological framework or some variant of it is predicated upon the availability of the requisite indicators for each of the twenty-three member countries and associated states that fall under the jurisdiction of the ECLAC. While such indicators may not necessarily be available from every country, the proposed methodology should constitute a basis for informing prospective data collection that could yield the requisite indicators.

This pilot relies upon data that were readily available from five countries – Belize, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines. In the realm of education, none of the countries with the exception of St. Vincent and the Grenadines, had undertaken a Survey of Adult Literacy. This meant that data on adult literacy had to be obtained from another source and a proxy was used based upon 1998 estimates gleaned from the 2000 Human Development Report published by the UNDP. Clearly, the estimates are biased upwards, this being the case for each of the five countries. The 2000 Human Development Report was also the source of data on life expectancy at birth and the derivation of a proxy to capture computer literacy. While the countries published data pertaining to life expectancy at birth, estimates were only available according to sex with no specific provision being made for a global estimate irrespective of sex. Such a situation prompted a search for an alternative source in the form of the 2000 Human Development Report. In the absence of a direct measure to determine computer literacy, a proxy measure was drawn

from the 2000 Human Development Report. This measure provided an estimate of internet hosts per 1000 population and was considered to have face validity as it could be a function of levels of computer literacy.

In gauging countries' vulnerability status with regard to the preservation of security and the maintenance of social order, the number of indictable crimes per 100,000 population appears to be elusive insofar as such a measure is often based upon reported crime. With the exception of crimes such as murder, the coverage of reported crimes could be misleading despite the ready availability of such data from the respective police services. As a result, it is not surprising that the methodological framework has adopted homicides per 100,000 population as a key indicator that is less sensitive to non-responses. The Survey of Living Conditions (SLC) has been the source of much of the data that have been examined to treat with social vulnerability in the context of the education system. It has also permitted the collection of data for each of the four indicators identified as being instrumental in gauging social vulnerability with regard to resources allocation. Since the SLC instrument is a standardized data collection instrument that makes allowances for country-specific circumstances, it is a worthy source of data. This is a critical requirement in the quest towards the harmonization of methodological processes that are instrumental in the derivation of the proposed indicators.

The Measurement Framework: Establishing a Social Vulnerability Index

The five sub-national domains and their respective indicators are shown in Box #1. Earlier discussions have expressed the social vulnerability index as a linear combination of ten (10) indicators, each being assigned an equal weight. In order to ascertain the extent to which these indicators adequately reflect social vulnerability, the model should be tested empirically though such an evaluation is reserved for a subsequent paper. Box #2 describes the process leading to the derivation of transformation scores (i.e. Z_{ij}). These scores assume a standard format with a minimum of zero and a maximum of one. Assuming that Z_{ij} represents the standard score for the i^{th} input indicator and the j^{th} country, the social vulnerability index can be computed as $1 - V_j$ where V_j is as follows:

$$V_j = (\Sigma Z_{ij})/10$$

and Z_{ij} is as follows:

$$Z_{ij} = (a_{ij} - \text{Min } A_i)/(\text{Max } A_i - \text{Min } A_i)$$

Box 2. Transformation of Proposed Indicators According to Sub-National Domains

- **Education #1**: Proportion of the population 20 years and over with exposure to tertiary level education (x_{1j}). Then $Z_{1j}$is based on $a_{1j} = x_{1j}$, Min A_1 = Min X_1 and Max A_1 = Max X_1.
- **Education #2**: Proportion of the population 20 years and over that has successfully completed secondary education (x_{2j}). Then Z_{2j} is based on $a_{2j} = x_{2j}$, Min A_2 = Min X_2 and Max A_2 = Max X_2.
- **Education #3**: Adult literacy rate - population 15 years and over (x_{3j}). Then Z_{3j} is based on $a_{3j} = x_{3j}$, Min A_3 = Min X_3 and Max A_3 = Max X_3.
- **Health #1**: Life expectancy at birth (x_{4j}). Then Z_{4j} is based on $a_{4j} = x_{4j}$, Min A_4 = Min X_4 and Max A_4 = Max X_4.
- **Security, Social Order and Governance #1**: Indictable Crimes per 100,000 population (x_{5j}). Then Z_{5j} is based on $a_{5j} = 1 - x_{5j}$, Min A_5 = Max X_5 and Max A_5 = Min X_5.
- **Resources Allocation #1**: Proportion of all children (under 15 years) belonging to the two poorest quintiles (x_{6j}). Then Z_{6j} is based on $a_{6j} = 1 - x_{6j}$, Min A_6 = Max X_6 and Max A_6 = Min X_6.
- **Resources Allocation #2**: Proportion of working age population (15-64) belonging to the two poorest quintiles with no more than primary school education (x_{7j}). Then Z_{7j} is based on $a_{7j} = 1 - x_{7j}$, Min A_7 = Max X_7 and Max A_7 = Min X_7.
- **Resources Allocation #3**: Proportion of the population (15 years and over) belonging to the two poorest quintiles with no medical insurance coverage (x_{8j}). Then Z_{8j} is based on $a_{8j} = 1 - x_{8j}$, Min A_8 = Max X_8 and Max A_8 = Min X_8.
- **Resources Allocation #4**: Proportion of population belonging to the two poorest quintiles and living in households where the head was not employed (x_{9j}). Then Z_{9j} is based on $a_{9j} = 1 - x_{9j}$, Min A_9 = Max X_9 and Max A_9 = Min X_9.
- **Communications Architecture #1**: Computer literacy rate - population 15 years and over (x_{10j}). Then Z_{10j} is based on $a_{10j} = x_{10j}$, Min A_{10} = Min X_{10} and Max A_{10} = Max X_{10}.

Source: St. Bernard (2003a)

Max A_i represents the maximum value of the transformation of variable X_i while Min A_I represents the minimum value of the transformation of variable X_i . Note that a_{ij} is the transformation of the value of variable X_i for the j^{th} country (See Box #2).

Table 1 shows country-specific estimates reflecting variations in the indictors associated with the five sub-national domains that permit assessments of social vulnerability. These estimates have been derived from myriad sources that were mentioned in the previous section and are instrumental in the generation of standardized transformation scores within the respective sub-national domains. For the respective indicators, the maxima and minima are important data inputs in deriving the transformation scores and are summarized in Table 2. Table 3 presents the transformation scores for each of the ten indicators in each of the five countries. These scores are equally weighted and linearly combined to estimate the social vulnerability index. Table 4 shows indices that constitute estimates of social vulnerability in each of the five countries, a higher magnitude on the index being indicative of higher levels of social vulnerability. Within any given sub-national domain, Table 5 shows additional estimates of social vulnerability status and permit comparative assessments across the five countries. However, variations in the range of observations pertaining to indicators associated with the different sub-national domains place limitations on comparative assessments across domains.

Interpreting the Results

This pilot process has attempted to measure the vulnerability of social institutions in five Caribbean countries where all of the input data were readily available. The countries included Belize, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines. According to Table 4, social institutions in St. Kitts and Nevis are found to be the least vulnerable while those in Grenada are found to be the most vulnerable. The vulnerability of social institutions is observed to be just as high in St. Lucia as it is in Grenada. Table 5 treats with variations in the vulnerability of the key sub-systems across the five countries. With respect to the vulnerability of the education system, the estimates indicate that it is highest in St. Vincent and the Grenadines and lowest in St. Kitts and Nevis. Table 5 also suggests that the vulnerability of health systems is lowest in Belize and highest in countries such as St. Kitts and Nevis and in St. Lucia. According to Table 5, the greatest threat to security and social order appears to be in St. Lucia and to a somewhat lesser extent in Belize. In contrast, the threat is lowest in Grenada. With respect to resource allocation, by far the greatest threat has been evident in Grenada. Finally, there appears to be little or no variations across the countries with regard to threats overcoming the interplay between strengths,

weaknesses and opportunities in the arena of information and communications technology. Unless some mechanism could be found to standardize transformed scores to make allowances for variable ranges associated with observations for the respective input indicators, it will be difficult to evaluate the relative impact of the different social sectors on the vulnerability status within each of the five countries.

Table 1: Country-Specific Indicators

Indicators	Belize	Grenada	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines
Proportion of the population 20 years and over with tertiary level education **(Percentage)**	9.2	6.6	29.8	11.2	5.7
Proportion of the population 20 years and over that has successfully completed secondary education **(Percentage)**	12.4	14.7	26.3	20.0	14.8
Adult literacy rate – Population 15 years and over **(Percentage)**	92.7	96.0	90.0	82.0	82.0
Life expectancy at birth **(Years)**	74.9	72.0	70.0	70.0	73.0
Homicides per 100,000 population	23.4	12.1	17.3	33.6	18.6
Proportion of children under 15 years belonging to the two poorest quintiles **(Percentage)**	59.1	55.3	56.6	58.2	47.0
Proportion of working age population (15-64 years) belonging to the two poorest quintiles with no more than primary school education **(Percentage)**	36.1	34.3	23.6	30.2	25.2
Proportion of population (15 years and over) belonging to the two poorest quintiles with no medical insurance coverage **(Percentage)**	38.2	35.5	27.1	37.8	29.0
Proportion of the population belonging to the two poorest quintiles and living in households where the head was not employed **(Percentage)**	6.0	45.7	9.3	20.6	10.7
Internet hosts per 1000 population	1.10	0.03	0.12	0.16	0.0

Table 2: Proposed Maxima and Minima for Indictors

Indicators	Max A_i	Min A_i
Proportion of the population 20 years and over with tertiary level education **(Percentage)**	100.0	0.0
Proportion of the population 20 years and over that has successfully completed secondary education **(Percentage)**	100.0	0.0
Adult literacy rate – Population 15 years and over **(Percentage)**	100.0	0.0
Life expectancy at birth **(Years)**	90.0	30.0
Homicides per 100,000 population	0.0	100.0
Proportion of children under 15 years belonging to the two poorest quintiles **(Percentage)**	0.0	100.0
Proportion of working age population (15-64 years) belonging to the two poorest quintiles with no more than primary school education **(Percentage)**	0.0	100.0
Proportion of population (15 years and over) belonging to the two poorest quintiles with no medical insurance coverage **(Percentage)**	0.0	100.0
Proportion of the population belonging to the two poorest quintiles and living in households where the head was not employed **(Percentage)**	0.0	100.0
Internet hosts per 1000 population	225.0	0.0

Table 3: Transformation Scores by Proposed Indicator and Country (Z_{ij})

Indicators	Belize	Grenada	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines
Proportion of the population 20 years and over with tertiary level education **(Percentage)**	0.092	0.066	0.298	0.112	0.057
Proportion of the population 20 years and over that has successfully completed secondary education **(Percentage)**	0.124	0.147	0.263	0.200	0.148
Adult literacy rate – Population 15 years and over **(Percentage)**	0.927	0.960	0.900	0.820	0.820
Life expectancy at birth **(Years)**	0.748	0.700	0.667	0.667	0.717
Homicides per 100,000 population	0.766	0.879	0.827	0.664	0.814
Proportion of children under 15 years belonging to the two poorest quintiles **(Percentage)**	0.409	0.447	0.434	0.418	0.530
Proportion of working age population (15-64 years) belonging to the two poorest quintiles with no more than primary school education **(Percentage)**	0.639	0.657	0.764	0.798	0.748
Proportion of population (15 years and over) belonging to the two poorest quintiles with no medical insurance coverage **(Percentage)**	0.618	0.645	0.729	0.622	0.710
Proportion of the population belonging to the two poorest quintiles and living in households where the head was not employed **(Percentage)**	0.940	0.543	0.907	0.794	0.893
Internet hosts per 1000 population	0.005	0.000	0.001	0.001	0.000

Table 4: Estimated Social Vulnerability Index (1 - V_j)

Indices	Belize	Grenada	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines
V_j	0.527	0.504	0.579	0.510	0.544
Social Vulnerability Index (SVI)	**0.473**	**0.496**	**0.421**	**0.490**	**0.456**

Table 5: Social Vulnerability Index by Country (Within Sub-National Domains)

Sub-National Domains	Belize	Grenada	St. Kitts and Nevis	St. Lucia	St. Vincent and the Grenadines
Education	0.619	0.609	0.513	0.623	0.658
Health	0.252	0.300	0.333	0.333	0.283
Security and Social Order	0.234	0.121	0.173	0.336	0.186
Resource Allocation	0.349	0.427	0.291	0.342	0.280
Communications Prospects	0.995	1.000	0.999	0.999	1.000
Social Vulnerability Index (SVI)	**0.473**	**0.496**	**0.421**	**0.490**	**0.456**

Table 6 provides some food for thought when one considers the notion of vulnerability as a phenomenon that transcends poverty. It reveals that the prevalence of poverty has been lowest in St. Lucia and highest in St. Vincent and the Grenadines. It also shows that Grenada is ranked third according to observed poverty rates across the five countries. With respect to social vulnerability status however, the countries are ranked differently with St. Lucia and Grenada exhibiting higher levels of social vulnerability than St. Vincent and the Grenadines despite having lower rates of poverty when compared to the latter. However, there is need to thread delicately on such an observation as the reference periods for the various indicators vary across the five countries. Some interesting departures are also evident when one compares the ordinal placement of the countries with respect to the social vulnerability index and their respective HDIs for the corresponding period. However, the similarity of the rankings shown for the social vulnerability index and the

adjusted human development index is of interest especially since the latter is considered to be an attempt to model vulnerability and is based upon modeling specific dimensions that include resilience, sustainability, exposure and disadvantage.

Table 6: Social Vulnerability Index by Country (Within Sub-National Domains)

Social Vulnerability Index	**Human Development Index 1998**	**Poverty Rate – Head Count Index**	**Adjusted Human Development Index 1999[3]**
St. Kitts and Nevis *0.421*	St. Kitts and Nevis *0.798*	St. Lucia (1995) *25%*	St. Kitts and Nevis *0.457*
St. Vincent and the Grenadines *0.456*	Grenada *0.785*	St. Kitts and Nevis (1999/2000) *31%*	St. Vincent and the Grenadines *0.437*
Belize *0.473*	Belize *0.777*	Grenada (1998) *32%*	Belize ...
St. Lucia *0.490*	St. Vincent and the Grenadines *0.738*	Belize (1996) *33%*	Grenada *0.396*
Grenada *0.496*	St. Lucia *0.728*	St. Vincent and the Grenadines (1995) *38%*	St. Lucia *0.343*

Concluding Remarks

In this paper, the ideas and findings are at best exploratory and subject to further empirical tests. Similar data based on additional regional SLCs need to be obtained and analyzed using

multivariate techniques such as factor analysis. To this end, the SLCs in the Caribbean Sub-Region ought to be making provision for the generation of the relevant input indicators proposed in the paper. Such SLCs ought to be conducted on a regular basis, perhaps once every five years at a minimum. In addition to the SLCs, there is a need for surveys targeting reading, writing, numeracy and computer literacy among adults in the various islands. In each case, there should be a core instrument that could be modified to meet country-specific needs. There should also be overall inquiries into the IT attributes that are characteristic of communications and technological capabilities of the countries within the Sub-Region. All of these inquiries should be pursued at a minimum triennially. In order to more adequately treat with the health dimension of the index, national statistical offices should, on an annual basis, construct, present and publish life table functions reflecting global estimates (i.e. both sexes) in addition to those that are sex-specific. Due consideration should also be given to the generation of indicators targeting governance issues. These should include an index of rule of law, a measure of minority groups' participation in the economy and a measure of new governments' respect for previous governments' commitments.

[3] See OECS (2002), Table 2.7, Page 63

Bibliography

Barbier, E. B (1987) "The Concept of Sustainable Economic Development" **Environmental Conservation 14 (2): 101-110.**

Briguglio, Lino (1995) "Small Island Developing States and Their Economic Vulnerabilities" **World Development, 23(9): 1615-1632.**

Briguglio, Lino (1997) **Alternative Vulnerability Indices for Developing Countries**, Report for the United Nations Department of Economic and Social Affairs, Malta: Foundation for International Studies, University of Malta, November, 1997.

Briguglio, Lino (1998) "Operationalising the Economic Vulnerability Index", Paper prepared for the **Seminar on the Vulnerability of SIDS**, The European Centre for Pacific Studies, The European Centre for Development Policy Management, Pacific Concerns and Friedrich Ebert Stiftung, ACP Secretariat , Brussels, September, 1-2.

CEPAL (1994) **Social Panorama of Latin America,** United Nations Publications, Santiago, Chile.

CEPAL (2000) **Social Panorama of Latin America, 1999-2000,** United Nations Publications, Santiago, Chile.

Chander, D. R. (1996) **Measurement of the Vulnerability of Small States,** Report for the Commonwealth Secretariat, London

Chambers, R (ed) (1989) "Vulnerability: How the Poor Cope", **Special Issue, IDS Bulletin Vol. 20, No. 2**

Chambers, Robert (1989) "Editorial Introduction: Vulnerability, Coping and Policy" in **IDS Bulletin 20 (2): 1-7**.

Chambers, Robert and Gordon R. Conway (1991) "Sustainable Rural Livelihoods: Practical Concepts for the 21st Century" **IDS Discussion Paper 296.**

Crowards, Tom (2000) "Comparative Vulnerability to Natural Disasters in the Caribbean" Paper presented at the **OAS/UDSE-NOAA/CSC Workshop on Vulnerability Assessment Techniques**, Charleston, South Carolina, March 20-22, 2000

Crowards, Tom and Wendy Coulter (1999) "Measuring The Comparative Economic Vulnerability of the Eastern Caribbean" **Journal of Eastern Caribbean Studies, 23(9): 1615-1632.**

Daly, H (1991) "Sustainable Development: From Concept and Theory Towards Operational Principles" in H. E. Daly (ed) Steady-State Economics: Second Edition with New Essays: Island Press: Washington, D.C.

Dwyer, Daisy and Judith Bruce eds (1988) **A Home Divided: Women and Income in the Third World**, Stanford University Press: Stanford, California.

Evans, Alison (1996) "Women: Rural Development and Gender Issues in Rural Household Economics" **Institute of Development Studies Discussion Paper 254**, Sussex, England.

Gordon, David and Paul Spicker (eds) (1999) **The International Glossary on Poverty,** Zed Books, London and New York.

Guillaumont, Patrick (1999) "On the Economic Vulnerability of Low Income Countries" Paper prepared for the **International Task Force on Commodity Risk Management in Developing Countries**, World Bank

Haddad, Lawrence and Ravi Kanbur (1989) "How Serious is the Neglect of Intra-Household Inequality?" **Policy Research Working Paper 296**, World Bank Research Advisory Staff, Washignton, D.C.

Kaly, U. L, L. Briguglio, H, Mc Leod, S. Schmall, C. Pratt and Reginald Pal (1999) "Environmental Vulnerability Index to Summarize National Environmental Profiles" **SOPAC Technical Report 275,** South Pacific Applied Geoscience Commission

Mc Cullogh, eds . **Of Marriage and the Market**, London: C.S.E.

Morris, D. M. (1979) **Measuring the Condition of the World's Poor**, Overseas Development Council: London

Moser Caroline O. (1996) **Confronting Crisis: A Comparative Study of Household Responses to Poverty and Vulnerability in Four Poor Urban Communities**, The World Bank, Washington, D.C.

OECS (2002) **OECS Human Development Report 2002**, Organization of Eastern Caribbean States Secretariat, Morne fortune, Castries, St. Lucia

Ogwang, Tomson (1994) "The Choice of Principal Variables for Computing the Human Development Index" **World Development, 22 (12): 2011-2014**

Pantin, Dennis A. (1997) **Alternative Ecological Vulnerability Indices for Developing Countries with Special Reference to Small Island Developing States (SIDS)**. Report for the United Nations Department of Economic and Social Affairs, Sustainable Economic Development Unit, Trinidad: University of the West Indies.

Pelling, Mark and Juha I. Uitto (2001) "Small Island Developing States: Natural disaster Vulnerability and Global Change" **Environmental Hazards 3, 49-62.**

Ribot, Jesse, C (1996) “Climate Variability, Climate Change and Vulnerability: Moving Forward by Looking Back" In Jesse C. Ribot, Antonio Rocha Magalhaes and Stahis Panagides, (eds) **Climate Variability, Climate Change and Social Vulnerability in the Semi-Arid Tropics,** Cambridge University Press.

Sen, Amartya (1990) “Gender and Co-operative Conflicts” In Irene Tinker, (ed) **Persistent Inequalities,** Oxford University Press: Oxford, England.

St. Bernard, Godfrey (2002) “The Establishment of Core Data Systems for the Anglophone Caribbean”, Paper Presented to **CARICOM Secretariat Meeting on Core Data Systems**, Coyaba Beach Resort, Grand Anse, Grenada, September 8-10

St. Bernard, Godfrey (2003a) “Towards the Construction of a Social Vulnerability Index – Theoretical and Methodological Considerations”, Paper Submitted for Publication in the **Journal of Social and Economic Studies,** The University of the West Indies, Mona, Jamaica

St. Bernard, Godfrey (2003b) “Towards a Social Vulnerability Index in the Caribbean”, ECLAC sub-Regional Headquarters for the Caribbean, Port of Spain, Trinidad and Tobago

St. Bernard, Godfrey (2004) “Measuring Social Vulnerability - Prospects for Evaluating Public Expenditure” in Ramesh Ramsaran (ed) **Fiscal Experience in the Caribbean - Emerging Issues and Problems,** Caribbean Centre for Monetary Studies, The University of the West Indies, St. Augustine

Streeten, P (1995) Comments on “The Theoretical Framework of the ILO action against Poverty”, in G. Rodgers (ed), **The Poverty agenda and the ILO**, International Labour Office, Geneva.

UNDP (1991) **Human Development Report,** Oxford University Press: New York.

World Bank (1993) “Paradigm Postponed: Gender and Economic Adjustment in Sub-Saharan Africa” Technical Note. Africa Technical Department, Human Resources and Poverty Division, Washington, D.C.

Wratten, E. (1994) **Conceptualizing Urban Poverty**, Background Paper for the United Nations Centre for Human Settlements (Habitat), Global Report on Human Settlements 1996, London School of Economics, London.