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Original Research

Socioeconomic and lifestyle factors influencing non-communicable disease prevalence among rural Jamaican adults: a population-based study

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Abstract

Introduction: Non-communicable diseases (NCDs) represent a major public health challenge in Jamaica, particularly within rural communities where socioeconomic and infrastructural barriers may heighten risk. This study examined the prevalence and determinants of hypertension, diabetes, and obesity among 1185 rural adults aged 15 years and older using secondary data from the Jamaica Health and Lifestyle Survey III (2016–2017).
Methods: Descriptive statistics, bivariate analyses, and multivariate logistic regression were employed.
Results: Hypertension prevalence was 34.5%, obesity 28.9%, and diabetes 12.8%. Older age was the strongest predictor of disease: adults aged 60 years or more had significantly higher odds of hypertension (odds ratio (OR) 4.8; 95% confidence interval (CI): 3.7–6.2) and diabetes (OR 3.5; 95%CI: 2.5–4.9). Obesity and physical inactivity independently increased risk, while secondary or higher education was protective against diabetes. Women were significantly more likely to be obese.
Conclusion: The findings highlight the multifactorial drivers of rural NCD burden and underscore the need for targeted, multisectoral interventions addressing behavioural and social determinants of health.

Keywords

diabetes, hypertension, Jamaica, non-communicable diseases, prevalence.

Introduction

Non-communicable diseases (NCDs) are the leading causes of morbidity and premature mortality in Jamaica, driven by demographic ageing, epidemiological transition, and shifts in dietary and physical activity patterns[1]. Cardiovascular diseases, diabetes, cancers, and chronic respiratory conditions impose substantial pressure on healthcare systems and household economic stability, with similar trends observed across the Caribbean and other small island developing states[2-6]. Although national data indicate high prevalence of hypertension and diabetes, these aggregate estimates obscure important geographic disparities, particularly within rural communities where structural inequities may heighten vulnerability[1,2]. Rural populations often

face constrained access to preventive services, diagnostic capacity, and chronic disease management due to workforce shortages, transportation barriers, and limited infrastructure, contributing to delayed diagnosis and poorer health outcomes[7-9]. Despite these challenges, empirical analyses disaggregating rural NCD patterns using nationally representative data remain limited.

The burden of NCDs in rural Jamaica is best understood through an integrated framework that combines structural, behavioural, and health system perspectives. The Social Determinants of Health framework emphasises how socioeconomic conditions, education, geographic location, and resource distribution shape exposure to risk factors and access to care[9,10]. At the individual level, the Health Belief Model explains how perceptions of susceptibility, severity, and barriers influence health behaviours such as diet, physical activity, and care-seeking[11,12], while the Andersen Behavioral Model highlights the role of predisposing characteristics, enabling resources, and need in determining healthcare utilisation[13]. These perspectives are further strengthened by life course and ecological approaches, which recognise the cumulative and multi-level nature of health risks across individual, community, and policy environments[14-16]. Together, these frameworks provide a comprehensive lens for examining how structural inequities translate into behavioural risks and differential health outcomes in rural populations.

Existing literature underscores that NCD risk in the Caribbean is shaped by the interaction of socioeconomic constraints, environmental exposures, and health system limitations[1,2,7-9,17-19]. Rural residents are disproportionately affected by barriers to healthcare access, including limited diagnostic infrastructure and fragmented continuity of care, often resulting in reliance on episodic rather than preventive services[8,9]. Behavioural risk factors – such as high consumption of processed foods, physical inactivity, and limited access to safe recreational spaces – further exacerbate cardiometabolic risk[1,2]. While community-based screening and mobile health interventions show promise in improving early detection and behavioural modification, their implementation remains uneven and insufficiently evaluated for long-term sustainability in rural settings[20,21]. Consequently, a critical gap persists in population-based, multivariable analyses of rural NCD determinants in Jamaica, limiting the development of targeted, evidence-based interventions to reduce geographic health disparities.

Methods

Study design and data source

This study employed a cross-sectional design using secondary data from the Jamaica Health and Lifestyle Survey III (JHLS III), conducted in 2016–2017. The JHLS III is a nationally representative survey that utilised a stratified, multi-stage cluster sampling design to collect comprehensive data on health, lifestyle behaviours, and biomarkers among Jamaicans aged 15 years and older [1]. Rural areas were oversampled to ensure adequate representation. For the present analysis, rural residency was defined according to the classification of rural enumeration districts as designated by the Statistical Institute of Jamaica. Only participants aged 15 years and older with complete data on key variables were included. The final analytic sample comprised 2807 participants; approximately 42.2% of the total respondents were rural residents. Cases with missing or implausible values were excluded to maintain data quality and analytical validity[1].

Sampling frame

The sampling frame was derived from the national master sampling frame maintained by the Statistical Institute of Jamaica, based on the most recent population and housing census, and implemented using a stratified, multi-stage cluster sampling design. Parishes were defined as primary strata, and enumeration districts (EDs) served as primary sampling units selected using probability proportional to size, with urban–rural allocation reflecting the national distribution of EDs within each parish. All private households within selected EDs were eligible for inclusion, and resident Jamaicans aged 15 years and older constituted the target population; institutionalised individuals (eg those in hospitals, correctional facilities, or military barracks) were excluded.

A total of 3420 dwellings were initially targeted for participation in the survey. Of these, 224 were found to be empty, resulting in 3246 dwellings being contacted. Among the contacted dwellings, 357 households refused to participate, while 2889 completed questionnaires were obtained, yielding a response rate of 89% and a refusal rate slightly above the anticipated 10% non-response. However, age data were irretrievable for 82 respondents due to damaged questionnaire forms, reducing the final analytic sample to 2807 participants included in the survey-weighted analysis. Despite these exclusions, the achieved sample size was considered adequate to estimate national- and parish-level prevalence of hypertension and diabetes with a 10% margin of error and at least 80% statistical power, while accounting for the complex cluster sampling design and anticipated non-response.

Measures and variables

Data were collected by trained field teams using structured questionnaires to obtain sociodemographic characteristics, medical history, and behavioural risk factors. Standardised biological measurements included blood pressure, height, weight, and fasting blood glucose. Hypertension was defined according to criteria of the *Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* (systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg) or self-reported physician diagnosis. Diabetes was defined as fasting blood glucose ≥7.0 mmol/L or self-reported diagnosis[1]. Obesity was defined as BMI≥30 kg/m^2. The Ministry of Health & Wellness, Jamaica et al defines physical activity as the 'prevalence of high physical activity, as determined using the International Physical Activity Questionnaire …' (p. xii)[1]. All measurements followed international protocols to ensure comparability and measurement reliability. Key covariates included age, sex, education, income, physical activity, and BMI.

Statistical analysis

Descriptive statistics were used to summarise demographic and health-related characteristics. Bivariate analyses employed χ^2 tests for categorical variables and *t*-tests for continuous variables to examine associations between NCD outcomes and sociodemographic factors. Multivariate logistic regression models were constructed to identify independent predictors of hypertension and diabetes while adjusting for relevant covariates[7].

Statistical significance was set at $p<0.05$. Analyses were conducted using Stata v16 (StataCorp; https://www.stata.com [https://www.stata.com]).

Ethics approval

Ethics approval for the JHLS III was granted by the University of the West Indies Ethics Committee and the Ministry of Health & Wellness, Jamaica[1]. The study adhered to ethical principles outlined in the Declaration of Helsinki, ensuring participant anonymity and confidentiality. This secondary analysis involved no access to identifiable information and complied with established data protection protocols[8].

Results

The study analysed data from 1185 rural Jamaican adults aged 15 years and older. Sociodemographic characteristics are shown in Table 1. The mean participant age was 44.7 years (standard deviation 15.3), with 22.2% aged 60 years or more, highlighting an ageing rural population vulnerable to chronic illnesses. Women represented 56.2% of the sample. Educationally, 62.5% had attained at least secondary school level, while 48.3% reported incomes less than the national median. These demographic factors frame the broader social determinants influencing NCD prevalence and health service utilisation in rural Jamaica[1].

Prevalence of key NCDs in rural Jamaican adults is shown in Table 2. Hypertension prevalence stood at 34.5%, indicating a substantial burden of cardiovascular risk within rural populations. Obesity affected 28.9%, disproportionately impacting females (32.4%) more than males (24.5%). Diabetes prevalence was 12.8%, consistent with previous Jamaican national estimates. The differences in obesity prevalence between sexes was statistically significant ($p<0.001$). In contrast, differences in hypertension and diabetes by sex ($p=0.58$ and $p=0.43$, respectively), were not, suggesting gender-specific risk factors for obesity but more uniform rates of hypertension and diabetes across sexes[2,8].

Results of bivariate analysis for selected variables in relation to NCDs are shown in Table 3. Age was strongly correlated with NCD prevalence. The prevalence of hypertension among participants aged 60 and older was 61.2%, nearly five times higher than the 12.5% prevalence observed in the 15–29 age group ($p<0.05$). Diabetes also increased with age, from 3.7% in the youngest cohort to 27.8% in those aged 60 years or more ($p<0.05$). This suggests that physiological ageing combined with cumulative exposure to risk factors drives NCD prevalence in older adults. Lower educational attainment was significantly associated with a higher prevalence of diabetes (15.4% vs 9.8%, $p<0.05$), highlighting socioeconomic gradients in disease risk[9].

Physical inactivity was another important behavioural factor. Among participants reporting insufficient physical activity, 35.7% were obese compared to 21.4% among those meeting physical activity guidelines ($p<0.0.5$). Furthermore, inactivity increased the odds of hypertension and diabetes in logistic regression models. These findings suggest that lifestyle is a key modifiable risk factor in rural communities with limited recreational infrastructure and safety concerns that may hinder exercise[15].

Multivariate logistic regression models identified older age, obesity, physical inactivity, and lower education as significant independent predictors of hypertension and diabetes (Table 4). For example, those aged 60 years or more had nearly five times the odds of hypertension (odds ratio (OR) 4.8; 95% confidence interval (CI): 3.7–6.2) and over three times the odds of diabetes (OR 3.5; 95%CI: 2.5–4.9) compared to younger adults (15–29 years). Obesity doubled the odds of both hypertension (OR 2.3; 95%CI: 1.8–2.9) and diabetes (OR 2.0; 95%CI: 1.4–2.8). Physical inactivity increased the odds by 70% for hypertension and 50% for diabetes, underscoring its pivotal role in NCD pathogenesis[7].

Female sex was a strong predictor of obesity (OR 1.6; 95%CI: 1.3–2.0), though it was not independently associated with hypertension or diabetes. Educational attainment was significantly associated with a lower diabetes risk (OR 0.6 for secondary or higher education compared to less than secondary education), suggesting that health literacy and socioeconomic position contribute substantially to disease risk profiles[9].

Table 1: Demographic characteristics of rural Jamaican adults (*N*=1185)

Characteristic		%/mean±SD
Age (years)		44.7±15.3
Age group (years)	15–29	22.4
	30–44	28.7
	45–59	26.7
	≥60	22.2
Sex	Male	43.8
	Female	56.2
Education	Less than secondary	37.5
	Secondary or higher	62.5
Income	Less than median	48.3
	Greater than median	51.7

SD, standard deviation.

Table 2: Prevalence of key non-communicable diseases among rural Jamaican adults

Condition	Overall prevalence (%)	Male (%)	Female (%)	*p*-value
Hypertension	34.5	33.8	35.1	0.58
Diabetes	12.8	13.5	12.2	0.43
Obesity	28.9	24.5	32.4	<0.001***

*$p<0.05$, **$p<0.01$, ***$p<0.001$

Table 3: Bivariate associations between selected variables and non-communicable diseases

Variable		Hypertension (%)	Diabetes (%)	Obesity (%)	*p*-value (hypertension)	*p*-value (diabetes)	*p*-value (obesity)
Age (years)	≥60	61.2	27.8	38.6	<0.05*	<0.05*	<0.05*
	15–29	12.5	3.7	18.4			
Education	Less than secondary	37.8	15.3	30.2	0.12	0.02*	0.31
	Secondary or higher	32.7	9.8	28.1			
Physical activity level	Physically inactive	42.3	15.4	35.7	<0.001***	0.01*	<0.001***
	Physically active	29.7	10.2	21.4			

*p<0.05, **p<0.01, ***p<0.001

Table 4: Logistic regression predictors of hypertension and diabetes

Predictor	Hypertension OR (95%CI)	Diabetes OR (95%CI)
Age ≥60 years	4.8 (3.7–6.2)	3.5 (2.5–4.9)
Female sex	1.1 (0.9–1.4)	1.0 (0.8–1.3)
Physical inactivity	1.7 (1.2–2.4)	1.5 (1.1–2.1)
Obesity (BMI ≥30 kg/m^2)	2.3 (1.8–2.9)	2.0 (1.4–2.8)
Secondary or higher education	0.8 (0.6–1.1)	0.6 (0.5–0.8)

CI, confidence interval. OR, odds ratio.

Discussion

This study demonstrates a substantial burden of NCDs among rural Jamaicans, with hypertension, obesity, and diabetes affecting significant proportions of adults. The observed prevalence aligns with national and regional estimates, reinforcing that rural populations experience persistent chronic disease challenges shaped by structural and behavioural determinants[1,2]. The high prevalence of hypertension highlights the urgent need to strengthen cardiovascular prevention, early detection, and management within rural primary healthcare systems, where limited infrastructure and resource constraints may hinder effective disease control. However, these findings should be interpreted with caution, given the cross-sectional design, which limits causal inference between identified risk factors and disease outcomes. Additionally, while the nationally representative dataset strengthens external validity, potential selection bias arising from non-response and the exclusion of institutionalised populations may affect generalisability.

Age emerged as the most significant predictor of hypertension and diabetes, consistent with global evidence on cumulative exposure to risk factors and physiological ageing[7]. The elevated burden among older adults underscores the need for expanded geriatric-focused chronic disease services in rural Jamaica. Gender disparities were most evident in obesity prevalence, with women disproportionately affected, likely reflecting sociocultural influences on diet and physical activity patterns[1,9]. Educational attainment demonstrated a protective effect, particularly against diabetes, highlighting the importance of health literacy and socioeconomic positioning in shaping disease risk[9]. Nevertheless, the analysis was constrained by the variables available in the secondary dataset, limiting the inclusion of potentially relevant determinants such as detailed dietary patterns, healthcare utilisation, and environmental exposures. Furthermore, some measures relied on self-reported data, which may introduce reporting bias and affect the precision of estimated associations.

Physical inactivity and obesity were significant modifiable predictors of hypertension and diabetes, underscoring the central role of lifestyle factors in NCD development. Yet, behavioural risks must be interpreted within the context of rural environmental constraints, including limited recreational infrastructure, restricted access to affordable healthy foods, and broader socioeconomic challenges. These findings reinforce the need for multisectoral collaboration across health, agriculture, transport, and planning sectors to create enabling environments for healthier behaviours. Although income was not independently significant in multivariate models, its association with education and observed descriptive disparities suggests underlying economic influences on health outcomes. While the study provides important population-based insights into rural NCD burden in Jamaica, the inability to establish temporality and the absence of certain contextual variables highlight the need for longitudinal and mixed-methods research to better capture causal pathways and lived experiences. Strengthening rural health systems, improving service accessibility, and addressing structural inequities remain essential to reducing chronic disease disparities.

Conclusion

NCDs remain highly prevalent among rural Jamaican adults, driven by ageing, obesity, physical inactivity, and lower educational attainment. These findings highlight the interplay between behavioural risks and structural inequities in shaping rural health outcomes. Reducing this burden requires strengthening rural primary health care through expanded screening, improved access to diagnostics and essential medications, and increased workforce capacity. Targeted, community-based interventions promoting physical activity and healthy diets are critical, particularly for older adults and women. Broader multisectoral action is also needed to address upstream determinants, including access to nutritious foods, health education, and supportive built environments. Enhancing surveillance systems and prioritising equity-focused, evidence-based policies will be essential to reducing rural–urban disparities and advancing universal health coverage[22] in Jamaica.

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Conflicts of interest

The authors declare no conflicts of interest.

AI disclosure statement

ChatGPT was used to help narrow the research gap during the conceptualisation stage of this study.

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