

*Full Length Research Paper*

# Prevalence and correlates of physical health conditions in Jamaica and Guyana

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**The increasing prevalence of non-communicable diseases remains an important source of concern in the Caribbean and Latin American regions. This study examines rates and the associated socio-demographic correlates of physical health indicators in Jamaica and Guyana. Area probability cross-sectional data were collected on 1,218 Jamaicans and 2,068 Guyanese participants in 2005. Physician-diagnosed hypertension, diabetes mellitus, arthritis, and self-rated oral and general physical health were assessed using descriptive statistics, chi-square, and hierarchical logistic regression analytic procedures. Jamaicans generally reported poorer physical health, including diabetes mellitus, arthritis, and overall perceived oral and physical health compared to Guyanese; Guyanese reported higher rates of hypertension. Generally, lower social and economic standing was associated with poorer health conditions but made different contributions across countries. The study highlights the need for greater awareness and access to health care services for individuals who are especially vulnerable to poorer health. The results of this study suggest the need for additional studies on factors associated with physical health conditions, including a better understanding of the role of race/ethnicity in the Caribbean.**

**Key words:** prevalence, physical health, Guyana, Jamaica.

## INTRODUCTION

Increasing prevalence of non-communicable diseases has contributed to increased rates of morbidity and

mortality of individuals and remains an important source of concern in the Caribbean and Latin American regions

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(Wang et al., 2018; Ferguson et al., 2017; PAHO, 2016; NCD-RisC, 2016; Watkins et al., 2016; Rivera-Andrade and Luna, 2014; Bonilla-Chacin, 2013; Barretto et al., 2012). According to recent reports, the major contributors to increased rates of morbidity and mortality are lifestyle changes and social and economic determinants, characteristic of low income and developing nations experiencing demographic transitions (NCD-RisC, 2016; WHO, 2015, 2016; Barretto et al., 2012). For instance, four out of five of the leading causes of death in Jamaica are attributed to cardiovascular disease, diabetes mellitus, heart disease, and hypertension (Ferguson et al., 2017; NCD-RisC, 2016; Kramer et al., 2018; Razzaghi, 2016). In Guyana, non-communicable diseases create the highest health burdens, and social and environmental factors are viewed as important sources of these conditions (Bennett et al., 2018; Ezzati et al., 2018; PAHO, 2012). Despite greater general awareness about these trends in physical health among citizens within the Caribbean region, limited comparative studies using area probability methods and reliable health measures have hindered the ability to accurately identify the sources of these problems (Bonilla-Chacin, 2013; Barretto et al., 2012; Ferguson et al., 2011a, b). In this study, the authors used representative population samples collected in Jamaica and Guyana to estimate rates and associated contributing factors of physician- diagnosed and self-rated physical health conditions.

### **Prevalence of physical health conditions**

Chronic physical health diseases have a considerable impact on the lives of persons in the Caribbean and Latin America and represent some of the leading causes of cardiovascular diseases and cancer in Jamaica (Nguyen et al., 2018; Murphy et al., 2017; NCD-RisC, 2016; Chao et al., 2011). Hypertension, however, remains the most widespread with overall prevalence rates ranging from 18 to 55% (Salicrup et al., 2018; NCD-RisC, 2016; Bonilla-Chacin, 2013; Barretto et al., 2012). Strong correlations exist between hypertension and other chronic health conditions in the Caribbean region. In recent studies, approximately half of individuals with diabetes also had a history of hypertension (PAHO, 2016; Lee et al., 2013). Similar chronic disease patterns have been found in Guyana, where the high prevalence of diabetes mellitus and hypertension is associated with high rates of coronary heart diseases that rank among the leading causes of death (Bennett et al., 2018; Migdalis et al., 2015; PAHO, 2016; PAHO, 2012).

### **Social correlates of health in Jamaica and Guyana**

Social and economic factors, such as gender, marital

status, age, and socioeconomic status are known to be associated with physical health (Wilson et al., 2018; Ferguson et al., 2017; Jindal et al., 2016a, b; Choi et al., 2015; Braveman et al., 2011). Other pertinent social determinants include living conditions, lifestyle, sanitation, and access to electricity and potable water. For some conditions, however, the burden is greater for women than men (Nunura, 2017; Bennett et al., 2015; WHO, 2016a; Ferguson et al., 2011a, b; Wilson et al., 2010; Bourne et al., 2010).

Studies conducted in Jamaica revealed a higher prevalence of diabetes mellitus, stroke, heart disease, and hypercholesterolemia among women (Cunningham-Myrie et al., 2015; Wilks et al., 2008). In fact, hypertension among women has been found to be as much as two and a half times higher than that among men (Ferguson et al., 2017, 2018; Nunura, 2017; Cunningham-Myrie et al., 2015). Among Guyanese, men were less likely to report one or more chronic and recurring illnesses than women (Jindal et al., 2016a; Wilson et al., 2010).

Cross-cultural studies also indicate that married individuals traditionally enjoy better health (Ferguson et al., 2018; Cunningham-Myrie et al., 2015; Peace et al., 2014; Cunningham-Myrie et al., 2013; Alladin et al., 2011). Research suggests that being married may serve as a protective factor against diseases with men accruing the greatest marital health benefit (Gomez et al., 2016; Ferguson et al., 2011a, b). For example, in the United States unmarried African Americans have been found to be at greater risk for cardiovascular diseases, diabetes mellitus, and overall higher mortality than married persons (Schwandt et al., 2010; Koball et al., 2010).

The Caribbean region has experienced considerable increases in the proportion of the population over the age of sixty, with even higher projected increases over the next decade. The region has subsequently witnessed a surge of diseases associated with aging, with older persons reporting lower self-rated health than younger individuals (Whisenant, 2014; Bennett et al., 2015; Nunura, 2017; Chao et al., 2011). There is a growth in chronic diseases, such as arthritis, hypertension, and diabetes mellitus among aging populations (Wilson et al., 2018; Lacey et al., 2015; Chao et al., 2011). In Jamaica, approximately half of persons over the age of 40, when compared to around a quarter of individuals between the ages of 25 and 39, have hypertension (Bourne et al., 2009). Studies further have shown that more than one-third of new type 2 diabetes cases were among persons over the age of sixty in the overall Caribbean region (Whisenant, 2014).

Research has also long found an association between socioeconomic status (SES) and physical health (Wilson et al., 2018; WHO, 2016a; Bennett et al., 2015; Braveman et al., 2011; Schwandt et al., 2010; Koball et al., 2010). In many studies, individuals on the lower socio-economic

gradient were more susceptible to poorer overall physical health (Nunura, 2017; Cunningham-Myrie et al., 2015; Bonilla-Chacin, 2013; Braveman et al., 2011; Bourne et al., 2010). In Jamaica specifically, individuals within the lowest economic group have been found to have higher prevalence rates of diabetes mellitus, hypertension, and cholesterolemia (Bennett et al., 2015; Chao et al., 2011). A small number of studies conducted in Guyana have found similar associations between lower economic status and poor physical health (Jindal et al., 2016a, b).

On some Caribbean islands issues of race/ethnicity have been a source of contention. Racial tensions have been noted in Guyana, with reports of racial inequalities in housing and employment (Wilson et al., 2010). In US studies, discrimination has been linked to negative physical health outcomes (Sellers et al., 2013; Krieger et al., 2011; Sternthal et al., 2011). The authors' understanding of the link between race and health in the Caribbean is limited, as few studies have been conducted to understand the dynamic in the Caribbean region. Studies conducted in Guyana have found higher odds of impairment among the Indo-Guyanese as compared to the black population (Wilson et al., 2010). Given the Caribbean colonial experience and change in demographics resulting from in-migration to the region from other groups, it is important to understand how individuals' health outcomes might be influenced by racial and ethnic group membership.

### Conceptual framework

This study is guided by a social determinant of health model. Social determinants of health include macro-level social factors, such as socio-demographic and socio-economic status (SES), which are linked to health (Braveman et al., 2011). Research in the social determinants of health suggests that societies are structured in such a way that access to positive health resources is distributed according to one's position within the social structure. One's social position and health may be shaped by factors such as gender, age, race, ethnicity, and economic status. The specific dynamics of social statuses and their association with health may differ across countries. In the US and the Caribbean, socio-economic status is a central driving force associated with social and economic position and individual health outcomes (Williams et al., 2016; James et al., 2012; Wilson et al., 2010; Braveman et al., 2011). Persons of higher social classes are more likely to have more consistent employment, safer neighborhoods and housing, healthier food, higher education, and lower stress environments; each of which is associated with positive health outcomes (Mirowsky, 2017; James et al., 2012; Williams et al., 2008). Persons in lower social classes are more likely to be exposed to social contexts

that present direct and indirect health risks. For example, the higher chronic stress exposure of persons in lower social classes may make them more vulnerable to various physical ailments (Choi et al., 2015; James et al., 2012; Sternthal et al., 2011). Given the rampant inequalities that exist in some societies, it might be the case that certain groups are more vulnerable to physical health disorders than others.

### Research objective

This study examines the rates and the association between social and economic conditions and physical health outcomes within and between residents in Jamaica and Guyana. The study further addresses the contributions of demographic and socio-economic factors to physical health in the respective countries.

## MATERIALS AND METHODS

### Study design and sample

Area probability samples based upon the Family Across Generations and Nations Study (FAGN) were used for this study. The FAGN is the National Survey of American Life replication and the health and well-being of multigenerational families across contexts (Jackson et al., 2004; Lacey et al., 2016). The study included data collected in Jamaica and Guyana. In Jamaica, data were collected on individuals who resided in the Kingston Metropolitan Region including urban Kingston, and St. Andrew, and Portmore (Boxill et al., 2007). Interviews with participants were conducted in August 2005 and completed in December of that year. Similar sampling methods were used in the greater Georgetown (urban), suburban and rural areas of Guyana (Bynoe et al., 2006). Questionnaires were administered to Guyanese participants between July and December of 2005. A total of 1,218 interviews were completed in Jamaica, and 2,068 interviews were collected in Guyana. The response rate for the Jamaican sample was 76%; Guyana had a slightly higher rate at 82%. Human subjects' approval was obtained by the Ministry of Health in both countries.

### Measures

#### Physical health

The physical health of participants was determined by asking participants to indicate whether they were diagnosed by a physician with any of the following conditions: arthritis or "rheumatism"; hypertension or "high blood pressure"; and diabetes mellitus or "sugar". Self-rated physical and oral health was addressed by: "How would you rate your overall physical health?" and "How would you rate the overall condition of your teeth, gums, and mouth at the present time." Both physical and oral health was assessed on a 5-point Likert scale: (1) excellent; (2) very good; (3) good; (4) fair, and (5) poor. The scale was recoded, and the categories dichotomized into fair/poor health and good/excellent health for the analysis.

#### Social factors

The social variables examined for this study were age (18-29, 30-

44, 45-59, 60 and older), gender (male, female), marital status (married, with partner, separated/divorced/widowed, never married), and race/ethnicity. In Guyana, the racial/ethnic categories were: Black (African descendants), Indo-Guyanese (descendants of East India), and mixed/other (e.g., Other Asian, Hispanic/Latino, Other). Race/ethnicity was divided into two in Jamaica: Black (African descendants) and other/mix (e.g., White, Chinese, East Indian, Other Asian, Hispanic/Latino, Other).

### **Socioeconomic factors**

The economic factors were education (primary/some high school, high school, college/vocational/technical), employment status (employed, unemployed, not in the labor force), and household income (categorized as statistical quintiles).

### **Statistical analysis**

Descriptive statistics and cross-tabulations (chi-square) were used to address rates and associations with physical health conditions by socio-demographic factors. Hierarchical logistic regression analysis was conducted to ascertain the independent contributions of social and economic factors to the physical health status of participants in the respective Caribbean countries. Social factors (age, gender, marital status) were included in block 1. Block 2 consisted of socioeconomic variables (education, income, occupational status). Race/ethnicity among Guyanese was entered in the third and final block. Race/ethnicity was excluded in the Jamaican models because an overwhelming majority (97.4%) of the sample was comprised of individuals of African descent. In regression analyses, R-squared statistics were calculated and reported. Post-stratification weights based upon census estimates of age and gender was also applied. Race/ethnicity was an additional stratification factor in Guyana. Statistical significance was set at the 0.05 alpha levels for all analyses.

### **Sample description**

Participants in Guyana on average were older than Jamaican participants ( $m = 40.5$  vs.  $38.9$ ) (Table 1). Over half of the Guyanese sample was female, compared to the nearly three-quarters of females that made up the Jamaican sample ( $51.8$  vs.  $69.5\%$ ). Most of the Guyanese participants were married compared to Jamaicans, who primarily never married ( $34.2$  vs.  $56.6\%$ ). A majority of Guyanese participants had primary or some high school education, while almost half of Jamaicans were high school graduates ( $54$  vs.  $49.8\%$ ). Across samples, participants were generally employed, with Guyanese participants having higher rates of employment compared to Jamaicans ( $53.7$  vs.  $44.1\%$ ). The income level was generally higher for Jamaicans, with more individuals within the fourth quintile category ( $42.4\%$ ) when compared to Guyanese who were mostly represented in the second quintile ( $30\%$ ). In both Guyana and Jamaica, a larger percentage of participants were Black ( $55.5$  vs.  $97.4\%$ ).

## **RESULTS**

### **Prevalence of physical health**

For most conditions, rates of poor physical health conditions were generally higher among Jamaicans compared to the Guyanese (Table 2). Specifically, higher

rates of diabetes mellitus ( $7.5$  vs.  $6.6\%$ ), arthritis ( $7.8$  vs.  $5.0\%$ ), self-rated fair or poor oral health ( $26.4$  vs.  $21.5\%$ ), and general physical health ( $25.7$  vs.  $17.5\%$ ) were observed for Jamaicans. A slightly higher rate of hypertension, however, was found for Guyanese than their Jamaican counterpart ( $14.6$  vs.  $14.1\%$ ).

### **Factors associated with physical health**

#### **Hypertension**

Across samples, older Jamaicans, and Guyanese subjects (e.g., 60 and above) had excessive rates of hypertension ( $43.5$  vs.  $49.6$ ,  $P < 0.001$ ) (Table 2). Elevated levels of hypertension were also found among Jamaican and Guyanese women ( $17.2$  vs.  $16.7\%$ ,  $P < 0.01$ ). Additionally, greater proportions of Jamaicans and Guyanese who were separated, divorced, or widowed had hypertension ( $25.9$  vs.  $27.1\%$ ,  $P < 0.001$ ).

Associations between socioeconomic status indicators and hypertension were also found. Both bottom quintiles Jamaican and Guyanese participants were susceptible to this condition ( $20.9$  vs.  $22.2\%$ ,  $P < 0.05$ ). Primary or some high school educated individuals were also at a higher risk for hypertension in both countries ( $25.4$  vs.  $20.1\%$ ,  $P < 0.001$ ). Finally, Jamaican and Guyanese participants that were not in the labor force had higher rates of hypertension ( $20.5$  vs.  $24.4\%$ ,  $P < 0.001$ ).

#### **Diabetes mellitus**

The analysis further revealed that older participants had higher proportions of diabetes mellitus in both Jamaica and Guyana. This was more evident among individuals over the age of sixty in the respective countries ( $23.1$  vs.  $16.4\%$ ,  $P < 0.001$ ). Separated, divorced, or widowed participants also had higher proportions of diabetes mellitus ( $15.9$  vs.  $10.4\%$ ,  $P < 0.001$ ). Both Jamaican and Guyanese participants in the lower-income quintile category ( $12.3$  vs.  $10.0\%$ ,  $P < 0.001$ ) and with a primary or some high school education ( $16.7\%$  vs.  $10.1\%$ ,  $P < 0.001$ ) were at higher risk for diabetes. This association in high rates of diabetes was also found for unemployed Jamaicans ( $9.2\%$ ,  $P < 0.05$ ) and among Guyanese that were not in the labor force ( $9.5\%$ ,  $P < 0.01$ ). Although the association was different among gender groups, more Jamaican ( $8.9\%$ ,  $P < 0.05$ ) and Guyanese females ( $7.3\%$ ,  $P > 0.05$ ) reported that a physician had told them that they had diabetes. In Guyana, an association was also found for race/ethnicity, with Indo-Guyanese having a greater risk for this condition ( $9.9\%$ ,  $P < 0.001$ ).

#### **Arthritis**

Similarities in association were observed between

**Table 1.** Sample characteristics in Guyana and Jamaica.

Percentage (except for age) Characteristics	Caribbean samples	
	Guyana (2005) (%)	Jamaica (2005) (%)
<b>Mean age</b>	40.5	38.9
<b>Gender</b>		
Male	48.2	30.5
Female	51.8	69.5
<b>Marital status</b>		
Married	34.2	20.3
Partnered	16.0	13.2
Sep-div-widow	18.6	9.9
Never married	31.2	56.6
<b>Education level</b>		
Primary/some high school	54.0	28.3
High school graduate	29.7	49.8
College-vocation-technical	16.3	21.9
<b>Employment status</b>		
Employed	53.7	44.1
Unemployed	10.8	28.6
Not in the labor force	35.5	27.4
<b>Equivalised income</b>		
Bottom quintile	14.0	21.1
Second quintile	30.0	24.3
Middle quintile	23.4	1.6
Fourth quintile	22.4	42.4
Highest quintile	10.2	10.7
<b>Race/Ethnicity</b>		
Black	55.2	97.4
Indo	34.7	---
Mixed/Other	10.1	2.6
<b>[N]</b>	<b>2068</b>	<b>1218</b>

arthritis and socio-demographic indicators. For example, both Jamaican and Guyanese participants over the age of 60 had higher rates of arthritic conditions (41.3 vs. 27.5%,  $P < 0.001$ ). Separated, divorced, or widowed Jamaican and Guyanese participants likewise had significantly higher rates (19 vs. 12.2%,  $P < 0.001$ ). Jamaican and Guyanese participants with lower education (17 vs. 7.4%,  $P < 0.001$ ) also had higher rates of arthritis. While associations were found for income and employment status in relation to arthritis, there were differences in response patterns. Higher rates of arthritis were found among bottom quintile Jamaicans (14.7%,  $P$

$< 0.001$ ), while Guyanese in the second quintile were highly represented in this category (7.7%,  $P < 0.001$ ). Furthermore, Jamaicans (11.9%,  $P < 0.001$ ) and Guyanese (10.3%,  $P < 0.001$ ) that were not in the labor force had higher rates of arthritis. No association was found between gender and arthritis in either country.

### Self-rated oral health

The study findings further revealed that a greater percentage of older participants with fair or poor self-

**Table 2.** Prevalence and factors associated with physical health.

Rate	Hypertension		Diabetes Mellitus		Arthritis		Oral Health		General Health	
	JA	GUY	JA	GUY	JA	GUY	JA	GUY	JA	GUY
	14.1	14.6	7.5	6.6	7.8	5.0	26.4	21.5	25.7	17.5
<b>Age</b>										
18-29	2.4	1.1	1.5	0.9	0.6	0.0	12.7	7.5	17.1	7.5
30-44	11.0	7.8	2.3	5.0	3.2	1.7	20.0	17.8	22.1	10.0
45-59	25.5	23.1	20.3	12.1	8.5	5.3	38.1	28.9	30.8	27.4
60 and above	43.5	49.6	23.1	16.4	41.3	27.5	64.7	48.9	51.3	42.8
<i>P value</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Gender</b>										
Male	8.0	12.1	4.7	5.8	9.0	4.4	28.5	22.4	22.0	16.6
Female	17.2	16.7	8.9	7.3	7.2	5.5	25.5	20.6	27.4	18.3
<i>p value</i>	0.000	0.006	0.021	0.202	0.334	0.315	0.272	0.307	0.050	0.327
<b>Marital status</b>										
Married	23.6	18.5	11.8	9.2	12.3	5.9	31.2	18.6	27.6	17.7
Partnered	9.8	10.1	3.4	2.2	0.9	2.2	19.5	23.5	26.8	14.0
Sep-Div-Widow	25.9	27.1	15.9	10.4	19.0	12.2	44.5	34.0	39.2	29.6
Never married	9.9	5.3	5.5	3.7	6.0	1.4	23.3	15.8	22.6	12.0
<i>P value</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
<b>Equalized income</b>										
Bottom quintile	20.9	22.2	12.3	8.7	14.7	7.2	42.4	29.0	35.5	23.8
Second quintile	18.2	19.3	11.8	10.0	9.8	7.7	29.6	28.0	30.6	23.3
Middle quintile	6.7	12.2	0.0	3.5	0.0	4.5	15.8	15.8	10.5	14.6
Fourth quintile	10.6	7.8	3.3	4.0	5.3	2.0	18.5	15.7	19.1	10.8
Highest quintile	6.8	10.9	5.8	7.0	1.0	2.4	21.5	17.2	23.3	13.4
<i>P value</i>	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
<b>Education</b>										
Primary/some HS	25.4	20.1	16.7	10.1	17.4	7.4	44.5	28.6	38.9	22.9
High school grad	10.0	8.7	3.7	3.1	4.4	2.7	21.8	13.2	22.0	12.2
College-Voc-Tech	8.8	7.9	5.2	2.1	4.3	2.1	13.6	11.9	17.8	9.8
<i>P value</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Employment status</b>										
Employed	11.0	8.8	4.8	5.3	3.4	2.4	19.6	17.6	19.4	12.6
Unemployed	10.6	11.9	9.2	4.2	4.9	2.1	27.8	28.4	29.5	18.1
Not in labor force	20.5	24.4	9.1	9.5	11.9	10.3	36.8	25.3	32.7	24.9
<i>P value</i>	0.001	0.000	0.042	0.002	0.000	0.000	0.000	0.000	0.000	0.000
<b>Race/ethnicity</b>										
Black	-	14.7	-	4.5	-	5.7	-	20.2	-	16.1
Indo	-	14.7	-	9.9	-	4.7	-	21.3	-	21.3
Mixed/other	-	13.8	-	4.7	-	3.8	-	24.3	-	13.3
<i>P value</i>	-	0.907	-	0.000	-	0.390	-	0.253	-	0.001

rated oral health. Specifically, higher rates of fair or poor dental health were found among both Jamaican and Guyanese participants over the age of 60 (64.7 vs.

48.9%,  $P < 0.001$ ). Separated, divorced, or widowed individuals had similar ratings in the respective countries (44.5 vs. 34.0%,  $P < 0.001$ ). The associations with fair or

**Table 3.** Multivariate analysis predicting hypertension.

Characteristics	Jamaica		Guyana	
Step 1	R <sup>2</sup>	ΔR <sup>2</sup>	R <sup>2</sup>	ΔR <sup>2</sup>
Social factors	24.1***	-	34.1***	---
<b>Step 2</b>				
SES	24.6***	0.5	35.2***	1.1
<b>Step 3</b>				
Race/Ethnicity	-	-	35.4*	0.2

\* $P < 0.05$  \*\*  $P < 0.01$  \*\*\*  $P < 0.001$ .

poor self-rated oral health also extended to income, education, and employment status in both countries. In general, higher proportions of fair or poor self-rated oral health were found among Jamaicans and Guyanese within the bottom income quintile (42.4 vs. 29.0%,  $P < 0.001$ ) and lowest education category (44.5 vs. 28.6%,  $P < 0.001$ ). Also, compared to Jamaicans not in the labor force (36.8%,  $P < 0.001$ ), unemployed Guyanese (28.4%,  $P < 0.001$ ) had higher rates of fair or poor self-rated oral assessments.

### Self-rated general health

Significant associations were also found with respect to fair or poor self-rated general health among older (e.g., 60 and older) Jamaican and Guyanese (51.3 vs. 42.8%,  $P < 0.001$ ) participants. Separated, divorced, and widowed participants had a disproportionately higher representation of fair or poor general health rating for the respective countries (39.2 vs. 29.6%,  $P < 0.01$ ). Additionally, both Jamaican and Guyanese participants within the bottom income category had poorer self-rated general health (35.5 vs. 23.8%,  $P < 0.001$ ). Primary or some high school educated Jamaican and Guyanese participants also had higher rates of fair or poor health conditions (38.9 vs. 22.9%,  $P < 0.001$ ). Likewise, a greater proportion of fair or poor self-rated health was found among Jamaicans and Guyanese who were not in the labor force (32.7 vs. 24.9%,  $P < 0.001$ ). Poor general physical health was further found to be higher among the Indo-Guyanese (21.3%,  $P < 0.001$ ), compared to blacks.

### Multivariate analyses on contributing factors of physical health

Illustrated in the multivariate analysis in Table 3, social and economic factors made significant independent contributions to hypertension in Jamaica ( $R^2 = 24.6\%$ ,  $P < 0.001$ ) and Guyana ( $R^2 = 35.4\%$ ,  $P < 0.001$ ). Social

factors ( $R^2 = 24.1\%$ ,  $P < 0.001$  vs.  $R^2 = 34.1\%$ ,  $P < 0.001$ ), however, had a stronger association with hypertension in the respective populations compared to economic factors ( $R^2 = 0.5\%$ ,  $P > 0.05$  vs.  $R^2 = 1.1\%$ ,  $P > 0.05$ ) that did not.

Table 4 shows a similar pattern regarding the contributions of social and economic factors to diabetes mellitus in Jamaica ( $R^2 = 24.1\%$ ,  $P < 0.001$ ) and Guyana ( $R^2 = 18.6\%$ ,  $P < 0.001$ ). Again, social factors were most important in the model, making larger contributions in Jamaica ( $R^2 = 19.6\%$ ,  $P < 0.001$ ) and Guyana ( $R^2 = 13.1\%$ ,  $P < 0.001$ ). While significant, economic factors ( $R^2 = 4.5\%$ ,  $P < 0.05$ ) vs.  $R^2 = 4.3\%$ ,  $P < 0.01$ ) made a meager contribution to diabetes mellitus in the respective populations. Race/ethnicity ( $R^2 = 1.2\%$ ,  $P < 0.01$ ) also made a small but significant contribution to diabetes mellitus in Guyana.

Illustrated in Table 5, social and economic factors contributed to doctor reports of arthritis in both Jamaica ( $R^2 = 35.8\%$ ,  $P < 0.001$ ) and Guyana ( $R^2 = 41.6\%$ ,  $P < 0.001$ ). Stronger associations between social factors again were found in both countries ( $R^2 = 34.2\%$ ,  $P < 0.001$  vs.  $R^2 = 39.3\%$ ,  $P < 0.001$ ). Economic factors did not make significant contributions. The same was true for racial and ethnicity status in Guyana.

In relation to self-rated oral health (Table 6), associations were found for social and economic factors in both Jamaica ( $R^2 = 22.6\%$ ,  $P < 0.001$ ) and Guyana ( $R^2 = 20.6\%$ ,  $P < 0.01$ ), with a larger effect resulting from social factors. Economic factors ( $R^2 = 3.0\%$ ,  $P < 0.001$  vs.  $R^2 = 2.6\%$ ,  $P < 0.001$ ) also made a smaller, but significant contribution to self-rated oral health in both populations.

This was also the case for race/ethnicity in Guyana ( $R^2 = 0.6\%$ ,  $P < 0.01$ ).

Finally, social and economic factors played a significant role in self-rated general physical health in Jamaica ( $R^2 = 12.8\%$ ,  $P < 0.001$ ) and Guyana ( $R^2 = 17.9\%$ ,  $P < 0.001$ ) (Table 7). Similar to previous analyses, social factors made a greater contribution to the model and provided a better explanation in the respective countries ( $R^2 = 10.2\%$ ,  $P < .001$  vs.  $R^2 = 15.9\%$ ,  $P < 0.001$ ). Among Guyanese,

**Table 4.** Multivariate analysis predicting diabetes mellitus.

Characteristics	Jamaica		Guyana	
	R <sup>2</sup>	ΔR <sup>2</sup>	R <sup>2</sup>	ΔR <sup>2</sup>
<b>Step 1</b>				
Social factors	19.6***	-	13.1***	-
<b>Step 2</b>				
SES	24.1***	4.5*	17.4***	4.3**
<b>Step 3</b>				
Race/Ethnicity	-	-	18.6**	1.2**

\* $P < 0.05$  \*\*  $P < 0.01$  \*\*\*  $P < 0.001$ .

**Table 5.** Multivariate analysis predicting arthritis.

Characteristics	Jamaica		Guyana	
	R <sup>2</sup>	ΔR <sup>2</sup>	R <sup>2</sup>	ΔR <sup>2</sup>
<b>Step 1</b>				
Social factors	34.2***	-	39.3***	-
<b>Step 2</b>				
SES	35.8***	1.6	41.2***	1.9
<b>Step 3</b>				
Race/Ethnicity	-	-	41.6***	0.4

\* $P < 0.05$  \*\*  $P < 0.01$  \*\*\*  $P < 0.001$ .

**Table 6.** Multivariate analysis predicting self-rated oral health.

Characteristics	Jamaica		Guyana	
	R <sup>2</sup>	ΔR <sup>2</sup>	R <sup>2</sup>	ΔR <sup>2</sup>
<b>Step 1</b>				
Social factors	19.6***	-	17.4***	-
<b>Step 2</b>				
SES	22.6***	3.0***	20.0***	2.6***
<b>Step 3</b>				
Race/Ethnicity	-	-	20.6***	0.6**

\* $P < 0.05$  \*\*  $P < .01$  \*\*\*  $P < 0.001$ .

race/ethnicity had a relatively small but significant effect on self-rated physical general health in Guyana ( $R^2 = 0.6$ ,  $P < 0.05$ ).

## DISCUSSION

This study on rates and factors associated with physical health in Jamaica and Guyana show more similarities

than differences in poor health conditions between countries. Across health conditions, however, Jamaicans were more likely to have poorer physical health than their Guyanese counterparts. Notably and consistent with past studies, females, older age, and individuals with lower socioeconomic status were vulnerable to poorer health conditions (Wilson et al., 2018; Williams et al., 2016; Lacey et al., 2015; Braveman et al., 2011; James et al., 2012; Wilson et al., 2010).



**Table 7.** Multivariate analysis predicting self-rated physical health.

Characteristics	Jamaica		Guyana	
	R <sup>2</sup>	ΔR <sup>2</sup>	R <sup>2</sup>	ΔR <sup>2</sup>
<b>Step 1</b>				
Social factors	10.2***	-	15.9***	-
<b>Step 2</b>				
SES	12.8***	2.6**	17.3**	1.4***
<b>Step 3</b>				
Race/Ethnicity	-	-	17.9***	0.6*

\*P < 0.05 \*\* P < .01 \*\*\* P < 0.001.

Separated, widowed, or divorced individuals had high rates of poor health conditions relative to married individuals, which affirms previously studies that being married or residing with a living partner might serve as a protective factor (Taylor et al., 2015; Levine et al., 2015). Even though race/ethnicity was not evaluated in Jamaica, it was found to be associated with certain health outcomes in Guyana. Higher rates of diabetes mellitus and fair or poor general physical health were found among Indo-Guyanese compared to other racial and ethnic groups. This may be indicative of racial tensions that have been noted between groups within the population (Bissessar and La Guerre, 2013; Wilson et al., 2010). Racial conflict is a significant source of stress and has been linked to negative health in US studies (Braveman et al., 2011; Krieger et al., 2011). This could also be a result of poorer diets and health-seeking behavior among members within this cultural group.

The study in large part also found that social factors (that is, age, gender, marital status) were more likely to be associated with poor health conditions, even though economic factors also contributed. This is consistent with the social determinants' perspective on health disparities, which postulates that access to positive health resources varies across different social status positions (Mirowsky, 2017; Stoddart et al., 2017). Overall, however, many similarities existed across countries regarding factors contributing to individual health outcomes, particularly as they relate to social and economic influences.

There are a few limitations to this study, primarily related to the use of cross-sectional data. Because of the nature in which the data were collected, as well as the analyses conducted, causal inferences cannot be drawn. Second, information was only obtained on individuals within the Kingston Metropolitan areas of Jamaica and can only be generalized to individuals within this region. However, at the time of data collection, a majority of Jamaica's total population resided in this region. In addition, rates of physical conditions may be underestimated or under-reported due to cultural factors

in help-seeking behavior that may result in under diagnoses (Lee et al., 2013). Generally, high poverty rates in these countries may also limit access to care for some individuals. It should also be noted that individuals with greater resources are more likely to have greater access to quality health care and are more likely to be diagnosed for their health condition in these countries. Further, the study did not explore in-country geographic location and its potential influence on health outcomes; particularly in rural areas (Guyana), where individuals may fare worse in comparison to other areas. Finally, although the authors examined data more than a decade old during a time that conditions may have differed from today, the results of this study are less likely to change during this time span. There is also limited quality data available that allowed for addressing the research objectives, particularly in Guyana.

Despite these limitations, the study makes some valuable contributions to the literature. First, it is one of the very few studies to make cross-national context comparisons on the physical health of Caribbean populations using area probability sampling methods. No research to our knowledge has explicitly assessed and compared social determinants of health models across Guyana and Jamaica. These samples also used multiple physicians reported health measures that may provide more reliable estimates. The study also addressed important factors such as race/ethnicity and the potential that group membership may have on the health and well-being of individuals, rarely done in studies in the Caribbean region.

## Conclusion

Overall, the results of this study suggest the need for better awareness of the correlates and consequences of chronic physical health conditions, such as diabetes mellitus, hypertension, and arthritis in the Caribbean region. Some conditions may evolve from improper diets,

stressful circumstances, unhealthy lifestyles, and natural causes, such as the aging process (Ferguson et al., 2017; Lee et al., 2013; Barretto et al., 2012). There is also evidence suggesting that cultural approaches to managing illness may play a role in the increased morbidity and mortality in the Caribbean region. Many persons rely on self-treatment rather than formal medical treatment due to cultural norms and affordability. For example, research suggests that approximately 40% of Jamaicans utilize self-treatment in response to chronic illness (Wilks et al., 2008). Although the ability to pay for treatment is a factor in decisions to seek care, persons across SES groups were found to underutilize formal health care (Jindal et al., 2016). Future research should examine access to health care and the cultural appropriateness of health belief models utilized in Caribbean countries, as well as the influence of belief systems and cultural practices on health behaviors and outcomes. It is also important that research should be geared to examining the role of racial and ethnic group membership and other social factors in the health outcomes of individuals as the Caribbean region becomes more heterogeneous.

## CONFLICT OF INTERESTS

The authors declare no competing interests.

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