

Inequality, Poverty and Vulnerability: Exploring the Interaction Mechanism

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Abstract: *This study attempts to provide empirical evidence on the nature of the interaction between inequality, poverty and vulnerability so as to stimulate an informed debate on the strategies for overcoming the development challenges they pose. Findings show that contrary to theoretical speculations and policy anticipations, there exists no statistically significant relationship between inequality, poverty and vulnerability. These variables are found to be mutually exclusive, inter-independent, distinct and unreinforced by one another in their operations. Instead, other variables such as health and education expenditures, per capita income, and household income are found to be significantly correlated with inequality, poverty and vulnerability. This implies that, although inequality, poverty and vulnerability do not impact and reinforce each other, there are other factors that have significant impact on them.*

Keywords: inequality, poverty, vulnerability, development

1. Introduction

The growing and persistent incidences of inequality, poverty and vulnerability especially in developing countries have been a source of concern for policymakers and the international development community. This is so because a society that is characterized by high levels of inequality, poverty and vulnerability is perceived as lacking the potentiality needed to emerge out of a state of underdevelopment. Even developed countries with reasonably high rates of inequality and poverty are believed to face the possibility of halting and even reversing their development progress. This concern created by the presence of these factors is predicated on their perceived tendencies to exclude the majority of the population from meaningfully participating in the growth process and adequately sharing from the growth benefits. There is therefore an appreciable level of recognition accorded these phenomena in development studies. However, years of theorizing and analysis have produced rather controversial conceptual definitions of inequality, poverty and vulnerability.

Despite contending definitions, inequality is generally perceived as a widening gap in income distribution among the various quintiles that make up the economy. Poverty on the other hand exists if households lack sufficient income that enables them have access to the basic necessities of life. Vulnerability implies predisposition to poverty and inequality. That is, the tendency that a household that is currently poor or non-poor will become poorer or poor in the future, and therefore excluded from equitable distribution of income. This situation highlights the fragility of the income stream of the poor and the possibility of being excluded from public social security programmes that serve as safety nets against poverty.

Over the years, social scientists have assumed that inequality, poverty and vulnerability are mutually inclusive, interdependent and reinforcing. However, there still exists some degree of controversy on the nature and extent of the interaction between these socioeconomic phenomena. Currently, the interrelationship between inequality, poverty and vulnerability appear to be buried in theoretical obscurity.

In today's developing world, where emphasis is on elimination of inequality, poverty and vulnerability in order to create adequate human participation in growth processes and in sharing growth benefits, the development challenges posed these factors cannot be neglected. The understanding of the nature and extent of the interaction between inequality, poverty and vulnerability is critical in simulating policies to address them. This study therefore attempts to provide an empirical underpinning on the relationship between inequality, poverty and vulnerability so as to improve policymakers' understanding of the nature of interactions of these phenomena as basis for evolving appropriate policies to mitigate them.

The rest of the work is structured as follows: after the introduction in section one, a brief literature review is attempted in section two. Section three presents the model for the study, while the estimated results and discussion of findings are contained in section four. Finally, policy implications and summary are contained in the fifth section.

2. Literature Review

2.1. Inequality, Poverty and Vulnerability: A Conceptual Overview

Inequality is a broader concept than poverty in that it is defined over the entire population, not only the population below a certain poverty line. Most inequality measures do not depend on the mean of the distribution (at least this is considered to be a desirable property of an inequality measure). Instead, inequality is concerned with distribution of the overall income. Income inequality is a term that is used to describe an uneven distribution of wealth among a population within a defined geographic area. When this type of income inequality is high, it means that a small number of individuals especially those belonging to the first quintile receive the majority of the income generated during a specific period of time, while a low rate of income inequality would mean that the overall income generated was more evenly distributed among each of the households within the economy.

There are a number of different methods used to measure this type of disparity in income distribution structure, with methods like the Hoover Index, the Atkinson Index, the Gini Coefficient – which is general perceived to be the most appropriate, and the Theil Index being some of the more common examples.

Measuring income inequality is extremely important to understanding the impact of various events on both the overall economy and on individuals who live within that economy. For example, assessing the wealth and income difference that exists in a given economy can provide important data about the future direction of economic growth, and how it will affect residents in various income cohorts.

Many authors have insisted on the necessity of defining poverty as a multidimensional concept rather than relying on income or consumption expenditures per capita. Yet, not much has actually been done to include the various dimensions of deprivation into the practical definition and measurement of poverty. Existing attempts along that direction consist of aggregating various attributes into a single index through some arbitrary function and defining a poverty line and associated poverty measures on the basis of that index. This is merely redefining more generally the concept of poverty, which then essentially remains a one dimensional concept. In pure economic terms, income poverty is when a family's income fails to meet an established income threshold that differs across countries. Typically, it is measured with respect to families and not the individual, and is adjusted for the number of persons in a family. Economists often seek to identify the families whose economic position (defined as command over resources) falls below some minimally acceptance level. Similarly, the international standard of extreme poverty is set to the possession of less than 1 dollar a day [1](Smelser and Baltes 2001).

Poverty is an ex-post measure of a household's well-being (or lack thereof). It reflects a current state of deprivation, of lacking the resources or capabilities to satisfy current needs. Poverty as a multidimensional phenomenon is perhaps best exemplified in urban areas. Not only is urban poverty characterized by inadequate income (and hence inadequate consumption of basic necessities) but also by inadequate asset base, shelter and provision of public infrastructure (for example, piped water, sanitation, drainage, and so forth), as well as inadequate access to services such as health care, schools, vocational training, and protection of poorer groups' rights. Compounding this are limited or non-existent social safety nets, voicelessness, and powerlessness within political systems, judicial institutions and bureaucratic structures. Poverty measures depend on the average level of income or consumption in a country and the distribution of income or consumption. Based on these two elements, poverty measures therefore focus on the situation of those individuals or households at the bottom of the distribution [2](Bourguignon and Chakravarty 2003).

Vulnerability on the other hand, may be broadly construed as an ex-ante measure of well-being, reflecting not so much how well off a household currently is, but what its future prospects. What distinguishes the two is the presence of risk—the fact that the level of future well-being is uncertain. The uncertainty that households face about the future stems from

multiple sources of risk – harvests may fail, food prices may rise, and the main income earner of the household may become ill or die and so on. If such risks were absent (and the future were certain) there would be no distinction between ex-ante (vulnerability) and ex-post (poverty) measures of well-being. Vulnerability implies a predisposition of individuals or households to the risk of sliding down the well-being scale and becoming poorer. However, the concept should be distinguished from poverty, no matter whether the latter is defined narrowly in terms of the lack of basic income or in terms of several dimensions including educational opportunity, health, nutrition, and so on. Vulnerability can be linked to any of the outcomes of human well-being and often such links are not simple. For example, links between health and vulnerability are complex because not only is ill health often the result of poverty and deprived living conditions, but poor health can also lead to impoverishment.

Another definition of vulnerability within the framework of poverty eradication sees it as the ex-ante risk that a household will, if currently non-poor, fall below the poverty line, or if currently poor, will remain in poverty. Certainly this is not the only definition possible. In fact, in much of the recent work on the vulnerability of different segments within a population, vulnerability is defined in terms of exposure to adverse shocks to welfare, rather than in terms of exposure to poverty. The difference is substantive. This definition would include among the vulnerable, households who are currently poor and have a high probability of remaining poor even if they do not experience any large adverse welfare shocks. On the other hand, this definition would exclude those households among the non-poor who face a high probability of a large adverse shock but are currently well-off enough so that even were they to experience the shock, they would still remain non-poor.

2.2 Theories of Poverty: Interrelations with Inequality and Vulnerability

Individual Theory of Poverty

The individual theory of poverty is a large and multifaceted set of explanations that focus on the individual as being responsible for their poverty situation. The theory assumes that competition rewards winners with affluence and general stability; losers are poor. Typically, politically conservative theorists blame individuals in poverty for creating their own problems, and argue that with harder work and better choices the poor could have avoided their problems. The theory also assumes that individuals can change their economic status by making better socio-economic and political choices. Other variations of the individual theory of poverty ascribe poverty to lack of genetic qualities such as intelligence that are not so easily reversed [3](Bradshaw 2006).

2.2.1 Cultural Theory

This theory suggests that poverty is created by the transmission over generations of a set of beliefs, values, and skills that are socially generated but individually held. Individuals are not necessarily to blame because they are victims of their dysfunctional subculture or culture. The culture of poverty constitutes a “design for living” that is passed on from one generation to the next. Individuals feel

marginalized, helpless and inferior, and adopt an attitude of living for the present. People adopting this culture of poverty do not participate in community life or join political parties; they make little use of banks, hospitals and the likes. They live in slums and by the time slum children are aged six or seven, they have usually absorbed the basic values and attitudes of their sub-culture and are not psychologically geared to take full advantage of changing conditions or increased opportunities which may occur in their lifetime.

2.2.2 Structural Theory

This theory assumes that individuals have strong motivation to succeed. However, the poor are overwhelmingly prevented from success by structural barriers that need to be removed. Theorists in this tradition look not to the individual as a source of poverty, but to the economic, political, and social system which cause people to have limited opportunities and resources with which to achieve improved income and well being. It attributes poverty to the existence of class divisions in society. Poverty helps to maintain the domination of the bourgeoisie; it serves the interest of this wealth owning class.

2.2.3 Geographic Theory

This theory answers the question on why are some regions poor while others are rich? Poverty is concentrated in neighborhoods, states, regions, and nations that are often endowed with the greatest natural resources, especially those in developing countries. This theory generates such concepts as rural poverty, ghetto poverty, urban disinvestment, Southern poverty, third-world poverty, and other framings of the problem which represent a spatial characterization of poverty that exists separately from other theories. While this geographically based theory of poverty build on the other theories, it calls attention to the fact that people, institutions, and cultures in certain areas lack the objective resources needed to generate well being and income, and that they lack the power to claim redistribution. Recent explanations of this nature of poverty outline the contributing factors to include disinvestment, proximity to natural resources, density, diffusion of innovation, and other factors [3].

2.2.4 Cumulative Theory

Poverty conditions and causes are linked in interdependent spirals of decline, and these spirals are very hard to reverse. It looks at the individual and their community as caught in a spiral of opportunity and problems, and that once problems dominate they close other opportunities and create a cumulative set of problems that make any effective response nearly impossible. This approach acknowledges the complexity of poverty at every level in contrast to those who seek single factor solutions. This approach also does not distinguish between individual and community because they are intertwined. The cyclical explanation explicitly looks at individual situations and community resources as mutually dependent, with a faltering economy, for example, creating individuals who lack resources to participate in the economy, which makes economic survival even harder for the community since people pay fewer taxes. Thus the interdependence of factors creating poverty actually accelerates once a cycle of decline is initiated.

2.3 Empirical Literature

A study in Kenya examines the most recently available evidence to inform current debates about the nature of poverty and inequality in Kenya, and appropriate policy directions. It seeks to add value to existing knowledge by focusing on and drivers of poverty, by exploiting panel data collected over time. The study confirms that there has been some improvement in poverty overall since 1997, but poverty is still very pervasive, especially in rural areas. Inequality is large and appears to have risen over time. The main correlates of poverty resonate with those found in earlier studies – including family size, lack of education and frequency of shocks [4](World Bank 2008).

A report by the Organization for Economic Corporation and Development (OECD) on income inequality documents that the gap between the rich and the poor in OECD countries has widened continuously over the three decades to 2008, reaching an all-time high. New OECD data show that the global economic crisis has squeezed incomes from work and capital in most countries. Excluding the mitigating effects of the welfare state, via taxes and transfers on income, inequality has increased by more over the past three years to the end of 2010 than in the previous twelve. Tax-benefit systems, reinforced by fiscal stimulus policies, were able to absorb most of this impact and alleviate some of the pain. But, as the economic and especially the jobs crisis persists and fiscal consolidation takes hold, there is a growing risk that the most vulnerable in society will be hit harder as the cost of the crisis increases [5](OECD 2011).

The relationship between income and health is well established: the higher an individual's income, the better his or her health. However, recent research suggests that health may also be affected by the distribution of income within society. [6]Kawachi and Kennedy (1999) outline the potential mechanisms underlying the so-called relative income hypothesis, which predicts that an individual's health status is better in societies with a more equal distribution of incomes. They find that the effects of income inequality on health may be mediated by underinvestment in social goods, such as public education and health care; disruption of social cohesion and the erosion of social capital; and the harmful psychosocial effects of invidious social comparisons.

The paper by [7]Zaman (2000) explores the relationship between micro-credit and the reduction of poverty and vulnerability by focusing on BRAC, one of the largest micro-credit providers in Bangladesh. The main argument in this paper is that micro-credit contributes to mitigating a number of factors that contribute to vulnerability, whereas the impact on income-poverty is a function of borrowing beyond a certain loan threshold and to a certain extent contingent on how poor the household is to start with. This argument is illustrated by complementing the existing literature with some empirical analysis of household survey data collected in Bangladesh in 1995. Consumption data from 1072 households is used to show that the largest effect on poverty arises when a moderate-poor BRAC loanee borrows more than 10000 taka (\$200) in cumulative loans. A number of pathways by which micro-credit can reduce vulnerability, namely by strengthening crisis-coping mechanisms (the 1998 flood in Bangladesh is used as a case study), building assets

and 'empowering' women are discussed. Data from 1568 women are used to construct sixteen 'female empowerment' indicators and the empirical analysis that follows suggests that microcredit has the greatest effect on female control over assets and also on her knowledge of social issues controlling for a host of other characteristics.

A number of cross-national studies have indicated that the degree of income inequality in a given society is strongly related to the society's level of mortality ([8]Rodgers, 1997; and [9]Wilkinson, 1990, [10]1992). In one investigation of nine nations included in the Luxembourg Income Study, a correlation of 0.86 was reported between average life expectancy and proportion of income allotted to the 70 per cent of the population at the lowest income levels ([10]Wilkinson 1992). Two recent US studies independently demonstrated an association between income inequality and mortality. [11]Kennedy, Kawachi, Prothrow-Stith (1996) examine the relationship between degree of household income inequality and state-level variation in all-cause and cause-specific mortality. The degree of income inequality in each state was estimated by the Robin Hood Index, which is equivalent to the proportion of aggregate income that must be redistributed from households above the mean and transferred to those below the mean in order to achieve perfect equality in the distribution of household incomes. The higher the Robin Hood Index, the more unequal the distribution of income. The overall correlation of the Robin Hood Index to all-cause mortality in 1990 was 0.54. After adjustment for poverty, a 1 per cent rise in the Robin Hood Index was associated with an increase in age-adjusted total mortality rate of 21.7 deaths per 100 000. The Robin Hood Index was also associated with deaths from specific causes, including coronary heart disease, cancer, and infant mortality.

In an independent study, [12]Kaplan et al (1996) examine the association between income inequality-as measured by the share of aggregate income earned by the bottom 50 per cent of households and state level variations in total mortality. A strong association is found between their measure of income inequality and age-adjusted total mortality rates in 1990 ($r = -0.62$). Moreover, the degree of income inequality in each state in 1980 was a powerful predictor of levels of total mortality 10 years later. The pathways and mechanisms underlying the association between income inequality and mortality levels remain to be established [13]Kawachi et al, 1994). One hypothesis is that rising income inequality results in increased levels of frustration, which may have deleterious behavioral and health consequences. Societies that permit large disparities in income to develop also tend to be the ones that underinvest in human capital (e.g., education), health care, and other factors that promote health. Recently, it has been hypothesized that the growing gap between the rich and the poor has led to declining levels of social cohesion and trust, or disinvestment in "social capital [13](Kawachi et al 1994; and [12]Kaplan et al 1996).

Recent studies have demonstrated that income inequality is related to mortality rates. Debates on how to reduce poverty and inequality have focused on two controversial questions: Should social policies be targeted to low-income groups or be universal? Should benefits be equal for all or earnings-related?

Analyzing how growth has been divided among the poor and non-poor, [14]Albert, Elloso, and Ramos (2008), examine the growth rate of (real) per capita income across corresponding quintiles of the population using the so called Growth Incidence Curve (GIC). Their analysis shows that growth in the Philippines for the period 2000–2006 may be considered to be relatively pro-poor because in comparison with the population in the upper income percentile, those in the bottom 30 percent benefited more in terms of the average growth rate. The same trend was observed in the urban areas for the same period [15]Albert and Ramos (2010).

A study that investigates the impact of institutional factors on poverty in Kenya using household survey and district level data find that education attainment assets, and family composition are important correlates of poverty. The results suggest the need to design pro-poor and targeted programmes to provide the additional impetus needed to invest and build institutions that would be welfare-improving [16](Kabubo-Mariara, Ndenge, and Mwabu, 2009).

As informative as the above studies may appear, they fail to provide illuminating insight on the interaction between inequality, poverty and vulnerability, that is, they treated each of these concepts in isolation whereas possibility of mutual interaction exists between them. It is therefore pertinent to develop an econometric framework that encompasses these three factors to endure the practical understanding of their interaction mechanism.

3. Methodology

3.1. Modeling the Interactions between Inequality, Poverty and Vulnerability

The nature and direction of the interaction between poverty, inequality and vulnerability is somewhat clouded in controversy. Years of theorizing and empirical investigations have failed to produce a clear-cut conclusion on the causal relationship between poverty, inequality and vulnerability. Most researchers argue that poverty is an ex-post indication of a household's standard of living, that is, it reflects the current state of income and consumption of basic necessities. Vulnerability on the other hand is an ex-ante indication of a household's state of welfare, that is, it indicates the possibility that a household that is currently poor will become poorer in the future or those that are not presently poor will become poor with time. Thus, poverty precedes vulnerability. But vulnerability can necessitate poverty by incapacitating household to mitigate against economic risks and shocks that can reduce their income earning capabilities. Thus, poverty can as well succeed vulnerability.

The interaction between poverty and inequality attracts a rather higher degree of controversy. [17]Persson and Tabellini (1994) argue that by being harmful to economic growth, inequality leads to poverty since economic growth is a necessary condition for poverty reduction. However, poverty can as well cause inequality by limiting the capacities of households from optimally participating in the growth process and maximally taking advantage of growth-induced economic opportunities that can pull them out of the inequality trap. This explains why growth benefits tend to

circulate among the richest quintile of the population, making income distribution to be unequal.

The interrelationship between inequality and vulnerability appears to have received no attention in the literature. Nevertheless, it can be argued that as income is unequally distributed, those at the lowest level of the distribution channel receive little or nothing and are therefore unable to mobilize adequate resources to absorb any economic eventualities. This inability to reduce shock or adapt to changing economic environment implies predisposition to vulnerability. On the other hand, vulnerable households suffer income inequality since there is limited capacity to participate in income-enhancing and welfare-improving economic activities. This makes such households to receive sub-optimal share in income distribution and increases the possible likelihood of remaining in the lowest quintile of the income distribution channel.

As theoretically appealing, plausible and straightforward as the foregoing analyses appear, they lack empirical support and justification. To lend credibility to their appeal, it becomes imperative to develop an econometric framework to test the validity of their assumptions. To better understand the directional relationship between poverty and inequality, and vulnerability, we develop the following model:

$$\text{LogPOV}_{it} = \beta_0 + \beta_1 \text{LogINEQ}_{it} + \beta_2 \text{LogVUNB}_{it} + \beta_3 \text{LogEDU}_{it} + \beta_4 \text{LogPCI}_{it} + \varepsilon_{it} \quad (1)$$

$$\text{LogINEQ}_{it} = \alpha_0 + \alpha_1 \text{LogPOV}_{it} + \alpha_2 \text{LogVUNB}_{it} + \alpha_3 \text{LogPCI}_{it} + \alpha_4 \text{LogHINC}_{it} + v_{it} \quad (2)$$

$$\text{LogVUNB}_{it} = \delta_0 + \delta_1 \text{LogPOV}_{it} + \delta_2 \text{LogINEQ}_{it} + \delta_3 \text{LogSOSP}_{it} + \delta_4 \text{LogHINC}_{it} + z_{it} \quad (3)$$

Where POV is poverty; INEQ is inequality; VUNB is an indicator of household vulnerability to poverty and inequality; EDU measures education attainment; PCI represents per capita income; HINC measures household income; SOSP represents a vector of social spending on health and education; while ε , v and z are the error terms of equations (1), (2) and (3) respectively. In equation (1), model (3.1) assumes that poverty in country i at time t is dependent on inequality, vulnerability, education attainment and per capita income in that country at that time. On the other hand, in equation (2), the assumption is that inequality in country i at time t is in-turn influenced by poverty, vulnerability, per capita income and household income in that country at that time. Equally, in equation (3), vulnerability is assumed to be a function of poverty, inequality, social spending and household income.

3.2 Data Sources, Types and Method of Analysis

All data for the study are sourced from the World Bank's World Development Indicator website. Poverty is measured by the conventional \$1.25 dollar per day approach. Population below \$1.25 a day is the percentage of the population living on less than \$1.25 a day at 2005 international prices. As a result of revisions in PPP exchange rates, poverty rates for individual countries in current year cannot be compared with poverty rates reported in previous years. Inequality will be represented by the Gini coefficient.

Vulnerability is proxied by vulnerable employment rate. Vulnerable employment is unpaid family workers and own-account workers as a percentage of total employment. Education attainment is measured by adult literacy rate. Adult (15+) literacy rate is the percentage of the population age 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. Generally, 'literacy' also encompasses 'numeracy', the ability to make simple arithmetic calculations. This indicator is calculated by dividing the number of literates aged 15 years and over by the corresponding age group population and multiplying the result by 100. Per capita income is based on purchasing power parity (PPP). This is gross national income (GNI) converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GNI as a U.S. dollar has in the United States. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in current international dollars. Social spending is public spending on health and education. Total health expenditure (as percentage of GDP) is the sum of public and private health expenditure. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation. Public expenditure on education (as percentage of GDP) is the total public expenditure (current and capital) on education expressed as a percentage of the Gross Domestic Product (GDP) in a given year. Public expenditure on education includes government spending on educational institutions (both public and private), education administration, and transfers/subsidies for private entities (students/households and other private entities). Household income per capita is measured by household expenditure per capita.

Given the simultaneous nature of the above model, the identification of the model is important to determine the appropriate method of estimation. The determination of the identifiability of the model involves the use of the rank and order conditions for identifiability. Employing the rank and order method, results show that the equations of the model are all overidentified, thereby justifying the adoption of the two stage least square (2SLS) estimation technique for parameter estimation. The basic idea behind the 2SLS is to purify the stochastic explanatory variables (POV; INEQ; and VUNB) of the influence of the stochastic disturbances. This goal is accomplished by performing the reduced-form regression of POV; INEQ; and VUNB on all the predetermined variables in the system (Stage 1), obtaining the estimates, $(\text{POV}^e; \text{INEQ}^e; \text{and } \text{VUNB}^e)^1$ and using the estimated value to replace the original value in the original equation, and then applying OLS to the equation thus transformed (Stage 2). The estimators thus obtained are consistent; that is, they converge to their true mean values as the sample size increases indefinitely (Gujarati and Porter, 2009). This is the approach adopted by this study.

¹ e indicates estimated value.

4. Presentation of Results and Discussion of Findings

First, we present the descriptive statistics and the correlation matrix of the study variables, followed by the regression results of the model.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev
POV	9.6000	8.0868
INEQ	45.4213	9.2886
VUNB	43.4000	19.5258
PCI	7702.6670	4846.1230
EDU	92.3333	5.5891
HEX	7.1533	2.4555
EDEX	4.9133	1.6101
HINC	2323.0500	1873.7560

Source: Author's Computation.

Table 1 presents the descriptive statistics of the study variables. From the table, poverty rate averages 9.6 per cent of the population in the sample countries, although its standard deviation is high at 8 per cent suggesting a reasonable degree of variability. On the average, 45.42 per cent of the population of the sample countries is victim of income inequality, while an average 43.4 per cent of is vulnerable to poverty and inequality. Residents of the sample countries receive an average of \$7703 as their per capita income, although, its standard deviation shows a high degree of volatility. Education attainment shows an impressive and relatively stable average of 92.33 per cent. Education and health expenditures record a relatively stable mean of 4.91 per cent and 7.15 per cent respectively. Household income average \$2323, but remains largely unstable.

Table 2: First Stage Estimation Results

Variables	Dep Var LogPoverty	Dep. Var. LogInequality	Dep.Var. LogVulnerability
	(1)	(2)	(3)
LogEDU	-0.63(-0.66)	0.06(0.34)	0.71(0.91)
LogPCI	-1.39(-1.67)	-0.08(-0.73)	0.35(1.93)***
LogHEX	-0.34(-0.49)	0.26(2.92)**	-0.28(1.40)
LogEDEX	-0.44(-0.79)	-0.15(-1.21)	-0.50(-2.54)**
LogHINC	0.26(0.45)	0.11(1.26)	-0.71(-5.20)*
C	15.63(4.26)	3.10(5.17)	3.95(1.15)
R ²	0.55	0.28	0.82
Adj. R ²	0.48	0.16	0.75
F	7.96	2.35	12.40
N	76.00	56.00	72.00

Source: Author's Computation. * Significant at 1 per cent; ** significant at 5 per cent; *** significant at 10 per cent.

Table 2 shows the first stage estimation of the model. In equation (1), where poverty is the dependent variable, none of the independent variables is correlated with it. This is rather surprising as expectation is that these variables are factors influencing poverty. From equation (2), we find that inequality is significantly associated with health expenditure. Increasing health expenditure by 1 per cent on the average implies increasing inequality by 0.26 per cent. It does appear that health expenditure in the sample countries is targeted at the rich rather than the poor. Concentrating health

expenditure on secondary healthcare facilities especially in urban areas is capable of marginalizing the poor from benefitting from such public spending, and therefore concentrates income on the rich instead of redistributing it to the poor. In equation (3), vulnerability is significantly correlated with per capita income, education expenditure and household income – although its correlation with per capita income is weak as it is only significant at 10 per cent level, and violates our a priori expectation. A 1 per cent increase in education expenditure and household income will lead to an average of 0.50 per cent and 0.71 per cent decrease in vulnerability respectively. This is in line with our a priori expectation because education enables households to move away from vulnerable employment to a more decent, higher-income earning, and more secure jobs, while improvement in household income strengthens households' ability to cope with economic shocks. This reduces their vulnerability to poverty. In table 3, we present the results of the second stage estimation.

Table 3: Second Stage Estimation Results

Var.	Dep. Var. LogPoverty	Dep. Var. LogInequality	Dep. Var. LogVulnerability
	(4)	(5)	(6)
LogPOV		-0.10(-0.51)	-0.04(-0.48)
LogINEQ	2.21(0.52)		0.82(0.59)
LogVUNB	0.25(0.31)	0.002(0.08)	
LogEDU		-0.09(-0.06)	
LogPCI	-1.39(1.92)***	-0.05(-0.18)	
LogHEX		-	0.43(-1.19)
LogEDEX			0.36(-0.59)
LogHINC		0.188(0.84)	-0.48(-2.90)**
C	5.11(0.28)	2.861(3.021)	5.51(1.37)
R ²	0.43	0.26	0.76
Adj. R ²	0.21	0.10	0.62
F	1.91	1.04	5.55
N	55	46	68

Source: Author's Computation. * Significant at 1 per cent; ** significant at 5 per cent; *** significant at 10 per cent.

Equation (4), results indicate that poverty shares no significant association with inequality and vulnerability. However, a weak negative correlation is found between it and per capita income. As per capita income increases, say, by 1 per cent, poverty reduces by an average of 1.4 per cent. This implies that, although, increase in per capita income does not imply receipt of the income, people tend to benefit marginally from the economic growth that causes the per capita income increase, and these benefits are necessary to pull them out of the poverty trap. In equation (5), findings reveal that inequality shares no significant relationship with poverty, vulnerability or any other variable entering that equation. This implies that inequality is not determined by any of those variables; it is rather an indication of the malfunctioning of the income distribution system prevailing in an economy. As a result, its remedy does not lie in the manipulation of these variables. Results in equation (6) highlight a rather complimentary scenario. Vulnerability lacks any significant association with poverty and inequality. This finding reinforces the ones made earlier. There is complete absence of empirical linkage between these three socio-economic phenomena, although they appear to be mutually dependent. Conversely, per capita household

income shares a significant negative association with vulnerability. Increasing household income per capita by an average of 1 per cent reduces vulnerability by an average of 0.48 per cent. Increase in household per capita income enables households to cope with adverse internal and external economic conditions, make informed economic decisions and even undertake viable investment ventures that improve and sustain income streams, thereby diminishing the propensity for vulnerability.

5. Policy Implications

The challenge of reducing inequality, poverty and vulnerability in order to ensure sustainable human development is perhaps a continuing one that requires a detail understanding of how these problems interact. This understanding of their interaction mechanism facilitates the formulation of sound development policies to address them. Based on the findings of this study, the following policy implications are considered pertinent:

Poverty reduction strategies should be developed without undue consideration to the level of inequality and vulnerability. That people suffer from income inequality rarely imply that they are poor or vulnerable to poverty. Even when income is equitably distributed, poverty may still exist because some household may lack the capacity to receive their appropriate share of the distributed income due to lack of formal job or low education. Equally vulnerability does not stem from inequality; people are vulnerable mainly because they have no formal schooling, and this limits their chances of being engaged in a high income-earning employment, coupled with the cyclical nature of the type of informal or agri-based employment they are qualified for. This situation predisposes them to vulnerability, and not the mere fact that income is inequitably distributed.

Theoretically, it is argued that poverty predisposes households to vulnerability. But our findings confirm that that is rather not the case. Instead, households are vulnerable not because they are currently poor, but because their current sources of income is unsustainable, and this can equally be attributed to the fragility of their current employment which in turn is a function of their level of education. Thus, on the overall, policies to reduce inequality, poverty and vulnerability must focus substantially on increasing expenditures and access to health and education services, and also, expanding sustainable employment opportunities especially in the formal sector. This will ensure the creation and retention of alternative sources of household income, thereby reducing inequality, poverty and vulnerability.

5.1 Conclusion

One of the greatest development challenges facing the world today is the elimination of poverty through reduction in income inequality and vulnerability. Years of theorizing have provided unsubstantiated argument supporting the existence of linkage between these phenomena. Policymakers have hitherto proceeded in their development policy making with the latent assumption of the existence of interdependence between these concepts. Recent heightened interest in the study of poverty, inequality and vulnerability calls for a more robust and expanded empirical investigation of the

interaction mechanism driving them. This study set out to achieve this noble task. Whilst the review of theoretical literature confirms the existence of five well established theories explaining how these variables interact namely, individual theory of poverty, cultural theory, structural theory, geographic theory, and cumulative theory, review of empirical literature provided insufficient information to ascertain the existence of interaction and effect of one variable on the other. The findings from the study show that contrary to theoretical speculations, there is a clear absence of empirical linkage between poverty, inequality, and vulnerability. These variables are mutually exclusive, inter-independent, distinct and unreinforced by the other in their operation. It is argued then that to achieve the desired development goal, especially the Millennium Development Goals (MDGs), policies meant to address these issues should recognize their individualistic nature and address them accordingly.

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