The Impact of Macroeconomic Indicators on Admission Rates in Jamaica Physical Medicine and Rehabilitation Hospitals

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Abstract

The polio epidemic occurred during the time Professor Golding served at the Kingston Public Hospital. This was an opportune time for him to form the rehabilitation center to make those affected by the polio pandemic become physically functional again, disability rehabilitation. It is the only Hospital of its kind in the English-speaking Caribbean that provides rehabilitation to individuals afflicted with polio. This paper evaluated the impact of macroeconomic indicators on physical medicine and rehabilitation hospitalization in Jamaica, using data panel data from 2006-2015. The economic environment has an influence on physical medicine and rehabilitation hospitalization. While there are areas of complexities that need more scientific enquiry, policy makers and health care practitioners need to label a 'bad economic climate' as a disease, recognize its influence on ill-health choices and plan for it in physical medicine and rehabilitation.

Keywords: Disability; Macroeconomic Indicators; Physical medicine; Rehabilitation; Sir John Golding Rehabilitation Hospital

Introduction

Physical Medicine and Rehabilitation or physical and rehabilitation medicine is a branch of medicine that deals with the restoration of functional ability and the quality of life of people who are physically impaired or disabled [1,2]. Physical Medicine and Rehabilitation (PM&R) was developed in the 20th century in the United States; but became a specialty in 1947 [3-5]. Dawson summarized PM&R in a diagrammatic manner, which shows the tenets of this discipline [6]. This was not a specialty in medicine in Jamaica prior to the 1950s [7].

An outbreak of polio in the 1950s was the primary rationale for the start of the discussions on physical medicine and rehabilitation in Jamaica [8]. Despite the stigma that disability is a sin in Jamaica, as presented at a meeting at the Kingston Public Rehabilitation Society in 1954; the Mona Rehabilitation Hospital was established to address physical medicine and rehabilitation of victims of the polio epidemic [7,8]. The pioneer behind the establishment of this Hospital, Professor Sir John Golding was a British orthopaedic surgeon. The polio epidemic occurred during the time Professor Golding served at the Kingston Public Hospital and this was the opportune time for him to establish the centre. It is the only Hospital of its kind in the English-speaking Caribbean that provides rehabilitation services to those afflicted with polio and physical deformities [9]. The Hospital was later renamed the Sir John Golding Rehabilitation Hospital in memory of the pioneer, that caters to all patients despite their physical deformities **(Figure 1)**.

Jones opined that "The high crime rate coupled with the seemingly never-ending number of motor-vehicle accidents is paralyzing the Sir John Golding Rehabilitation Centre" [10]. He forwarded that many people who are alive after injuries include gunshot, wounding, et cetera, or those who were born with physical abnormalities have suffered because they had to say home and that the English-speaking Caribbean does not have the required facilities to deal with the many cases of physical medicine and rehabilitation. The Rehabilitation Hospital was built in the 1950's and Jamaica's population has increased significantly since then as well as the number of violent acts and accidents. Those happenings have created much strain on the institution and studies have been conducted on the facility since its inception

Rehabilitation Team Approach
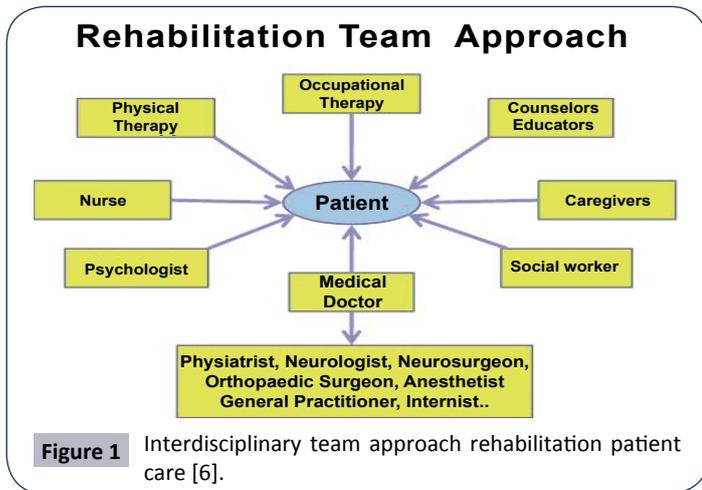

Figure 1 Interdisciplinary team approach rehabilitation patient care [6].

[11]. It follows the understanding that the high rate of physical confrontations (i.e., violence) as well as accidents in Jamaica places significant strain on the Hospital. Jones forwarded a claim made by Dr. Rory Dixon, senior medical officer at the Hospital, that "there is an increase in violence in the society [10]. Also, the population has increased since this institution was built in 1954 while the capacity, unfortunately, hasn't increased".

There are plethora of studies physical medicine and rehabilitation [12-15]; Dr. Dixon's perspective places in the discussion arena the issue of the demands of physical medicine and rehabilitation in Jamaica [10]. His argument about the rise in violence in Jamaica can be supported by studies that show an exponential increase in the number of murders in Jamaica since the 1960's [10,16-19]. A search of the literature unearths two studies in the West Indian Medical Journal, on Physical Medicine and Rehabilitation, with none on effects of macroeconomic indicators (i.e., poverty, inflation, unemployment, GDP per capita and the exchange rate) [6,8,20] on physical medicine and rehabilitation. This study fills the gap in the literature by empirically investigating the influence of macroeconomic indicators on physical medicine and rehabilitation hospitalization, especially in keeping with Dr. Dixon comment that there is a significant rise in demand for physical medicine and rehabilitation in Jamaica [10].

Theoretical Framework

Crotty sets a premise that a theoretical framework is critical to scientific research as it provides the basis for methodology and the interpretation of findings [21]. It can be seen from Crotty's graphical depiction of the research process **(Figure 2)**; the theoretical perspective provides the philosophical structure that guides the methodology, methods and overarching viewpoint that sets the stage for the thinking and interpretation of the study [21]. Thus, the theoretical framework of this study was positivism. Positivism is embedded in the epistemology of objectivism. Crotty summarized objectivism by in this way "objectivist epistemology holds that meaning; therefore meaningful reality exists as such apart from the operation of any consciousness" [21], which accounts for the usage of econometric models using Ordinary Least Square Regression (OLS).

Econometric tools, especially multiple regressions (OLS), have widely been used to study multiple independent variables influencing a single dependent variable. Econometricians like Mamingi, Hill et al. and Wooldridge have shown how OLS is used to model many linear variables simultaneously influencing a single dependent variable [22-24].

It is not surprising that Harcourt used the econometric tool of regression to examine how institutionalization and macroeconomic indicators influence homicide in the United States [25]. He used 68 years of panel data from the United States on homicide and institutionalization, controlling for youth population rates, macro-economic conditions, demographic characteristics and criminal justice enforcement to establish a mathematical model that explain factors that affect homicide, homicide was logged [25]. The econometric model is captured in a single equation (1):

$$\log \text{Homicide Rates}_{sy} = \alpha + \beta \text{Institutionalization Rate}_{sy} + \theta \text{Controls}_{sy} + \Upsilon_s + \delta_y + \Upsilon + \varepsilon_{sy} \tag{1}$$

"where s represents states and y reflects the year. The dependent variable of interest in this class of models was the natural log of the annual homicide rate for each state, which was obtained using vital statistics measures of death by homicide. The key explanatory variable of interest was the 1-year-lagged rate of aggregated institutionalization in state and federal prisons, in public mental hospitals, and in other institutions for the mentally ill. The model used a weighted least squares regression, with weights equal to the annual population of the states, clustering standard errors at the state level. The model conditions on state and year fixed effects (Υ_s and δ_y) to account for unmeasured factors that influence crime and either are constant within states over the study period or change over time but exert a constant influence over the entire set of states" [25].

The present work was not about homicide; but used a similar econometric approach to the study of physical medicine and rehabilitation in Jamaica. Harcourt's model had health care
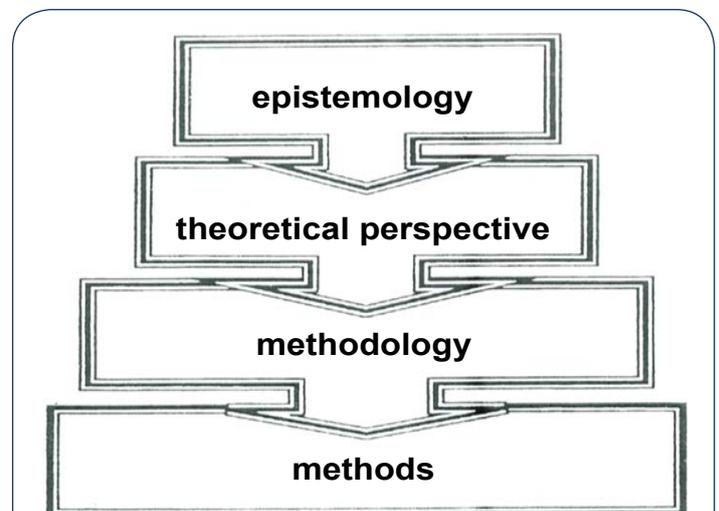
Figure 2 Linking epistemologies, theories, methodologies and methods.

institution as an independent variable and so provides a rationale in using it as the dependent variable. This paper examines factors that influence physical medicine and rehabilitation hospitalization, which is captured in equation (2):

$$PM\&H_t = f(Controls_t) \qquad (2)$$

Where $PM\&H_t$ denoted physical medicine and rehabilitation hospitalization (or the number of people admitted to the physical medicine and rehabilitation hospital in Jamaica) for time period t (i.e., 2006, …, 2015) and controls means the macroeconomic indicators (i.e., inflation rate; unemployment rate; poverty rate; and exchange rate)

Using OLS, equation (2) can be expressed as:

$$PM\&H_t = \alpha + \beta_1 I_t + \beta_2 U_t + \beta_1 P_t + \beta_1 ER_t + \varepsilon \qquad (3)$$

Where α is an intersect of PM&H; β_i are the coefficients of variables; U_t is unemployment rate for time period t; P_t means poverty rate for time t and ER_t is the exchange rate (USD and Jamaican dollar) for time period, t and ε is the residual error.

Methods and Materials

This paper is a secondary study using panel data for Jamaica. The period for this work is from 2006 through to 2015, 10 years of panel data points. The data for this study were taken from various Jamaica Government Publications including the Demographic Statistics, which provided data on population. The Jamaica Constabulary Force and Economic and Social Survey of Jamaica (ESSJ) provided the data for accidents, and mid-year population [26-28]. Data were also obtained from the Ministry of Health on admissions to a national mental health public hospital in Jamaica, which was the Bellevue Hospital [29]. The Ministry of Health collates data from the various hospitals in Jamaica including Bellevue and the Sir John Golding Rehabilitation hospitals. Ordinary Least Square (OLS) regression was used to determine factors of physical medicine and hospitalization. In this paper, scatter diagrams and model summary were used to explain associations as well as probabilities and elasticity of the macroeconomic indicators (poverty, inflation, unemployment and the exchange rates).

In order to meet the use of the OLS' application, for this study, all the assumptions were met before usage. It should be not that where variables are highly inter-correlated (r>0.7), tolerance were checked and if multi-collinearity was discovered to influence the outcome of the squared R value, so one of the variables was dropped and using separately in a model without the highly correlated variable. In this study, there was a high statistical significant association between unemployment rate and poverty (r>0.7), the use of both variable significantly affect the squared R value and it was found that both could not be used simultaneous in same model. Thus, a separate model was built with either poverty or unemployment and so no one model was constructed with both variables.

Physical Medicine and Rehabilitation hospitalization elasticity of macroeconomic conditions was calculated by annual percentage change in hospitalization to Sir John Golding Rehabilitation

Hospital in Jamaica divided by the annual percentage change in each macroeconomic indicator:

Physical Medicine and Rehabilitation Hospitalization elasticities for each macroeconomic indicator:

1) Poverty (η P) = % Δ in admissions to Sir John Golding Hospital for time t divided by the % Δ in poverty rate for time t;

2) Inflation (η I) = % Δ in admissions to Sir John Golding Rehabilitation Hospital for time t divided by the % Δ in inflation rate for time t;

3) Exchange rate (η ER) = % Δ in admissions to Sir John Golding Rehabilitation Hospital for time t divided by the % Δ in exchange rate for time t;

4) Unemployment rate (η U) = % Δ in admissions to Sir John Golding Rehabilitation Hospital for time t divided by the % Δ in unemployment rate for time t.

Interpretation of elasticities: $\eta<1$ denotes that the hospitalization is responsive to the macroeconomic indicator; $\eta>1$ means that the hospitalization is unresponsive to the macroeconomic indicator.

Responsive to a macroeconomic indictor means that a 1% change in that indictor will result in a more than 1% change in admissions to the Sir John Golding Rehabilitation Hospital (i.e., Physical Medicine and Rehabilitation Hospitalization).

Unresponsive to a macroeconomic indictor denoted that a 1% change in the indicator would result in a less than 1% change in admissions to the Sir John Golding Rehabilitation Hospital (i.e., Physical Medicine and Rehabilitation Hospitalization).

Results

Table 1 presents admissions (or hospitalization) to the Sir John Golding Rehabilitation Hospital and macroeconomic indicators for Jamaica, 2006-2015. For the 10 year period, the average number of hospitalization to the Sir John Golding Rehabilitation hospital was 241 people. For the first 5 years (2006-2010), the average number of hospitalization was 191 ± 37 compared to 292 ± 44 for the latter 5-year period (i.e., 2011-2015). Such values indicate that hospitalization for physical medicine and rehabilitation service rose by 52.9%, which indicated substantial increase in physical deformity over the last 5 years compared to the former 5 years. Furthermore, for the studied period, the annual prevalence for physical medicine and rehabilitation (PM&R) rate per 100,000 was 8.9 ± 2.2, with the figure rising from 4.92 per 100,000 in 2006 compared to 12.74 (Increased by 2.6 times).

Various cross-elasticities of hospitalization and macro-economic indicators are presented in **Table 2**. Cross-elasticity of hospitalization and 1) inflation rate (i.e., η I); 2) poverty rate (i.e., η P); 3) unemployment rate (η U); and 4) exchange rate (i.e., η ER) are all presented in **Table 2**. Of all the elasticities, the only one with majority of them being low responsivity was hospitalization and inflation rate, with the reverse being the case for the others.

Table 3 is a summary of the responsivity of physical medicine and rehabilitation hospitalization to various macroeconomic indicators. Admissions to the Sir John Golding Rehabilitation Hospital (i.e., physical medicine and rehabilitation hospital) in Jamaica are influenced by changes in the exchange rate, poverty and inflation. However, physical medicine and rehabilitation hospitalization is equally responsive but unresponsive to changes in the poverty rate. The responsiveness of the admissions to the Sir John Golding Rehabilitation Hospital (i.e., Physical Medicine and Rehabilitation Hospitalization) indicated that the condition in question (macroeconomic indicator) will fundamentally change hospitalization to the Sir John Golding Rehabilitation Hospital (i.e., Physical Medicine and Rehabilitation Hospitalization).

Table 1: Hospitalization to Sir John Golding Rehabilitation Hospital, macroeconomic indicators, and physical medicine and rehabilitation rate per 100,000 (PM&R), 2006-2015.

Year	Sir John Golding Rehabilitation Hospitalization	Inflation rate	Poverty rate	Unemployment rate	ER	PM&R rate/100000
2006	131	5.7	14.3	10.3	65.88	4.92
2007	214	16.8	9.9	10.0	69.06	8.00
2008	180	16.8	12.3	11.0	72.92	6.70
2009	225	10.2	16.5	11.0	88.49	8.35
2010	205	11.7	17.6	13.0	87.38	7.61
2011	290	6	16.5	11.3	86.08	10.74
2012	239	8	19.9	13.7	88.99	8.83
2013	267	9.5	20	14.9	106.38	9.84
2014	306	6.4		14.2	114.6	11.25
2015	356	3.7	16.5	13.1	120.42	12.74
Mean ± SD	241.3 ± 65.5	9.5 ± 4.5	15.9 ± 3.3	12.3 ± 1.7	90.0 ± 18.7	8.9 ± 2.2

ER denotes the exchange rate (USD and Jamaican dollar)

Table 2: Annual percent change in admissions to Sir John Golding Rehabilitation Hospital and macroeconomic indicators as well as elasticities.

Year	Annual % Δ Hospitalization	Annual % Δ Inflation	Annual % Δ Poverty	Annual % Δ U unemployment	Annual % Δ ER	η I	η P	η U	η ER
2006	-	-	-	-	-	-	-	-	-
2007	63.36	194.74	-30.77	-2.91	4.83	0.33	-2.06	-21.75	13.13
2008	-15.89	0.00	24.24	10.00	5.59	∞	-0.66	-1.59	-2.84
2009	25.00	-39.29	34.15	0.00	21.35	-0.64	0.73	∞	1.17
2010	-8.89	14.71	6.67	18.18	-1.25	-0.60	-1.33	-0.49	7.09
2011	41.46	-48.72	-6.25	-13.08	-1.49	-0.85	-6.63	-3.17	-27.87
2012	-17.59	33.33	20.61	21.24	3.38	-0.53	-0.85	-0.83	-5.20
2013	11.72	18.75	0.50	8.76	19.54	0.62	23.31	1.34	0.60
2014	14.61	-32.63	-	-4.70	7.73	-0.45	-	-3.11	1.89
2015	16.34	-42.19	-	-7.75	5.08	-0.39	-	-2.11	3.22

∞: Means infinity or a very large number

Table 3: Summary of responsivity of physical medicine and Rehabilitation Hospital to macroeconomic indicators (exchange rate, unemployment rate, poverty rate and inflation rate), Jamaica, 2006-2015.

Year	Responsive (η>1)				Unresponsive (η<1)			
	ER	U	P	I	ER	U	P	I
2006	-	-	-	-	-	-	-	-
2007	✓	✓	✓					✓
2008	✓	✓		✓			✓	
2009	✓	✓					✓	✓
2010	✓		✓			✓		✓
2011	✓		✓			✓		✓
2012	✓					✓	✓	✓
2013		✓	✓		✓			✓
2014	✓	✓					✓	✓
2015	✓	✓						✓

ER: Exchange Rate; U: Unemployment Rate; P: Poverty Rate; I: Inflation Rate
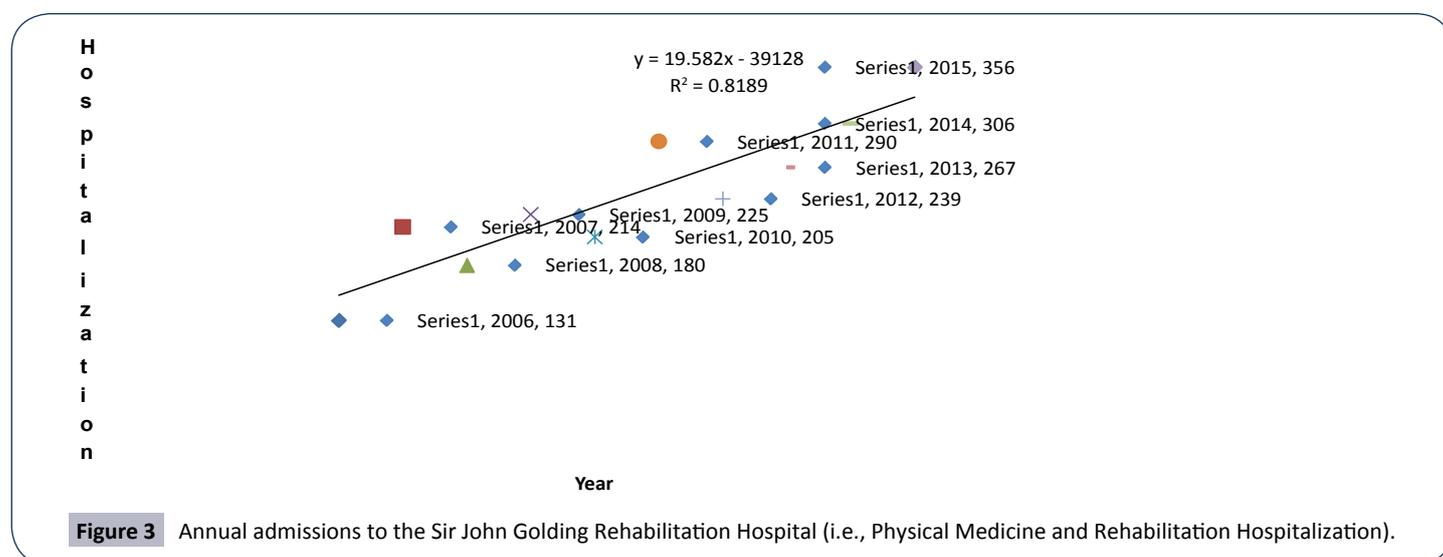✓: Means a selection

Figure 3 depicts a graphic display of annual admission to the Sir John Golding Rehabilitation Hospital (i.e., Physical Medicine and Rehabilitation Hospitalization) in Jamaica, 2006-2015. A super-imposed function placed on the data points along with an equation and the rate of explanation of the function (R^2). Using the squared R value (i.e., 0.819), annual admission to the Sir John Golding Rehabilitation Hospital (i.e., Physical Medicine and Rehabilitation Hospitalization) in Jamaica was best fitted with a linear function. Furthermore, the gradient of the linear function is a positive value (i.e., 19.58) which meant that admission to the Sir John Golding Rehabilitation Hospital (i.e., Physical Medicine and Rehabilitation Hospitalization) had been positively increasing by the same rate over the 10-year period.

Table 4 presents Pearson's product moment correlation coefficient among selected macroeconomic indicators for Jamaica, 2006-2015. A strong direct statistical correlation existed between poverty and the unemployment rate (r_{xy}=0.862, P<0.0001) as well as unemployment and the exchange rate (r_{xy}=0.718, P=0.035). Physical Medicine and Rehabilitation hospitalization was statistically correlated with all the macroeconomic indicators, with the only inverse correlation existed between admissions to the Sir John Golding Rehabilitation hospital and inflation. Furthermore, strong statistical association existed between

admission to the Sir John Golding Rehabilitation hospital and 1) inflation (r_{xy}=0.834, P<0.0001) and 2) exchange rate (r_{xy}=0.872, P<0.0001).

Table 5 presents OLS estimates of admissions to the Sir John Golding Rehabilitation hospital and selected macroeconomic indicators, Jamaica. With the high multicollinearity between poverty and unemployment rate, poverty was omitted from this model when unemployment rate was entered therein and vice versa. In this study, there was a high statistical significant association between unemployment rate and poverty (r>0.7), the use of both variable significantly affect the squared R value and it was found that both could not be used simultaneous in same model. The three macroeconomic indicators (unemployment, inflation and the exchange rates) were predictors of admissions to the Sir John Golding Rehabilitation hospital, with the indicators accounting for 0.894 (89.4%) of the variability in admissions to the Sir John Golding Rehabilitation hospital (F [3,7]=64.833, P<0.0001).

Table 6 presents OLS estimates of admissions to the Sir John Golding Rehabilitation hospital and selected macroeconomic indicators, Jamaica. With the high multicollinearity between poverty and unemployment rate, unemployment was omitted from the model when poverty was therein and vice versa. In

Figure 3 Annual admissions to the Sir John Golding Rehabilitation Hospital (i.e., Physical Medicine and Rehabilitation Hospitalization).

Table 4: Pearson's product moment correlation coefficient among selected macroeconomic indicators.

		Rehabilitation Hospitalization	Exchange rate	Inflation rate	Unemployment rate	Poverty rate
Pearson Correlation	Rehabilitation Hospitalization	1	0.834	-0.872	0.377	0.362
	Exchange rate	0.834	1	-0.812	0.718	0.640
	Inflation rate	-0.872	-0.812	1	-0.520	-0.690
	Unemployment rate	0.377	0.718	-0.520	1	0.862
	Poverty rate	0.362	0.640	-0.690	0.862	1
Sig. (2-tailed)	Rehabilitation Hospitalization	-	<0.0001	<0.0001	0.035	0.041
	Exchange rate	<0.0001	-	<0.0001	<0.0001	<0.0001
	Inflation rate	<0.0001	<0.0001	-	0.005	<0.0001
	Unemployment rate	0.035	<0.0001	0.005	-	<0.0001
	Poverty rate	0.041	<0.0001	<0.0001	< 0.0001	-

Table 5: OLS estimates of admissions to the Sir John Golding Rehabilitation Hospital and selected macroeconomic indicators, Jamaica.

Model	Beta	Std. Error	t statistic	P value	95% CI Lower-Upper
Constant	-	49.4	5.116	<0.0001	150.7-355.2
Exchange Rate	0.758	0.488	4.932	<0.0001	1.4-3.4
Inflation rate	-0.486	1.5	-4.038	0.001	-8.99 - -2.9
Unemployment	0.396	3.5	3.716	0.001	5.8 - 20.4

Table 6: OLS estimates of admissions to the Sir John Golding Rehabilitation Hospital and selected macroeconomic indicators, Jamaica.

Model	Beta	Std. Error	t	P value	95% CI Lower-Upper
Constant	-	38.978	8.725	<0.0001	258.9-421.4
Inflation rate	-0.840	1.097	-9.148	<0.0001	-12.3 - -7.7
Poverty rate	0.533	1.122	7.640	<0.0001	6.2-10.9
Exchange rate	0.493	0.291	5.700	<0.0001	1.1-2.3

this study, there was a high statistical significant association between unemployment rate and poverty ($r>0.7$), the use of both variable significantly affect the squared R value and it was found that both could not be used simultaneous in same model. The three macroeconomic indicators (poverty, inflation and the exchange rates) were factors of admissions to the Sir John Golding Rehabilitation hospital, accounting for 0.951 (95.1%) of the variability in admissions to the Sir John Golding Rehabilitation hospital ($F_{[3,7]}=128.728$, $P<0.0001$).

The hierarchical models (i.e., model 1-to-model 3) indicate from the most influential variable (i.e., model 1) to least for the last item in model 3. The most influential factor of admissions to the Sir John Golding Rehabilitation hospital and selected macroeconomic indicators was the inflation rate-Model 1: $R^2=0.761$, $F_{[1,9]}=69.972$, $P<0.0001$ **(Table 7)**. It should be noted that there is an inverse significant correlation between inflation and physical medicine and rehabilitation hospitalization. The next variable of significance is poverty, model 2. The poverty rate contributed 0.110 (or 11.0%; $F_{[2,8]}=70.748$, $P<0.0001$), with their being a positive significant association between poverty and physical medicine and rehabilitation hospitalization. The last model (i.e., model 3) has all the variables, with the least significant one placed last therein, exchange rate (i.e., 8.0%; $F_{[3,7]}=128.728$, $P<0.0001$).

The hierarchical models (i.e., model 1-to-model 3) indicate from the most influential variable that is present in model 1 to the least significant in the final model, model 3. The most influential factor of admissions to the Sir John Golding Rehabilitation hospital and selected macroeconomic indicators was the inflation rate and this is present in the first model-Model 1: $R^2=0.780$; $F_{[1,9]}=88.508$, $P<0.0001$ **(Table 8)**. In model 2, show the variable that has the second most influence on physical medicine and rehabilitation hospitalization, exchange rate, which contributed 0.071 (or 7.1%; $F_{[2,8]}=58.912$, $P<0.0001$). Finally, in model 3 the least significant variable is the unemployment rate (i.e., 6.3%; $F_{[3,7]}=64.833$, $P<0.0001$). The association of each factor with the dependent variable was presented in OLS regression **(Table 8)**. **Table 8** shows a negative correlation between inflation and hospitalization to the Sir John Golding Rehabilitation hospital (beta=-0.486, P=0.001); whereas positive relationships between

the exchange rate (ER) and hospitalization to the Sir John Golding Rehabilitation hospital (beta=0.758, P<0.0001) as well as between unemployment and hospitalization to the Sir John Golding Rehabilitation hospital (beta=0.396, P=0.001).

Discussion

It is widely established in the health literature that income influences health [30-33]. Outside of income, there are many other social determinants of health; but the researchers found no empirical study from our search of the literature that examined macroeconomic indicators and their influence (or otherwise) on the hospitalization to a national rehabilitation hospital in Jamaica [30,33,34]. All the indicators have some influence on admissions to the Sir John Golding Rehabilitation Hospital in Jamaica for physical medicine and rehabilitation services. The selected macroeconomic indicators were inflation, unemployment, poverty and the exchange rate (USD and Jamaican dollars), with inflation having the most influence on physical medicine and rehabilitation hospitalization. Although the inflation rate had the most impact on physical medicine and rehabilitation hospitalizations, admissions to the Sir John Golding Rehabilitation Hospital were most responsive to the exchange rate.

When Dr. Dixon, senior medical officer at the Sir John Golding Rehabilitation Hospital, indicated that violence and accidents were the cause of hospitalization to that institution, he did not examine the macroeconomic environment and so the perspective was narrow. Both violence and accidents was the immediate visible outlet that was associated with the demand for physical medicine and rehabilitation hospitalization; but influence of inflation and the exchange rate were not identified as having contributed to the violence and accident [10]. Clearly, the macroeconomic environment has an influence on the outcomes of physical medicine and rehabilitation, which were translated by the violence and the accidents. Using labour compensation and social security expended in the United States, in 1982, Battistella wrote that some US $13 billion and US $23.1 billion, respectively, were paid out for morbidity owing to some deficiency and this looks at the economics of disability [12]; but it was not taken from the perspective examined by the current work.

We found that physical medicine and rehabilitation hospitalization was significantly influenced by the macroeconomic environment (i.e., exchange rate, unemployment rate and poverty) and despite that reality, we still cannot ascribe as causal relationship between: 1) Violence and hospitalization; and 2) Accident and hospitalization, because the macroeconomic indicators such as poverty, the exchange rate and unemployment rate must be taken into consideration before one can definitively established causality. Although a strong positive bivariate correlation emerged between the exchange rate (USD and Jamaican dollars), such an indicator was not causal as when linked with other macroeconomic indicators such as inflation and poverty, it was lowly associated with physical medicine and rehabilitation hospitalization. Such findings caution one against making claims about causality on a single strong bivariate relationship. Although inflation had strong correlation with physical medicine and rehabilitation hospitalization, it is inversely related to hospitalization compared to the exchange rate that had a positive influence on admissions to the Sir John Golding Rehabilitation hospital. It can be extrapolated from the

Table 7: OLS estimates, using hierarchical method, of admissions to the Sir John Golding Rehabilitation Hospital and selected macroeconomic indicators, Jamaica.

Model		B	Std. Error	Beta	T	P	95% CI Lower-Upper
1	Constant	354.7	13.986	-	25.360	<0.0001	325.7-383.7
	Inflation	-10.4	1.245	-0.872	-8.365	<0.0001	-13.0 - -7.8
2	Constant	512.6	38.821	-	13.205	<0.0001	431.9-593.4
	Inflation	-14.2	1.294	-1.188	-10.964	<0.0001	-16.9 - -11.5
	Poverty	7.4	1.742	0.458	-4.227	<0.0001	3.7-11.0
3	Constant	340.1	38.978	-	8.725	<0.0001	258.8-421.4
	Inflation	-10.0	1.097	-0.840	-9.148	<0.0001	-12.3 - -7.7
	Poverty	8.6	1.122	0.533	7.640	<0.0001	6.0-10.9
	ER	1.7	.291	0.493	5.700	<0.0001	1.1-2.3

Model 1: R^2=0.761, F=69.972, P<0.0001
Model 1: R^2=0.871, F=70.748, P<0.0001
Model 1: R^2=0.951, F=128.728, P<0.0001

Table 8: OLS estimates, using hierarchical method, of admissions to the Sir John Golding Rehabilitation hospital and selected macroeconomic indicators, Jamaica.

Model		Beta	Std. Error	t	P value	95.0% CI Lower-Upper
1	Constant	-	12.389	29.087	<0.0001	334.9-385.9
	Inflation rate	-0.883	1.147	-9.408	<0.0001	-13.2 - -8.4
2	Constant	-	59.049	3.461	0.002	82.5-326.2
	Inflation rate	-0.558	1.799	-3.786	0.001	-10.5 - -3.1
	Exchange rate	0.396	.468	2.690	0.013	0.3-2.2
3	Constant	-	49.443	5.116	<0.0001	150.6-355.2
	Inflation rate	-0.486	1.472	-4.038	0.001	-9.0-3.0
	Exchange rate	0.758	.488	4.932	<0.0001	1.4-3.4
	Unemployment rate	0.396	3.535	3.716	0.001	5.8-20.4

Model 1: R^2 = 0.780, F = 88.508, P<0.0001
Model 1: R^2 = 0.831, F=58.912, P<0.0001
Model 1: R^2 = 0.894, F=64.833, P<0.0001

data that when the general state of the economy is high, people will become engaged in reckless behavior, thereby leading to physical deformity. The increased demand owed to violence and accidents were expressions of the general deterioration of the Jamaican economy and not what seemingly identified by Dr. Dixon. A separation must be made between the outcome and the factor that led to the stated outcome. The violence or the accident is the outcome of poorly managed economy and the economic factor must be brought into medicine and rehabilitation care of patients.

The expression that is evident to Dr. Dixon is the psychology of poverty, unemployment and the general poor state of an economy [10]. There is a paradox in this study that while hospitalization to the Sir John Golding Rehabilitation hospital was mostly influenced by inflation, it was also highly responsive to it. In the same breath, the demand for physical medicine and rehabilitation was responsive to both poverty and unemployment; they have a secondary role to inflation and warn against a single perspective for the complexity of the matter. Clearly more research is needed to untangle these complexed paradoxical matters that emerge in the current work. The matter still remains that macroeconomic indicators such as poverty, exchange rate, unemployment and inflation rates have influences on the changes in demand for physical medicine and rehabilitation in Jamaica.

The researchers are offering some explanations for what emerged in this paper. The explanations are: 1) Psychological burden of economic frustrations; 2) Economic burden has a futuristic impact on behavior; and 3) the economic environment must be included in health discourse. The psychological burden of economic frustrations makes people irrational and this leads to reckless behaviors that translate into social deviance including physical confrontations and reckless driving on the roadways. As people are burdened by the economy, this has a futuristic end where they rationalize irrationality, and thereby erratic behavior emerged because of the depressive psychological burden. The issue of psychiatric disorders having an economic component must begin placement in medicine, especially in the issue of choices, and how these choices account for a certain physical outcome.

Conclusion

The economic environment has an influence on physical medicine and rehabilitation hospitalization. While there are areas of complexities that need more scientific enquiry, policy makers and health care practitioners need to characterize a 'bad economic climate' as a disease, and recognize its influence on ill-health, choices and plan for it by way of physical medicine and rehabilitation.

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