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Health, violent crimes, murder and inflation: public health phenomena

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Abstract

Introduction: The Jamaican Ministry of Health published a report which showed that in 2006, the direct health care cost of violence was approximately Jamaican $2 billion. Despite this reality, there is a paucity of empirical studies on health crimes in the nation the study of crimes statistics from a health perspective. Objectives: This paper
1) evaluates the role of inflation on murder as well as violent crimes,
2) examines the influence of murder on violent crimes, and
3) how illness impacts on the murder rate. Methods: The current study utilizes published data to carry-out its analyses. The data were collated from Jamaica Government Publications, namely Jamaica Survey of Living Conditions, Economic and Social Survey of Jamaica, and Bank of Jamaica. Results: Between 1988 and 2011, the average numbers of violent crimes were 17,301 with 1,042 people murdered. A strong negative statistical association existed between lnviolent crimes and murder ($P < 0.0001$); weak direct relationships were found between lnviolent crime and inflation ($P = 0.014$) and low inverse correlation between lnmurder and inflation ($P = 0.011$). Of the two variables that were used to examine logmurder, only lninflation was statistical correlation with lnmurder ($P = 0.033$), with the factor accounting for 36.5% of the variability in lnmurder. An inverse statistical correlation emerged between lnviolent crimes and lninflation ($P < 0.0001$). Conclusion: Inflation is a public health challenge in Jamaica as it has two separate and distinct effects on murder and violent crime, which is problematic for policy makers.

INTRODUCTION

The nexus of violent crimes in Jamaica goes back to pre-emancipation, when the revolt of the slaves would lead to their capture and murder. The conditions in post-emancipated Jamaica were similar to those obtained in pre-emancipation for the slaves - inequality, little opportunity, socio-economic exclusion, demonstration, conspiracy, and attempts to murder the plantation owners. These would oftentimes result in bloodshed of slaves, which was the experience of Paul Bogle following his march on Morant Bay in 1865 [1, 2]. In this society, violent crimes have increasingly drawn the attention of the world and institutions such as the World Bank. In 1996, the institution co-sponsored a research to examine and provide information on the poverty-crime phenomenon [3], because of the spiraling high murders in the nation.

Bourne and co-authors postulated that "Jamaica is among the top 10 most murderous nations in the World" [4], which proceeds this finding from the World Bank that:

Between 1998 and 2000, according to police reports, drug and gang related murder accounted on average for 22 percent of total murders. Domestic violence represented about 30 percent of total murders. The rising severity of the murder problem is highlighted by comparison with New York, a high crime city – while both Jamaica and New York experienced similar rates of murder in 1970, Jamaica's murder rate had increased to almost seven time that of New York's by year 2000 [5]. Violence was long established as a public health phenomenon at the Forty-ninth World Health Assembly

[6]. It was revealed that nine (9) out of every 50 Jamaicans indicated being assaulted in the last 12 months [7]. The Jamaican Ministry of Health revealed that violence crimes cost the nation approximately Jamaican two ($2) billion in 2006 and that the productivity losses were estimated to be Jamaican four ($4) billion [8]. The issue of health crimes - the study of crimes statistics from a health perspective - requires extensive enquiry in order to provide information that will frame policies. A call for the study of violence from the public health perspective was made by Coleman [9], but the matter still lags behind the spiralling murder pandemic. In 2011, Bourne and colleagues began a serious of inquiries into health crimes [4, 10], in which they evaluated violent crimes from a health perspective. In the publications, it was found that murder increases by geometric progression [10] and there was no statistical correlation between violent crimes and self-reported illness [4]. The none association between ill-health and violent crime still establishes that there is public health challenge in a space when violent crimes are high and murders have reached a pandemic status.

The public health problem of violent crimes emerged from a study conducted by Dundas and co-authors who found that "The number of pre-adolescent children presenting to the BCH [Bustamante Children Hospital] with gunshot wounds has increased by 155percentage between 2002 and 2005" and "A mortality rate of 4percentage was seen but long-term morbidity was uncommon" [11]. Bourne and his colleagues' work examined violent crimes and ill-health from the perspective of the population [4]; but it did not examine murder and health. However the limitation Dundas et al's study was its non-generalizability which means that more studies are needed on this critical matter. The public health challenge of violence was not forthcoming from Bourne and coauthors' research, but this was highlighted in Dundas and colleagues' study which found that "Shootings were likely to occur between 4:00 pm and 10:00 pm in the evening, at or near home, in inner city communities. Affected children were unlikely to have been under direct adult supervision at the time of injury and were reported to be intended targets of the shooting in 49percentage of cases" [11].

Some issues that can be extrapolated from Dundas and coauthors are 1) the economics of violence, 2) violence and social institutions, and 3) the involvement of public health institutions in addressing the violence phenomenon. Violence is costing the society in regards to utilization of health care services. The fact that many of the cases identified by Dundas and colleagues were from inner-city communities; this would imply the correlation between violence and poverty which adds another dimension to the health economics and health crimes. There are established empirical studies which show that there is a correlation between poverty and crimes [3, 12, 13] and poverty and illness [14, 15], suggesting that health crime phenomenon in Jamaica is as a result of poverty (or inafffordability). Although the poverty-crime paradigm was recently refuted by Bourne [16] – using secondary data on crime and poverty in Jamaica- and another study provided evidence that revealed no statistical relationship between ill-health and poverty as well as the association between illness and gross domestic product (GDP) [4], these offer insights into the health crime discourse and still there are gaps that must be filled by further research.

With one (1) in five (5) Jamaicans below the poverty level in 2010 as well as the direct relationship between poverty and unemployment [16] and the association between poverty and not seeking medical care [15], there is a high likeliness that increases in inflation, unemployment and will further raise the vulnerability level of those in the economic margins. The vulnerability of those on the economic margins deteriorates with a rise in inflation as they will substitute health care for higher cost goods and services, and with the increase in murders since 2000, the poor who are most exposed to this phenomenon will transfer the health cost to the state when they interface with public health care facilities. The objectives of this study are to 1) evaluate the role of inflation on murder as well as violent crimes, 2) examine the influence of murder on violent crimes, and 3) explore how illness impacts on the murder rate

Empirical Framework

The current study utilizes a similar empirical model employed by Robert Waldmann [17] in the examination of factors that influence infant mortality in the world (including developing nations). He theorizes that:

Log (Infant mortality) = $\beta 0 + \beta 1 \log$ (Poor income) + $\beta 2$ log (Middle income) + γ Rich Share + δ Year 1970.

Where $\beta 1$, $\beta 2$, γ and δ are coefficients of particular variables, Rich share signifies the distribution of the national income received by the richest five (5) percentage points of people in the nation. According to Waldmann the poor and middle income signify"the income levels of the poorest 20 percent of the population and the middle strata of the income distribution lying between the twentieth and the ninety-fifth percentiles" [17]. Year 1970 symbolizes "an indicator variable that flags data for 1970" [17].

Waldmann's model identifies three factors that influence infant mortality (transformed) – log income,

share of income and year. Using a different factor (inflation) and a somewhat modified dependent variable (murder, violent crime), this work found the natural logarithm of the dependent and the independent variables as was the general case in Waldmann's work on infant mortality. These are expressed in Eqn [1.1] to [3.2].

Murder = αInflationβ ……..…...[1.1]

Log Murder = ω + β log (Inflation) …….…….[1.2]

where ω = log α and β < 0 (ie negative)

Violent crime = αMurderβ……[2.1]

Log violent crime = ω + β log (Murder) ……..[2.2]

where ω = log α and β < 0 (ie negative)

Violent crime = αInflationβ …….[3.1]

Log violent crime = ω + β log (Inflation) ……[3.2]

where ω = log α and β > 0

METHODS AND DATA

The current study utilizes published data to carry-out its analyses. The data were collated from Jamaica Government Publications, namely Jamaica Survey of Living Conditions (JSLC) [18], Economic and Social Survey of Jamaica (ESSJ) [19], and Bank of Jamaica (BoJ) [20]. The data from the JSLC were on rate of illness from 1989 to 2010 on the population. Regarding inflation, data were mainly taken from the Bank of Jamaica publication (Economic Statistics). Data collated from the Economic and Social Survey of Jamaica was related to violent crimes.

STATISTICAL

Data were stored, retrieved and analysed using SPSS for Windows 16.0 (SPSS Inc; Chicago, IL, USA). Pearson's product Moment Correlation was used to assess the bivariate correlation between particular macroeconomic and other variables. Ordinary least square (OLS) regression analyses were used to establish the model for 1) log illness, 2) log violent crimes, and 3) log murder. The logging of the variables was in keeping with 1) empirical model and 2) the nature of the variables. The variables were logged because of skewness, and this was done in keeping suitability for OLS. All the assumptions of OLS were tested prior to the use of this statistical technique in this paper. The level of significance used in this study was P ≤ 5percentage (0.05).

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 as well as the Durbin-Watson test value (DW).

VARIABLES

Illness rate is a percentage of people in the population who reported having an illness in the survey week. Illness is an indicator of poor ('bad') health as only since 2007 the JSLC began collecting data on self-rated health status [18]. Prior to that year, data on illness was collected, which was used to plan for the health of the populace. For years in Jamaica, data were collected on the antithesis of health to aid policy formulation; this was used in this research.

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

Inflation is the persistent upward movement in prices, which is measured over a 12-month period in percentage points.

RESULTS

Table1. Violent crimes, murder, self-reported illness (in percentage) and inflation (in percentage), 1989-2010

Year	Violent crime	Murder	Illness	Inflation
1989	19,886	439	16.8	17.2
1990	20,698	542	18.3	29.8
1991	18,522	561	13.7	80.2
1992	20,173	629	10.6	40.2
1993	21,275	653	12	30.1
1994	22,403	690	12.9	26.8
1995	23,083	780	9.8	25.6
1996	24,617	925	10.7	15.8
1997	22,053	1,037	9.7	9.2
1998	19,781	953	8.8	7.9
1999	17,056	849	10.1	6.8
2000	16,469	887	14.2	6.1
2001	14,929	1,191	13.4	8.8
2002	14,047	1,045	12.6	7.2
2003	13,611	975	12.51	13.8
2004	15,306	1,471	11.4	13.7
2005	14,920	1,674	12.51	12.6
2006	13,136	1,340	12.2	5.7
2007	14,219	1,574	15.5	16.8
2008	11,432	1,601	8.7	16.8
2009	11,939	1,680	10.6	10.2
2010	11,062	1,428		13.0
Average	17,301	1,042	12.2	18.8

Table 1 presents data on violent crimes, murder, illness rate and inflation in Jamaica. Between 1988 and 2011, the average numbers of violent crimes have been

17,301, with 1,042 people having been murders. Generally, violent crimes have been trending down since 1989 but the reverse is true for murder.

Table 2 displays bivariate correlation between log violent crime, log murder, log illness and log inflation. A strong negative statistical association existed between log violent crimes and murder (Pearson correlation = -0.811, P < 0.0001); weak direct relationships were found between log violent crime and log inflation (Pearson correlation = 0.515, P = 0.014) and low inverse correlation between log murder and log inflation (Pearson correlation = -0.533, P = 0.011).

Table 2. Correlation matrix between log violent crime, log murder, log illness rate (in percentage) and log inflation (in percentage)

		Log Violent Crimes	Log Murder	Log illness	Log Inflation
Pearson Correlation	Log violent crimes	1.000			
	Log murder	-0.811	1.000		
	Log illness	0.178	-0.390	1.000	
	Log inflation	0.515	-0.533	0.209	1.000
Sig. (1-tailed)	Log violent crimes	.	0.000	0.239	0.014
	Log murder	0.000	.	0.055	0.011
	Log illness	0.239	0.055	.	0.203
	Log Inflation	0.014	0.011	0.203	.
N	Log violent crimes	18	18	18	18
	Log murder	18	18	18	18
	Log illness	18	18	18	18
	Log inflation	18	18	18	18

Of the two variables that were used to examine log murder, only log inflation was statistical correlation with log murder (F statistic [2, 15] = 4.319, P = 0.033), with the factor accounting for 36.5 percentage of the variability in lnmurder (Table 3).

Table 3. OLS for log murder, log illness and log inflation

Characteristic	Unstandardized Coefficients	Std. Error	Beta	t statistic	*P* value	95percentage CI
Constant	9.141	1.087		8.409	<0.0001	6.824 - 11.458
Log illness	-0.611	0.441	-0.291	-1.386	0.186	-1.552 - 0.329
Log Inflation	0.281	0.125	-0.472	-2.246	0.040	-0.548 - -0.014
F statistic [2, 15] = 4.319, *P* = 0.033						
R^2 = 0.365						
Adjusted R^2 = 0.281						

An inverse statistical correlation emerged between log violent crimes and log inflation (F statistic [1, 17] = 33.406, P < 0.0001). A one (1) percentage point change in log murder accounts for 66.3 percentage of the variance in log violent crimes (Table 4).

Table 4. OLS for log violent crimes and log murder

Characteristic	Unstandardized Coefficients	Std. Error	Beta	t statistic	*P* value	95percentage CI
Constant	12.765	0.531		24.050	<0.0001	11.165 - 13.885
Log Murder	-0.446	0.077	-0.814	-5.780	<0.0001	-.609 - -0.283
F statistic [1, 17] = 33.406, *P* < 0.0001						
R^2 = 0.663						
Adjusted R^2 = 0.643						

Dependent variable: lnViolentCrimes

Log inflation influence log violent crimes in Jamaica (F statistic [1, 21] = 4.058, P < 0.05), with 12.7 percentage

points of the variability in logged violent crimes can be explained by a one (1) percentage point change in logged inflation (Table 5).

Table 5. OLS for log violent crimes and log inflation

Characteristic	Unstandardized Coefficients	Std. Error	Beta	t statistic	*P* value	95percentage CI
Constant	9.330	0.205		45.580	<0.0001	8.903 - 9.757
lnInflation	0.149	0.074	0.411	2.014	0.05	-0.005 - 0.303

F statistic [1, 21] = 4.058, $P < 0.05$
$R^2 = 0.169$
Adjusted $R^2 = 0.127$
Dependent Variable: log Violent Crimes

Equations [1] and [2] indicate a decreasing function, with Eqn [3] being an increasing function. The decreasing functions show that a one (1) percentage point change in inflation or murder will result in a less than one (1) percentage variation in the resultant variable. In the case for the increasing function, a one (1) percentage point change in Inflation will result in a more than one (1) percentage adjustment to violent crimes.

DISCUSSION

The problems affecting health go beyond diseases and pathogens causing conditions to violence, and the socio-economic environment. When the Jamaican Ministry of Health (MoH) priced health care cost of violence it excluded the human cost of violence which extends beyond the cost of health care services to the grief, pain, bewilderment, law enforcement, productivity, family separation and displacement, educational displacement, and other human conditions. The WHO [6] opined that the cost of violence convert into billions of dollars, which was in keeping with the findings of the MoH, and even so the price is more difficult to estimate as violence goes to some intangible conditions. The reality of violence is that it affects people's health, which makes it a public health matter as well as a social phenomenon. Violence for most part has been taken as a social phenomenon in the Caribbean, particularly Jamaica, and rightfully so because of the violation of individual's human rights. No one can deny that violence operates from 1) individual, 2) community, 3) societal, and 4) relational levels.

The WHO stated that "…public health is not about individual patients. Its focus is on dealing with diseases and with conditions and problems affecting health, and its aims to provide the maximum benefit for the largest number of people" [6], indicating that inflation which affects everyone in a society may be a public health challenge if it influences health. By definition, inflation is the persistent upward movement in prices, suggesting that the cost of living increases and the economically vulnerable will be more exposed to the difficulty of survivability. With empirical evidence showing that there is a strong direct statistical relationship between not seeking medical care and poverty in Jamaica – rs=0.759, R2 = 0.596, p<0.05 – as well as positive correlation between inflation and poverty - R2 = 0.732, p<0.05 [15], increased cost of living should translate into a switching of health care utilization for good among the poor.

This work revealed that inflation is positive correlated with violent crimes and inverse associated with murders. The findings provide the complexity of the public health challenge among health care specialists as 1) in periods of increased inflation violent crimes such as shooting, rape and carnal abuse, robbery, manslaughter, infanticide, suicide, felonious wounding, and other offences against the person would be higher and pose a problem of health care workers as well as increase health care cost, and 2) rise in inflation would be good as the number of murders would reduce. By wanting lowered inflation for the purpose of decline in violent crime, this would spell increased murder which is greater societal loss and the cost of this increase for the survivors'family and the health care professional. Clearly there is no good to inflation in regards to public health. There is no solution to the inflation dilemma and this complicates the public health approach to be taken.

An understanding of the public health approach must begin with an examination of the composition of murders in Jamaica. Of the 1,471 murders that occurred in 2004, 75.9 percentage points involved firearms [19]. The statistics show an increasingly worrying social problem in the society as in 2008, there were 1,601 murders of which 77 percentage points were by guns [19]. Among the 1,471 and 1,601 homicides, there are children below pre-adolescents, some of whom are cared for by the public health facilities (BCH) before

being pronounced dead. This is a cost to the state. The death of Jamaicans below the life expectancy of 75 years would indicate premature mortality. Dundas and coauthors' study highlight some important issues: 1) the price of violent crimes, 2) premature mortality, 3) public health challenge of violence and 4) conflict in various social milieus in Jamaica. They postulated that "On the contrary, children now seem to be a targeted group. Illustrative of this is the fact that 11 of the 74 children had multiple gunshot wounds, indicating a clear intent to kill" [11]. Dundas et al's work emphasizes an area of the public health dilemma in Jamaica, which is clearly the same among adult population. The violence phenomenon which has swept across the society is even more complex for public health practitioners is inflation which is real matter is dangerous and likely to result in public health challenges.

The absence of no statistical correlation between health -defined as self-reported illness- and inflation could be owing to the definition of health which was narrow. Health is more than the absence of illness [21] and the omission of psychological health is clearly a weakness of this work as violent crimes, particularly murder and rape, have significant influence of psychological wellbeing (or health). By the narrow definition of health in this research means that psychological conditions are still to be empirically examined as it relates to murder and violent crimes. This limitation of the data does not argue for the non-publication of this work as empirical evidence shows that there is a strong correlation between self-reported illness and objective health in Jamaica [22]. It follows, therefore, that the current work offers invaluable insights into a phenomenon that requires more research. As there is no denial that violence is a public health matter, particularly rape, murder, infanticide, suicide, and felonious wounding, and that the relationship between inflation and violent crimes dictates the importance of this study to the public health discourse. Violence is a major public health phenomenon has it accounts for more direct health care utilization than any single diseases in the Jamaica and to a lesser extent are homicides. Internationally, Jamaica like the wider Caribbean, the same can be said about the violence phenomenon in regards to its direct cost on medical care [6, 24].

CONCLUSION

Clearly the public health approach to violence in Jamaica is complex. While the relationship between inflation and violent crimes is a direct one, the reverse is true for murders which are among the definition of violent crimes. Empirical evidence establishes that there is no statistical association between physical illness (health defined for this study) and violent crimes, but the psychological aspects were not examined in this paper. McManus and Mullett [24] entitled a publication 'Better Health, Lower Crime' suggesting that inverse correlation between health and crimes, which means that by reducing crimes we should see a resultant increase in health status. From the findings of this study, the matter is complex one as by reducing general violent crime, we are highly likely to increase murders and inflation has distinct effect on violent crimes and murders. These findings indicate a whole new set of public health challenges in addressing changes in inflation (cost of living) rates.

In summary, public health specialists must be vigilant of role of increased inflation on violent crimes and institute measures that can effectively address these consequences, while recognising that lowering inflation will also be a public health dilemma. The problems of increased violent crimes extend beyond the immediate activity, which was ably captured by the Planning Institute of Jamaica and Ministry of Foreign Affairs and Foreign Trade:

> Homicidal violence, 77percentage by the gun, is a leading social problem; it is male on male, youth on youth, poor on poor1. Of the youth, aged 15–24, 26.2percentage males and 7.9percentage females are illiterate. Unattached youth, those who are not in school, unemployed and not participating in any training course, comprise roughly 30percentage of the total youth population. About a quarter of unattached youths had attained only a grade 9 level or less of education. This makes female youth vulnerable to sexual exploitation and adolescent pregnancy and puts male youth in an extremely vulnerable position, which might lead to participation in criminal gangs [25]

Within the context of Planning Institute of Jamaica and Ministry of Foreign Affairs and Foreign Trade's perspectives, increased inflation translates into sexual exploitation, rape of the economic vulnerable, poor women being increasingly denied the right to use contraception, rise in commercial workers because of socio-economic conditions and forced prostitution that will result in public health challenges. The inflation matter is complex as lowered inflation cannot be desirable as this means more murders, which have its own health problems and a rise in inflation has negative consequences for violent crimes.

Limitation of study

The operational definition of health is self-reported illness is a negative perspective at examining health; but, data on self-reported health status which is a wider conceptualization of health was collected from 2007. Hence, the use of secondary data poses a problem a wider coverage of phenomenon as well as aid in

understanding an aspect of health crime.

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