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NON-COMMUNICABLE DISEASES AND HEALTH INDICES OF ADOLESCENTS IN JAMAICA: A NATIONAL PERSPECTIVE

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# Non-Communicable Diseases and Health Indices of Adolescents in Jamaica: A National Perspective

Paul Andrew Bourne <sup>α</sup>, Cynthia Francis <sup>σ</sup>, Charlene Sharpe-Pryce <sup>ρ</sup>, Angela Hudson-Davis <sup>ω</sup>, Ikhalfani Solan <sup>¥</sup>, Olive Watson-Coleman <sup>§</sup> & Joan Rhule <sup>x</sup>

**Abstract- Introduction:** Of all human deaths in the world, in 2008, 63 percent are owing to non-communicable diseases (NCDs) of which 80 percent are in developing countries. In Jamaica for 2008, 50 percent of deaths occur to NCDs, especially among women and older people. The adolescence period is rarely seen for its contributory role to NCDs, which is the rationale for few research in the area among this cohort in English-speaking Caribbean. This study fills the gap in the literature by examining NCDs among adolescents.

**Objectives:** The objectives are to examine the adolescence period as it relates to NCDs, evaluate health indices in this period and determine the prevalence of NCDs as well as disaggregate NCDs by socio-demographic characteristics.

**Materials and methods:** A sample of 1,394 respondents ages 10 to 19 years from a national probability survey is used for this study. The data are taken from the Jamaica Survey of Living Conditions, which is a modification of the World Bank's Household Living Standards Survey.

**Results:** The prevalence rate for NCDs among adolescents in Jamaica is 2.7 percent, 7 percent report having an illness and among those with an illness, 48.7 percent have NCDs (diabetes, 4.0 percent; hypertension, 1.3; Other NCDs, 43.4 percent). Diabetes begins in middle adolescence among poor rural females and hypertension starts in late adolescent among affluent urban females.

**Conclusion:** The findings herein warrant public health interventions that are specialized to the sociodemographic and health realities of adolescents.

**Keywords:** adolescents, cardiovascular diseases, chronic condition, developing nations, health, jamaica, lifestyle practices, non-communicable diseases.

## I. INTRODUCTION

Non-communicable diseases (NCDs) have reached an epidemic stage in developing countries. This perspective is embedded in the World Health Organization's (WHO) statistics, which

show that 80 percent of NCDs are in the developing nations and that they account for 60 percent of all mortalities [1]. NCDs, therefore, singly account for most human deaths than any other happenings and this warrants public health recognition as well as interventions. On disaggregating NCDs, Unwin and Alberti [2] opine that these deaths are mostly associated with working aged people, women and that "... [the] incidences in younger adults are substantially higher in the poor countries of the world than in the rich", which concurs with the work of the WHO. There are implications of Unwin and Alberti's perspective and these include lowered production, increase medication and health care visitations for Caribbean people because of chronic noncommunicable diseases.

The Caribbean region, which is a part of developing world, subscribes to the NCDs' profile has outlined by the WHO. In fact, Hospedales et al. went further than the WHO to postulate that NCDs in the Caribbean Community (CARICOM) have the highest burden in the Americas [3]. Such a perspective supports the NCDs epidemic in the Caribbean region; warrants research in the area and provide a rationale for the many studies that have been conducted since the last decade in the region on different NCDs [3-14]. The plethora of studies on NCDs also includes one on children, which is conducted by Bourne [15]. Using national probability data for Jamaica, Bourne finds that some NCDs in children have increased by over 100 percent in a 5-year period, chief among them being diabetes [15]. While this finding offers some insights into the coverage of NCDs among Caribbean peoples, those cases would not be relating to lifestyle practices of the patients but more in keeping with biological deficiency including lifestyle practices of the mothers.

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Bourne's work [15] paints a gloomed picture of the NCDs epidemic, particularly diabetes, in children. Although NCDs is substantially an adult, woman and rural area phenomena [4, 16], reported cases among children and the percent increases in the last 5 years are astronomical in Jamaica [15]. In research of the literature, we find a research that examines health and lifestyle practices of Jamaicans ages 15-74 years. In that work, depression, diabetes mellitus, high cholesterol and obesity are synonymous with women and rural residents [14]: depression (men, 14.8 percent; women, 25.6 percent); diabetes (men, 6.4 percent; women, 9.3 percent); high cholesterol (men, 7.5 percent; women, 15.6 percent), and obesity (men, 12.3 percent; women, 37.5 percent). Among those ages 15-24 years old, 1.2 percent report having diabetes mellitus, 6.3 percent hypertension, and high cholesterol 4.0 percent and 20.4 percent notes having depression [14]. Within the context of the aforementioned studied sample, children and adolescents are excluded and mean that none, from a national perspective on Jamaican adolescents, is in the literature. However, other studies in different parts of the globe find that three quarters of adolescents who remain obese in adulthood had a high probability of developing neoplasm, diabetes and stroke [16-19]. Those studies highlight the risk factors associated with poor lifestyle practices among adolescents and how these translate into NCDs at older ages. One study went as far as to highlight the percentage of adolescents who are overweight [20] and another research indicates that they are two times more likely to develop cardiovascular diseases and seven times more likely of having atherosclerosis diseases[21]. Clearly, the prevalence of NCDs in developing countries is primarily owing to poor lifestyle practices during adolescence, which the WHO states is accounted for more than half of the cases [22]. There is a paucity of information on the prevalence of particular NCDs among adolescents in the Caribbean. In fact, the prevalence of high blood pressure among is 4.5 percent [23]; diabetes 25 percent [24]; 70 percent of obese adolescents are at risk of cardiovascular disease on or before 20 years of age [25]; 10 percent adolescents have chronic lung diseases (asthma) [26], and leukaemia is the most common malignant among European young people under 15 years (47 per 1 million) [27]. The high risk factors are well documented in the literature on NCDs in developing countries [28]; and with the previous mentioned statistics, a clear account of NCDs in developing world can be had and justifiable rationales for intervention programmes [29]. Although the Caribbean has the highest rate of NCDs in the Americas [3], the NCDs epidemic in the region extends beyond this locality to Africa [30]. It is not surprising therefore that an article is entitled 'Non communicable diseases: a race against time' [31];

because this is summarizes the challenges of NCDs in the developing world, especially the Caribbean. To clarify their perspective that NCDs is the highest for the Caribbean in the America, Hospedales et al. [3] opine that amputations resulting from Diabetic-related issues are the highest in Barbados compared to the rest of the world, and that diabetes is 600 percent higher in Trinidad and Tobago compared to North America, which offers a rationale for plethora of studies on NCDs in the region.

Although adolescents only constitute 20 percent of Jamaica's population [32], lifestyle practices during the adolescence period – the invincible era – accounts for most of the mortality in later life or deaths by NCDs. Statistics reveal that 65 percent of all deaths in the world in 2008 are owing to NCDs of which the majority (80 percent) are in developing countries [33, 34], indicating that the lifestyle practices of people in low-to-middle income countries during the adolescence period extent beyond individual to societal and global burdens. Although Jamaica is an English-speaking middle income developing country in the Caribbean, between 48 and 55 percent of all deaths are because of NCDs [32], especially among women and elderly people [13, 15], this does not warrant a non-research perspective on the matter from an adolescent vantage point. Health issues in the Caribbean region have focused rightfully so on teenage pregnancy, crime and violence, other reproductive health matters and substance use (or abuse) [35-40]; but the gateway period to the NCDs is left substantially unexplored. With the literature showing that the adolescence period is the gateway to the prevalence of NCDs in the developing world [34]; hence, it is fitting to study this age cohort as it relates to NCDs and health status. In an extensive search of the literature, we did not find one article that singly examined NCDs and general health of adolescents. The World Health Assembly has gone as far as to support a resolution that its members must institute measures to address issues relating to young people as it relates to NCDs [41]; yet, few studies have been published on the English-speaking Caribbean and/or Latin America region on the NCDs in the adolescence period [42-44]. Of the three articles that we identify, two are on Jamaica: The first is a cross-sectional study of 276 adolescents ages 14-19 years from grades 9 to 12 from 5 of the 14 parishes in Jamaica [42]. The purpose of the research, lead by Barrett et al, wass to examine risk factors among the respondents as it relates to Type 2 diabetes (T2D) and cardiovascular diseases (CVD).The second study used a national probability cross-sectional data on Jamaica for adolescents ages 10-19 years, aims to evaluate demographic shifts in health conditions and the typology of health conditions experienced by this age cohort [43]. The study by Baldwin et al, covered the Latin America and the Caribbean young people aged

10-24 years; but primarily focused on four NCDs that are cardiovascular disease, cancers, diabetes, and chronic respiratory diseases. Furthermore, the study assessed the population's behavioral risk factors such as tobacco usage, alcohol consumption, unhealthy diet, and lack physical inactivity [44]. The literature therefore lacks a single study that is a national probability study on NCDs and health status of adolescents aged 10-19 years. The objectives of this study are: to examine the adolescence period as it relates to NCDs; evaluate health indices in this period, and determine the prevalence of NCDs as well as disaggregate NCDs by socio-demographic characteristics.

## II. MATERIALS AND METHODS

On a yearly basis, the Planning Institute of Jamaica (PIOJ) and the Statistical Institute of Jamaica (STATIN), two governmental agencies, conduct national probability surveys called the Jamaica Survey of Living Conditions (JSLC), which seeks to guide policy formulations. The JSLC is cross-sectional descriptive surveys, which uses stratified random sampling techniques. It collects data on households characteristics, health, education, expenditure on durable and non-durable goods, utilities, etc), social programmes, and other information. The survey is collected using a standardized instrument (i.e., questionnaire) that on average takes approximately 45 minutes to complete by each respondent. The JSLC is modeled after the World Bank's Living Standards Measurement Study (LSMS) household survey [45]. There are some modifications to the LSMS, as JSLC is more focused on policy impacts and therefore this is reflected in the collected data.

According to the JSLC [45], the sample is weighted to reflect the population of Jamaica. The households in the JSLC are interviewed on an annual basis for a period of up to four years, after which a new representative sampling frame is redesign and drawn. A detailed presentation of the sampling techniques are in other published works [14, 15]. The data are entered, stored and retrieved in the Statistical Packages for the Social Sciences (SPSS) for Windows, Version 21.0. For this study, descriptive statistics are performed for the socio-demographic characteristics of the sample; the bivariate analyses are chi-square and analysis of variance (ANOVA). Statistical significance was determined using a p value < 5% (i.e., 95% confidence interval).

## III. DEFINITION OF VARIABLES

*Health:* This is defined as the self-rated health status of an individual

*Good health:* Is a binary variable where 1 = at least good self-rated health status and 0 = otherwise.

*Age:* This is the total number of years lived since birth, measured from one birthday to the next

*Health-care Seeking Behavior (or visits to medical professional):* This is derived from the question 'Have you sought medical attention in the last four weeks (using the survey period), where 1=yes and 0=otherwise.

*Age groups:* Adolescents are individuals ages 10 to 19 years old, with early adolescence being 10-12 years; middle adolescence, 13-15 years old; and late adolescence being 16+ years old.

*Other NCDs:* These include malignant neoplasms, ischaemic and other heart diseases, and high cholesterol.

*Health Insurance Coverage:* This is a binary measure, in which 1 denotes self-reported ownership of private and/or public health insurance coverage and 0 is otherwise.

*Length of illness:* The number of days an individual report that he/she experiences ill-health due to NCDs.

*Purchased prescribed medications:* This is an individual reporting that he/she filled the prescription that he/she received on visit to the health care practitioner(s).

*Health indices:* For this paper, this concept is measured using illness (or self-reported illness), health-care seeking behavior (or health care utilization), health insurance coverage, and health insurance utilization.

*Non-communicable Disease (NCD):* A disease that is non-infectious

Figure 1 depicts a bar graph showing percent of those with chronic noncommunicable diseases by gender of the respondents. Of those with chronic noncommunicable diseases (n=37), 62.2 (n=23) percent are females. Among the female who indicate having a chronic noncommunicable disease, 13.0 percent have diabetes, 4.4 percent have hypertension and 82.6 percent have other chronic noncommunicable conditions. All the males, on the other hand, report having other chronic noncommunicable diseases.

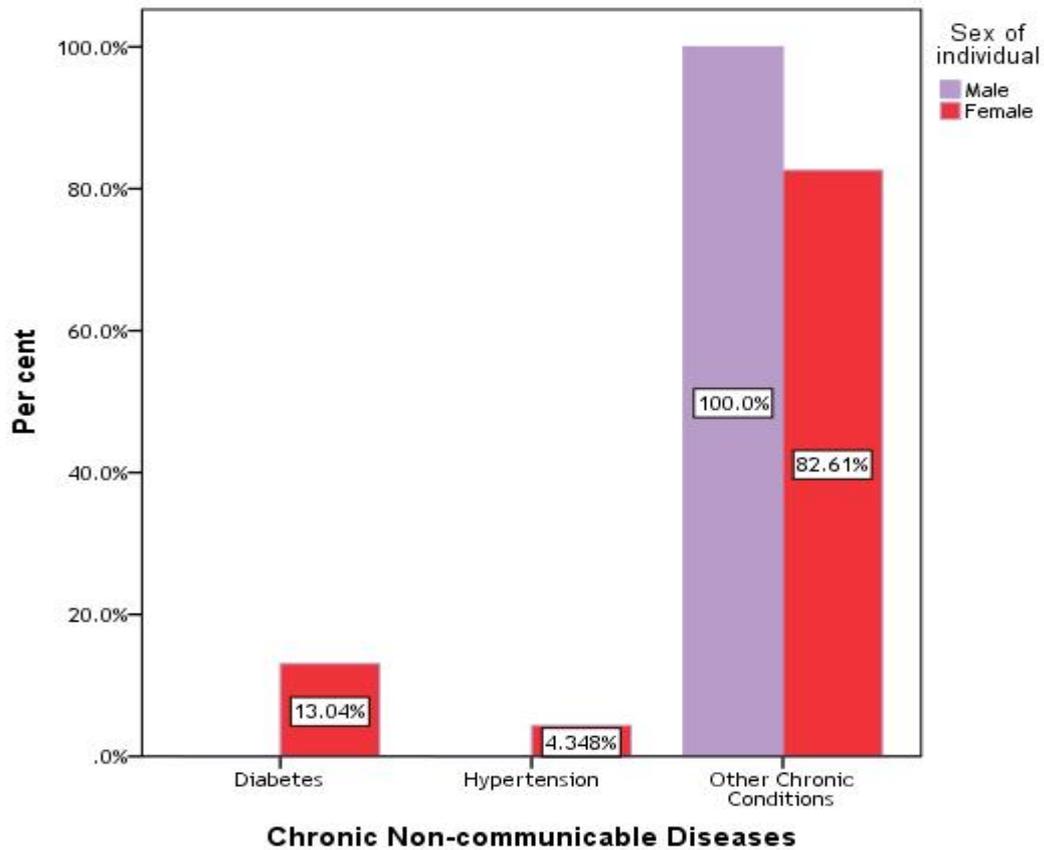


Figure 1 : Chronic non-communicable diseases by gender of respondents

Table 1 summarizes the socio-demographics of the sampled population. Marginally more of the sampled respondents are in their late adolescence (35.7 percent), 51.8 percent are females, and 51.1 percent reside in

rural areas. The majority of the respondents currently live with their biological mother (76 percent) compared to 37.4 percent who reside with their biological father.

Table 1 : Socio-demographic characteristics of sampled population, n = 1, 394

Characteristics	Frequency (Percent)
<b>Age cohort</b>	
Early Adolescence	463 (33.2)
Middle Adolescence	433 (31.1)
Late Adolescence	498 (35.7)
<b>Gender</b>	
Male	672 (48.2)
Female	722 (51.8)
<b>Area of residence</b>	
Urban	394 (28.3)
Peri Urban	287 (20.6)
Rural	713 (51.1)
<b>Population Income Quintile</b>	
1	320 (23.0)
2	328 (23.5)
3	287 (20.6)
4	263 (18.9)
5	196 (14.1)
<b>Biological parent lives in household</b>	
Father	277 (37.4)
Mother	562 (76.0)
<b>Received Social Assistance</b>	
Yes	232 (17.3)
No	1108 (82.7)

Table 2 presents percent on self-reported illness, health status and non-communicable diseases of the sampled respondents. Three percent of the sampled respondents report having non-communicable conditions (NCDs). The majority of those with NCDs,

report having Other conditions (43.4 percent) compared to 4.0 percent having diabetes and 1.3 percent having hypertension. In fact, none of the respondents report having arthritis (or arthritic pains).

*Table 2 :* Health Indices, n = 1, 394

Characteristics	Frequency (Percent)
<b>Self-reported illness</b>	
Yes	89 (6.6)
No	1251 (93.4)
<b>Self-reported health status</b>	
Very Good	631 (47.2)
Good	601 (45.0)
Fair	84 (6.3)
Poor	20 (1.5)
<b>Self-reported Conditions</b>	
<b>Non-communicable diseases (NCDs)</b>	
Diabetes	3 (4.0)
Hypertension	1 (1.3)
Others Conditions	33 (43.4)
<b>Infectious diseases</b>	
	39 (51.3)
<b>Health Insurance Coverage</b>	
No	1123 (85.3)
Yes	194 (14.7)
<b>Health-Care Seeking Behavior</b>	
No	43 (46.2)
Yes	50 (53.8)
<b>Health Care Facility Utilization</b>	
Private	23 (46.0)
Public	26 (53.1)

Of those who report having at least one non-communicable disease, 33.3 percent of those with diabetes are in their early adolescence compared to 33.3 percent with other conditions. Two in every three respondents with diabetes indicate purchasing the prescribed medication compared to none with Other conditions and all with hypertension. All the respondents who indicate having diabetes are females as well as those with hypertension compared to 57.6 percent of those with Other conditions (**Table 3**). However, the majority of the diabetics are poor females (66.6 percent) from rural areas compared to affluent urban females who are hypertensive (100 percent). A statistical association exists between purchased prescribed medications and typology of NCDs ( $P < 0.0001$ ), with none emerging between - age cohort and typology of NCDs ( $P = 0.412$ ); health insurance coverage and typology of NCDs ( $P=0.181$ ); population income quintile and typology of NCDs ( $P=0.668$ ) and other combinations (**Table 3**).

Table 3: Selected characteristics by typology of non-communicable diseases

Characteristics	Non-communicable diseases			$\chi^2$ , P value
	Diabetes	Hypertension	Other Condition	
<b>Age cohort</b>				3.953; 0.412
Early adolescence	1 (33.3)	0 (0.0)	11 (33.3)	
Middle adolescence	2 (66.7)	0 (0.0)	11 (33.3)	
Late adolescence	0 (0.0)	1 (100.0)	11 (33.3)	
<b>Purchased Prescribed Medicine</b>				28.052; < 0.001
No	1 (33.3)	0 (0.0)	33 (100.0)	
Yes	2 (66.7)	1 (100.0)	0 (0.0)	
<b>Education</b>				5.350; 0.5
No formal schooling	0 (0.0)	1 (100.0)	6 (18.2)	
Primary (or preparatory)	1 (33.3)	0 (0.0)	10 (30.3)	
Secondary	2 (66.7)	0 (0.0)	15 (45.5)	
Tertiary	0 (0.0)	0 (0.0)	2 (6.1)	
<b>Health Insurance Coverage</b>				3.417; 0.181
No	1 (33.3)	1 (100.0)	26 (78.8)	
Yes	2 (66.7)	0 (0.0)	7 (21.2)	
<b>Health-Care Seeking Behavior</b>				0.795; 0.672
No	1 (33.3)	0 (0.0)	14 (42.4)	
Yes	2 (66.7)	1 (100.0)	19 (57.6)	
<b>Gender</b>				2.730; 0.255
Male	0 (0.0)	0 (0.0)	14 (42.4)	
Female	3 (100.0)	1 (100.0)	19 (57.6)	
<b>Area of residence</b>				4.746; 0.314
Urban	0 (0.0)	1 (100.0)	11 (33.3)	
Peri-urban	0 (0.0)	0 (0.0)	5 (15.2)	
Rural	3 (100.0)	0 (0.0)	17 (51.5)	
<b>Population Income Quintile</b>				5.812; 0.668
1	1 (33.3)	0 (0.0)	9 (27.3)	
2	1 (33.3)	0 (0.0)	4 (12.1)	
3	0 (0.0)	0 (0.0)	5 (15.2)	
4	1 (33.3)	0 (0.0)	8 (24.2)	
5	0 (0.0)	1 (100.0)	7 (21.2)	
<b>Self-reported health status</b>				4.893; 0.299
At least good	1 (33.3)	0 (0.0)	21 (63.6)	
Fair	2 (66.7)	1 (100.0)	8 (24.2)	
Poor	0 (0.0)	0 (0.0)	4 (12.2)	
<b>Utilization of health care facility</b>				3.053; 0.217
Private	0 (0.0)	1 (100.0)	10 (52.6)	
Public	3 (100.0)	0 (0.0)	9 (47.4)	
<b>Length of illness</b> - mean $\pm$ SD (in days)	2.3 $\pm$ 4.0	4.0 $\pm$ 0.0	4.1 $\pm$ 5.4	F = 0.143; 0.867

SD denotes standard deviation

Table 4 depicts cross tabulations between self-reported health status and selected characteristics. The majority of those who report poor health status reside in rural areas (65 percent); among those who report at least good health status, 95 percent have Other NCDs

and 4.5 percent with diabetes. Statistical relationships exist between 1) area of residence and health status ( $P < 0.0001$ ) and 2) population income quintile and health status ( $P < 0.0001$ ).

Table 4: Selected characteristics by self-reported health status

Characteristics	Self-reported health status			$\chi^2$ , P value
	At least good	Fair	Poor	
<b>Age cohort</b>				2.009; 0.734
Early adolescence	408 (33.1)	26 (31.0)	5 (25.0)	
Middle adolescence	380 (30.8)	27 (32.1)	9 (45.0)	
Late adolescence	444 (36.0)	31 (36.9)	6 (3.0)	
<b>Purchased Prescribed Medicine</b>				2.022; 0.364

No	52 (98.1)	23 (92.0)	5 (100.0)	
Yes	1 (1.9)	2 (8.0)	0 (0.0)	
<b>Education</b>				10.745; 0.097
No formal schooling	185 (15.2)	13 (15.5)	13 (15.5)	
Primary (or preparatory)	348 (28.5)	23 (27.4)	23 (27.4)	
Secondary	654 (53.6)	41 (48.8)	41 (48.8)	
Tertiary	33 (2.7)	7 (8.3)	7 (8.3)	
<b>Health Insurance Coverage</b>				1.564; 0.457
No	1028 (85.1)	71 (84.5)	19 (95.0)	
Yes	180 (14.9)	13 (15.5)	1 (5.0)	
<b>Health-Care Seeking Behavior</b>				3.823; 0.148
No	27 (45.8)	15 (55.6)	1 (14.3)	
Yes	32 (54.2)	12 (44.4)	6 (85.7)	
<b>Gender</b>				5.602; 0.061
Male	610 (49.5)	31 (36.9)	8 (40.0)	
Female	622 (50.5)	53 (63.1)	12 (60.0)	
<b>Area of residence</b>				21.961; <0.0001
Urban	334 (27.1)	38 (45.2)	7 (35.0)	
Peri-urban	273 (22.2)	7 (8.3)	0 (0.0)	
Rural	625 (50.7)	39 (46.4)	13 (65.0)	
<b>Population Income Quintile</b>				29.723; <00001
1	272 (22.1)	16 (19.0)	13 (65.0)	
2	302 (24.5)	17 (20.2)	1 (5.0)	
3	257 (20.9)	23 (27.4)	1 (5.0)	
4	239 (19.4)	11 (13.1)	2 (10.0)	
5	162 (13.1)	17 (20.2)	3 (15.0)	
<b>Chronic conditions</b>				4.893; 0.299
Diabetes	1 (4.5)	2 (18.2)	0 (0.0)	
Hypertension	0 (0.0)	1 (9.1)	0 (0.0)	
Others	21 (95.5)	8 (72.7)	4 (100.0)	
<b>Utilization of health care facility</b>				2.633; 0.268
Private	13 (41.9)	8 (66.7)	2 (33.3)	
Public	18 (58.1)	4 (33.3)	4 (66.7)	
<b>Length of illness - mean <math>\pm</math> SD (in days)</b>	2.7 $\pm$ 4.4	4.2 $\pm$ 6.1	3.3 $\pm$ 4.9	F = 0.915; 0.404

*SD denotes standard deviation*

#### IV. DISCUSSION

The Caribbean region is experiencing NCDs epidemic, which have economic and preventative control burdens for their governments [3, 4, 47]. The reality is, the Caribbean region has the highest prevalence of NCDs in the Americas [3] and this has many implications for public health including cost of public health care expenditure and cost of programmes to address unhealthy lifestyle practices [47]. Although 63 percent of global mortality is accountable to NCDs, of which 80 percent are in low-and middle income nations [33, 34] and that fact that between 48 and 55 percent of deaths in Jamaica are among the elderly [32, 48], the adolescence period which is a gateway to the behavioural practices for increased risk factors that influence the development of NCDs must of critical importance to the Caribbean region. The rationale behind the importance of adolescence and childhood as it relates to NCDs is embedded in the statistics on the matter. In 2007, a study finds that 12 in every 100 Jamaican children ages 0 to 14 have diabetes [14], and another reveals that in 2007 over 2002, hypertension

increased by 175 percent for adolescents and diabetes mellitus by 700 percent among adolescents ages 10-19 years [43]. This study goes further than all its predecessors on NCDs among adolescents and young people by revealing that 1) 3 out of every 100 Jamaican adolescents have a NCDs; 2) 4 in every 100 adolescents have diabetes; 3) 1 in every 100 adolescents has hypertension, 4) diabetes is prevalent in middle adolescent females, 5) hypertension commences at late adolescence in females, 6) those with other chronic illnesses are least likely to purchase prescribed medications (0 percent) compared to diabetic adolescents (67 percent) and hypertensive adolescents and 7) during the adolescence period only one NCDs is reported by each Jamaican adolescent. When Samuels and Fraser [46] made the call for a 'Wellness Day' that would assemble the Caribbean countries to discuss measures to prevent and control NCDs [47], the matter was fitting and even more so today, which is supported by Ferguson et al. [48] and the present study.

The present study finds that 92 percent of Jamaican adolescents report that they have at least

good health status; 7 percent have an illness and those with an illness, 48.7 percent have chronic non-communicable conditions. While the prevalence of NCDs, based on the current study, is lower than that for the adolescents (3 percent) compared to that for the population (9 percent) [46], the invincibility of this age cohort is embedded in the current health indices including the majority of them believe that they are healthy (93.2 percent) and those who sought medical care (53.8 percent). Another health index which could justify the invincibility of adolescents in Jamaica is the prevalence of mortality rate. In 2007, the overall prevalence of mortality rate in Jamaica for adolescents is 22 per 1000 deaths, which is greater for males than females (male, 26 per 1000 deaths; female, 17 per 1000 deaths) [32], such statistics illustrate that the rate of deaths among adolescents in Jamaica is relatively low and must account for the concern that probability of mortality during adolescence is small. This reality holds the key to the reckless living including unhealthy diet, high passive consumption of alcohol and cigarettes, sweetened beverages, less legumes and vegetables, with limited understand of the implications that such behavior will influence later life experiences. Adolescence is perceived as window period for reckless behavior and these will not be included in the biological timeline, and few adolescents accepts the causal relationship between their current accounts and increased risk of NCDs in later life – that is, one's actions and the associated consequences.

However, using Barrett et al.'s study [42] 33.3 percent of adolescent school pupils are overweight, and 80% of them indicate 3+ risk factors for type 2 diabetes and cardiovascular diseases. Barrett et al's work, therefore, provide a basis for interpreting the unhealthy lifestyle practices of the Jamaican adolescents as well as NCDs in later adulthood among Jamaicans. The poor lifestyle practices of Jamaican adolescents is similar to that of other countries, such as Pakistan. A study on Pakistanis adolescent school children, ages 14 to 17 years, finds that 96.9 percent have preventable risk factor for NCDS and 80+ percent have at least 2, which is in keeping with what is observed in Jamaica.

In Barrett et al's research, they find that 1) 14.5 percent of respondents are overweight, 2) 21 percent are obese, 3) 17 percent are hypertensive, 4) 1.1 percent is diabetic, 5) 39 percent are not physically active, and 6) 8 percent are pre-hypertensive. Barrett et al's work cannot be generalizable; but the current study, which is national probability cross-sectional survey, shows less hypertensive Jamaican adolescents, more diabetics and more self-reported healthy adolescents. One of the weaknesses of this study is the fact that it is a self-reported study unlike Barrett et al's work or that of Wilks et al's research [14] which tested for the conditions. Wilks and colleagues' work finds that 49.3 percent of Jamaicans ages 15-74 years are unaware that they had hypertension, 24 percent are unaware that

they have diabetes and 86 percent are unaware that they have high cholesterol [14].

A part of the rationale for the discovery at the time of Wilks et al's work was that the population experienced no symptoms (or illness), which meant they had not visited a health care professional. The same thing can be said about adolescents in this study because 7 percent reported an illness and the majority indicate at least good health and therefore this would explain their unwillingness to engage in healthy lifestyle behaviors, which later account for the NCDs epidemic recorded by statistics on the Caribbean. In using statistics for Latin America and the Caribbean, Baldwin et al [45], , claimed that poor and unhealthy diet, excessive alcohol consumption, and low physical activity account for the majority of obese and overweight people who are more likely to have diabetes mellitus, hypertension and heart diseases. They went further to argue that "The region of Latin America and the Caribbean] has the most serious problem with obesity worldwide", which explains Hospedales et al.'s perspective that the Caribbean region has the highest prevalence of NCDs in the Americas [3].

The NCDs epidemic that is impacting the developing world is owing to the unhealthy behavioral practices of the population, which extend beyond the Caribbean [49]. In Pakistan, among adolescent school children, 4 out of 5 practice unhealthy diets and 3 out of 5 are physically inactive as well as passive smokers. Therefore, this substantiates the position of a 'Race Against Time' [50] to address the risk factor of NCDs in the developing world. The 'Race Against Time' must commence with early life origins, particularly at the early adolescence period, which holds much of the answers to NCDs in later adult life [51-54]. The NCDs epidemic in developing countries, including the English-speaking Caribbean, can be explained by Early Life Origins of Adults disease theory of which was developed by Kermack and colleagues [55]. They postulated that the decline in adult mortalities in United Kingdom and Sweden for the periods 1751 to 1930 are as a result of improvements in the conditions surrounding child health, especially living conditions of children including prenatal nutrition. When compared to the decline in adult mortalities – in the UK and Sweden, it the conclusion then that the decline in conditions in the Caribbean is what is causing the increase in the diabetes. Such a perspective, therefore, opens a better understanding for the rise in childhood diabetes seen in Jamaica for 2007 over 2002 [14]. It can also be used to explain the diabetes and other NCDs among adolescents in the early period of their lives. In the present work, we find that one-third of diabetic adolescents in Jamaica are 10 to 12 years which is the same for those with other chronic non-communicable diseases. Hypertension on the other hand, tends to take a longer time to present itself in adolescents, oftentimes showing up in their late adolescence.

In Jamaica, the current reality is, two-thirds of the diabetic adolescents are secondary school females between the ages of 13 and 15 years old. This finding shows that 67 percent of diabetic middle aged adolescents are rural poor female, with 33.3 percent living below the poverty line. Unlike the diabetic adolescents, they are urban females in their late adolescence, with 39.4 percent being poor (27.3 percent living below the poverty live. Embedded in those findings is the association between poverty and chronic conditions, which concurs with the literature [1, 56, 57], and the poor nutritional intake influencing NCDs as early as in the adolescence years. According to Wang et al. "...the well-known Dutch Winter Famine ("Hongerwinter") study, which examined long-term health outcomes of children born to mothers starved during pregnancy because of a Nazi blockage of the food supply lines during the Second World War. As adults, these children experienced significantly higher rates of type 2 diabetes and cardiovascular disease relative to their peers whose mothers had adequate nutritional intake during pregnancy" [51], which the present work shows that is occurring during the early adolescence years.

The socialized dietary practices of children and adolescents are the resultant effect of the parents' practices and these become a cost in the general society. Wilks and colleagues find that 1) 55 percent of Jamaicans ages 15-74 years consume at least a bottle or glass of sweetened beverage each day; 2) 88 percent consume pastry products at least once per day; 3) 39 percent eat fatty foods at least once per week; and 4) 46 percent are lowly physically active [13]. Inactivity in Jamaican adults is the almost the same for those adults in the Eastern Caribbean countries (46 percent) [58] and 46 percent of young males (ages 15-24 years old) compare to 72.4 percent of young females (ages 15-24 years old) have never made an effort to increase physical activity in the last year (2008). Again this underscores the correlation between adults' behaviour and those of adolescents. There is the high consumption of alcoholic beverages and cigarettes in Jamaica. Sixty-two percent of Jamaicans ages 15-74 years currently use alcohol [13]. According to Wilks and colleagues' study, current alcohol usage in 2008 is even greater when disaggregate by age cohort - among those 1) 15-24 years old, 77.5%; 2) 25-34 years old, 83.2%; and 35-44 years old, 80.0%. Cigarette smoking is among the risk factors for chronic lung diseases as well as kidney diseases [59]; yet, it continues to be attractive to young people.

All the studies that have been reviewed on NCDs concur with each other in that overall chronic non-communicable diseases is a gendered phenomenon (i.e., females) [2, 6,8,9,12-14, 34]. Another reality which emanates from this work is the feminization of NCDs, which continues to adulthood based on postulations of the WHO that claims that 65 percent of all female deaths

in the world are due to NCDs [34]. The matter of the feminization of chronic noncommunicable diseases goes back to childhood as Bourne [13] finds that more diabetic female children (ages 0-14 years) are in Jamaica and this is also the case for those who have other chronic conditions (males, 19.4 percent; females, 22.3 percent). The current findings supports the feminization of NCDs even during the adolescence years. For every 16 adolescent females, with a chronic noncommunicable disease, there are 10 males, and when the figures are disaggregated more information is revealed on the matter of NCDs by gender. More female adolescents than males report having diabetes (male, 0 percent; females, 13.0 percent) and hypertension (male, 0 percent; females, 4.3 percent) and this is reversed for those with other chronic conditions. This work concurs with the literature that female adolescents and children in the early stage of adolescence are more likely to have diabetes than males [60-63]. We went further than the literature to show that hypertension in the adolescence years is a female health condition, which start in late adolescence among urban youth. However, this work disagrees with the literature that male adolescents are more likely to have cardiovascular diseases than female adolescents. For example, 14 females to 10 adolescent males report having other NCDs including neoplasms, high cholesterol and heart diseases.. In spite of the aforementioned results, adolescent females did not report being healthier (i.e., at least good health, 51 percent) than their male counterparts (49 percent), with  $P$  equals 0.061. Again this is based on the current study about feminization of cardiovascular conditions (males, 0 percent; females, 100 percent).

Using the prevalence rate data from this research to compared with global results some marked disparities emerge between the figures, the prevalence of hypertension is lower in Jamaican adolescents (1.3 percent) compared to those globally (4.5 percent) [22] as well as among diabetics adolescents (e.g., Jamaica, 4 percent; globe, 25%) [23], which are feminized diseases. NCDs diseases affecting women have a long history in the Caribbean, which is noted by Hagley in 1990 [63] and this continues even today among Jamaican children and adolescents. Even among older people in Jamaica, the Eastern Caribbean countries, South Africa, Cameroon and the rest of the world, NCDs are feminized phenomena [14, 34, 58, 64, 65] and the present finding shows that this emanates from the early adolescence period among rural poor. This takes the discussion into mortalities owing to NCDs by the genders to understand what obtains in the contemporary society. The present findings establish that diabetes and hypertension are feminized phenomena during the adolescence period, other studies extend this into late adulthood and so are deaths to NCDs. In 2007, statistics show that for every 15 female that die because of diabetes there are 10 male [32]; and there are 14 female deaths to

hypertension for every 10 male deaths for the same illness [32], which goes further to support the feminization of diabetes and hypertension in Jamaica. In fact, for the periods 2006-2010, diabetes and hypertension are the second and third leading cause of death among Jamaican females, while these are the third and sixth among males respectively [32]. The issue here is, the feminization of some NCDs in the adolescence period, particularly diabetes and hypertension, continues into late adulthood and this also explains deaths to these same chronic noncommunicable diseases in later life.

## V. CONCLUSION

Many of the unhealthy and poor lifestyle practices that high risk factors for NCDs in later adulthood starts during the adolescence period. The adolescence period among Jamaicans as it relates to NCDs are not the same as this study shows that diabetes becomes rampant during middle adolescence and hypertension is a later life phenomenon. There are marked dissimilarities, therefore, among the typology of NCDs among adolescents which is also the case for particular sociodemographic characteristics. Diabetes is a rural area poor female phenomenon among adolescents in Jamaica, while hypertension is an affluent urban area adolescent female phenomenon. The findings would support specialized public health intervention programmes to tackle NCDs in adolescents.

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