

The changing faces of diabetes, hypertension and arthritis in a Caribbean population

Paul A. Bourne¹, Samuel McDaniel², Maxwell S. Williams², Cynthia Francis¹,
Maureen D. Kerr-Campbell³, Orville W. Beckford⁴

¹Department of Community Health and Psychiatry, Faculty of Medical Sciences; ²Department of Mathematics, Faculty of Pure and Applied Sciences; ³Systems Development Unit, Main Library; ⁴Department of Sociology, Psychology and Social Work, Faculty of Social Sciences, University of the West Indies, Mona, Kingston, Jamaica.

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Abstract

Background: Globally, chronic illnesses are the leading cause of mortality, and this is no different in developing countries, particularly in the Caribbean. Little information emerged in the literature on the changing faces of particular self-reported chronic diseases. **Aims:** This study examines the transitions in the demographic characteristics of those with diabetes, hypertension and arthritis, as we hypothesized that there are changing faces of those with these illnesses. **Materials and methods:** A sample of 592 respondents from the 2002 and 2007 Jamaica Survey of Living Conditions. Only respondents who indicated that they were diagnosed with these particular chronic conditions were used for the analysis. **Results:** The prevalence of particular chronic diseases increased from 8 per 1,000 in 2002 to 56 per 1,000 in 2007. The average annual increase in particular chronic diseases was 17.2%. Diabetes mellitus showed an exponential average annual increase of 185% compared to hypertension (+ 12.7%) and arthritis (- 3.8%). Almost 5 percent of diabetics were less than 30 years of age (2.4% less than 15 years), and 41% less than 59 years. Three percent of hypertensive respondents were 30 years and under as well as 2% of arthritics. **Conclusion:** The demographic transition in particular chronic conditions now demands that data collection on those illnesses be lowered to < 15 years. This research highlights the urgent need for a diabetes campaign that extends beyond parents to include vendors, confectionary manufacturers and government, in order to address the tsunami of chronic diseases facing the nation.

Keywords: Chronic illness, diabetes mellitus, hypertension, arthritis, children, developing countries.

Correspondence to: Paul A. Bourne, Research Fellow and Biostatistician, Department of Community Health and Psychiatry, UWI, Mona, Jamaica. 876 457-6990 (mobile), Email: paulbourne1@yahoo.com

Introduction

Globally, chronic illnesses are the leading cause of mortality (60%) [1, 2], and this is no different in developing countries, particularly in the Caribbean [2-6]. Statistics indicate that 79% of all mortalities are attributable to chronic diseases, and that they are occurring in developing countries such as those in the Caribbean [3]. Using data for 1989 and 1990, Holder & Lewis [7] showed that hypertension and diabetes mellitus were among the 5 leading causes of mortality in the English-speaking

Caribbean and Suriname. The findings from Holder and Lewis indicated that mortality resulting from hypertension was highest in Dominica (over 90 per 100,000 of the population) and diabetes crude death rates per 100,000 of the population were the greatest in Trinidad and Tobago (over 85 per 100,000).

The 20th century has brought with it massive changes in the typology of diseases, where deaths have shifted from infectious diseases such as tuberculosis, pneumonia, yellow fever, Black Death (i.e. Bubonic Plague), smallpox

and 'diphtheria' to diseases such as cancer, heart complaints and diabetes. Although diseases have moved from infectious to degenerate, chronic non-communicable illnesses have arisen and are still lingering in spite of all the advances in science, medicine and technology. Morrison [8] titled an article 'Diabetes and Hypertension: Twin Trouble' in which he established that diabetes mellitus and hypertension have now become two problems for Jamaicans and people in the wider Caribbean. This situation was corroborated by Callender [9] and Steingo at the 6th International Diabetes and Hypertension Conference, which was held in Jamaica in March 2000. They found that there is a positive association between diabetic and hypertensive patients - 50% of individuals with diabetes had a history of hypertension [9, 10]. Prior to those scholars' work, Eldemire [11] found that 34.8% of new cases of diabetes and 39.6% of hypertension were associated with senior citizens (i.e. ages 60 and over). In an article published by Caribbean Food and Nutrition Institute, the prevalence rate of diabetes mellitus affecting Jamaicans is noted to be higher than in North American and "many European countries" [9].

Chronic illnesses have been on the rise in the Caribbean. In a 1996 study conducted by Morrison and colleagues in Trinidad and Tobago [12], they noted that there is an alarming rise in the prevalence rate of diabetes mellitus (15-18%). A study in Barbados found that between 1988 and 1992 the prevalence rate of diabetes mellitus for the population was 17.5%; 12.5% in mixed population (black/white), 6.0% in white/other and 0.3% in the younger population [13]. Another research, in Europe, found that the prevalence among newly diagnosed diabetics in Europeans was 20%; African-Caribbeans, 22%; and in Pakistanis, 33% [14]. They also postulated that there is an association between poverty and diabetes. Van Agt et al. [15] went further when they found that poverty was greater among the chronically ill, with which a later study by the World Health Organization [16] concurred. The WHO [16] stated that 80% of chronic illnesses were in low and middle income countries, emphasizing the association between not only diabetes and poverty, but chronic conditions and poverty. The relationship between poverty and chronic conditions extends to premature mortality [17]. Findings from the WHO [4] showed that 60% of global mortality is caused by chronic illness, which offers an explanation of the face for those with these particular conditions. Within the context of a strong association between poverty and chronic illness, the high prevalence of diabetes mellitus, hypertension and other chronic conditions in developing countries should not be surprising [16, 18].

Yach et al. [18] further opined that the global figure for diabetes is projected to move from 171 million (2.8%) in 2000 to 366 million (6.5%) in 2030. Of this figure 298 million of these persons will be in developing countries, which reinforces the poverty-illness relationship. Chronic diseases can be likened to a tsunami [19] in developing nations [20-22], and it seems to be spiralling

because of the unhealthy lifestyle of people. The tsunami of chronic illnesses in the developing countries is equally reflected in the Americas [20, 21], and particularly Jamaica. The face of chronic illness in developing nations is therefore for (1) lower socioeconomic strata, (2) rural residents, (3) adults, (4) gender differences, (5) lower educational level, and (6) married people.

A great deal of research exists on the management of chronic illnesses, and rightfully so, as these go to the health status and mortality of a population [23, 24]. The profiles of those with chronic diseases have never been examined in Latin America and the Caribbean, and studies outside of this region have used a piecemeal approach to the investigation of chronic conditions. Hence information is available on one or a few of the aforementioned faces of chronic illness, and some research has examined diabetes mellitus and hypertension but not arthritis. The present gap in the literature will be lowered by this study examining the faces of chronic illness from half a decade of data. Using data for 2002 and 2007, the current paper will investigate the changing faces of chronic diseases in Jamaica. The study will utilize three chronic diseases (i.e. diabetes mellitus, hypertension, and arthritis), and analyze health status, health insurance status, health care utilization, chronic illness and other sociodemographic characteristics in order to ascertain the transition occurring in the population. We hypothesized that there are changing faces of those with diabetes, hypertension and arthritis over the last half a decade (2000-2007).

Materials and Methods

Data

The current study extracted a sample of 592 respondents from the 2002 and 2007 Jamaica Survey of Living Conditions (JSLC). Only respondents who indicated that they were diagnosed with particular chronic conditions were used for this analysis (i.e. diabetes mellitus, hypertension, and arthritis). The present subsample represents 0.8% of the 2002 national sample (25,018) and 5.7% of the 2007 sample (6,783). The JSLC is an annual and nationally representative cross-sectional survey that collects information on consumption, education, health status, health conditions, health care utilization, health insurance coverage, non-food consumption expenditure, housing conditions, inventory of durable goods, social assistance, demographic characteristics and other issues [25]. The information is from the civilian and non-institutionalized population of Jamaica. It is a modification of the World Bank's Living Standards Measurement Study (LSMS) household survey [26]. A self-administered questionnaire was used to collect the data.

Overall, the response rate for the 2007 JSLC was 73.8% and 72.3% for 2002. Over 1,994 households of individuals nationwide are included in the entire database of all ages [27]. The residents of a total of 620 households were interviewed from urban areas, 439 from other towns and 935 from rural areas. This sample represents 6,783

non-institutionalized civilians living in Jamaica at the time of the survey. The JSLC used complex sampling design, and it is also weighted to reflect the population of Jamaica.

Statistical analysis

Statistical analyses were performed using the Statistical Packages for the Social Sciences for Windows 16.0 (SPSS Inc; Chicago, IL, USA). Descriptive statistics such as mean, standard deviation, frequency and percentage were used to analyze the socio-demographic characteristics of the sample. Chi-square was used to examine the

association between non-metric variables, and an Analysis of Variance was used to test the equality of means among non-dichotomous categorical variables. Means and frequency distribution were considered significant at $P < 0.05$ using chi-square, independent sample t-test, and analysis of variance f test.

Measures

Table 1 presents the operational definitions of some of the variables used in this study.

Table 1 Operational definitions of particular variables

Variable	Operational definition	Coding
Self-evaluated health status (or health status)	This is taken from the question "In general, would you say your health is excellent, good, moderate, poor or very poor?"	
Sex	Being male or female	
Age group	Age group is classified into 4 categories.	Children - ages < 15 years old Young adults - 15 to 30 years old Other age adults - 31- 59 years old Young old - 60 - 74 years old Old old - 75 - 84 years old Oldest old - 85+ years old
Social hierarchy	Income quintiles were used to measure social class, and these range from quintile 1 (poorest 20%) to 5 (wealthiest 20%)	Low = poorest 20% to poor; middle = middle quintile and upper = wealthy to wealthiest 20%
Health care-seeking behavior (health seeking behavior)	Visits to pharmacies, medical practitioners, nurses in the last 4-weeks	1 = visits to health care professionals, 0=otherwise
Self-reported illness	Have you had any illness or injury during the past four weeks? For example, have you had a cold, diarrhea, asthma, diabetes, hypertension, arthritis or other?	
Chronic illness	These can be broadly defined as conditions which prolonged, do not resolved spontaneously, and are infrequently curable. This is taken from the question 'What are the illnesses that you have been diagnosed with - Cold, diarrhea, asthma, diabetes mellitus, hypertension, arthritis, other chronic conditions (unspecified)? The chronic conditions were diabetes mellitus, hypertension and arthritis.	

Results

Health care utilization, health insurance status, particular chronic illness (i.e. diabetes mellitus, hypertension and arthritis), and sociodemographic characteristics are presented in Table 2. The findings in Table 2 showed that the average annual increase in the particular chronic illness was 17.2% between 2002 and 2007. Arthritis showed an average annual reduction of 3.8%, hypertension, + 12.7% and diabetes mellitus, + 185.0%. Furthermore, the average annual increase in health care utilization (visits to health care institutions) was 11.9% (public hospital, + 8.2%; private hospital, + 10.7%; public health care centre, + 8.4%; private health care centre, + 17.1%). On average the annual increase in health insurance coverage was + 148%; while the health care utilization (health seekers) increased by 11.7%. The particular chronic illnesses have shifted mostly from urban (67.6%) to rural residents (55.1%). This shift could be attributed to cultural factors affecting how and what individuals eat in rural versus urban areas. The sedentary lifestyles of urban areas also added to the overall dramatic increase in chronic illnesses.

Table 3 presents information on self-reported diagnosed

particular chronic illness by sex of respondents for 2002 and 2007. On average, the annual increase in particular chronic illness in males was 19.0% compared to 16.5% in females. Diabetes mellitus showed the highest annual percentage increase (males 186.7% and females 184.4%), while arthritis fell in females (average annual 7.9%) compared to an increase in males (average annual 10.0%). Hypertension increased more in females (average annual 14.0%) compared to 9.7% in males. This could be attributed to the increasing absorption of females into the upper echelons of management in stressful occupations such as banking and finance, law, and the police force.

Table 4 examines information on health coverage, health status, health care utilization and some sociodemographic characteristics by self-reported diagnosed particular chronic illnesses for 2002 and 2007. Based on Table 4, although particular chronic illnesses have decreased in rural respondents, rural dwellers continue to be the face of chronic conditions as well as married, primary, uninsured, private health centers and those in the lower class. The average annual increase in particular chronic illnesses increased by 22.9% for those in the lower strata compared to 11.0% for those in the middle class and 16.0% for those

in the wealthy socioeconomic strata. However, the greatest increase occurred in diabetics belonging to the upper class (average annual + 200%) compared to those lower class (116.7%). On the other hand, the highest average annual increase in hypertension occurred in the lower socioeconomic group (26.9%) as compared to those in the middle class (7.4%) and upper socioeconomic strata (7.1%). The massive increase in cases of diabetes within the upper class is clearly not due to the lack of resources for seeking health care. A more detailed analysis of their diet and lifestyle is needed to ascertain the real causes for the drastic increase relative to other socioeconomic groups.

Table 2 Demographic characteristic of sample, 2002 and 2007

Characteristic	2002		2007	
	n	%	n	%
Chronic illness				
Diabetes mellitus	12	5.8	123	31.9
Hypertension	126	60.9	206	53.5
Arthritis	69	33.3	56	14.5
Sex				
Male	58	28.0	113	29.4
Female	149	72.0	272	70.6
Marital status				
Married	95	46.1	163	42.8
Never married	50	24.3	130	34.1
Divorced	1	0.5	14	3.7
Separated	3	1.5	10	2.6
Widowed	57	27.7	64	16.8
Income quintile				
Poorest 20%	29	14.0	83	21.6
Poor	40	19.3	65	16.9
Middle	49	23.7	76	19.7
Wealthy	39	18.8	79	20.5
Wealthiest 20%	50	24.2	82	21.3
Health care utilization				
Public hospital	51	28.8	72	25.5
Private hospital	15	8.5	23	8.2
Public health centre	43	24.3	61	21.6
Private health centre	68	38.4	126	44.7
Health care utilization				
Sought medical care	163	79.1	258	67.4
Did not seek care	43	20.9	125	32.6
Health insurance status				
Insured	15	7.2	126	32.8
Uninsured	192	92.8	258	67.2
Age cohort				
Children	0	0.0	3	0.8
Young adults	2	1.0	10	2.6
Other age adults	49	23.7	137	35.6
Young-old	90	43.5	132	34.3
Old-old	58	28.0	82	21.3
Oldest-old	8	3.9	21	5.5
Area of residence				
Urban	24	11.6	95	24.7
Semi-urban	43	20.8	78	20.3
Rural	140	67.6	212	55.1

Table 5 presents information on the age of respondents and particular self-reported chronic conditions for 2002 and 2007. Based on this information, there is a change in the face of particular chronic ailments in Jamaica. The face is changing to reflect the inclusion of those less than 30

years of age (including children) as distinct from the elderly population.

Table 3 Self-reported diagnosed chronic illness by sex of respondents, 2002 and 2007

Characteristic	2002 ¹		2007 ²	
	Sex of respondents		Sex of respondents	
	Male n (%)	Female n (%)	Male n (%)	Female n (%)
Chronic illness				
Diabetes	3 (5.2)	9 (6.0)	31 (24.7)	92 (33.8)
Hypertension	39 (67.2)	87 (58.4)	58 (51.3)	148(54.4)
Arthritis	16 (27.6)	53 (35.6)	24 (21.2)	32 (11.8)

¹ $\chi^2 = 1.39, P = 0.499$; ² $\chi^2 = 6.09, P = 0.048$

Discussion

The present study revealed that the prevalence of particular chronic diseases (i.e. diabetes mellitus, hypertension and arthritis) increased from 8 per 1,000 in 2002 to 56 per 1,000 in 2007. The average annual increase of particular chronic illnesses was 17.2%. Diabetes mellitus showed an exponential average annual increase of 185% compared to hypertension (+ 12.7%) and arthritis (- 3.8%). While hypertension remained the most prevalent of the particular chronic diseases in this study, diabetes mellitus showed the greatest annual increase. The transitions of particular chronic conditions are accounted for by (1) urban-to-rural shift, (2) female-to-male, (3) aged-to-young people, and (4) lower socioeconomic strata to upper class. The average annual increase in particular chronic diseases was greatest among those in the lower socioeconomic groups. However when the particular chronic ailments were disaggregated, the findings indicated that those in the wealthy socioeconomic group had the largest prevalence increase in diabetes mellitus, hypertension was greatest among those in the lower class and those in the upper class had the greatest reduction in arthritic cases. Particularly of note is the switching from public health care utilization by particular chronically ill respondents to private health care utilization. Similarly, the prevalence of health insurance coverage on average saw an exponential annual increase of 148%, while health care seeking behavior over the same period showed a marginal increase of 12%.

There is an emerging body of literature to support the changing face of people with particular chronic diseases from old ages (30+ years) to younger people including children [28-32]. Traditionally chronic conditions such as diabetes mellitus were mostly prevalent among the elderly. This reality supports the large reservoir of literature on elderly diabetic, hypertensive and arthritic patients. With the emergence of epidemiological and population transition, much attention was placed on diseases in middle and later ages as well as those conditions that accounted for most of the mortality and morbidity in a population. Because lifestyle practices were mostly responsible for chronic illness, many researchers limited their investigation to people 30+ years old [8-11, 23, 33, 34].

Table 4 Particular demographic and health variable by diagnosed chronic illness, 2002 and 2007

Characteristic	2002			2007		
	Chronic illness			Chronic illness		
	Diabetes mellitus n (%)	Hypertension n (%)	Arthritis n (%)	Diabetes mellitus n (%)	Hypertension n (%)	Arthritis n (%)
Area of residence						
Urban	1 (8.3)	15 (11.9)	8 (11.6)	32 (26.0)	47 (22.8)	16 (28.6)
Semi-urban	1 (8.3)	29 (23.0)	13 (18.8)	27 (22.0)	41 (19.9)	10 (17.9)
Rural	10 (83.3)	82 (65.1)	48 (69.6)	64 (52.0)	118 (57.3)	30 (53.6)
Marital status						
Married	4 (33.3)	61 (48.4)	30 (44.1)	48 (40.0)	91 (44.4)	24 (42.9)
Never married	4 (33.3)	30 (23.8)	16 (23.5)	39 (32.5)	69 (33.7)	22 (39.3)
Divorced	0 (0.0)	0 (0.0)	1 (1.5)	10 (8.3)	3 (1.5)	1 (1.8)
Separated	0 (0.0)	2 (1.6)	1 (1.5)	4 (3.3)	5 (2.4)	1 (1.8)
Widowed	4 (33.4)	33 (26.2)	20 (29.4)	19 (15.8)	37 (18.0)	8 (14.3)
Health utilization						
Public hospital	3 (30.0)	31 (29.5)	17 (23.0)	27 (32.9)	35 (25.5)	10 (32.3)
Private hospital	1 (10.0)	9 (8.6)	5 (6.8)	11 (13.4)	7 (5.2)	5 (16.1)
Public centre	2 (20.0)	21 (20.0)	20 (27.0)	23 (28.1)	34 (24.8)	4 (12.9)
Private centre	4 (40.0)	44 (41.9)	32 (43.2)	21 (25.6)	61 (44.5)	12 (38.7)
Health seekers						
Did not	1 (9.1)	26 (20.6)	16 (23.2)	34 (27.6)†	66 (32.0)†	27 (48.2)†
Sought	10 (90.9)	100 (79.4)	53 (76.8)	89 (72.4)†	140 (68.0)†	29 (51.8)†
Education						
Primary	8 (66.7)	73 (59.8)	43 (63.2)	121 (98.4)	205 (99.5)	56 (100.0)
Secondary	4 (33.3)	47 (38.5)	24 (35.3)	2 (1.6)	0 (0.0)	0 (0.0)
Tertiary	0 (0.0)	2 (1.6)	1 (1.5)	0 (0.0)	1 (0.5)	0 (0.0)
Health coverage						
Uninsured	11 (91.7)	114 (90.5)	67 (97.1)	69 (56.1)†	148 (71.8)†	41 (74.5)†
Insured	1 (8.3)	12 (9.5)	2 (2.9)	54 (43.9)†	58 (28.2)†	14 (25.5)†
Social class						
Lower	6 (50.0)	35 (27.8)	28 (40.6)	41 (33.3)†	82 (39.8)†	25 (44.6)†
Middle	0 (0.0)	35 (27.8)	14 (20.3)	16 (13.0)†	48 (23.3)†	12 (21.4)†
Upper	6 (50.0)	56 (44.4)	27 (39.1)	66 (53.7)†	76 (36.9)†	19 (33.9)†
Health status						
Very good	NI	NI	NI	5 (4.1)	10 (4.9)	1 (1.8)
Good	NI	NI	NI	21 (17.1)	45 (21.8)	12 (21.4)
Fair	NI	NI	NI	67 (54.5)	91 (44.2)	25 (44.6)
Poor	NI	NI	NI	26 (21.1)	52 (25.2)	18 (32.1)
Very poor	NI	NI	NI	4 (3.3)	8 (3.9)	0 (0.0)

NI – No information; † Significant (P < 0.05)

Table 5 Age of respondent by particular chronic illness, 2002 and 2007

Characteristic	2002			2007		
	Chronic illness			Chronic illness		
	Diabetes mellitus n (%)	Hypertension n (%)	Arthritis n (%)	Diabetes mellitus n (%)	Hypertension n (%)	Arthritis n (%)
Age cohort						
Children	0 (0.0)	0 (0.0)	0 (0.0)	3 (2.4)	0 (0.0)	0 (0.0)
Young adult	0 (0.0)	2 (1.6)	0 (0.0)	3 (2.4)	6 (2.9)	1 (1.8)
Other age adult	5 (41.7)	31 (24.6)	13 (18.8)	44 (35.8)	76 (36.9)	17 (30.4)
Young-old	5 (41.7)	54 (42.9)	31 (44.9)	49 (39.8)	61 (29.6)	22 (39.3)
Old-old	2 (16.7)	32 (25.4)	24 (34.8)	19 (15.4)	49 (23.8)	14 (25.0)
Oldest-old	0 (0.0)	7 (5.6)	1 (1.4)	5 (4.1)	14 (6.8)	2 (3.6)
Age Mean (SD)	62.1 (12.6)	67.2 (12.8)	68.4 (11.5)	60.9 (16.0)	62.5 (16.8)	64.3 (14.5)

† Significant (P < 0.05)

The present paper supports the literature that particular self-reported chronic diseases (such as diabetes, hypertension and arthritis) are found mostly among the elderly (60+ years). The findings revealed that the mean ages of those with the specific self-reported chronic ailments have fallen marginally in Jamaica over the period

(2002-2007). This is somewhat deceptive as 41% of those with diabetes were less than 60 years of age, compared to 40% of those with hypertension and 31% of arthritic respondents. Two percent of diabetic respondents were less than 15 years of age, but no children had hypertension or arthritis. Similarly, increases were

observed in diabetes and arthritis for the young adult (diabetics aged 15-30 years) for the period. This is evidence that self-reported particular chronic diseases are changing face as almost 5% of diabetics were less than 31 years old in 2007 compared to 0% in 2002. Another emerging face of particular self-reported chronic illness is that of those with arthritis, as almost 2% of cases were among people ages 15-30 years of age.

The young face of those with diabetes and other chronic diseases can be accounted for by (1) maternal nutrition during pregnancy [31], (2) diet [35] and the environment [30]. The sedentary lifestyles of the youth in the population are further entrenched by the modern electronic games which have removed the young person from the playing field and see him spending longer periods on the couch in front of the television. This hooked-on-game syndrome has also resulted in the increased consumption of sweet snacks and other so-called junk food. The new face of those with particular chronic diseases is changing, and this reality is therefore a cause for public health concern. This means that policy makers, health care practitioners, educators and the wider community need to recognize that chronic conditions such as diabetes, hypertension and arthritis have begun manifesting in young people as well as children. There is an urgent rationale for an intervention campaign that will sensitize educators, medical practitioners, parents, and children about the current reality of children and young adults being diagnosed with particular chronic illnesses. The intervention program that should be formulated must include signs of ailments, place of reference, chronic disease management, nutrition, and medical practitioners understanding that testing for diabetes, hypertension and arthritis must be a rudimentary part of medical examinations, even of children, and further, even if their parents are not experiencing those conditions.

The emerging young face of diabetics, and hypertensive and arthritis patients requires a new thrust in the study of mortality and morbidity data for health planning. Although diabetes, hypertension and arthritis may not be among the 10 leading causes of mortality in Jamaica [36] or the developing society, the emergence of those conditions requires researchers, demographers, epidemiologists and policy makers to embark on the inclusion of data on those conditions in publications in order that they can be examined. In a recently conducted study by Wilks et al. [37], they used teens of 15+ years to present information on those with particular diseases, but neglected to mention the new reality of children of younger ages with particular chronic illnesses. The new reality means that researchers, policy makers and the general society need to be cognizant of these facts. This will be accommodated by researchers, and in particular the statistical agency, publishing findings on the new reality in order to commence the discourse and intervention campaign. With the absence of information on the matter, this can be construed as a miniscule problem. However, the new findings are reflecting the early onset of diabetes (< 15

years) and the provision of data beginning at 15 years omits 0.8% of infected children or 2.4% of diabetics.

The present paper unearths more information on the new faces of those with particular chronic conditions at younger ages. Fifty-four out of every 100 persons with particular chronic diseases (i.e. diabetes, hypertension and arthritis) had hypertension, 32 out of every 100 had diabetes and 15 out of every 100 had arthritis. Despite the majority of those with particular chronic illnesses having hypertension, the prevalence rate for those with diabetes increased exponentially more than the other conditions. Many studies have established a relationship between poverty and illness [1, 2, 16 and 22], and particularly poverty and chronic illness [15]. Van et al.'s work [15] revealed that chronic diseases were greater among those in the lower socioeconomic strata than the other social classes, but this study found that more people in the wealthy class had diabetes, while more hypertensive and arthritic respondents were in the lower socioeconomic group. The current findings are providing some clarification for Van et al.'s research.

Although the prevalence rate of particular chronic illnesses was greater among the wealthy strata for 2002 and 2007, those in the lower socioeconomic group recorded the greatest average annual percentage change. On disaggregating the particular chronic diseases, the present paper showed that the prevalence of diabetes was greater among the upper than the lower class, and the opposite was noted for hypertension and arthritis. This finding does not only clarify Van et al.'s research, but provides pertinent information on the unhealthy lifestyle practices among the wealthy, and reinforces the role of material deprivation on health, health conditions and mortality.

Two scholars opined that money can buy health [38], implying that health is a transferable commodity, and that unhealthy lifestyle practices by the wealthy can be reversed with money. Clearly Smith and Kington's claim [38] can be refuted as 42 out of every 100 chronically ill respondents were in the upper class, and more than half of those with diabetes were part of the wealthy income group. For any postulation to hold true about money purchasing health, one of the key axioms that needs to be looked at is the health conditions being lower among the wealthy than those in the lower class. The wealthy will continue to live by their desires, and at the onset of chronic ailments, may be able to reverse this by medical expenditure. It is well established that income is positively correlated with health, as money affords a particular diet, nutrition, medical facilities, safe drinking water, proper sanitation, leisure and good physical milieu, but the reality is that whenever unhealthy lifestyle practices become the choice of an individual, his/her money will not be able to eradicate the onset of diabetes, hypertension, heart disease, or other chronic diseases. Therefore, money enhances the scope of better health, but it cannot buy good health as this is not transferable from one person to the next.

The very reason that health is non-transferable is the rationale behind the mortality of the wealthy elderly, and morbidity among the upper class. Socioeconomic status was found to be the strongest determinant of variations in health [39, 40], as wealth allows for particular choices, opportunities, access, resources and privileges that are not available to the poor. While those matters provide a virtual door leading to better health, money or wealth does not reduce the risk of ill-health arising from poor choices. A study by Wilks et al. [37] found that most (71%) of those in the upper socioeconomic strata currently use alcohol which is more than those in the lower class (59%) and the middle class (64%). Twice as many people in the upper class (14%) had heart attacks compared to those in the middle class (7%) and 6% in the lower class [37]. The evidence is in that concretizes and refutes the proposition that 'money can buy health', and although the association between income and health is well established, unhealthy lifestyle choices cannot be reversed with money.

The carbonated soft drink industry is experiencing a boom in the USA and the Caribbean [41, 42]. Recently, research conducted by Ha et al. [41] found that carbonated soft drinks and milk were the two most popular non-alcoholic beverages in the USA. They accounted for 39.1% of total beverage consumption. This explosion in carbonated soft drinks means that added sugar is infesting the dietary intake of young people and children more than in previous decades. Another study showed that among children aged 6 to 19 years there was a positive significant statistical association with soft drink consumption and a negative one with milk intake [43]. A sedentary lifestyle along with the consumption of sugar, salted food and fast food are accounting for the overweight and obesity in the world. According to Bostrom and Eliasson [44], over 50% of men and 33.3% of women between the ages of 16 and 74 years in Sweden are overweight and obese. Wilks et al. [37] found that 73% of Jamaicans aged 15 to 74 years practice a sedentary lifestyle, and obesity was the third most popular disease (5.6% of the population, 8.5% of females and 2.7% of males) behind hypertension (20.2%) and diabetes mellitus (7.6%).

The growing global tsunami of chronic diseases in developing countries, and in particular Jamaica, requires urgent policy and public health intervention. The carbonated soft drink industry has infiltrated the consumption intake of young adults and children. Sugar in the form of sweets (lollipops, candies, et cetera) is sold in every shop and supermarket, and at school gates in Jamaica. Children and young adults are fed a diet of more sugar than vegetables, beans, legumes, nuts, protein, dairy products, fruits and fiber. Embedded in the increase in diabetes in children and young adults in Jamaica are parents' and children's nutritional intake (or lack thereof), as the dietary habits of Jamaicans have changed to include more fast foods and less nutrient dense diets. This extends beyond Jamaica to Barbados [44] and the USA [41]. With the exponential increase in diabetes over the last 5 years in Jamaica, and the increase in unhealthy lifestyle

practices of the people, coupled with the sales explosion of the carbonated soft drink industry and the increase in fast food outlets, Jamaica is experiencing a diabetes epidemic which cannot be resolved without government and policy interventions. As is clear from the literature, with the increase in carbonated soft drinks, reduction in milk intake and influx of fast food entities in the Americas, the diabetes epidemic of Jamaica may become a reality across the Americas. This is not just affecting countries in the Americas, as studies have shown that Type 2 diabetes has become a global public health problem [46, 47]. The WHO contextualized the global public health Type 2 Diabetes epidemic when it stated that during 1999-2025 the prevalence of this ailment will be 40% in the developed nations and 170% in the developing countries. Clearly this paper is showing that diabetes has now reached an epidemic state in Jamaica, and may no longer be an epidemic but a pandemic disease. Type 2 diabetes is no longer an "adult" or "later life" disease, as was the case a generation ago, as it is now being diagnosed in children in Jamaica and other countries [48, 49].

This study highlights the changing image of those with particular chronic diseases (i.e. diabetes, hypertension and arthritis) in Jamaica. With 2 out of every 100 diabetics being children (<15 years) and the new image of hypertensive and arthritic patients being 15-30 years, plus the exponential increase in diabetes in the wealthy class, the present research highlights significant public health problems. In the last half a decade (2002-2007), the average annual increase in diabetes mellitus has risen by 185% indicating the unhealthy lifestyle practices of pregnant women, children and other young adults.

The image of particular chronic illness in Jamaica continues to be lower class female and rural residents, but the average annual increase in diabetes mellitus was 200% for those in the wealthy class, compared to 117% of those in the lower socioeconomic class. Forty-seven out of every 100 chronically ill people in Jamaica utilize public health care facilities, which denotes that the matter is a public one and not solely individual. The cost of public health care in the next 5-10 years will increase phenomenally, as greater proportions of the population who rely on the public health care system will be afflicted with these chronic diseases. This has serious implications for the sustainable development of developing countries as well as their future achievements regarding the United Nations Millennium development goals. To act now will not only save lives but will also save the various developing countries billions of dollars that can be spent on other development programs.

The demographic transition, in particular chronic conditions, now demands that data collection on those illnesses be lowered to < 15 years. Apart from the lowering of the ages in the data collection process, public health specialists need to address the massive changes in new diabetic cases. This is an obvious problem, which requires public health intervention as well as lifestyle

management of diabetes. This sensitization and lifestyle management campaign must extend to include educators, parents, children, vendors (especially those at schools), and the government.

Governments need to regulate the sugar content of products in Jamaica (carbonated soft drinks, confectionary and fast food) as this is contributing to a public health problem which will cost the government and people in the medium to long-term. Diabetes can be likened to a tsunami in Jamaica and one that demands government intervention. Currently, there is a lifestyle campaign dealing with sexual behavior, condom usage, and cancer in Jamaica; this research highlights the urgent need for a diabetes campaign that extends beyond parents to include vendors, confectionaries, soft drink manufacturers and government, in order to sensitize the public about this new public health problem. The gravity of the situation is that such a program cannot be delayed for some time in the future as the opportunity costs of delay are (1) higher public expenditure, (2) increasing cost of diabetic care and management, (3) lower production cost, (4) increased unemployment benefits, (5) the imputed cost of ignorance, and (6) an increased mortality rate.

Conclusion

In summary, the theoretical position that underlines testing for diabetes among other chronic diseases should be abandoned, as the findings show the need to begin rudimentary health examinations of all ages. The new thrust of governments, public health specialists and researchers is to commence a mandate that addresses confectionary products' ingredients, and institution guidelines about the sugar and salt components of manufactured commodities. The wider confectionary and food industry cannot be left unregulated as the chronic diseases tsunami is upon us, and it will require a concerted effort from everyone to combat this public health problem as the nation addresses the diabetes epidemic. Diabetes has risen to such epidemic proportions that it now requires a policy initiative aimed at reducing the level of increases in a managed way.

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Conflict of Interest

The authors have no conflict of interest to report.

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