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The Influence of Macroeconomic Factors on Murders in Jamaica: Should the Police Be Cautious in Interpreting the Murder Statistics?

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Abstract: Jamaica has been plagued by high murder rates for some time and the issue has become a national problem. This research seeks to: 1) model murder, 2) determine factors of mortality, 3) examine the role of poverty on murder, and 4) provide policy markers, particularly the police, with an understanding of how murders can be effectively addressed. This study is a secondary data analysis of statistics from different agencies. Data were entered and stored into Microsoft Excel and SPSS for Window version 17.0 (SPSS Inc; Chicago, IL, USA) which were both used to analyze the data. The averaged murders per decade have been increasing by geometrical progression, with the greater proportion occurring in the last decade (2000-2010). Although averaged murders for each decade have been increasing, the lowest increased occurred in the 1990s compared to the 1980s (43.4%). There is a strong positive correlation between the annual exchange rate and lnmurder ($r_s = 0.934$, $p<0.0001$). However, a strong inverse relationship exist between lnpoverty and annual exchange rate ($r_s = -0.748$, $p<0.0001$) as well as between lnpoverty and lnmurder ($r_s = -0.831$, $p<0.0001$), while weak relationships existed between 1) exchange rate and mortality ($r_s = 0.507$, $p<0.019$), 2) lnpoverty and mortality ($r_s = -0.549$, $p<0.010$) and 3) lnmurder and lnmortality ($r_s = 0.485$, $p<0.026$). The Jamaican police should not credit themselves for the reduction in murders that took place in 2010.

Key words: Economic growth, exchange rate, econometric models, Jamaican police, Jamaica, macroeconomic variables, murder, mortality, police, poverty

INTRODUCTION

Jamaica has been plagued by high murder rates for some time and the issue has become a national problem. A national probability cross-sectional survey that was conducted by Powell *et al*. (2007) found that 'crime and violence' was the leading national problem identified by Jamaicans in 2007 (Powell *et al*., 2007). Another independent research that was conducted in the same year by Boxill *et al*. (2007) revealed that 1 out of every 10 Jamaicans indicated being victims of crimes. In the same research (Boxill *et al*., 2007; 117), many countries in Latin America and the Caribbean (excluding nations like Trinidad and Tobago, Guyana, and Barbados) have more people being victims of crimes than in Jamaica. Latin American nations like Mexico, Chile and Peru had victimization rates in excess of 20.1, 20.2, 23.1 and 26.2%, respectively (Boxill *et al*., 2007). Clearly, violence and crimes are not atypical to Jamaica; it extends to the wider Caribbean and Latin America. Harriott (2004a) postulated that, in respect to murders, Jamaica was ranked number one (1) in the Caribbean; and in 2005, it was the highest in the world. He continued that "The problem of crime in the Caribbean-its causes, its consequences, and its control-emerged as a major concern during the 1990s" (Harriott, 2004a), indicating that the twin problem continue to escape policy markers as the crime-solution is still being discussed 21 years later.

According to Boxill *et al*. (2007), "The murder rate [in Jamaica] moved from 19.2 per 100,000 to 39 per 100,000 in the same period [1977 and 2000]", indicating that murders are increasing at a geometric rate. The contemporary murder reality in Jamaica dates back to slavery. Simmonds (2004) opined that the social inequalities in the plantation society were reasons for criminal activities as the slaves sought to topple the 'aristocracy' establishment. Land tenure was a class phenomenon in Jamaica (Clarke, 1953; Beckford, 1972), and the poor were unlikely to change their situation without political intervention, special bequest or land reform nationalization. The peasant class that was later defined as lower class (working or poor) was and is a marginalized group in Jamaica (Beckford, 1972). The peasants were given marginalized lands; paid low wages, socio-politically oppressed, and travailed under the hands of the planters' class (now upper class). The challenges of peasant according to Beckford are "The plantation is a total economic institution. It binds everyone in its

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embrace to the one task of executing the will of the owner or owners. And because it is omnipotent and omnipresent in the lives of those living within its confines, it is also a total institution" (Beckford, 1972).

The administrators in Jamaica had formulated a Rent Restriction Act on 9th October 1944, and amended it on April 6, 1983, in regard to rented property and tenancy disputes. The Act was to govern the relation between landlord and tenants. The issues that were entailed in the Act did not alleviate the challenges of working class, land inequities and the land reform of the 1900s did nothing to address the land powered class, marginalized lands owned by the working class. Despite the intentions of the Act, it was believed that it was 'pro-tenant' and can arguably be seen as a fallacy and a wide disparity between the legislature and reality. Landlords often times disregard the statute as a result of "Its one sided nature". Besson noted that land reform in Jamaica did not change fundamentally the position of the working class (Besson, 1995).

In Jamaica, the reality was that land reform between 1866 and 1900 had maintained the social stratification and structure (Besson, 1995); the working class was again marginalized. In a book entitled 'Class, status and social mobility in Jamaica, a sociologist, Derek Gordon, opined that "The fundamental issue which researched into social mobility in Jamaica must confront is the paradox of large scale social mobility generated by the opening up of new positions coexisting side by side with gross and, perhaps, even widening inequalities of opportunity between the minority at the top and majority at the bottom of the social order" (Gordon, 1987). Gordon's perspectives highlighted the struggles of those in the lower class (Beckford and Witter, 1982) in a system that people seeing social mobility defined by social stratification; yet, the income inequality continues and sometimes widen. The poor is reduced to menial low paid tasks, marginalized lands (including homes) and these widen the probability of even coming out of this reality without political intervention, education or bequest, which dates back to slavery.

The land disparity, therefore, needed land reform as well as other social reforms that were created because of capitalism. Prior to the Michael Manley's socialism regime in the 1970s, the administrators in Jamaica had formulated a Rent Restriction Act on the 9th of October 1944, and amended it on April 6, 1983, in regard to rented property and tenancy disputes. The Act was to govern the relation between landlord and tenants. The issues that were entailed in the Act did not alleviate the challenges of the working class, land inequities and the land reform of the 1900s did nothing to address the land powered class, marginalized lands owned by the working class. Despite the intentions of the Act, it was believed that it was 'pro-tenant' and can arguably be seen as a fallacy and a wide disparity between the legislature and reality. Landlords often times disregard the statute as a result of "Its one sided nature". Again the working class who required housing was a victim of capitalism (or free market). (The ACT) The Rent Restriction Act has clear guidelines in matters relating to the rented premises and formal interaction between landlord and tenants, and matters surrounding eviction among other issues. Further the Act had stipulations on penalties for non-compliance and breaches; yet these were blatantly disregarded by landlords who held the power, like in the plantation society. They were disregarding the laws, and the working class was not at the mercy of this power interest group. The complaints were ventilated by the working class, and Michael Manley in the 1970s responded by the establishing the Rent Assessment Board (1972). Politics was once again used to address some contradictions in the system with particular focus on disparities between landlord and tenants in relations to rental matters (Bernal, 1986). Poor tenants are oppressed by a system that favours the bettered class, the haves, and a means of having something if one is from the marginalized group are:

- Education
- Bequest
- Political transformation
- Involvement in criminal activities

To do nothing is to continue into persistent marginalization, which accounts for the experimentation into criminal activities as an alternative source of survivability.

The institutional legacies of plantation society continues in contemporary Jamaica, and while the definitions of stratification have changed as well as increased social mobility has occurred among the populace, but the rigid stratification has not change and the experiences of the poor have remained basically the same (Gordon, 1987; Stone, 1980). The current reality in Jamaica was echoed by Dr. Horace Chang who postulated that amendments to the Rent Restriction Act (of 1983) were necessary because of the inadequacy in the Act and the current realities (JIS, 2008). He stated that "while it is the dream of most persons to own their home, the reality is that, no matter what mechanism a government puts in place to provide shelter; this dream will never be realized at all" (JIS, 2008). Embedded in the Chang's perspective is the importance of the embedded social inequalities. Jamaicans are cognizant of the social injustice in the administration of the society (including justice) as emerged from the study by Powell *et al*. (2007). They asked the question 'Would you say that the country is governed for the benefit of the few powerful interests, or is it governed for the good of everyone", 69 out of every 100 indicated for a few powerful interests and percentage revealed that justice was in favour of the rich (Powell *et al*., 2007).

As the established agency that was instituted to serve, reassure and protect the citizenry, the police are increasingly called upon to solve crimes, particularly murders. When Jamaicans were asked in 2007 'How would you evaluate the work of the police in preventing crime in your community' 7 out of every 10 indicated that they were doing at least a fairly good job, while 22 out of every 25 indicated that 'the war against crime and delinquency in Jamaica is being won' (Powell *et al*., 2007). The police are held accountable for unsolved crimes, high crimes and delinquency among the general populace, in a society in which 31 out of every 50 people indicated that their salaries (or wages) were unable to cover expenses (Powell *et al*., 2007). Embedded in the aforementioned perspective is an implied correlation between poverty and crime. This is the common sense perspective that is held by many individuals, and studies have even provided evidence to support the correlation between poverty and social inequality (Headley, 1994; Levy, 2001; Ellis, 1992; Stone, 1987; Phillips and Wedderburn, 1987). Some scholars have gone as far as to state that "The supply of offences is substantially an economic phenomenon" (Francis *et al*., 2001). The poverty and crime phenomenon, particularly murder, assumes that the solving of poverty would put an end to crime and violence in a society.

In 2009, the prevalence of poverty in Jamaica was 16.5% which increased by 23% in 2010, while murders for the same period declined by 15% (Planning Institute of Jamaica, 1988-2009; JCF, 2011). In the same period, the percentage of firearms recovered increased by 27.2% (JCF, 2011), indicating the efforts of the police to curb (if not eliminate) all crimes, particularly major crimes, in Jamaica. The efforts of the police have making inroads into the crime phenomenon in Jamaica; but crime is still a monster in the society. Clearly there must be questioning of the common sense notion of poverty and crime, and the police are called upon to address an issue that is complex and mostly outside of their ambits. A Caribbean criminologist, Professor Anthony Harriott opined that the crime problem in the region has resulted in extensive public policy concerns as well as the quest for solutions. He stated that "While policy should be informed by an appreciation of the problem involving at least an analytic description of it, policy elaboration need not await a definitive analysis of its sources or the causes" (Harriott, 2004b).

The discussion of 'crime fighting' (crime reduction) relies on the research to aid in the formulation of policies and programmes. Like Harriott (2004b) postulated policy formulated does not necessarily need to rely on empirical findings, but this provides the needed ingredients that can drive better policy strategies. One of the causes that is already been questioned by this study is poverty causing crimes, particularly murders in Jamaica. With the importance of research to the decision making process (Davis, 2005); new evidence questioning the established epistemology denotes that police require cutting edge research to drive its efforts in addressing the crime problem. According to Harriott (2004a) there is a shift in traditional pattern of criminal activities, suggesting that information on this new phenomenon is critical to the police effectively attaining their mandate. Another reality for the police is increased in particular typology of crimes. Jones (2004) opined that the rate of crime and victimization against women has been increasing since 1990 to 2001, particularly sexual assault, rape and murders.

Jamaica experienced a banking crisis in the mid-1990s, which influenced many aspects of the lives of Jamaicans. According to the International Monetary Fund (IMF), "Public debt increased substantially after the banking crisis in the 1990s and currently stands at 128 percent of GDP, despite a program adopted in 2004 to reduce it to around 100 % of GDP by 2009" (IMF, 2008). The banking crisis has contributed to reservation, apprehension and mistrust of the financial system. A study by Powell *et al*. (2007) found that 12% of Jamaicans indicated having confidence in the private sector and that 30% of Jamaicans believed that the country is 'going' in the right direction. Powell *et al.* (2007) work highlighted the challenges of the post banking crisis, which has led the alternative investment schemes (AISs) to exploit the low confidence that people have in the financial system's operations. According to FSC (2003), the early 1990s was characterized as a turbulent time for the Jamaican financial system. This followed the banking crisis of the mid-1990s that saw increased public debt, doubled digit inflation, unemployment, and poverty. The government in an effort to prevent social unrest or stave off political collapse, sought to enact new legislation in order to strengthen and restructure the financial sector. Despite all the efforts of the government, it seems that these could not stop the inevitable; there were numerous failed financial entities. While the government was aiding the financial sector, the human sufferings were mounting and left to languish the economic times. Albeit difficult to policing a society like Jamaica without addressing some of the structural and economic inequalities, the police are adjudged not based on the general parameters of the society, but the outcome of their actions (or inactions) to solve, protect and reassure the populace in safe milieu. This is captured in Powell *et al*. (2007) which found that the police were among three public institutions (including political parties and local government council) with the least confidence from the public. Again, the police are not able to address the difficult socioeconomic climate, but they are asked to solve crimes.

Clearly among the strategic management policies developed by the hierarchy within the police force the new research findings should revamp programmes. It may seem plausible to subscribe the reduction in crimes, particularly murders, to the new police commissioner and

his programmes, but before this should be so labelled, we need to examine the macroeconomic milieu and isolated measure, and then a conclusion should be made. Comprehensive searches of the literature on crimes, particularly murders, have not found a single study that has examined murder, poverty, mortality and the annual exchange rate. Recognizing the paucity of information in the literature on the aforementioned issues, this research fills the gap by evaluate all those variables in a single inquiry. The police cannot plan around the reality in the society, which includes people's perception on being likely victims of violence and crime. A study by Harriott (2004c) found that 2 out of every 5 Jamaicans believed that they were highly likely to be victims of a crime and had a high risk of being physically abused in a violent act. Hence, objectives of this study are to:

- Model murder
- Determine factors of mortality
- Establish a poverty function
- Provide policy markers, particularly the police, with an understanding of how murders can be effectively addressed.

THEORETICAL FRAMEWORK

Crotty (2005) aptly summarizes the rationale for a theoretical framework when he postulated that "The philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria" (3) as a study brings with it a set of assumptions. He continued that "this is precisely what we do when we elaborate our theoretical perspective. Such an elaboration is a statement of the assumptions brought to the research task and reflected in the methodology as we understand and employ it" (Crotty, 2005). The theoretical perspective that is brought to bear on this work is positivism (and post-positivism). The perspective of positivism is embedded in the epistemology of objectivism. The "objectivist epistemology holds that meaning, and therefore meaningful reality, exists as such apart from the operation of any consciousness" said Crotty (2005).

The objectivist epistemology holds sacred logic, precision, general principles, principles of verification, the standard of rigor, gradual development, establishment of laws, principles, theories and apparatuses in "search for truth" and proofs (Balashov and Rosenberg, 2002). Wanting to establish general laws, for this work, data were collected from Bank of Jamaica (Bank of Jamaica, 2010a, b), The Statistical Institute of Jamaica and the Planning Institute of Jamaica. Econometricians have long developed a set of tools that can be employed to model many factors simultaneously influencing a single dependent variable.

Mamingi (2005), Hill *et al*. (2001) and Wooldridge (2006), many linear variables can be model in a single function. A case would be argued for

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 \ldots + \beta_nX_n + \epsilon_i \quad (1)$$

where Y (linear dependent variable) is a function of a constant, α, some explanatory variables (linear independent variables), $X_{1\text{-}n}$, $\beta_{1\text{-}n}$ is the parameter for each explanatory variable. In Eq. (1), both parameters and the variables are linear. For Eq. (1), ordinary least square can be in fitting the data.

There are fives assumptions that are embodied in linear multiple regression, which can be had by reading the aforementioned writers.

Equally, they have shown that for an equation like:

$$Q = e^cK_i^{\beta_1}L_i^{\beta_2} \quad (2)$$

The variables are non-linear (K and L), with linear parameters (β_1 and β_2). This is accommodated by finding the logarithm for each side, giving:

$$Ln(Q) = \ln(e^c) + \beta_1\ln(K_i) + \beta_2\ln(L_i) + \epsilon_i \quad (3)$$

where ln = logarithm, Q = output, K_i = capital (or machine-hour, L_i = Labour (worker hours) I stands for firm and ϵ the error term.

In the case of Eq. (1), if the linearity assumption is violated, the variables must be log transformed.

Assume that the dependent variable in Eq. (1) had violated linearity, by log transforming the variable, the equation would now be:

$$\ln Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_nX_n + \epsilon_i \quad (4)$$

If independent variables (or one) violate the linearity assumption, the equation can be written as:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 \ldots + \beta_nX_n + \epsilon_i \quad (5)$$

In a case when both dependent and independent variable violate the linear assumption, the equation is written as:

$$\ln Y = \ln(\alpha) + \beta_1\ln X_1 + \beta_2\ln X_2 + \beta_3\ln X_3 + \beta_4\ln X_4 \ldots + \beta_n\ln X_n + \epsilon_i \quad (6)$$

For this work, murder can be expressed as:

$$\ln Y = \alpha + \beta X + \epsilon \quad (7.1)$$

where ln(Y) denotes log of annual number of murders, X represents the annual exchange rate, β is the parameter for the annual exchange rate and ϵ is the random error:

$$\ln Y = \ln(\alpha) + \beta \ln X + \epsilon \quad (8.2)$$

where ln(Y) denotes log of annual number of murders, X represents the annual prevalence of poverty, β is the parameter for t annual prevalence of poverty and ϵ is the random error.

Based on Eq. (7) and (8), the annual number of murders can be written as:

$$Y = e^{(\alpha + \beta X + \epsilon)} \quad (7.2)$$

$$Y = e^{(\alpha + \beta X + \epsilon)} \quad (8.2)$$

Equations (7.1) and (8.1) or (7.2)/(8.2) constitute only the significant predictor (or factor-p<0.05), and do not represent a hypothesis to be test.

For non-linear models that are polynomials, Hill *et al* (2001) opined that the "…since parameters enter in a linear way", the model are still linear regression. In such a case, Excel will be used to determine nonlinear polynomial function. The only function which ascribed to this principle was lnmortality and annual exchange rate.

$$\text{Ln (Mortality)} = \alpha_1 + \alpha_2 X + \alpha_3 X^2 + \alpha_4 X^3 + \alpha_5 X^4 + \alpha_6 X^5 + \alpha_7 X^6 \quad (9)$$

The variable X represents annual exchange rate, which is the only explanatory variable.

Data and methods: The current work is a secondary data analysis. Data were collected from Jamaica Government Publications, namely Jamaica Survey of Living Conditions (JSLC), Bank of Jamaica, Jamaica Constabulary Force and Economic and Social Survey of Jamaica (ESSJ). Jamaica Survey of Living Conditions (JSLC) (Planning Institute of Jamaica, 1989-2010) provided data on health care utilization (or health care seeking behaviour), illness rate and poverty; Economic and Social Survey of Jamaica on poverty (Planning Institute of Jamaica, 1989-2010); Statistical Digest on inflation and annual exchange rate (Bank of Jamaica, 1981-2010; Bank of Jamaica, 2010b) and the Demographic Statistics on mortality, crude death rate (Statistical Institute of Jamaica, 1987-2011) and the Statistical Department of the Jamaica Constabulary Force on murders. The period for this study is from 1989 to 2009.

The JSLC is jointly conducted by the Planning Institute of Jamaica (PIOJ) and the Statistical Institute of Jamaica (1987-2011). The JSLC is a nationally representative cross-sectional descriptive survey which uses stratified random sampling and comprised data on households' characteristics, health, education, expenditure, social programmes, and other information. An administered questionnaire modelled from the World Bank's Living Standards Measurement Study (LSMS) household survey (World Bank, 2002) is used to collect the data. There are some modifications to the LSMS, as JSLC is more focused on policy impacts.

The JSLC used a two-stage stratified random sampling design where there was a Primary Sampling Unit (PSU) and a selection of dwellings from the primary units. The PSU is an Enumeration District (ED) which constituted of a minimum of 100 dwellings in rural areas and 150 in urban areas. An ED is an independent geographic unit that shares a common boundary. This means that the country was grouped into strata of equal size based on dwellings (EDs). Based on the JSLC, the PSUs is a listing of all the dwellings and this was used as the sampling frame from which a Master Sample of dwelling was compiled. According to the JSLC, the sample was weighted to reflect the population of the nation. The households in the JSLC were interviewed during three to four years, after which a new representative sample was drawn. In this study, we used aggregate to the parish level, which means that analysis can be made across periods (or over time).

The Economic and Social Survey of Jamaica (ESSJ) is a publication of the PIOJ which collates information on social and economic indicators of Jamaica. We collected data mainly on unemployment rate in Jamaica from 1989 to 2009 (Planning Institute of Jamaica, 1989-2010).

The annual exchange rate of the Jamaican to the United States' dollar were collected from the Bank of Jamaica's (BoJ) publication (Bank of Jamaica, 1981-2010) and the Gross Domestic Product (GDP) information was had from the International Monetary Fund's World Economic Outlook (International Monetary Fund , 2009). Data on murder were obtained from Statistical Unit, Jamaica Constabulary Force (JCF) for the period 1970-2010, while the others were for the period 1989-2010. Data on murders were cross referenced with later years and from the Economic and Social Survey to ensure accuracy of earlier years.

Some abbreviations will be used throughout this work. They are CDR - crude death rate; HI - health insurance coverage, HSB - health seeking behaviour (or health care utilization) and GDP (gross domestic product) per capita growth, GDP.

Statistical analysis: Data were entered and stored into Microsoft Excel and SPSS for Window version 17.0 (SPSS Inc; Chicago, IL, USA) which were both used to analyze the data. Pearson's product Moment Correlation was used to assess the bivariate correlation between particular macroeconomic and other variables. Scatter diagrams and best fit models were used on the data. Ordinary least square (OLS) regression analyses were used to establish the model for 1) log mortality and 2) log murder. Ordinary least square regressions were utilized to

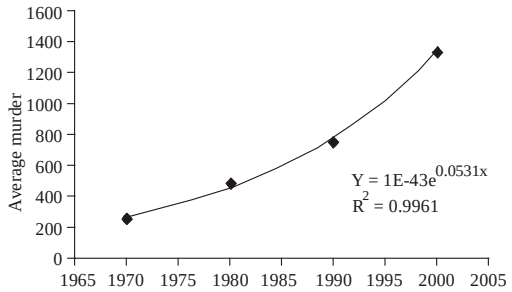

Fig. 1: Average number of murders per decade, 1970s, 1980s, 1990s and 2000

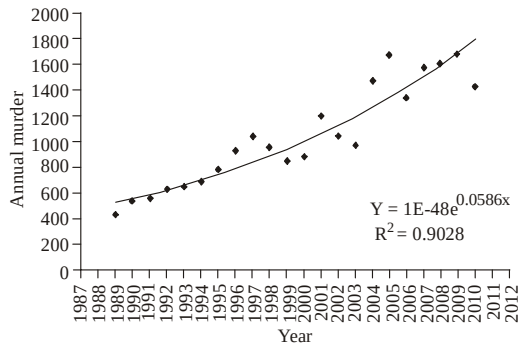

Fig. 2: Annual murders from 1989-to-2010

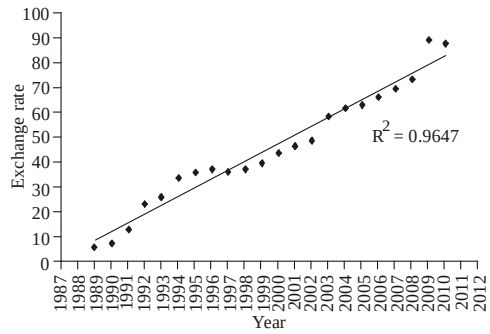

Fig. 3: Annual exchange rate of Jamaica to US dollars from 1989-to-2010

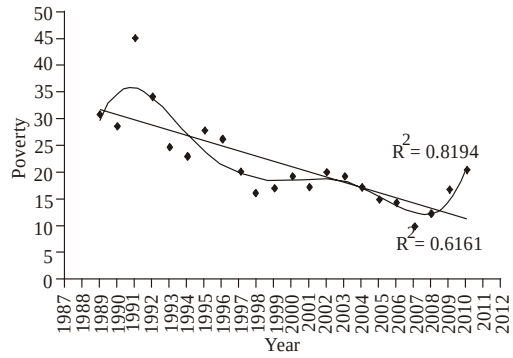

Fig. 4: Annual prevalence of poverty from 1989-to-2010

analyze the possible explanatory variables. A p-value of 5% was chosen to indicate statistical significance. The variables that were entered into the model were significant in the bivariate correlation (Pearson's Product Moment Correlation). In any instance where collinearity existed (r>0.7); the variables were entered independently into the model to determine as to which of those should be retained during the final model construction. The final decision on whether or not to retain the variables was based on the variables' contribution to the predictive power of the model and its goodness of fit. Each scatter plot was modelled by a linear, power, exponential or polynomial best fit function based on the data, with the aid of Excel as well as in SPSS.

The exchange rate (or Jamaican exchange rate) is the number of Jamaican dollars needed to purchase one United States' dollar (US$1).

Murder denotes the number of people unlawfully killed (a crime causing death without a lawful excuse) within a particular geopolitical zone (excluding police killings or homicides).

Mortality means the total number of deaths occurred within the population for a particular period, which is usually at the year. The quality of mortality statistics in Jamaica is relative good as a study conducted by McCaw-Binns *et al*. (2002) found that in 1997, the completeness of registration of mortality was 84.8%, in 1998 it was 89.6%. The quality of completeness of mortality registration has been established by the World Health Organization, ICD classification (Mathers *et al*., 2005). A completeness of 70-90% is considered to be medium quality and more than 90% is high quality data. Within the context of the WHO's classification, death statistics in Jamaica is of medium quality and is relatively close to being of high quality. The Statistical Institute of Jamaica (Statistical Institute of Jamaica, 1987-2011) noted that since 2005, the police have been working closely with the Registrar General's Department (RGD), and they have established a data registry which is kept and maintained by the RGD.

RESULTS

Figure 1 shows the average number of murders for 4 decades (1970s, 1980s, 1990s, and 2000). The averaged murders per decade have been increased by geometrical progression, with the greater proportion occurring in the last decade (2000-2010), 94% compared to 1990s. Although averaged murders for each decade have been increasing, the lowest increased occurred in the 1990s compared to the 1980s (43.4%), with the 1970s over the 1980s had an upward movement of 85%. The averaged murder for the 4 decade was 1,042 Jamaicans, with 2009

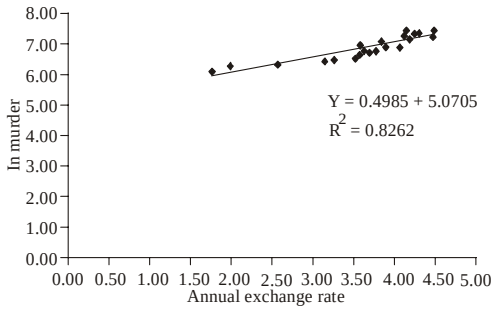

Fig. 5: lnMurder and annual exchange rate, from 1989-2010

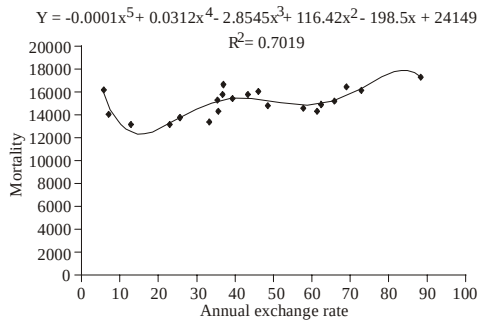

Fig. 6: Mortality and annual exchange rate, from 1989-2010

being the most murderous year in the period (1,680 Jamaicans). Hence, averaged murders for the period can be best fitted by an exponential function (e^x; R^2 = 99.6%).

Figure 2 illustrates an annual murder figure from 1989-to-2009, which is best fitted by an exponential function (e^x; R^2 = 90.3%). This indicates that annual murders have been increasing by a geometric rate.

Figure 3 represents a linear function of annual exchange rate from 1989-to-2010 (R^2 = 96.5%). The annual exchange rate has been increasing at an arithmetic rate (or a constant), and is best fitted by a straight line.

Figure 4 illustrates the fitting of annual prevalence of poverty from 1980-to-2010, using a linear and a non-linear function. Based on the squared r value, annual prevalence of poverty is best fitted by a non-linear function (R^2 = 81.9%) compared to a linear function (R^2 = 61.2%). The non-linear function is a 5 degree polynomial.

Figure 5 depicts a linear function of log murder and annual exchange rate (R^2 = 0.8262). Figure 6 presents a non-linear function of mortality and annual exchange rate (R^2 = 0.7019).

There is a strong positive correlation between the annual exchange rate and lnmurder (r_s = 0.934, p<0.0001). However, a strong inverse relationship exist between lnpoverty and annual exchange rate (r_s = -0.748, p<0.0001) as well as between lnpoverty and lnmurder (r_s = -0.831, p<0.0001), while weak relationships existed

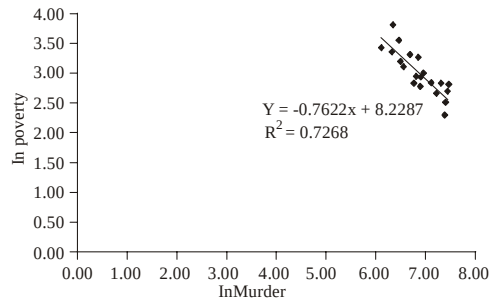

Fig. 7: lnPoverty and lnMurder, from 1989-2010

between 1) exchange rate and mortality (r_s = 0.507, p<0.019), 2) lnpoverty and mortality (r_s = -0.549, p<0.010) and 3) lnmurder and lnmortality (r_s = 0.485, p<0.026) (Table 1).

Table 2 displays information on the correlations of selected macroeconomic and mortality variables. Of the 3 variables used in the model, only one emerged as statistically significant factor of lnmurder, exchange rate-F statistic = 61.99, p<0.0001.with an explanatory power of 91.1%. Based on the VIF values, there is a high multicollinearity between poverty and the exchange rate. Poverty and the exchange rate, therefore, should not be simultaneously entered as independent variable, because of the high correlation between them as the multicollinearity they produce as independent variables. Using Excel, murder as a function of annual exchange rate can be written as:

$$\text{lnMurder} = \alpha + \beta(\text{Annual Exchange Rate}) \quad (10.1)$$

$$\text{lnMurder} = 5.071 + 0.499(\text{Exchange rate}) + e \quad (10.2)$$

$$\text{Murder} = e^{(5.071 + 0.499\text{Exchange rate})} \quad (10.3)$$

Two variables were entered into a single model and one emerged as being statistically significant predictor of lnmurder, lnpoverty (F statistic = 23.977, p<0.0001; R^2 = 0.727) (Table 3). The relationship between the two variables is an inverse one. Using Excel, murder as a function of poverty can be written as:

$$\text{lnMurder} = \ln(\alpha) + \beta\ln(\text{Poverty}) \quad (11.1)$$

$$\text{lnMurder} = 9.735 - 0.952\text{lnPoverty} + e \quad (11.2)$$

$$\text{Murder} = 9.735\text{Poverty}^{(-0.952)} \quad (11.3)$$

Figure 7 illustrates the nonlinear function of mortality and annual exchange rate, using Excel. The function can be written as:

$$\text{Mortality} = 24149 - 1981.5X + 116.4X^2 - 2.854X^3 + 0.013X^4 - 0.0001X^5 \quad (12.1)$$

Table 1: Pearson's product moment correlation coefficient of selected macroeconomic and health variables, and murder

		Exchange rate	Lnpoverty	Lnmurder	Lnmortality
Exchange_Rate	Pearson correlation	1	- 0.748**	0.934**	0.507*
	Sig. (2-tailed)		0.000	0.000	0.019
	N	22	22	22	21
Lnpoverty	Pearson correlation	- 0.748**	1	- 0.831**	-0.549**
	Sig. (2-tailed)	0.000		0.000	0.010
	N	22	22	22	21
Lnmurder	Pearson correlation	0.934**	- 0.831**	1	0.485*
	Sig. (2-tailed)	0.000	0.000		0.026
	N	22	22	22	21
Lnmortality	Pearson correlation	0.507*	- 0.0549**	0.485*	1
	Sig. (2-tailed)	0.019	0.010	0.026	
	N	21	21	21	21

**: Correlation is significant at the 0.01 level (2-tailed); *: Correlation is significant at the 0.05 level (2-tailed)

Table 2: Ordinary least square regression: selected macroeconomic and mortality variables influencing lnmurder

							Collinearity Statistics	
Variable	Unstandardized coefficients B	Std. Error	β	T	p-value	CI (95%)	Tolerance	VIF
Constant	8.931	4.194		2.130	0.048	0.083-17.779		
Lnpoverty	- 0.280	0.142	- 0.250	- 1.971	0.065	- 0.579-0.020	0.326	3.070
Lnmortality	- 0.190	0.422	- 0.038	- 0.452	0.657	- 1.080-0.699	0.306	3.265
Exchange Rate	0.014	0.002	0.762	6.197	0.000	0.009-0.019	0.689	1.452

F Statistic [3,17]: 61.994; p<0.0001;
R^2: 0.912;
Adjusted R^2: 0.901;
N: 20;
Durbin-Watson: 2.0

Dependent Variable: lnMurder

Table 3: Ordinary least square regression: Selected macroeconomic and mortality variables influencing lnmurder

							Collinearity statistic	
Variable	Unstandardized coefficients B	Std. Error	β	t	p-value	CI (95%)	Tolerance	VIF
Constant	8.480	7.356		1.153	0.264	- 6.974-23.934		
lnMortality	0.124	0.734	0.025	0.169	0.868	- 1.419-1.667	0.699	1.431
ln poverty	- 0.938	0.165	- 0.839	- 5.694	0.000	- 1.284-0.592	0.699	1.431

F statistic [2,18]: 23.977; p<0.0001;
R^2: 0.727;
Adjusted R^2: 0.697;
N: 20;
Durbin-Watson: 1.0

Dependent Variable: lnMurder

The variable X represents annual exchange rate, which is the only explanatory variable. This model has an explanatory power of 70.2% (R^2 = 0.702).

Based on the principles identified in the theoretical framework:

$$\text{Poverty} = \alpha\text{Murder}^{\beta} \quad (13.1)$$
$$\ln\text{Poverty} = \ln(\alpha) + \beta\ln(\text{Murder}) \quad (13.2.1)$$

Equation (13.2) was tested in SPSS as well as Excel, with a minimal no difference existing between the two applications. Hence, Fig. 8 depicts the linear parameter of Eq. (13.1), which can be written as:

$$\ln\text{Poverty} = 8.23 - 0.762\ln(\text{Murder}) \quad (13.2.2)$$
$$\text{Poverty} = 8.23\text{Murder}^{(-0.721)} \quad (13.2.3)$$

It should be noted that the explanatory power of the model (13.2.3) is 72.7% (R^2 = 0.727) -F-statistic = 50.51, Prob (F-statistic<0.0001).

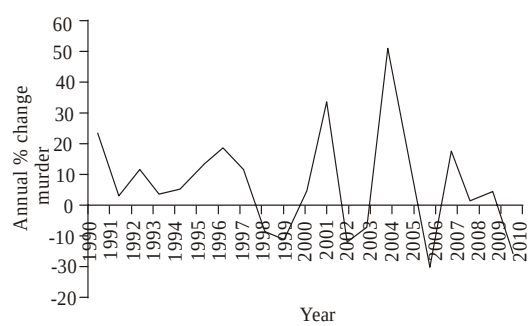

Fig. 8: Annual % change in murder, 1990-2010

Log murder is a function of log mortality as well as log mortality is a function of log murder was tested using both Excel and SPSS, with each yielding marginally different results.

$$\ln\text{Murder} = \ln(\alpha) + \beta\ln(\text{Mortality}) + e \quad (14.1)$$

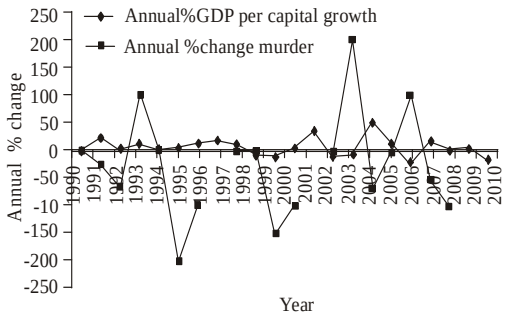

Fig. 9: Annual per cent change in murder and GDP per capita growth, 1990-2010.The gaps in the annual % GDP per capita growth denotes periods in which the growth rate was 0

$$\ln Murder = -16.735 + 2.450\ln(Mortality) \quad (14.2.1)$$

$$Murder = Mortality^{2.450} - 16.735 \quad (14.2.2)$$

$$Mortality = 8.967\ murder^{0.0965} \quad (15.1)$$

The explanatory power of model (Eq. 14.2.2) is R^2 = 23.6%.

Figure 8 presents information on the annual per cent change in the number of murders from 1990-to-2010. In 2004, the average number of murders grew by 51% compared to 2003.

Figure 9 shows the annual per cent change in GDP per capita growth from 1990-to-2010. In periods of economic growth, murder decline and when murder increases, the GDP contracts.

Limitations: There are other variables that can influence the nature of this work such as remittances, and domestic tax structure, which could be intervene or confounding variables. Emerging out of the exclusion of those variables is the difficulty to precisely dictate the effect of a particular factor. However, this paper is an introductory inquiry that sets the platform for future research, policy modifications and set a guideline for understanding the phenomenon. Another limitation of this study is the lag effect that was not taken into consideration.

DISCUSSION

In 'They cry 'respect': Urban violence and poverty in Jamaica', Levy postulated that there is a relationship between unemployment and crime, and poverty and crime. He says that "Along with people from other areas they point to a direct link between unemployment and crime, to the economic pressure..." (Levy, 2001). Despite the qualitative methodology that he uses to acquire data for his findings, Levy's findings provided a basis, upon which an understanding may be had of the importance of financial independence, violence and crime, unemployment and poverty. From Levy's study, chief among the characteristics of youth involvement in gangs is 'parents low education' and 'financial inadequacy'. It is clearly from Levy's study, that the poor experience a high rate of non-school attendance because of in affordability. With such a setting, the ability to transform their lives is highly improbable as they lack the financial resources, and their human capital is rather low, making their labour cost low, and this explains the high degree of unemployment or involvement in menial work or 'hustling'. Lipton and Litchfield (2001) forwarded an explanation for the setting above, when they opined that higher levels of non-resources are associated with lower levels of poverty (Lipton and Litchfield, 2001), indicating the poverty is associated with reduced human capability which is supported by Sen (1979, 1981). Poverty bars people from resources and opportunities (including employment and education), which in return increase human suffering. Levy (2001) noted that the human suffering explains crime and violence. Levy (2001) aptly summarized the implied association between poverty, opportunity (or the lack of), resources, choices and crimes, when he wrote that"

> "Without work however, it is the general view, youths cannot be "strong"-they have no hopes, they become idle, and idleness leads to "badness", to gang war and gun violence. "A man will rob and kill if him hungry." Older women comment that "the devil find [s] work of idle hands". Youth remark that they have less time and energy for crime and stealing when working. They also, they admit, have less need to steal: it is a means to survival, but listed as the last resort. The observation was made in one community that there was currently less violence because many young men were working on a nearby large piece of construction. The belief was that once that work ceased, violence and crime would resume" (Levy, 2001)

Levy's findings highlighted wholesale common sense perception of the linkage between poverty and criminality as well as resource constraints and crimes. One of the resource constraints of those in the poor communities is education and like Sen (1979, 1981) postulated, poverty retards capabilities. Education is a vehicle for social mobility, capacity building and poverty alleviation. Access to tertiary education is a difficult option for the poor. Based on studies, education is a vehicle in the socio-economic mobility (development) (Nie *et al*., 1972) to which if were to be accessed by the poor can transform their social-environment (Barr, 2005). Poverty prevents economic freedom and choice, and so despite one's willingness, this circumvents many realities of their experience. The poor is held in the vicious cycle of continuous poverty. The Inter-American Development

Bank in highlighting the social conditions of the poor says, "Who are the poor? They are likely to be less educated and to work in the informal sector" (Inter-American Development Bank, 1998). One writer forwards a perspective that converges with that of the Inter-American Development Bank that access to higher education is the most basic ingredient in the reduction of poverty (NetAid, 2005). NetAid asks the question 'Why is education key to ending global poverty?'

Many writers have argued that education (i.e., formal education) increases one's scope and employability, and this experience improves income capabilities, perception of health care, promotes fewer children and opens one access to information. Access to education, therefore, provides its recipient with particular skills that she/he will harness in accessing resources that will change his/her socio-economic status. The benefits to education are far reaching. They extend beyond the person to the wider community that the individual will interact on an ongoing basis. In attempt to illustrate the benefits of education beyond the personal, NetAid cites that "increasing the number of children who finish school leads to economic growth, social and political stability, a decline in crime rates and improved social services" (NetAid, 2005). Again, poverty is embedded in the discourse of crime and violence as well as economic marginalization.

Studies have shown there is a high correlation between levels of schooling and levels of economic development (Oxaal, 1997). Nevertheless, despite the association that exists between the variables, the issue of causality is still inconclusive. Scholars have not concretized whether or not income growth causes educational expansion or vice versa. According to Oxaal (1997) 'human capital theory' asserts, "education creates skills which facilitate higher levels of productivity among those who possess them in comparison with those who do not" (Oxaal, 1997), which supports Sen (1979, 1981) postulations. From the 'human capital theory' education is a worthwhile expenditure as it creates capacity and skills which are needed to transform the productive space of a company, society or country. Levy (2001) found that among the urban communities with high crime and violence is low education, high drop-out from schools and high absenteeism.

Gibbison and Murthy (2003) in analyzing issues of irregular attendance in Jamaican primary school argued that a superior educated population is more productive, "with greater productivity leading to higher rates of economic growth". The benefits of education are not limited to the techniques of analyses and formal knowledge acquired on the environment or on socio-psychological issues but it includes health-seeking behaviour, national poverty alleviation, crime reductions and greater citizenry participation in the political process. From Gibbison and Murthy (2003), "In 1990 the major reason for school absence was economic for the 2 lowest quintiles, accounting for 44 to 74% of school absence". This finding highlights the disadvantaged position of the poor to attain or access secondary and by extension tertiary level education, which emerged in Levy's study on poverty and urban violence. It is due to the cost of attendance, general economic liveability and violence that retards urban poor residents from completing secondary schools and going on to tertiary institutions.

A critical component that is held against the poor in access formal education is affordability. From not having the financial resources to expend on necessities, the poor are even less likely to improve their human capital without financial assistance from institutions. An important determinant of educational participation in all contemporary society is money to which the poor are unable to find. Hence, with the increasing cost of education beyond the secondary level, the poor are marginalized and left on the outskirts of the tertiary level education structure. They, on the other hand, if are given loans and other income support schemes from organizations; they are able to compete with the children of middle-class families. According to the Senate Community Affairs References Committee, "Students from low income families are less likely to participate in higher education and the lower the income, the more unlikely the progression to higher education.

Buhmann *et al*. (1988), by means of cross-country information from a Luxembourg Income Study data base on 10 developed countries, and Coulter *et al*. (1992), using the United Kingdom Family Expenditure Survey data, both find associative relationship between inequality and poverty estimates within the context of household size and consumption. A study conducted by Meenakshi and Ray (2002) on 68,102 households in rural India, concurs with the findings of previous studies that an inverse relationship exists between household size and consumption. With the robustness of household size of the poor and the degree of material deprivation, they are then less likely to access secondary and so post-secondary education. This is primarily due to incapacitation and not ability or intellectual capacity of the people.

One of the components of poverty is high rates of unemployment and so it is highly probabilistic that the poor will reside within a particular geo-political zone due to financial constraints. The poor are more likely to live in low-income areas, slums, dilapidated building, within poor socio-economic surroundings, and in violent prone areas (Joseph Rowntree Foundation, 2000), which dates back to slavery (or the plantation economy) (Beckford, 1972). Statistics for Jamaica revealed that unemployment is highest among the poor and so is the lowest level of education. Poverty is not only explaining retarded opportunities and capabilities; it is associated with increased health conditions.

According to the WHO (2005) 80% of chronic diseases occur in low and middle income countries. The WHO stated that "In reality, low and middle income countries are at the centre of both old and new public health challenges" (WHO, 2005). The high risk of death in low income countries is owing to food insecurity, low water quality, low sanitation coupled with in access to financial resources. Poverty makes it insurmountable for poor people to respond to illness unless health care services are free. Hence, the people who are poor will suffer even more so from chronic diseases. The WHO captures this aptly "...People who are already poor are the most likely to suffer financially from chronic diseases, which often deepen poverty and damage long term economic prospects" (WHO, 2005). Again this goes back to the inverse correlation between poverty and higher level education, poverty and non-access to financial resources, and now poverty and illness. A study by Bourne found a strong correlation between poverty and illness in Jamaica (Bourne, 2009).

Powell *et al*. (2007), using probability sampling cross-sectional survey of 1,338 Jamaicans, found that the poor (ie. lower class) has the lowest self-evaluated health status, with the middle class reported the greatest health status. "In Jamaica 59% of people with chronic diseases experienced financial difficulties because of their illness..." (WHO, 2005). This goes to the previous findings that argued about the negative association between poverty and education, and poverty and tertiary education; and the positive correlation between poverty and illness. Poverty is not only eroding people's standard of living (i.e., economic wellbeing), it is directly associated with increased chronic and non-chronic illness and the challenges of one's inability to access health care services. This can be seen in a finding of WHO (2005), which indicated that in 2000, 65-70% of people who mentioned that they were unable to afford medication claimed that they were unable to afford it, suggesting that poverty retards the quality and productive of human capital.

The police as well as the general populace hold to the findings of the literature and the common sense notion of the strong correlation between poverty and crimes. Although Levy used a qualitative methodology, he argued about the correlation between poverty and gun violence, poverty and criminality and poverty and poverty and police brutality (Levy, 2001). In the same study, he outlined that "It would be a tragic mistake to believe; however, that the simple transfer of some physical resources will solve the problem [crime in urban poor communities]". He continued that "There is much more to the 'solution' put forward on that" (Levy, 2001). If poverty is causing crime and violence, why Levy forwarded the aforementioned argument? Simply put, poverty is not directly associated with increased crime and violence. In fact, this study found a strong inverse correlation between poverty and murder, which disagrees with the common sense perspective as well as those of Levy and other scholars that have previous stated otherwise. If many of the proponents of the strong direct correlation between poverty and crime, particularly murders, if they had examined the macroeconomic landscape of Jamaica would have realized that this could not have been the case as rural poverty is twice that of urban poverty, yet crime and violence is substantially an urban inner-city phenomenon (Planning Institute of Jamaica, 1988-2009).

The police force is a part of the political landscape, and it is increasingly called upon to address crime outside of the resources to address the phenomenon. There is no denial that police officers are engaged in civilian killings and corrupt practices (Robotham, 2003; Figueroa and Sives, 2003), and the utterance of urban poor people in inner-city communities that they are a part of the crime and violence have empirical remits. The police are called upon to reduce crimes, particularly murders, and in the execution of their duties, they are accused of excesses and abuses. According to Robotham (2003), "The 'hardcore' approach is also tolerant of a certain amount of police brutality. The notion here seems to be that in the inner-city context in Jamaica it is necessary to persistent harassment tactics and excessive force, even where no crime have been committed", which supports Levy's earlier study (Levy, 2001). The difficulty to solve crimes and the political pressure that are brought to bear on the police, sometimes sees crime being the focus at the cost of other lesser offenses. The fact that the crimes are committed mostly in urban inner-city communities, police is expected to immediately remedy and solve problems that extend beyond their capability. Nevertheless, the task of the police is to protect, serve and reassure which makes them accountable for increases in murders and their non-solutions.

In effectively to carry out the mandate, the police need not use common sense notions and previous studies that create a causal link between crime and increases in poverty as this is clearly not the case in Jamaica. This work has found that strong correlation between the increases in the annual exchange rate and murders in Jamaica. The finding of the present study revealed that 87.2% of the variability in murders can be explained by the change in the annual exchange rate. What does this represents? Anthony Harriott (2004a) was wrong when he postulated that material deprivation is not responsible for the high levels of murder, because the traditional natures of crimes are changing. Harriott (2011) opined that one half of the goods are affected by the exchange rate, suggesting that upward movement in the rate affects the cost of living. With the present findings that there is a direct strong relationship between the annual exchange

rate and murders in Jamaica, it means that general sufferings account for geometric increases in murders and not poverty. This work found that the elasticity of murder in response to annual exchange rate changes is an elasticity one, which denotes that for every $1 change in annual exchange rate, this will result in on average a 1.65 change in murders. Simply put, on average almost 2 Jamaicans will be murdered at the of an end years for every $1.00 upward movement in the annual exchange rate.

Levy (2001) found that economic hardship in his work, but because of the prevalence of the notion of poverty in the literature, he misread the findings and labelled it poverty. In Levy's study, the participants argued that:

- Cost of living is extremely high
- Economic pressure
- Unemployment is high as well as the human sufferings that are associated with it
- Little money
- General survivability is difficult
- Economic frustrations accounted for crimes in urban poor communities

The emphasis of economics was no pronounced in Levy's research that wrote "Along with people from other areas [communities study] they point to a direct link between unemployment and crime, to the economic pressure driving violence" (Levy, 2001). In the aforementioned quotation, the Horace Levy bold the following work 'economic pressure driving violence' and in another sector the words 'cost of living', which outlines the catalyst for the increased criminality. To support the findings that emerged from Levy (2001), murder increased by 5% compared to 2008 (and that murders were the highest in the 4 decades in 2009, 1680 Jamaica) during this time, unemployment increased by 7.5%, the annual exchange rate increased by 21.1%, the nation was experiencing an economic recession (GDP declined by 12.2%), remittance, which is source of income for many Jamaicans, particularly inner-city people, fell by 11.3% (Ramacon, 2011; Bank of Jamaica, 2010a). In that same period the percentage of Jamaicans reporting an illness increased by 21.8%, suggesting economic hardship had translated into lowered health status.

In 2010, a study by Ramacon (2011) found that 52% of Jamaicans who received remittances had reduced amounts since the recession in the US. Eighteen percent of remittance inflows were used for food (18%), education (14%), utility (19%) and medical expenses (7%). The Bank of Jamaica commissioned study revealed that the majority of remittances were received by unemployed Jamaicans (24.3%) followed by self-employed people (12.1%), students (8.4%) and retirees (4.4%) and that inflows were mostly from United States (62%) (Ramacon, 2011). The macroeconomic indicators such as inflation, poverty, exchange rate, GDP per capita during the decades of 2000 had destroyed the human capital of Jamaicans much so that increased mortality and murders were consequences of the economic climate. The economic climate (CaPRI, 2008; Kirkpatrick and Tennant, 2002; Stennett *et al*., 1998; Downes, 2009; Peart, 1995) had set the stage for the murderous place that the country has become, and economy that is falsely based on pyramid-driven schemes, high interest rate, lost money, lowered remittances (or income), high unemployment and significant increases in cost of living will see rise in murder and mortality. The fact that the economic environment in Jamaica over the last decade (2000-2010) has seen double unemployment (average unemployment rate =10.6%), with unemployment being direct correlated with illness (or ill-health); the economic climate is both 'bad' for health and life, which supports McCaw-Binns *et al*. (2002) that violence is bad for health.

Within the context of the aforementioned findings, it is a common sense notion that the decline in murders by 15% in 2010 compared to 2009 should be ascribed to the strategies and changes in the hierarchy of the Police Force. This answer must be germinated from the findings instead of adding another common sense rationale. In 2010, the prevalence of poverty increased by 23% compared to 2009, but murders fell by 15% which supports some other explanation instead of poverty. Again, poverty is not the explanation for the increases in murders in Jamaica, and this common sense argument must be dispelled and laid to rest. In 2010 compared with 2009, the nation was out of the economic recession (with GDP increased by 3.1%), the exchange rate declined by 4.7% as well as inflation by 17.1%, remittance inflows began increased by 9.7% (Bank of Jamaica, 2010a), which means that economic hardship had dissipated and there was a general betterment of wellbeing. In 2004, Harriott (2004b) opined that "The police have sought to take credit for this decline [in general crimes]" which could be equally argued for the decline in 2010 compared to 2009. The improvement in economic wellbeing of Jamaicans accounts reduction in number of murders, and not to any strategic (or otherwise) plan of the police.

The current findings make an argument police's initiatives accounting for the reduction in crimes difficult to proof and that the common sense explanation of poverty should be ascribed to the overall changes (upward or downward) in murders. Since, the poverty gap between those who resided in rural and urban areas has continued unabated with there being some fluctuations in each year compared to the previous one (Planning Institute of Jamaica, 1989-2010; Planning Institute of Jamaica, 1989-2010). The greater prevalence of poverty in rural areas is not atypical to Jamaica as other writers have noted this in

other societies (Fields, 1980; National Bureau of Statistics, 2002; National Bureau of Statistics, 2002). In Jamaica (1995-2004), the incidence of rural poverty was about 37% compared to urban poverty which was 15%. In the same period, the incidence of rural poverty was greater than the national poverty (27%), and the incidence of semi-urban poverty was 23% (Planning Institute of Jamaica, 1989-2010), with annual murders being 780 compared to 1680 in 2009 when rural poverty was two times that of urban poverty. Disaggregating the murder statistics for Jamaica by typology revealed that most of the cases were in urban inner-city community, with crimes increases (including murders) in years when there are national economic hardships (downturn including remittance inflows and high cost of living). "Poverty is not just an economic condition: the lack of daily necessities-of adequate food, water, shelter, or clothing. It is the absence of the capabilities and opportunities to change those conditions" said the Inter-American Development Bank (1998), which is not explaining the murder. Fields (1980) found "the highest incidence of poverty is among farmers and/or farm workers [from rural zones]", which is equally the case in Jamaica. One additional description of farmers in Jamaica is mostly older people. The statistics showed that this cohort of people is not the ones committing the crimes (JCF, 2011) and that they should not be labelled criminals because of poverty.

Crime-Poverty is substantially an urban area phenomenon, particularly inner-city communities, and this should not be labelled to the general society. Urban inner-city areas require educational, financial, cognitive and social transformation in order to address in the high prevalence of murders and other crimes that are therein. All the structural inadequacies in urban inner-city areas is titled poverty, and it is this loose conceptualization of poverty gets all the demonizing argument for things within those areas. Because the poor are more preoccupied with issues of survivability as against education, the social inequalities and immobility that exist in the nation will continue as the poor are highly likely to be caught in a cycle of persistent poverty, marginalized by the social structure, abused by state agencies (including the police) and the stereotype of criminals are assigned to them, without an understanding of their dreams, objectives, goals and mission for life. It is established that marginalized poor geo-political areas in Jamaica are those frequently experiencing murderous crimes (Harriott, 2004b); but should poverty be labelled as its causes and consequences?

In periods in which there is a general decline as indicated by macroeconomic variables such as unemployment, economic growth and the exchange rate, murder increases geometrically beyond other periods. An example here is in 2004 compared to 2003, when unemployment grew by 20.6%, the GDP per capita growth declined by 66.7% and the exchange rate depreciated by 5.9%, murder increased by 51% which as the greatest since 1989. In the mid-1990s, when the economic experience the financial crisis, according to the International Monetary Fund (IMF), "Public debt [for Jamaica] increased substantially after a banking crisis in the mid-1990s and currently stands at 128% of GDP, despite a program adopted in 2004 to reduce it to around 100 % of GDP by 2009" (IMF, 2008). In addition to the public debt, annual murder grew by double digits excluding 1998 compared to 1997, when murder grew by 8%. The mid-1990s was a period of economic recession and murder, excluding 1999 when the there was economic growth and a lower of the murder rate (by 11% compared to 1998). Robotham (2003) had identified the role of economic and crime, when he opined that "...the only long-term sustainable solution to the violent crime problem in Jamaica is the recovery of the formal economy" (Robotham, 2003). He continued that "The government must embark on a programme, however limited, of formal economic activities in the inner city" (Robotham, 2003). Failure to recognize the importance of the relationship to economics and murders as well as other crime will not abate the problem; instead we will continue to argue about marginal reduction in murder statistics that are in triple digits.

One of the indicators of the socio-economic conditions with a society is the Gini coefficient. The Gini coefficient measures the income inequalities in a nation among the social strata. A Gini coefficient of 0 indicates no inequality and the closer it is to 1, the greater is the inequality among the social hierarchies. In 1999, Jamaica and Uruguay had the lowest Gini coefficient (0.41) among Brazil, Ecuador, Guatemala, Mexico and Peru, which is lower than that for Latin America and the Caribbean (Suarez-Berenguela, 2002). The value for the Gini coefficient for Jamaica suggests that there is a wider disparity in income distribution among the social classes in society, although comparatively to other Latin America and Caribbean nations it is better. The income disparity in the society explains many of the social dissimilarities, including housing quality, physical milieu, access to quality health care and other resources, education, exploitation, marginalization, choice of abode and household size.

A stratified probability survey of 1,595 Jamaicans aged 18 years and older was conducted by Boxill *et al.* (2007) who found that 0.8% of respondents owned most of wealth and 69 out of every 100 participants had at most secondary level education. The maldistribution of income accounts for social disparities within the society-educational attainment, training, infant mortality and health care utilization differences. There is empirical evidence to support the fact that the poor have a greater

burden of disease and less access to health care services (Casas *et al*., 2002), and that mothers with at most primary level education are more likely to be poor as well as have more pregnancies (Wagstaff, 2002).

A study in Canada revealed that among people of different socioeconomic background (richest 20% and poorest 20%), that the difference in life expectancy was 6.3 years and 14.3 years for disability-free life expectancy (Pate, *et al*., 2002). Economic disparities in Latin America and the Caribbean like in Canada account for more than the social disparities to the differences in life expectancy. Pate and colleagues found that 60% of the national income within the region was earned by 20% of the richest in the population (Pate *et al*., 2002) indicating the relevance of using income inequality along poverty in examining social and health inequities (van Doorslaer and wagstaff, 2002).

Among the disparities which emerged from income inequalities in Jamaica is the access to particular typology of health care services. Higher-income Jamaicans demand high end private health care services, while lower-income individuals use the public health care facilities (Van Doorslaer and Wagstaff, 2002). Embodied in this finding is the how money is used to purchase health services before the socioeconomic hierarchy, which was also found in Brazil (Savedoff, 2002). The income inequality affords better health care products, and Savedoff (2002) went further to say they enjoy greater health than the poor. It can be extrapolated from Savedoff's work, that money can buy better health. This perspective was established in the literature by Smith and Kington (1997) who opined that money can buy good health. Such a theorizing would support greater health among the rich than the poor, but this is not the case in Jamaica as self-reported illnesses were greater for those in the upper than the lower income groups (Theodore *et al*., 2002). In fact, diabetes mellitus was 1.7 times greater among those in the richest 20% compared to those in the poorest 20% (Theodore *et al*., 2002).

Changes in the Gini coefficient, therefore, are a good assessment of social inequalities, marginalization, exploitation and disadvantage of particular groups within a nation. In 1958, the Gini coefficient for Jamaica was 0.58, which fell to 0.46 in 1977 (Banskota *et al*., 1987). The income inequality among Jamaicans seem to be relatively consistent since the 1970, which was in the general area of 0.42-0.45 (Gini coefficient - Bourne, 2008; King and Handa, 2000). The relative stability in the income inequality in Jamaica represents the difficulty with which someone is able to transcend social classes. Simply put, bad housing, poor education, unaffordable health care, low wages, exploitation and fear, sub-standard nutrition and physical milieu are highly lively to span the individual's life time. Gordon and Stone had already established the difficulty for an individual to social mobilize from one social class to another in Jamaica, despite seemingly an opportunity opened society.

The reality is capture fully in the income distribution among the social hierarchies, and how such maldistribution of economic resources is a determination of social opportunities (or social exclusion). Banskota *et al*. (1987) showed that 1.2% of the income is earned by those in the 10% decile compared to 35% of those in 90th decile (in 1977). Although in 1958, those in the poorest decile (10%) was earning 0.6% and those in the 90th decide 44% of the income, the amount of the income that was distributed to the other deciles remained relatively the same. Clearly the income inequality has not fundamentally change for the better among those in the poorest income group and the relative stability in the income distribution (Gupta, 2003) emphasizes how income inequity bars people from social mobility in Jamaica. There are minimal social mobility and class changes, but in general, the status quo remains intact and the marginalized continue to hold their position despite efforts to change it. Gordon's postulation is worthy of repetition, when he opined that "The fundamental issue which researched into social mobility in Jamaica must confront is the paradox of large scale social mobility generated by the opening up of new positions coexisting side by side with gross and, perhaps, even widening inequalities of opportunity between the minority at the top and majority at the bottom of the social order" (Gordon, 1987).

Outside of the macroeconomic variable(s) and murder, there is a positive correlation between murder and mortality. The findings from this research revealed that 24% of mortality can be explained by changes in murder. Using the econometric function derived from the data, it is clear that the relationship between the murder and mortality is highly responsive one. Based on the exponential function, on average, a 1% change in murder in Jamaica will result in a 1.1% change in mortality. This result highlights that while murder is an incremental part of the composition of mortality, the mortality statistics should not be used in a discussion of murders as this figures a fictitious view of the extent of murder on the populace. As mortality is primarily an age, disease and time phenomenon than a murder issue. Computing deaths for particular age cohorts from the mortality statistics of Jamaica (from 2002-to-2008), it was revealed that on average about 60% of deaths occurred at 60+ years and 70% 50+ years (Statistical Institute of Jamaica, 1987-2011), suggesting that mortality is an age, disease and time phenomenon and not a murder matter. Such findings provide clear clarification that murder and mortality statistics can be used interchangeably on inquiry on a particular issue-murder or mortality.

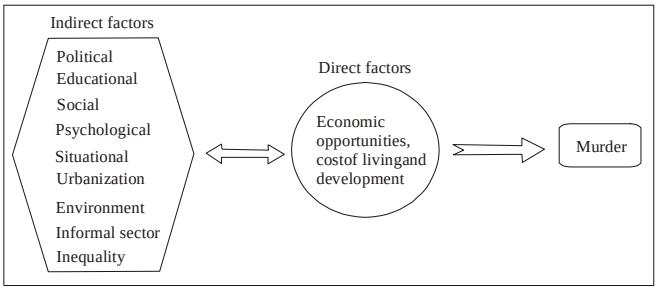

Fig. 10: Classification of factors of murder

Plethoras of factors have been established in the literature as causing crimes (including murders). These factors are poverty, demographic, economic, political social, environmental, urbanization, cognitive and growth in the informal illegal sector. (Harriott, 2004a, b, Robotham, 2003; Headley, 1994; Levy, 2001; Ellis, 1992; Simmonds, 2004; Tremblay, 1995; Clarke, 1995). Don Robotham aided the discourse on the causal factors of crime, when he opined that the use of the terminology background factors (demographic, economic, political and social factors) would suggest the issues cannot be addressed 'now '(Robotham, 2003). Based on the findings that emerged in this work, the researcher is forwarding the classification of direct and indirect determinants of murder (Fig. 10). This paper is proposing that economic factors (economic opportunities and development) have a direct causal influence on murder, and that the other factors (demographic, inequalities, political, urbanization, and psychological) are indirectly influence murder. Urbanization, the rise of the informal sector (underground economy), informal settlement ("squatter communities"), international migration, persistent and long levels of unemployment is all due to economic opportunities and development (or the lack) in the society. The notion expressed in Levy's study that "The observation was made in one community that there was currently less violence because many young men were working on a nearby large piece of construction. The belief was that once that work ceased, violence and crime would resume" (Levy, 2001) is simply economic opportunities and development (or the lack) and not poverty or seasonal unemployment. Hence, this justifies the inverse relationship between economic shock (or recession) and murders in Jamaica.

There is documented evidence of the causal link between poverty and murder (Robotham, 2003; Tremblay, 1995). This study found a bivariate correlation (or association) between poverty and murder, which disappears when other macroeconomic variables are entered simultaneously in a single model. Such a finding denotes that there is a spurious relationship between the two variables. With this result, no causality can be established or ascribed to poverty and murder in Jamaica as no relationship really exists between the two concepts. Selltiz *et al*. (1959) forwarded conditionality that must be met before causality can be established. These are:

- Concomitant variation or covariation between the dependent and the independent variables
- Temporal asymmetry or time ordering between the variables in condition 1
- The elimination of other possible causal relationship between the variables (Blalock, 1964)

With no real relationship existing between poverty and murder in Jamaica, when pertinent variables were included into a single model, the variables eliminate any probability of causality between poverty and murder, and the differences between the relationship and causality can be further examined in the works of other scholars (Blalock, 1964; Selltiz *et al*., 1959; Simon, 1957). The murder epidemic that has in sighted fear of criminal victimization has it genesis in the decade of the 1980 following the change in the economic base of many Jamaicans. Structural adjustment in the 1980s, created economic downturn, disrupted the economic climate, many people were displaced from their jobs, homes, incomes, and human suffers was widespread. This was not merely poverty that affected a few, it was massive economic downturn, displacement and economic misfortune that had over many. Then, in the 1990s, the World Bank began expressing concerns about the negative effects of structural adjustments (Rapley, 2002), when it had already set roots in developing nations, created exponential displacement and the human sufferings accounted for the shifts in geometric rise in murders in the 1980s compared to the 1970s. The legacy of structural adjustment in Jamaica has left with it murders, and not the intended effect of improving the economic base of the nation.

One scholar aptly summarized the effect of structural adjustment, when she postulated that "For some Regions,

notably Latin America and some countries in the Caribbean, the 1990s is regarded as a lost decade precisely because of the absence of economic growth and significant reversals on the social front" (Melville, 2002). Melville omitted that the 1990s murders began its upward unbridled movement in the region, especially in Jamaica as human suffering intensified and people sought alternative economic opportunities. The human suffering, displacement and economic misfortunes following structural adjustment are well document in the literature (Melville, 1996; Paul Cheng Young and Associates, 1986). The period is known for increased poverty, inflation, and economic downturn in the region and in 1980s in which was the murderous year in the period of the 1980s, Jamaica's economy declined by 5.7%. The human suffering did not begin in 1980 as economy experienced recession from 1974-to-1980s, with the exception of 1978 when there a positive economic growth. For years people were undergoing economic displacement and the structural adjustment policies made this worse. Clearly there is a time lag effect that materializes itself in decade of the 1980s in the form of murders. In the decade of 2000s that saw murder once again soaring compared to the 1990s, this time the economy had experienced banking and financial crises and economic recession (1996-to-1999). During the economic recession of the 1990s and financial crisis (Kirkpatrick and Tennant, 2002; World Bank, 2003), outside of the exponential rise in public debt and financial woes, in 1997 the economy declined by 2.4% compared to 1996 and this was the first time in the nation's history that murders increased to four digits (1,037 lives). Although the society was undergoing economic recession (from 1996-to-1999), there was economic improvement in 1998 and 1999 compared to 1997. In 1998 and 1999, the murder statistics declined to triple digits which are associated with the economic improvement in the lives of Jamaicans. In 2004, murders once again rose to quadruple digits signalling economic issues. The influx of Ponzi schemes began experiencing financial problems in the late 2004, the regulatory body was called in and a 'Cease and Desist Order' was issues in 2006. A study conducted by CaPRI (2008), of the 400 respondents, revealed that 73% of them indicated that they were better off from investing in AISs, and that the returns were mostly used for daily expenses.

A large number of investors in these schemes had come to terms with the possibility of losses and was not looking to the government for any bailout. Notwithstanding, there were those investors who were not aware of the possibility of losses and when the collapse occurred suffered a devastating blow. These were the same investors who had sold assets or invested their total life's savings and were not in a position to absorb this kind of loss (CaPRI, 2008). There were other investors who acquired loans as a means of investing in these schemes and after the collapse still had a loan payment to make after losing the additional income that came from the schemes. Although these individuals could not be defined as poor, destitute, economically vulnerable or impoverished by the economic climate, the FSC cannot close its eyes to the plight of some Jamaicans because seemingly their actions were careless and not warranted that decision (FSC, 2003). Here is a reality that some people knew of, and their decision to invest could in preparation of the future economic fallout.

Two captions in The Jamaica Observer (Friday, April 18, 2008a, b) read "Economic storm on region's horizon [Barbados and wider Caribbean]" and "Brace for economic fallout, region's banks told" (The Jamaica Observer, 2008a). Yes, in 2007, Jamaicans were forewarned by the International Monetary Fund to be mindful of unregulated investment schemes (Jamaica Gleaner, 2007), but this advise did not come with alternatives. The majority of depositors in the alternative investment schemes were at most moderate risk takers, suggesting that there in not a high appetite for risk but that there were no alternatives that could provide the substituted income to meet some of their daily expenses. Such a reality explains yet another economic crisis. Although there were earlier warnings of the likelihood of collapse of AISs (The Jamaica Observer, 2008b), the economic climate had fuelled the proliferation of these Ponzi schemes and their demise coupled with the recession that emitted from the United States (Downes, 2009) were justifications for the high murders in late 2000. Murders, therefore, are fundamentally an economic issue that is outside of the poverty perspective.

CONCLUSION

In order for the Jamaican Police Force to effectively implement measures that can reduce crimes, particularly murders, it would require the holistic efforts of other stakeholders including social workers, governments, financial institutions and funding agencies (World Bank, United Nations, Bank of Jamaica) that are geared toward general economic improvements. As any strategic framework by the police force to eliminate crimes, particularly murders that are void of economic transformation (betterment for the lower class) will be highly ineffective interventions. Murder is a function of the macroeconomic conditions, and strategies to reduce this phenomenon cannot treat the symptom and not the cause.

Murder is highly responsive to changes in the exchange rate as an incremental percentage change in the annual exchange rate (1%) will result in a 1.65% change in the number of murders committed in a year. It follows

that the exchange rate which influences the prices of many goods and services in Jamaica to the point where it not only indicates movements in the cost of living, it also offers insights into the murder statistics. The common sense notion that poverty is responsible for increases or a high murder figure in Jamaica is absolutely erroneously as the empirical evidence provides a refutation of this explanation. Another matter that must be highlighted in this work is that the police should be cautious in accepting the credit for the lowering of the murder rate in 2010 compared with 2009 as this may be less attributable to their strategic initiative, change in leadership and other exogenous factors. While the aforementioned issues were occurring in the society simultaneously there was the upturn of the economy (improvement in the GDP), increases in income from remittances, lowering of the exchange rate, lessening of the cost of living owing to the lowered dollars and its effect on prices, which translate into economic betterment for all including those in inner-city areas. While the initiatives of the police would influence the murder statistics, such efforts are miniature in comparison to the macroeconomic improvements in the living standards of people in the nation. The strategic efforts of police must be coalesce with economic programmes to alleviate (or reduce) economic hardship. Otherwise, all the planning, execution and efforts of the police will be futile as was the case in the past when they were unable to address the demon of murder. Politics (or politicians) must aid the efforts of the police by improving the general wellbeing of the populace, particularly those in inner-city communities. Economic betterment is, therefore, linked to murder reduction in the nation. Embedded in the findings of this work is the needed socio-economic and political transformation (including empowerment, employment, worth, self-esteem, social opportunities, education, economic interdependence, improved physical structure), of inner-city communities in order to effectively lower crimes, particularly murders, to less to triple digits.

The socio-economic marginalization of many people accounts for high murders in Jamaica The police needs to understand that while they seek to execute their duties, in marginalized communities (and this they should with fear or favour), their purpose should not be to belittle people who are already frustrated, despondent and hopeless as this will fuel rage and highly likely to result in murder in order to be noticed. Like Levy (2001) opined "For community people the role of the police is an important issues" and this cannot be discounted, undervalued, forgotten and withdrawn from inner-city communities. Albeit it appears that strategies from the police have not significantly curtailed the high murder rates in Jamaica, this study provides a platform for an understanding of the murder phenomenon and how its reduction requires a multi-agency approach. One of the potent issues which emerged from this study is money (financial resource) happens in the reduction of murders, and a good economic climate holds the key to the lowering of the murder rate. Hence, in period of economic recession, reduced remittance inflow, increased cost of living, and higher exchange rate, the police should be cognizant of their role as particular actions taken by them can result in increased murder. In economic crisis (including financial), the police should offer mediation through community leaders, community policing, social integration with other stakeholders, show respect for the people in inner-city communities, restraint from physical and psychological abuse of citizenry, and offer fair and unbiased justice in disputes. In the event they are unable to 'spit justice' between conflict parties, take in a reputable conflict resolution agency or expert and work alongside this body or individual to settle disputes.

During periods of economic downturn, increased cost of living, high (or hyperinflation), depreciation in exchange rate, lowered remittance inflows, high and persistent unemployment, policy practitioners (including the police) need to be careful their actions do not fuel increased murders because of the economic frustrations faced by people. Those periods require soft policing (community policing), self respect building, positive imaging, counselling, good mediation skills, zero tolerance to police abuses and excesses (including brutalizing citizenry, irrespective of their geopolitical abode), be more visible in communities, and have police-citizen work days in which officers and community address physical environmental problems. Despite the aforementioned actions, these will be futile without the aid of financial, political and other stakeholders investing in the citizenry of inner-city communities during periods of economic downturn. Simply put, a complex problem requires a multidimensional solution that cannot be solely lelt to the police. Apart of this crime monster in Jamaica is inherent in the social injustices and economic inequities that continued following slavery, which have not be adequately remedied, a band approach has been used to address a haemorrhage and the police are called upon to solve an issue that is outside of their ambits. Like Levy (2001) said "…these inputs have not been sufficient, so far at least, to turn the tide of violence, which has flourished on a serious scale" (62), suggesting that nexus of crime has roots that unmet by the social institution of the society. The wider institutions, including politicians, have failed the people and the murder problem should not be left to any single agency that cannot transform the economic base of the people they seek to serve.

Writing the 'Forward' in Horace Levy's monograph, Barry Chevannes opined that "… the current responsibility of both politicians and the business class in not dealing with the economic and social conditions fostering gang formation and crime" ((Levy, 2001), which highlights a growing neglect that has long standing roots

to the plantation economy (Beckford, 1972; Gordon, 1987; Stone, 1980, 1987). The police are called upon to solve a problem that is beyond their capabilities and resource allocation, and it is this pressure that leads to brutality, homicides and disrespect for the 'served' in their motto. Although Levy's study used an exploratory methodology, which denotes it inability to establish causation, the theme that emerged in the work was economic deprivation (low unemployment, little or no money, high cost of living, economic pressure, human suffering, and economic frustration) that is mistakenly classified as poverty. With between 52-61% of remittance inflows come to Jamaica being from the United States (Bank of Jamaica, 2010a, b), the improvement in the US economic explains the increased income inflows to many Jamaican families which despite the rise in unemployment and poverty in 2010 coupled with the fall in inflation and exchange rate and the rise in GDP per capita meant that the economics of living was better than when the recession occurred in the US. This work has found that economics accounts for the rise or fall in murders in Jamaica, and the police should not ascribe to themselves the fall in any period.

In summary, this study is not wholesalely arguing that the efforts of the police have no positive influence on the reduction in crime as examining the clear up rate for murders which according to Anthony Harriott rose from 35 to 61% (Harriott, 2004b), would suggests that this is so. However, the efforts of the police are minimal in changing the murder pattern and so they should be cautious in take the credit for the decline in murders. The answer is neither in temporary employment nor poverty alleviation, but in real and sustained economic opportunities. Jamaica's murder problem will never be effectively lowered to double-digits, until the society address the economic inequities and inequalities that are inherent in the system as the macroeconomic environment is a direct cause of movements in murders as well as other crimes. Those have been overlooked with each generation and the police are given the difficult task of curing the symptoms, while the causes are left unaddressed. The findings of this work are far reaching and should be used to guide policy formulation as we now have a better understanding of the murder phenomenon from an empirical perspective.

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