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Original Article

Health Management & Policy Section

The Influence of Violent Crimes on Health in Jamaica: A Spurious Correlation and an Alternative Paradigm

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ABSTRACT

Background: The discourse on crime and health in Jamaica is devoid of the influence of violent crimes on the nature of the health. The discourse on health recognizes that violent crime is a cause of mortality; however, health researchers have paid limited attention to this area, despite the fact that annually murders have taken more lives than HIV/AIDS.

Objectives: The objectives of this study were to test the hypotheses that 1) violent crime directly influenced the health status, 2) the correlation between violent crime and health was a spurious one, 3) other selected macroeconomic variables influenced the health status of Jamaica, 4) explained the model illness rate 5) established a number of violent crime equations, and 6) explained the cyclical distribution of the illness rates.

Methods: By using 21 years of data which were collected from different publications of the government departments in Jamaica, this study utilized different econometric techniques to carry out the data analyses.

Findings: On seeking to reduce the specification errors, this work found that there existed no real relationship between violent crime and the illness rate, and that the illness rate was a function of 1) health care utilization, 2) unemployment and 3) GDP.

Conclusion: The positive correlation between GDP and the illness rate in Jamaica suggested that health policies should be planned differently in the periods of growth as against the economic downturn.

Key Words: Illness, Health condition, Health, Macroeconomic variables, Violent crime, Unemployment, Jamaica

INTRODUCTION

Jamaica is among the top 10 most murderous nations in the world. Harriott opined that "In 1977, the rate of violent crime was 758 per 100, 000, but by 1996, it had risen to 958 per 100, 000" [1], suggesting that violent crimes were increasingly affecting more Jamaicans. A twenty-six per cent rise in violent crimes over 19 years, averaging 1.4 per cent, annually appears to be low, but the compounded effect and the consequences have affected significantly more people. In 2007, a study which was conducted by Powell and his colleagues summarized the extent of the current crime problem in Jamaica, when they found that crime and violence were rated as the number one national problem and that 9 out of every 50 Jamaicans indicated being assaulted in the last 12 months [2]. The fear of victimization is even greater among the Jamaicans (2 out of every 5) than the incidence of violence [3]. The crime phenomenon continues to adversely affect Jamaica; in 2004, the country had the highest murder rate in the Caribbean [4].

The World Bank published a report that compared the murders in Jamaica to those in New York. It found that:

> Between 1998 and 2000, according to the police reports, drug and gang related murders accounted for an average for 22 percent of the total murders. Domestic violence represented about 30 percent of the total murders. The rising severity of the murder problem in Jamaica was highlighted by comparing it with that in New York, a high crime city – while both Jamaica and New York experienced similar rates of murders in 1970, Jamaica's murder rate had increased to almost seven times that of New York's by the year 2000 [5].

The comparative crime statistics from the World Bank highlighted the human suffering and the loss of human capital, and it spoke of a psychological fear of victimization that had crippled Jamaica since the 1980s. The problem of crime in Jamaica warrants more investigations to understand the phenomenon [1, 3, 5-8]. The World Bank sponsored a large scale study on crime in Jamaica in 1996 [9]. However, despite the efforts of various institutions, individuals and agencies for understanding and addressing the crime problem in Jamaica, the phenomenon continues unabated and largely unresolved.

Harriott, a Caribbean criminologist who has contributed significantly to the field of crime studies), opined that Jamaica's crime problem began in the 1990s and that the two most pressing issues that were destroying the lives of Jamaicans were HIV/AIDS and the incidence of crime [10]. HIV and AIDS have been widely studied in the health field in Jamaica [11] because it is recognized as a pandemic. However, annually, violent crimes take more lives than HIV or AIDS; yet, violent crimes and their influence on the general health status have been sparingly researched on in the Caribbean region, particularly in Jamaica [12]. This sentiment was echoed by the Sonia Jackson, Director of the Statistical Institute of Jamaica in 2008, who contended that "There is a need to understand the contributory factors that lead to criminal and other violent behavioural practices" [13] and the association between crime and health, among other social indicators. Violent crimes like HIV and AIDS should have been studied in the health sector decades ago, as the phenomenon has now reached an epidemic status.

Statistics illustrate that the crime problem in Jamaica, by using murders, stood at 438 cases in 1989, and in 2010, it had increased

markedly by 225.3% [14]. Many studies have been done on the social determinants of health in the Caribbean, particularly in Jamaica [15-20], but none has included violent crime as an independent variable. In Latin America and the Caribbean, many studies on health issues including poverty and inequality have been done [21-24], but violent crime has not emerged as an independent variable. Marmot had studied the influence of income on health [25] and there is no doubt that violence affects the income. So, the time has come for researchers to evaluate the role of violent crime on health in Jamaica. While forwarding a list of the determinants of health, Longest [26] identified the social environment. Among the issues which were identified was 'law enforcement', suggesting that criminal activities should be included as a health determinant.

The World Health Organization and some scholars have joined the debate on the social determinants of health since the late 2000s [27-29]. Their contributions have aided the health landscape, but none of the works have identified violent crime as an explanatory variable (or factor). Longest, Jr. [26], while writing on 'health policy making in the United States', forwarded a conceptual perspective that included the social environment as a health determinant. Although Longest, Jr., did not directly speak about crime being a part of the social factors, it has been implied in his analysis. Crimes emerge from the social behaviour. Violent crimes are a social epidemic in the Latin America and the Caribbean [4, 30], particularly in Jamaica [1, 3, 7-9, 31]. An investigation of this phenomenon from a health perspective is lacking.

The reality is violent crimes must be considered as a modern epidemic which requires the involvement of epidemiologists, health demographers, as well as researchers from disciplines such as criminology and political science. Grossman, by using econometrics, developed a health model which provided explanatory factors on the variability in the health outcome [32]. Grossman did not include crimes among the determinants of health [32] and Smith and Kington [33], who expanded on Grossman's work, also did not include crime.

Researchers have found that violence explained 15% of the variability in childhood asthma among the neighbourhood children in Chicago [34]. The literature does not cease there, as in 2002, the Editor for Health Promotion International lamented that in 15 years, an originalresearch was never published in the journal on the effects of violence on health [35]. The violence and health issues are a longstanding one and in 1996, the World Health Assembly forwarded that violence was a major public health phenomenon [36]. Even so, the Caribbean still lags behind in the violence and health discourse. An article which was published in the West Indian Medical Journal on the violence in Jamaica, recognized the social challenges of violence in Jamaica, its public health consequences and the challenges that were brought to bear on the public health profession in an effort to do more in the 'area of violence prevention' [37].

The rationales for this study were based on a statement which was made by Dahlberg and Krug "a rigorous requirement of the scientific methods with its four key components are needed" [38], the call by the Director of the Statistical Institute of Jamaica and the paucity of empirical inquiry on the matter of *health crimes* in Jamaica. Consequently, the objectives of this study were to 1) determine whether violent crime directly influenced the health status, 2) establish whether the correlation between violent crime and health was a spurious one, 3) indicate the other selected macroeconomic variables that influenced the health status of Jamaicans, 4) determine the model illness rate function 5) establish an equation for the number of violent crimes, and 6) explain the cyclical distribution of the illness rate. Multiple linear and non-linear techniques were used to examine the data which were collated from the Government of Jamaica publications of various years (1989–2010).

Econometric Model

By using econometric analysis, Grossman [32] developed a theoretical and empirical framework that was used to establish many independent factors which simultaneously influenced a single dependent variable. Then in 1997, a group of academic researchers (Smith and Kington) expanded on the early work of Grossman. Grossman's model outlined that the health demand was a function of the different determinants, which are given in (Equation (1)):

$$H_t = f\ (H_{t-1}, G_o, B_t, MC_t, ED) \quad ...(1)$$

In which the H_t is the current health in the time period t, stock of health (H_{t-1}) in the previous period, B_t is thesmoking and excessive drinking, and good personal health behaviours (including exercise – G_o), MC_t, is the use of medical care, education of each family member (ED), and all the sources of the household income (including current income). Smith and Kington's [33] expanded model included other socioeconomic variables that were not identified by Grossman's early model (Equation (2)).

$$H_t = H^*\ (H_{t-1}, P_{mc}, P_o, ED, E_t, R_t, A_t, G_o) \quad ...(2)$$

Like Grossman, many other scholars have employed econometric modelling to study health [33, 39], health service utilization [40, 21] and illness [41]. Although it may appear outdated to operate health by way of illness, one scholar found that this was still a relatively good proximity for objective health (life expectancy) in 2009 [42]. The principles in the econometric analyses allow the examination of many possible variables on a single dependent variable. The type of data is normally what makes the difference in the model, logistic, multiple, probit or hierarchy regression. Wanting to establish the influence of particular independent variables on an outcome variable, based on the data, we employed ordinary least square regression (OLS) to determine the parameters which are linear, but the variables are not (Equation (3.1)). This established an illness function with violent crimes and health care utilization (Equation (3.2)).

$$I_t = \alpha C_t^{\beta}{}_1 HSB_t^{\beta}{}_2 + e_t \quad ...(3.1)$$

where I_t is the illness rate, C_t denotes the number of violent crimes, HSB represents the health care utilization, e_t is the error term and t equates the time, t = 1, 2, ...,21

$$\ln(I_t) = \delta + \beta_1 \ln(C_t) + \beta_2 \ln(HSB_t) + e_t \quad ...(3.2)$$

where $\delta = \ln(\alpha)$

The illness function in Equation (3.2) was expanded to incorporate unemployment (Equation (3.3)):

$$\ln(I_t) = \delta + \beta_1 \ln(C_t) + \beta_2 \ln(HSB_t) + \beta_3 \ln(U_t) + e_t \quad ...(3.3)$$

where U_t represents unemployment

The illness function in Equation (3.3) was expanded to incorporate GDP, and the equation was modified to exclude violent crime (Equation (3.4)):

$$\ln(I_t) = \delta + \beta_1 \ln(GDP_t) + \beta_2 \ln(HSB_t) + \beta_3 \ln(U_t) + e_t \quad ...(3.4)$$

where U_t represents unemployment

The model illness rate over time (1989-2009) was calculated by using the data (Equation (4))

$$\text{Illness rate} = \alpha + \delta X_t + \omega X^2_t + \gamma X^3_t \quad ...(4)$$

Where α is a constant, ω, γ and δ are the parameters of each variable and X denotes the variable t, where t= 1, 2, 3,...,21

Equation (5) expresses the number of violent crimes in Jamaica over time (1989-2010):

$$\text{Violent Crime (Number)} = \alpha + \delta X_t + \omega X^2_t + \gamma X^3_t \quad ...(5)$$

Where α is a constant, ω, γ and δ are the parameters of each variable and X denotes the variable t, where t= 1, 2, 3,..., 21

METHODS AND DATA

The current study utilized published data to carry-out its analyses. The data were collated from the Jamaica Government Publications, namely from the Jamaica Survey of Living Conditions (JSLC) [43], the Economic and Social Survey of Jamaica (ESSJ) [14], and the Bank of Jamaica (BoJ) [44]. The data from the JSLC were on the rates of illness, health care seeking behaviour and poverty for 1989 to 2009 in the population. Regarding the Gross Domestic Product (GDP) and inflation, the data were mainly taken from the Bank of Jamaica publications (Economic Statistics). The data which were collated from the Economic and Social Survey of Jamaica were related to violent crimes and unemployment.

Statistical

The data were stored, retrieved and analyzed by using SPSS for Windows, 16.0 (SPSS Inc; Chicago, IL, USA) and Microsoft Excel. The Pearson's Product Moment Correlation was used to assess the bivariate correlation between the 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 illness. The OLS was utilized to determine the possible explanatory variables and to test whether there really was a correlation between violent crimes and illness when the selected macroeconomic variables were placed in a single model.

In any instance where collinearity existed ($r > 0.7$); the variables were entered independently into the model to determine as to which of those had to 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, as well as on the Durbin-Watson test value (DW).

Variables

The illness rate was a percentage of the people in the population who reported as having an illness in the survey week. Illness was an indicator of poor ('bad') health, as only since 2007, the JSLC had begun collecting the data on the self-rated health status [43]. Prior to that year, the data on illness was collected, which was used to plan for the health of the populace. For years in Jamaica, the data were collected on the antithesis of health to aid the policy formulation; this was used in this research.

The number of violent crimes (violent crime) constituted nine offences as were labelled by the Jamaican Constabulary Force (murder, shooting, rape and carnal abuse, robbery, manslaughter, infanticide, suicide, felonious wounding, and other offences against the person).

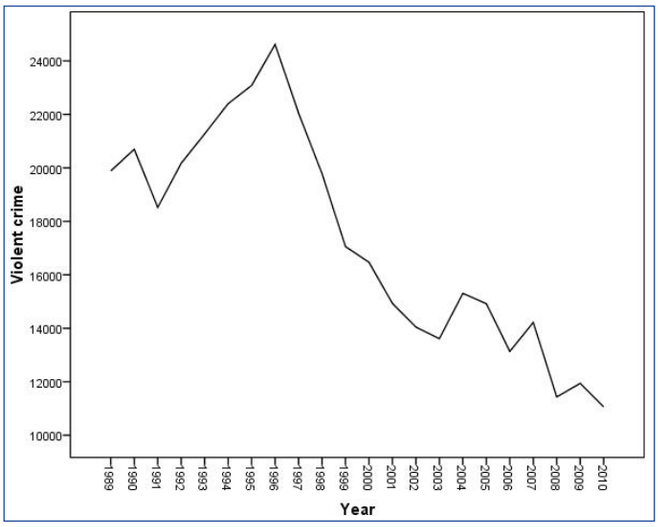
Findings

[Table/Fig-1] depicts the violent crimes in Jamaica from 1989 to 2010. Between 1989 and 1997, violent crimes were increasing and since 1997, the trend has reversed to a decreasing rate.

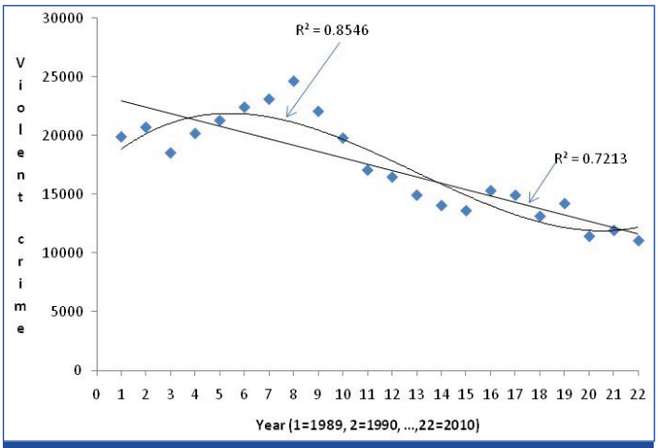
Although, 72% of the variability in the number of violent crimes since 1989 can be explained by a linear least square line, it is better fitted by a three degree polynomial ($R^2 = 0.855$ or 85.5%; [Table/Fig-2]). Decomposition of the illness rate to provide an explanation of the cyclical nature of the phenomenon, showed that the unemployment account for the increases, the health care utilization for the decline and the GDP for both, rise and fall. In periods of economic growth, the rate of illness rises.

[Table/Fig-3] shows that the prevalence of the illness rate in Jamaica was better fitted by a non-linear curve (R^2= 0.60) than a linear one (R^2 = 0.099). The distribution of the illness rate in Jamaica over the past 21 years (1989-to-2009) was a cyclical one, which has been represented by a 6 degree polynomial [Table/Fig-3]. Although no data were available for the illness rate of the populace prior to 1989, the distribution of the first data point (1989) represented a maximum turning point and the illness declined from then to 1995, which saw that the illness had begun to increase .

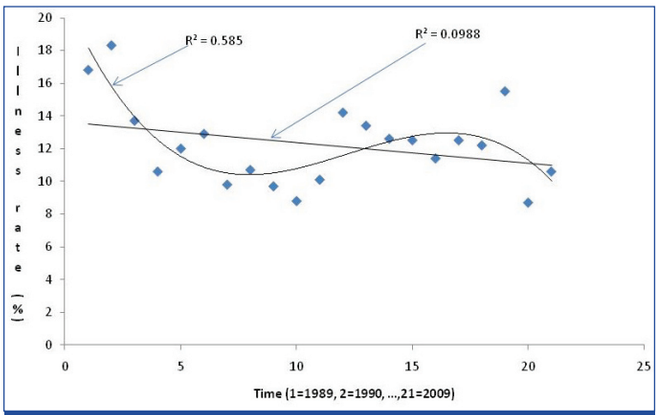
[Table/Fig-4] presents the information on the illness functions, with violent crime and health care seeking behaviour being the factors. The violent crime was inversely correlated with the illness rate (coefficient = -0.522, *P* = 0.023) as well as the health care seeking



[Table/Fig-1]: Annual number of violent crimes from 1989–2010



[Table/Fig-2]: Annual number of violent crimes from 1989–2010 best fitted by a linear and non-linear curve



[Table/Fig-3]: Prevalence of illness (in %) from 1989-2009, fitted by a linear and non-linear curve

Variable	Co-efficients	Standard Error	Beta	t statistic	Prob	CI (95%)
Constant	12.270	3.035		4.043	0.001	5.894 – 18.646
ln Violent crimes	–0.522	0.209	–0.605	–2.495	0.023	–0.962 – –0.083
ln HSB	–1.150	0.305	–0.915	–3.770	0.001	–1.791 – –0.509

R^2 = 0.442;
Adjusted R^2 = 0.379
F statistic = 7.116
Prob (F statistic < 0.0001
DW = 1.8
Standard error of regression t = 0.156
N = 21
Mean rate of illness = 2.5%
Standard error of dependent variable = 0.196

[Table/Fig-4]: OLS Equation of illness and poverty as well as health care utilization
Dependent variable: lnIllness rate

behaviour (or health care utilization = -1.15, *P* = 0.001). The two factors explained the 44.2% of the variability in the illness rate in Jamaica. The Durbin-Watson test (DW) indicated that there was no multicollinearity between the two explanatory variables (violent crime and health care utilization).

Of the four variables which were entered into the model, three emerged as the statistically significant factors of the illness rate: violent crimes (*P* = 0.040), health care utilization (*P* = 0.008) and unemployment (*P* = 0.077). The statistically significant factors accounted for 47.6% of the variability in the illness rate. A Durbin-Watson test value of 2.0 indicated that there was no multicollinearity among the factors [Table/Fig-5].

Of the 5 variables which were entered into the model, three emerged as the statistically significant factors of the illness rate – health care utilization (*P* =0.029), unemployment (*P* =0.023) and the GDP per capita (0.034). The significant factors accounted for 72.2% of the variability in the log illness rate. The correlation between the number of violent crimes (violent crime) and ln illness as has been noted in the [Table/Fig-4 and 5] is a spurious one ([Table/Fig-6], *P* = 0.307). This relationship did not really exist as GDP was not placed in the early models. There was a correlation between GDP and violent crime, in that when GDP was entered into this model, the real relationship was between GDP and lnillness and not between GDP and violent crime [Tables/Fig-6 and 7]. On testing for multicollinearity, the DW test value of 1.2 was found to be in the dark region, indicating a degree of uncertainty about the autocorrelation [Table/Fig-6]. The rule of thumb of a high

Variable	Coefficients	Standard Error	Beta	t statistic	Prob	CI (95%)
Constant	10.755	3.429		3.137	0.006	3.487 – 18.024
ln Violent crimes	–0.446	0.200	–0.517	-2.232	0.040	–0.870 – –0.022
lnHSB	–1.142	0.379	–0.908	-3.015	0.008	–1.945 – –0.339
ln Unem-ployment	0.408	0.216	0.355	1.887	0.077	–0.050 – 0.866
lnInflation	–0.090	0.064	–0.313	-1.405	0.179	–0.227 – 0.046

R^2 = 0.580
Adjusted R^2 = 0.476
F statistic = 5.535
Prob (F statistic = 0.005
DW = 2.0
Standard error of regression = 0.144
N = 21
Mean rate of illness = 2.5%
Standard error of dependent variable = 0.196

[Table/Fig-5]: OLS Equation of illness, crime, health care utilization and inflation
Dependent variable: lnIllness rate.

Variable	Co-efficients	Standard Error	Beta	t statistic	Prob	CI (95%)
Constant	7.862	3.278		2.399	0.032	0.782 – 14.943
lnHSB	–0.790	0.323	–0.592	–2.448	0.029	–1.487 – –0.093
ln Unem-ployment	0.508	0.197	0.482	2.585	0.023	0.083 – 0.933
lnViolent Crime	–0.272	0.256	–0.287	–1.063	0.307	–0.826 – 0.281
lnGDP per Capita	2.688	2.291	0.250	1.173	0.043	2.262 – 7.637
lnPoverty	-0.239	0.136	–0.442	–1.752	0.103	–0.533 – 0.056

R^2 = 0.722
Adjusted R^2 = 0.615
F statistic = 6.76
Prob (F statistic = 0.003
DW = 1.2
Standard error of regression = 0.119
N = 19
Mean rate of illness = 2.5%
Standard error of dependent variable = 0.196

[Table/Fig-6]: OLS Equation of illness rate with selected macroeconomic, health and crime variables
Dependent variable: lnIllness rate.

correlation among the independent variables ($r_s \geq 0.7$) was used to determine the likeliness of the multicollinearity. And this was found between 1) health care utilization and poverty (rs = –0.730, *P* < 0.0001) [Table/Fig-7].

[Table/Fig-7] presents a correlation matrix which examines the relationship (or not) among some of the tested variables. The correlation matrix shows that log illness was statistically associated with 1) log health care utilization (*P* = 0.043), 2) log unemployment (*P* = 0.002) and 3) the GDP per capita (*P* = 0.004). A moderately positive correlation existed between log poverty and log violent crime (r_s = 0.623, *P* = 0.002).

[Table/Fig-8] displays the information from a correlation matrix on the selected test variables. A strong correlation emerged between 1) log inflation and log health care utilization (r_s = –0.756, *P* < 0.00001) and

		lnIllness	ln HSB	ln Unemploy-ment	ln Violent Crimes	lnGDP_per Capita	lnPoverty
Pearson Correlation	lnIllness	1.000					
	lnHSB	–0.404	1.000				
	lnUnemployment	0.623	–0.524	1.000			
	lnViolentCrimes	–0.249	–0.571	0.163	1.000		
	GDP per Capita	0.596	–0.182	0.381	–0.416	1.000	
	lnPoverty	0.087	–0.730	0.494	0.623	0.149	1.000
Sig. (1–tailed)	lnIllness	–	0.043	0.002	0.152	0.004	0.361
	lnHSB	0.043	–	0.011	0.005	0.227	0.000
	lnUnemployment	0.002	0.011	–	0.252	0.054	0.016
	lnViolent Crimes	0.152	0.005	0.252	–	0.038	0.002
	lnGDP per Capita	0.004	0.227	0.054	0.038	–	0.272
	lnPoverty	0.361	0.000	0.016	0.002	0.272	–
N	lnIllness	19	19	19	19	19	19
	lnHSB	19	19	19	19	19	19
	lnUnemployment	19	19	19	19	19	19
	lnViolentCrimes	19	19	19	19	19	19
	GDP per Capita	19	19	19	19	19	19
	lnPoverty	19	19	19	19	19	19

[Table /Fig–7]: Correlation matrix of selected tested variable

		ln Illness	ln HSB	ln Unemploy-ment	ln Violent-Crimes	ln Poverty	ln Inflation	lnGDP per Capita
Pearson Correlation	lnIllness	1.000						
	lnHSB	–0.404	1.000					
	LoggedUnemployment	0.623	–0.524	1.000				
	lnViolentCrimes	–0.249	–0.571	0.163	1.000			
	lnPoverty	0.087	–0.730	0.494	0.623	1.000		
	lnInflation	0.227	–0.756	0.361	0.483	0.723	1.000	
	Ln GDP per Capita	0.596	–0.182	0.381	–0.416	0.149	0.182	1.000
Sig. (1–tailed)	lnIllness	–	0.043	0.002	0.152	0.361	0.175	0.004
	lnHSB	0.043	–	0.011	0.005	0.000	0.000	0.227
	lnUnemployment	0.002	0.011	–	0.252	0.016	0.064	0.054
	lnViolentCrimes	0.152	0.005	0.252	–	0.002	0.018	0.038
	lnPoverty	0.361	0.000	0.016	0.002	–	0.000	0.272
	lnInflation	0.175	0.000	0.064	0.018	0.000	–	0.227
	lnGDP per Capita	0.004	0.227	0.054	0.038	0.272	0.227	–
N	lnIllness	19	19	19	19	19	19	19
	lnHSB	19	19	19	19	19	19	19
	lnUnemployment	19	19	19	19	19	19	19
	lnViolentCrimes	19	19	19	19	19	19	19
	lnPoverty	19	19	19	19	19	19	19
	lnInflation	19	19	19	19	19	19	19
	lnGDP per Capita	19	19	19	19	19	19	19

[Table/Fig–8]: Correlation matrix tested variables

between 2) log poverty and log inflation (r_s = 0.723, $P < 0.00001$). With no statistically bivariate correlation existing between log inflation and log illness rate, coupled with the high autocorrelation among inflation and poverty as well as health care utilization, there was no reason to include this into a model for illness.

[Table/Fig-9] presents the information on the parameters, standard error, t statistic and probability for an illness rate of over 21 years (1989–2009). Equation (4) was fitted by a 3 degree polynomial, which accounted for 59% of the data.

The model illness rate over time (1989-2009) was calculated by using the data (Equation(4))

$$\text{Illness rate} = 21.1 - 3.21X_t + 0.3X^2_t - 0.01X^3_t \quad [4]$$

where X is the time, t= 1, 2, 3,..., 21

Equation (5) expresses the number of violent crimes in Jamaica over time (1989–2010). The number of violent crimes (violent crimes) was best fitted in Equation (5), that accounted for 86% of the data [Table/Fig-10]:

$$\text{Violent Crime (Number)} =$$

$$17\ 152 + 1922X_t - 224.65X^2_t + 5.77X^3_t \quad ...(5)$$

where t denotes time (from 1989-to-2010) t= 1, 2, 3, ..., 21

Variable	Coefficient	Standard error	t statistic	Prob
Constant	21.10	1.85	11.40	< 0.00001
X	–3.21	0.71	–5.51	<0.00001
X^2	0.30	0.07	4.04	0.0001
X^3	–0.01	0.002	–3.69	0.002
F statistic = 7.99 Prob (F statistic) = 0.0002 R^2 = 0.585 Adjusted R^2 = 0.512 Standard error of the model = 1.75				

[Table/Fig-9]: Illness function over time, 1989-2009

Variable	Coefficient	Standard error	t-statistic	Prob
Constant	17 152	1 729	–9.99	< 0.00001
X	1 922	637	3.04	0.007
X^2	–224.65	64	-3.69	0.002
X^3	5.77	1.8	4.6	0.005
F statistic = 35.254 Prob (F statistic) = 0.0001 R^2 = 0.855 Adjusted R^2 = 0.830 Standard error of the model = 1692.86				

[Table/Fig-10]: Number of Violent Crime function over time, 1989-2010

DISCUSSION

The call for violence to be included in the public health discipline goes back to 1996 (Forty-ninth World Health Assembly) [45] and this was equally echoed by Coleman in 2006 [37]. Although violence emerged from a social perspective and should have been seen as a health determinant as early as in the 1970s when Grossman developed an econometric model for the health determinants [32] which was later developed by Smith and Kington in 1997 [33], this was not the case from an empirical perspective. Violent crimes have been extensively researched in the Caribbean region, but from a health perspective, the literature is lacking. In 2008, of the total number of deaths in Jamaica (16, 123), 427 were caused by the human immunodeficiency virus (HIV) [34] as compared to 1, 601 murders and 11, 432 cases of violent crimes against persons [14]. The statistics on the causes of death in Jamaica from 2005 to 2008 showed that there were a total of 1,656 deaths which were caused by HIV as compared to 6,189 murders in the same period. The aforementioned indicates that on average, annual murder claimed 4 lives to every 1 death by HIV.

The present study found that the bivariate relationship between violent crimes and illness was a spurious one. The issue of the violent crime influenced health which was defined by the antithesis of illness, was not statistically associated in Jamaica. This did not suggest that violent crime was related to a positive (or broader) definition of health, including the psychological component. In the study of Gupta and colleagues, violent crime was statistically associated with asthma among children in Chicago [34]. The current study was unable to concur or disapprove Gupta et al's findings, but offered the general explanation that the illnesses which were reported in Jamaica (including asthma, arthritis, diabetes, hypertension, neoplasm and others); were not influenced by violent crimes.

Unemployment, on the other hand, directly influenced the ill-health. Unemployment was therefore bad for one's health, as it increased the likelihood of reporting a physical illness. Money provided the scope for a better dietary intake, good physical and social milieu, access to quality health care and security and it increased the immunity, which in turn could increase the body's resistance against disease causing pathogens. Smith and Kington [33] opined that money was good for health, suggesting that in periods of economic growth, the health status would rise. Smith and Kington's [33] theorizing was not supported by the current findings. Instead, in Jamaica, the ill-health was found to rise in periods of economic growth and to fall in times of economic recession. The inverse correlation between the economic growth and good health was also found in nations outside the Caribbean, including North America [25].

It appears paradoxical that unemployment increased the ill-health on one hand and that another economic prosperity reduced the health status. The answer was embedded in the lifestyle practices of the people during the different economic periods. Throughout the period of economic prosperity, people had more money to afford the goods and services which were once unaffordable and this increased income was usually spent on luxurious items, which was conflicting for the good health. Another issue that arose during the economic boom was increased alcohol, cigar and cigarette consumption and other practices that raised the risk of ill-health. Abel-Smith opined that the increase in the income of the poor would be spent on more food, better housing and better health care, as well as education [46], suggesting that the poor health could fall in the periods of economic growth. The people's behaviour was not necessarily rationale and idealistic as it was hoped. The reality from the data contradicted the rational idealism, as the ill-health rose in periods of economic prosperity in Jamaica.

One of the ironies of this work, based on the convention wisdom, was the inverse correlation between the health care utilization and the illness rate in Jamaica. It can be extrapolated from the data that the health care seekers in Jamaica were mostly the healthy people, and that those who were suffering from ill-health were demanding less health care services. Jamaicans feared the probability of being informed about an illness and its severity, in that if they perceived that there was a probability of an illness they would not seek medical care, except in instances in which it interfered with their employment, income opportunities and normal activities and in cases of disease severity also (threatens life). The behaviours which were exhibited by Jamaicans were not atypical as these were also reported in a qualitative study among street children in Pakistan [47] The reluctance of Jamaicans, especially men, to utilize health care seemed to span cultures, ethnicity, region and time as Ali and de Muynck's study [47] showed that Pakistani street children were unwilling to seek medical care unless it interfered with their income opportunities. In another part of the globe, in Anyigba, in North-Central Nigeria, Williams and colleagues found that 43 out of every 50 respondents waited for less than a week after the onset of the illness to seek medical care, and that 29 out of every 50 people indicated that they would recover without treatment [48].

The reluctance of the males in Jamaica in seeking medical care was influenced by their social status. One academic researcher provided an explanation that masculinity was interpreted as a resistance to weakness [49] and that given that an expression of illness and frequent visits to health institutions were construed as a sign of reduced manliness, this justified the unwillingness of the men in demanding health care services, except in periods of severity and reduced income opportunities. Encompassed in Barry Chevannes' theorizing [49] is the fact as to how the culture

dominants resistance from knowledge in educational attainment because of the macho socialization and that manhood is linked to strength and sexuality. An expression of illness by Caribbean males was seen as a pronouncement of weakness, which would threaten the premise of their manhood. It was this culturized perspective that retarded the ill Jamaicans, especially men, from demanding health care services. Caribbean females, on the other hand, were socialized enough to demand health care services, but because they were poorer and as increasingly more of them were breadwinners like their male counterparts, they weighed the health care visits with lost earnings before taking a decision on seeking medical care.

CONCLUSION

Although there was no real statistical relationship between violent crimes and health in Jamaica, violence was responsible for premature deaths and it was a cause of mortality which could not be neglected by the health practitioners, policy specialists and the academic researchers. Outside of violence and health (or ill-health), the role of GDP in influencing the illness rate as well as the unemployment in Jamaica indicated that the health policies should be planned differently in periods of growth and during a rise in the unemployment than in periods of recession and increased employment. The reality was that violence was a health cost, as figures from the Ministry of Health revealed that violence crimes cost the nation approximately $2 billion in Jamaican currency in 2006 and that the productivity losses were estimated to be $4 billion in Jamaican currency [50]. A new paradigm was needed in the health care system that was wellness driven with such products instead of the ill-driven current paradigm.

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