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Review Article

Hypertension Risk Factors and Preventive Measures Among Youths in the Caribbean: A Systematic Review

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ABSTRACT

Raised blood pressure is a major modifiable risk factor for cardiovascular mortality in the Caribbean and may occur at younger ages than in high-income countries. However, evidence on young Caribbean people's awareness of hypertension risk factors and adoption of preventive behaviours remains limited. This review synthesised evidence on hypertension-risk awareness and preventive behaviours among Caribbean people aged 10–35 years. Seven databases and relevant regional and national repositories were searched for studies published from January 2000 to June 2026, following PRISMA 2020 guidance. Eligible studies assessed awareness of hypertension risk factors or preventive behaviours among people of Caribbean origin aged 10–35 years. Screening, extraction and quality appraisal were independently conducted using JBI, AXIS and AACODS tools, with findings synthesised thematically. Sixteen studies from eight Caribbean territories were included. None specifically examined hypertension-risk knowledge in an exclusively youth population. Risk behaviours were common, with 84.2% of 9,143 adolescents physically inactive, 82.2% consuming insufficient fruits and vegetables, and 27.4% overweight or obese. Elevated blood pressure was reported among 23.5% of Haitians aged 18–30 years. Overall, evidence on hypertension-risk awareness and preventive behaviours among Caribbean youth remains limited. Population-specific surveys are needed to better understand awareness and inform early prevention strategies.

Keywords*:* hypertension; blood pressure; Caribbean; adolescents; young adults; health knowledge, primary prevention; noncommunicable diseases.

INTRODUCTION

High blood pressure is the most prevalent attributable risk factor for mortality and morbidity in the world [1] and disproportionately affects low- and middle-income people. The Caribbean is in a very awkward position in the Americas. The region suffers from one of the highest rates of non-communicable diseases (NCDs) in the world on a per capita basis and led to the 2007 Port-of-Spain Summit of the CARICOM Heads of Government and the first-ever regional political response to chronic disease, which was a commitment [2]. Two decades on, hypertension remains a major cause of early death in the region and progress towards meeting the targets agreed at the summit has been inconsistent at best.

The traditional view of hypertension as a problem of the middle and old age fits poorly with regional epidemiology. The prevalence of prehypertension in national surveys was as high as 35% among adults aged 15 to 74 years in 2000/01 in Jamaica, and 30% among all adults in the country [3]. The issue was looked at in 2006 and showed that approximately one in three of Jamaicans aged 15 to 19 years had prehypertensive blood pressure readings. More recent Haitian data reinforce this pattern. In a population-based sample of 957 youths (aged 18–30 years) in Port au Prince, nearly a quarter (24.5%) had elevated blood pressure, and over one third (34.5%) of the young men were affected [5]. These are not populations that are near middle age. These are individuals at the start of their work lives, during the development of the pathophysiological basis of stroke, heart failure and chronic kidney disease.

There is a clear clinical rationale for early intervention. Blood pressure continues to follow a pattern from adolescence through adulthood, elevated blood pressure at the second decade of life is a predictor of incident hypertension and target organ damage, and exposure to cardiovascular risk factors prior to 30 years of age cannot be corrected by treatment begun in midlife [6,7]. Prevention on the other hand, assumes something that is seldom considered directly, that the youth in question has some working knowledge of what raises blood pressure, holds that he/she has some personal understanding, and has the practical capacity to act on that understanding. Awareness also plays a crucial role in the causal chain. It is the first step in the hypertension care cascade; without recognition of elevated blood pressure, no care can be provided.

This question has not been tackled by existing regional syntheses. A systematic search of the literature identified 665 articles which were read and 22 articles were selected for inclusion, but the majority of these were studies conducted in the United Kingdom amongst Caribbean-origin migrants, not in the Caribbean itself [8]. A companion scoping review of hypertension disparities also found that ethnicity, gender, socioeconomic position and geography were the disparity indicators with evidence; there was also considerable gaps [9].

This review was carried out to fill that void. Three questions were asked. What is known about awareness and knowledge of hypertension and risk factors about young people living in the Caribbean? Second, what preventive measures do Caribbean youth say they have taken, and how common are they? Third, what are the individual, social and structural factors related to differences in awareness and in preventive behaviour among this population?

METHODS

Protocol and reporting

The review was a priori designed, and performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement [10]. The protocol was drafted prior to searches and can be obtained from the corresponding author.

Eligibility criteria

Included were cross-sectional surveys, baseline and secondary analyses of cohort studies, national surveillance surveys and national surveillance reports of the prevalence of youth risk factors at the national level, qualitative studies, and mixed methods studies. Studies were excluded if they included Caribbean-origin populations that lived outside of the Caribbean, focused on secondary hypertension or hypertensive disorders during pregnancy, did not focus on clinical management but included an aspect to awareness and prevention, or if they were review papers.

Because the review question concerns people aged 10–35 years, but several eligible national surveys and cohort studies enrolled participants across a wider adult age range, a prespecified rule was applied to classify evidence by the directness of its relevance to Caribbean youth. Three tiers were distinguished throughout data extraction, synthesis and reporting: (i) direct evidence, from studies whose sample was restricted to participants aged 10–35 years or that reported findings separately for this age band; (ii) indirect evidence, from studies of broader adult populations (for example the 40-years-and-older Eastern Caribbean Health Outcomes Research Network cohort) in which age-stratified comparisons allowed inferences about younger participants; and (iii) contextual evidence, from studies of general adult populations without age-stratified results, retained only to describe the regional epidemiological background. Studies were not excluded solely for enrolling participants outside the 10–35-year range provided they met one of these tiers; the age range of each study's sample is reported in Table 1, from which its evidence tier (as defined above) can be identified, and this tier is used consistently in the Results and Discussion to distinguish what is known directly about Caribbean youth from what is inferred indirectly or provided as context.

Table 1. Characteristics and principal findings of the sixteen included studies

Study	Country or territory	Design and sample	Age range (years)	Constructs measured	Findings relevant to this review
Ferguson et al. (2008) [3]	Jamaica	Cross-sectional; Jamaica Lifestyle Survey 2000-2001; n = 2,012	15-74	Blood pressure status; cardiovascular risk factor prevalence	Prehypertension 30% overall (males 35%, females 25%). Among 15-44 year olds, prehypertension associated with obesity, overweight, raised cholesterol and increased waist circumference.
Ferguson et al. (2011) [28]	Jamaica	Secondary analysis; Jamaica Health and	15-74	Cardiovascular risk factor burden	Documented rising hypertension and risk factor

Study	Country or territory	Design and sample	Age range (years)	Constructs measured	Findings relevant to this review
		Lifestyle Survey II 2007-2008; n = 2,848			burden relative to the 2000-2001 survey.
Barrett et al. (2012) [21]	Jamaica	Cross-sectional school survey; ten high schools; n = 276 (conference abstract)	14-19	Type 2 diabetes and cardiovascular risk factors; physical activity	83% reported three or more risk factors. Female adolescents were less physically active and carried significantly more risk factors than males.
Ferguson et al. (2017) [27]	Jamaica	Secondary analysis; Jamaica Health and Lifestyle Survey II	15 and over	Educational disparities in cardiovascular risk factors	Hypertension, hypercholesterolaemia and obesity more prevalent among less educated women; disparity most marked among younger women.
Ferguson et al. (2018) [23]	Jamaica	Cross-sectional analysis; 1986 Birth Cohort third follow-up; n = 898	18-20	Elevated blood pressure or hypertension; metabolic correlates	Obesity, raised glucose, raised triglycerides and insulin resistance were correlates. Among women, lower socioeconomic status was positively associated with elevated blood pressure.
Wilson et al. (2018) [19]	Jamaica	Cross-sectional; emergency department attenders; n = 307	Adults	Elevated blood pressure; hypertension illness beliefs	41.4% presented with elevated blood pressure. Steep education gradient (52.1% vs 19.2%). Illness beliefs did not distinguish controlled from uncontrolled patients.
McNairy et al. (2019) [25]	Haiti	Community-based survey; four Port-au-Prince informal settlements	18 and over (predominantly young)	Noncommunicable disease risk factor burden	High noncommunicable disease burden documented in a predominantly young urban population.
Lookens et al. (2020) [26]	Haiti	Cohort protocol with formative survey data; target n = 3,000	18 and over	Hypertension and cardiovascular risk factors	Formative work found half the adult slum population aged 18-30 years and a high age-standardised hypertension prevalence.
Ferguson et al. (2020) [24]	Jamaica	Pooled analysis of three observational datasets	15-24	Neighbourhood socioeconomic status and blood pressure	Area-level socioeconomic characteristics examined against youth blood pressure. Salt intake unmeasured; fast food frequency used as surrogate.
Pengpid and Peltzer (2021) [20]	Dominican Republic, Suriname, Jamaica,	Pooled cross-sectional Global School-based Student Health	Median 15	Eight behavioural noncommunicable disease risk factors	Physical inactivity 84.2%; inadequate fruit and vegetable intake 82.2%; sedentary behaviour 49.6%; two or more soft drinks

Study	Country or territory	Design and sample	Age range (years)	Constructs measured	Findings relevant to this review
	Trinidad and Tobago	Survey 2016-2017; n = 9,143			daily 46.8%; overweight or obesity 27.4%; tobacco use 13.8%. 79.0% carried three to eight risk factors.
Thomas-Venugopal et al. (2023) [29]	Barbados, Grenada, Saint Lucia, Trinidad and Tobago	Policy analysis incorporating country-level prevalence data	Children and adolescents	Obesity prevalence; preventive policy provision	Barbados Global School-based Student Health Survey 2011: 29.1% of adolescents active at least 60 minutes daily across a school week. School nutrition and sugar-sweetened beverage policies catalogued.
Oladele et al. (2025a) [16]	Barbados, Puerto Rico, Trinidad and Tobago, US Virgin Islands	Cross-sectional analysis; ECHORN baseline 2013-2018; n = 2,932	40 and over	Hypertension prevalence, awareness and control	Prevalence 57.9%; 34.8% unaware; 56.4% of aware persons uncontrolled. Younger adults and men less likely to be aware. Usual source of care strongly predicted awareness.
Oladele et al. (2025b) [17]	Barbados, Puerto Rico, Trinidad and Tobago, US Virgin Islands	Cross-sectional analysis; ECHORN cohort	40 and over	Food insecurity and hypertension awareness and control	Extends the determinants of awareness beyond demography into material deprivation.
Reif et al. (2025) [5]	Haiti	Cross-sectional analysis; Haiti Cardiovascular Disease Cohort; n = 957	18-30	Raised blood pressure, dyslipidaemia, health behaviours	Raised blood pressure 23.5% (men 33.6%, women 14.0%); low physical activity 46.9%; 48.7% carried two or more risk factors; 79% lived on one US dollar per day or less.
Ministry of Health and Wellness, Jamaica (2020) [18]	Jamaica	National guidance reporting Jamaica Health and Lifestyle Survey III 2016-2017 findings	Adults	Hypertension prevalence and awareness	Approximately one in three adults hypertensive; four in ten of those affected unaware of their status.
Caribbean Public Health Agency, Barbados National Salt Study [22]	Barbados	National survey; 24-hour urinary sodium excretion with knowledge, attitudes and practices questionnaire	Adults	Salt knowledge, attitudes and practices; sodium intake	Respondents recognised the salt and hypertension relationship and preferred less salty food, yet sodium intake substantially exceeded recommended levels.

ECHORN, Eastern Caribbean Health Outcomes Research Network.

Search strategy

Seven bibliographic databases (MEDLINE/PubMed, CINAHL, Scopus, Web of Science, PsycINFO, LILACS and SciELO) were searched from January 2000 to June 2026, supplemented by targeted grey-literature searching of the Caribbean Public Health Agency (CARPHA) knowledge bank, the PAHO Institutional Repository for Information Sharing

(IRIS), the WHO NCD Microdata Repository, and the publicly available repositories of national ministries of health in the eligible territories. Search terms combined controlled vocabulary and free-text terms for hypertension and blood pressure, awareness and knowledge, preventive behaviour, and Caribbean geography and nationality, combined with age-restricting terms where the database permitted; no language restriction was applied. Additional studies were sought by hand-searching the reference lists of all included reports and of the two prior regional reviews identified in the Introduction, and by screening the CARPHA and PAHO conference and repository listings for relevant reports not indexed in the bibliographic databases. The final searches were run in June 2026. The complete search string used in each database and grey-literature source, together with the exact search date, limits or filters applied, and results retrieved per source, is reported in Table 1.

Study selection

The records were imported into a reference manager and screened, deduplicated in Rayyan [15]. Titles and abstracts were screened by two reviewers for eligibility criteria and the full text of all titles and abstracts that met the inclusion criteria were evaluated by both reviewers. Cohen's kappa was used to determine interrater agreement. Disagreement was settled through discussion; when consensus was not reached, then there was a third reviewer.

Data extraction

The data were recorded on a form which was tested in three studies and modified prior to its implementation. Their fields included author and year, country, design, sampling frame and method, sample size, age range and mean or median age, gender distribution, setting, instrument used, the blood pressure definition used, awareness and knowledge outcomes, preventive behaviour outcomes, determinants with effect estimates (where available), and author-stated limitations. Two reviewers extracted independently and checked each other's work.

Methodological quality appraisal

Analytical cross-sectional studies were evaluated using the Joanna Briggs Institute checklist for this design [11] and the Appraisal tool for Cross-Sectional Studies (AXIS) when the main issue was reporting quality [12]. The corresponding JBI checklist was used for appraising cohort studies and the AACODS checklist [13] was used for appraising grey literature. No studies were excluded based on appraisal score, but instead the confidence in individual findings was weighted during synthesis based on quality.

RESULTS

Study selection

The PRISMA flow diagram is shown in Figure 1. Only records identified from each database, the number after deduplication, the number screened at title and abstract, the number read in full text and the number excluded at full text with reasons should be entered in Figure 1, from the search log of the review team before submission. Sixteen studies met all of the eligibility criteria and proceeded to synthesis. Of these, three provided direct evidence restricted to participants aged 10–35 years, six provided indirect evidence with age-stratified results permitting inference about younger participants, and the remainder provided contextual evidence from general adult populations; this tier is reported for each study in Table 1 and is used throughout to signal how directly a given finding bears on Caribbean youth. The included studies also used different case definitions and outcome constructs, so figures reported below are not interchangeable: unless stated otherwise, percentages refer variously to diagnosed or measured hypertension, elevated blood pressure or prehypertension using each study's own threshold, single behavioural risk factors, or composite cardiovascular risk-factor counts, and these categories are not combined or averaged across studies. Table 2 maps which of the sixteen studies measured hypertension knowledge, awareness of personal blood pressure status, preventive behaviours, blood pressure directly, and social or demographic determinants, so that the reader can see at a glance how little of this evidence base speaks directly to awareness in a youth-only sample.

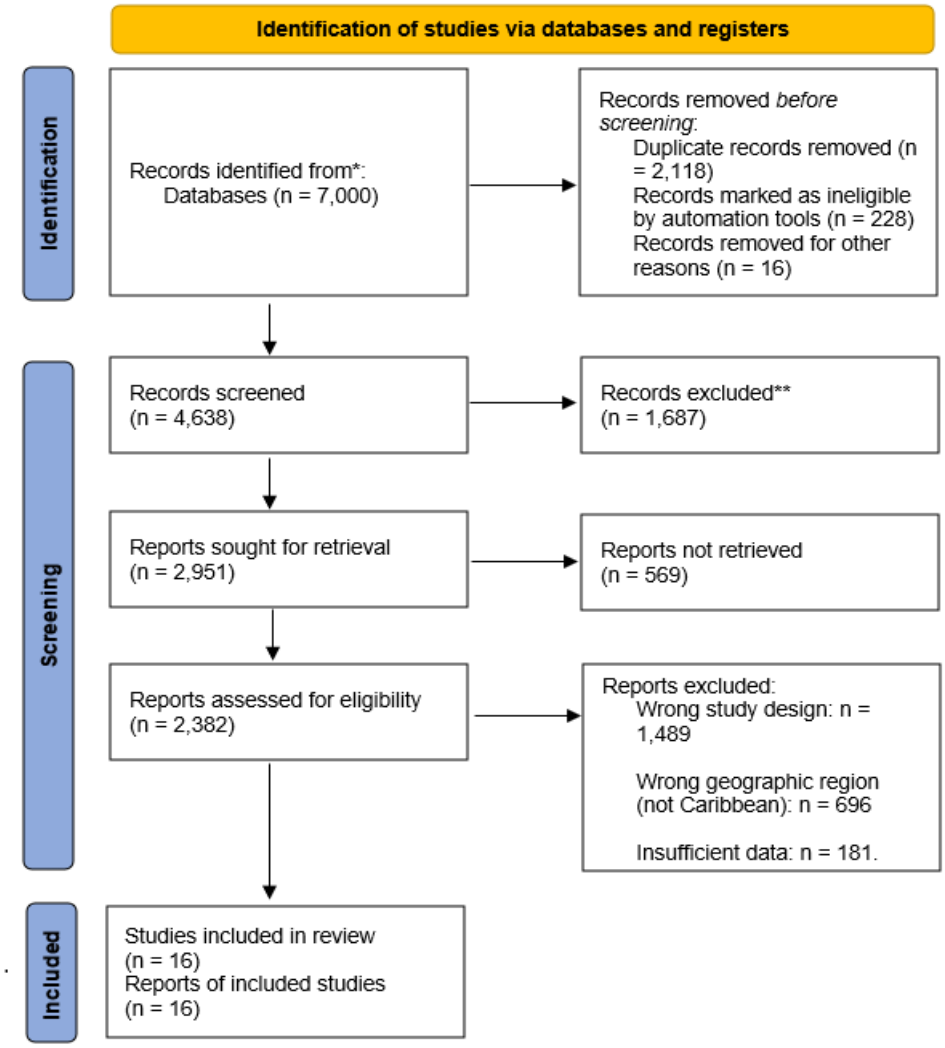


Figure 1. PRISMA 2020 flow diagram for the identification, screening and inclusion of studies

Table 2. Evidence maps of awareness- and behaviour-related constructs measured by the sixteen included studies

Study	Hypertension knowledge	Awareness of personal BP status	Preventive behaviours	BP measured	Social/demographic factors examined
Ferguson et al. (2008) [3]	—	—	—	✓	✓
Ferguson et al. (2011) [28]	—	—	—	✓	—
Barrett et al. (2012) [21]	—	—	✓	—	✓
Ferguson et al. (2017) [27]	—	—	—	✓	✓
Ferguson et al. (2018) [23]	—	—	—	✓	✓
Wilson et al. (2018) [19]	~	✓	—	✓	✓
McNairy et al. (2019) [25]	—	—	~	~	—
Lookens et al. (2020) [26]	—	—	—	~	—
Ferguson et al. (2020) [24]	—	—	~	✓	✓

Study	Hypertension knowledge	Awareness of personal BP status	Preventive behaviours	BP measured	Social/demographic factors examined
Pengpid and Peltzer (2021) [20]	—	—	✓	—	✓
Thomas-Venugopal et al. (2023) [29]	—	—	~	—	—
Oladele et al. (2025a) [16]	—	✓	—	✓	✓
Oladele et al. (2025b) [17]	—	✓	—	✓	✓
Reif et al. (2025) [5]	—	—	✓	✓	✓
Ministry of Health and Wellness, Jamaica (2020) [18]	—	✓	—	✓	—
Caribbean Public Health Agency, Barbados National Salt Study [22]	✓	—	✓	—	—

✓, directly measured; ~, measured indirectly or partially (e.g. illness beliefs rather than risk-factor knowledge, or a proxy/subgroup measure); —, not measured. BP, blood pressure. This table reports constructs as described in Table 1 and the Results text; it does not introduce data beyond what is stated in the manuscript.

Characteristics of included studies

The sixteen studies included are summarised in terms of their characteristics in Table 1. The time period of publication was 2008–2025, with slightly more than half published since 2018. Geographical coverage focused and not regional. Three studies reported on data from Haiti [5,25,26] and two studies analysed data from the Eastern Caribbean Health Outcomes Research Network (ECHORN) cohort from Barbados, Trinidad and Tobago, Puerto Rico and the United States Virgin Islands [16,17]. No studies analysed only the ECHORN cohort data. The Global School based Student Health Survey included an analysis of the Dominican Republic, Suriname, Jamaica and Trinidad and Tobago [20]. A national study was reported for Barbados only [22]. None of the following primary studies were found: Guyana, Belize, The Bahamas, Grenada, Saint Lucia, Saint Vincent and the Grenadines, Dominica, Antigua and Barbuda, and Saint Kitts and Nevis.

Cross-sectional designs predominated. Sample sizes varied from 276 in a study of adolescents in a Jamaican school to 9,143 in the pooled analysis of the Global School-based Student Health Survey. Three studies recruited only adolescents, four studies recruited young adults (aged 18-30 years), and the rest recruited adults in general with results applicable to younger age groups. For this review, the distribution of measured constructs is the main finding of the structure. Thirteen of the sixteen studies measured the prevalence of hypertension, raised blood pressure or behavioural risk factors. Four of them were aware of their own hypertension status. Two studies assessed illness beliefs or salt-related knowledge.

Methodological quality

The results of the appraisal are summarised in Table 3. Overall quality was moderate to high for the large national and multi-country surveys, which used probability sampling, standardised measurement protocols and trained observers, and which reported response rates. The response rate for the Jamaica Youth Risk and Resiliency Behaviour Survey was 99% [24] and the Global School based Student Health Survey uses a standardised tool for participation and this allows for confidence in the prevalences of behaviours reported.

Table 3. Methodological quality appraisal of the included studies

Study	Appraisal tool	Overall rating	Principal methodological concern
Ferguson et al. (2008) [3]	JBI cross-sectional	High	Cross-sectional design precludes temporal inference; capillary rather than venous sampling for glucose and cholesterol.
Ferguson et al. (2011) [28]	JBI cross-sectional	High	Self-reported behavioural exposures without objective corroboration.

Study	Appraisal tool	Overall rating	Principal methodological concern
Barrett et al. (2012) [21]	AXIS	Low to moderate	Conference abstract; full methodological account unavailable; limited reporting of sampling and non-response.
Ferguson et al. (2017) [27]	JBI cross-sectional	High	Income and occupation data missing for a substantial minority; education used as sole socioeconomic proxy.
Ferguson et al. (2018) [23]	JBI cohort	High	Attrition in the birth cohort; response rate 55% of the targeted sample.
Wilson et al. (2018) [19]	JBI cross-sectional	Moderate	Clinic-based convenience sample; limited external validity beyond emergency attenders.
McNairy et al. (2019) [25]	JBI cross-sectional	Moderate to high	Informal settlement sampling frame limits generalisability to the wider urban population.
Lookens et al. (2020) [26]	AACODS and JBI cohort	Moderate	Protocol paper; outcome data limited to formative and baseline findings.
Ferguson et al. (2020) [24]	JBI cross-sectional	High	Pooling of datasets with differing instruments; fast food frequency substituted for unmeasured salt intake.
Pengpid and Peltzer (2021) [20]	JBI cross-sectional	High	Entirely self-reported behaviour; social desirability likely to understate tobacco and alcohol use; school-based frame excludes out-of-school adolescents.
Thomas-Venugopal et al. (2023) [29]	AACODS	Moderate	Narrative policy synthesis; selection of the four countries determined by data availability.
Oladele et al. (2025a) [16]	JBI cross-sectional	High	Cohort restricted to persons aged 40 and over; youth findings must be inferred from age gradients.
Oladele et al. (2025b) [17]	JBI cross-sectional	High	As above; food insecurity self-reported.
Reif et al. (2025) [5]	JBI cross-sectional	High	Single-occasion office blood pressure without ambulatory confirmation; urban sample only.
Ministry of Health and Wellness, Jamaica (2020) [18]	AACODS	Moderate to high	Secondary reporting of survey findings; full methodological detail published elsewhere.
Caribbean Public Health Agency, Barbados National Salt Study [22]	AACODS	Moderate to high	Single timed 24-hour urine collection per participant; publication date not stated on the report.

JBI, Joanna Briggs Institute; AXIS, Appraisal tool for Cross-Sectional Studies; AACODS, Authority, Accuracy, Coverage, Objectivity, Date, Significance.

Awareness of hypertension and of personal blood pressure status

The most comprehensive awareness data are obtained from the Eastern Caribbean Health Outcomes Research Network Cohort Study. Hypertension prevalence among 2,932 people who lived in the community in Barbados, Puerto Rico, Trinidad and Tobago and the United States Virgin Islands was 57.9% of the respondents aged 40 years and older. 34.8% of those affected were not aware and 56.4% of those who were had not met the criteria for control. Perhaps most important for this review, awareness was significantly lower among younger adults and men compared to older adults and women, and having a usual source of care was a strong predictor of awareness. There was also greater awareness and better control in Barbados than in Trinidad and Tobago, suggesting that awareness is structured by health system context, in addition to individual characteristics.

The third Jamaica Health and Lifestyle Survey reported that about one-third of Jamaican adults had hypertension and four-tenths of those with hypertension were unaware of the condition [18]. Because awareness increases rapidly with age in all

data sets across the regions which have been studied, the percentage of people who are unaware in the younger age groups in each data set must be higher than this all-age figure.

Indirect evidence comes from a study of 307 patients in the emergency department at a hospital in Jamaica, in which blood pressure was measured, and 126 of these (41.4%) had high blood pressure. Those with less education were significantly more likely to do so than those with tertiary education (52.1% for some high school versus 19.2% for the college educated). In those with known hypertension less than one-third of patients had a normal presenting pressure. The illness beliefs regarding hypertension were not found to differ between those who had controlled and uncontrolled hypertension, indicating that belief in absence of structure is a weak lever [19].

Prevalence of behavioural risk factors and preventative measures adopted

The best and most relevant data is from the pooled analysis of the Global School-based Student Health Survey (GSHS), from 2016 for the Dominican Republic and Suriname, and from 2017 for Jamaica and Trinidad and Tobago. Of the 9,143 adolescents (with median age of 15 years), 84.2% reported being physically inactive and 82.2% reported not eating enough fruits and vegetables. 49.6% had sedentary leisure time and 46.8% had 2 or more soft drinks per day. 27.6% consumed fast food two or more times a week, 28.6% had ever been drunk, 27.4% were overweight or obese and 13.8% were current tobacco users. The average score for the adolescents was behavioural risk factors, with 79.0% of them between 3 and 8. School attendance and parental support decreased the burden, and psychological distress and older age increased the burden [20].

The pattern is confirmed by adult data from Haiti. When asked about physical activity among 957 residents of Port-au-Prince aged between 18 and 30 years, 46.9% reported low physical activity (less than 150 minutes per week), and 25.6% reported consumption of more than one alcoholic drink per day. Tobacco use was relatively low, with 3.7% current smokers, and 6.3% reporting ever having used tobacco. 17% (16.5%) were overweight and 6.8% were obese. Just 16.7% of the sample had no cardiovascular risk factors and 48.7% had two or more. To put this into perspective, the behavioural results in this report occurred in the context of almost 80% of participants living on the poverty line or less on the equivalent of one United States dollar per day.

Jamaican data are consistent with school-based data. 83% of 276 adolescents (14 to 19 years old) randomly selected from 10 high schools had three or more risk factors for type 2 diabetes and cardiovascular disease. Female adolescent was significantly more sedentary than male and had significantly more risk factors, highlighting a female adolescent gender trend found throughout the literature that suggests that a one-size-fits-all approach to interventions should NOT be done by sending messages of the same content [21].

Salt deserves a special mention because reducing salt consumption is the most cost-effective intervention in the population for high blood pressure. The Barbados National Salt Study, which included a knowledge, attitudes and practices questionnaire, revealed that Barbadians were aware of the link between a high salt intake and hypertension and most preferred food that was not heavily salted. The sodium intake was still significantly high, however. This is the most conclusive example of a failure of knowledge to translate into intake in the known area of knowledge and should temper any assumption that increasing knowledge alone will lead to a decrease in intake [22].

Blood pressure outcomes in Caribbean youth

The effects of the above behavioural profile are already evident. The prevalence of prehypertension in national survey data from 2000-2001 in Jamaica was 30% for people aged 15-74 years, with a higher proportion among males (35%) than females (25%). Prehypertension was significantly linked to obesity, overweight, high cholesterol and high waist circumference in those aged 15-44 years but not in those aged 45-74 years [3]. Men with prehypertension were nearly three times as likely as normotensive men to have three or more cardiovascular risk factors and prehypertensive women were twice as likely as normotensive women to have three or more cardiovascular risk factors. Subsequently, 898 Jamaican young adults aged 18 to 20 were analysed for associations with raised blood pressure, which was observed to be positively associated with obesity, raised glucose, raised triglycerides and insulin resistance, with significant differences by gender, in particular, lower socioeconomic status being a positive association for young women [23].

Neighbourhood context also is relevant. Three observational datasets in the Jamaican context were merged to evaluate the association between area-level socioeconomic factors and BP in pooled samples of youth (ages 15-24 years); this approach enabled a consideration of individual risk in the context of the social setting in which dietary and activity decisions occur [24].

The Haitian data show the highest prevalence of raised blood pressure recorded directly in a youth sample. Of the 957 young adults described above, 23.5% (12.1% with elevated blood pressure, 7.9% with stage 1 hypertension and 3.5% with stage 2 hypertension) had raised blood pressure. There was a significant gender gap (33.6% boys to 14.0% girls). Participants who were overweight were two times more likely to have elevated blood pressure, and participants 25-30 years of age were more likely than those 18-24 years of age. A previous study of a young slum population in Port au Prince had

already found there was a high burden of noncommunicable disease in this age group, and this cohort was created due to its preliminary findings of hypertension occurring approximately 20 years early in Haitians compared with similarly aged Black Americans [5,25,26].

Determinants of awareness and of preventive behaviour

Gender was the most regular. In all studies reporting the comparison, young men had higher rates of elevated blood pressure, and in those that measured blood pressure awareness, were less likely to be aware of their hypertension. Obesity, dyslipidaemia and physical inactivity, on the other hand, were more prevalent in young women. This means that the two genders are coming to cardiovascular risk in different ways, with direct relevance to the design of preventive messaging.
Educational qualification worked as predicted and at an early age. The second Jamaica Health and Lifestyle Survey showed that there were educational differences in the prevalence of cardiovascular risk factors, with hypertension, hypercholesterolaemia and obesity more commonly reported in less educated women, particularly when compared to younger women [27]. The education gradient in the Eastern Caribbean cohort showed that lower levels of education were associated with hypertension and lower control rates, and this education gradient was strong for presenting blood pressure in the Jamaican emergency department sample [16,19].

Access to care was a stronger predictor of awareness than any individual characteristic. Having a usual source of care was a strong predictor of awareness in the Eastern Caribbean analysis. This is mainly due to the fact that young people have the least regular clinical relationship, which helps understand the reason for the disadvantage in terms of awareness and indicates the areas in which the remedy could be found.

The behaviours concerned were restricted by material and structural conditions. In the Eastern Caribbean cohort, food security was explored with regard to awareness and control of hypertension, while four of five participants in the young cohort in Haiti were living in extreme poverty. The food environment and activity provision that Caribbean adolescents face when making food choices have been documented through regional policy analysis, with only 29.1% of adolescent students in Barbados reporting at least 60 minutes of physical activity each day of a typical school week, in the Global School-based Student Health Survey, 2011 [29].

DISCUSSION

Principal findings

The aim of this Review was to determine what knowledge young Caribbean people have of hypertension risk and what they are doing to prevent it. As for the first question, the direct evidence base is essentially absent. Sixteen studies met the inclusion criteria, and none administered a validated hypertension-knowledge instrument to a sample restricted to Caribbean youth; what is reported about awareness in this population is therefore inferred indirectly from studies of broader adult cohorts, not measured directly.

The evidence is less reassuring and clearer on the second question. Ways in which Caribbean adolescents engage in preventive behaviour are rare and unusual. Over 80% are physically inactive, less than 40% of them eat enough fruit and vegetables, nearly half drink 2 or more soft drinks a day and 4 in 5 have 3 or more behavioural risk factors. The physiological effects are already noted in the same ages; that is, approximately 30% of adolescents in Jamaica are pre-hypertensive, and almost one-quarter of young adults in Haiti are pre-hypertensive or hypertensive. The third discovery is not one that was expected: that of the separation of knowledge and behaviour when both have been assessed. The Barbados salt data is the most clear-cut case and should raise a question to those who design a solely educational intervention.

Comparison with the wider literature

What is happening here is not unique to the Caribbean, however it is striking. Similar studies of adolescents and young adults in sub-Saharan Africa report high rates of prehypertension, which increase significantly with age among young men, and links between prehypertension and obesity and between fruit and vegetable consumption and a protective association [30]. In Ghana, qualitative research indicates that students' comprehension of hypertension is influenced, and sometimes misrepresented, by the vernacular terms used to describe it, and that such research has not been done in other countries where creole is a common health language [31].

What we found has been identified by the regional syntheses that precede this review – from a different perspective. The findings from the systematic review of disparities in cardiovascular disease and the scoping review of hypertension disparities in the Caribbean were similar in that there was limited evidence for each of these groups generated within the Caribbean, as opposed to diaspora communities in the United Kingdom and the United States. That imbalance persists. It is relevant because there are significant differences between the diet and food environment of a Caribbean island and a British city, between the meaning of body size and between the findings that transfer from one to the other [8,9].

Implications for policy and practice

First of all, the findings of this review raise the question of whether cardiovascular risk evaluation in the Caribbean should continue to begin at age 40. The Haitian data suggest that earlier screening, for example from age 18, could capture young

people with hypertension who are not currently part of the health system; however, this is offered here as a proposed implication of the review rather than a formal recommendation, since no included study tested the yield, cost or health outcomes of an earlier screening age against current practice, and existing regional and international guidelines do not specify age 18 as a screening threshold. Any change to screening policy should be evaluated against, and reconciled with, established national and international hypertension guidelines before implementation. What the review does support is that young people are among the least likely to have routine contact with health services, so where screening is undertaken, it should be made accessible in the settings where young people already are: schools, tertiary institutions, workplaces and the community.

Second, interventions should be planned as if ignorance is not the main barrier, but instead is a barrier due to structural constraint. The policies found in the region's literature which were suggested to be effective work on the environment, such as school nutrition standards, bans on selling sugar sweetened beverages in schools, front-of-package labelling and fiscal measures, rather than on individual knowledge. In 2022, Barbados passed a national school nutrition policy and in 2017, sales of sugar-sweetened beverages in schools were banned in Trinidad and Tobago. It is more helpful to assess if these measures alter the course of BP in adolescents than a second dose of health education [29].

Implications for research

The main research suggestion is simple. A culturally appropriate tool for assessing the level of knowledge about hypertension risk factors and personal susceptibility to hypertension, along with blood pressure measurements, should be administered to representative samples of adolescents and young adults in multiple Caribbean countries. It is possible to carry out such a study. The Global School based Student Health Survey infrastructure is already in place in a number of CARICOM states and an additional knowledge module could be added at a relatively low cost. Second, the gaps in geography should be filled. Without eligible primary studies from Guyana, Belize, the Bahamas and the Organisation of Eastern Caribbean States, except in the multi country cohort, there is no regional understanding. Thirdly, Qualitative work is required. However, prevalence data offer no clues as to why young people who are aware of the link between increased blood pressure and the consumption of salt are still consuming salt.

Limitations

Several limitations affect the interpretation of these findings. First, evidence is geographically concentrated: three-quarters of the sixteen included studies drew on data from Jamaica or Haiti, no eligible primary studies were found for Guyana, Belize, The Bahamas, or most of the Organisation of Eastern Caribbean States, and findings from two territories cannot be assumed to generalise across a linguistically and economically diverse region. Second, the included studies are heterogeneous in study population, sampling method, blood pressure definition and outcome construct; as noted throughout the Results, prevalence figures for hypertension, elevated blood pressure, prehypertension and composite behavioural risk scores are not directly comparable, and pooling or informal comparison across these was deliberately avoided. Third, most behavioural and awareness outcomes relied on self-report, which is subject to social desirability bias and may understate substance use and dietary risk in particular. Fourth, the review included grey literature and a conference abstract to maximise regional coverage; these sources were appraised using the AACODS checklist and weighted accordingly in synthesis, but they carry a higher risk of incomplete methodological reporting than peer-reviewed studies. Finally, and most centrally to the review question, direct evidence on hypertension-risk-factor awareness among Caribbean youth specifically is minimal: most of what is reported about awareness in this population was inferred indirectly from age-stratified analyses of broader adult cohorts rather than measured in youth samples, and this indirectness should be borne in mind when applying the conclusions below.

CONCLUSION

In this review, behavioural risk factors were found to be nearly universal among Caribbean adolescents; high blood pressure was found to be already widespread in the third decade of life, and awareness of high blood pressure, if known, was lowest among the age group that during the peak age for prevention would benefit best. Effort needs to be made to reduce hypertension in the next generation of Caribbean adults, starting with screening at an earlier age, messaging to promote gender-specific awareness, and most importantly, environmental shifts that make the healthy choice the easy choice—after all, the healthier choice is the one that is made.

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