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Socioeconomic factors associated with medication non-use among people with hypertension and diabetes in Jamaica.

By

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Master of Public Health

Applied Epidemiology

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Applied Epidemiology
2024

Abstract

Socioeconomic factors associated with medication non-use among people with hypertension and diabetes in Jamaica.

By Janique Mishael Ricketts

Background: Stroke, ischemic heart disease, and diabetes mellitus are among the top 5 causes of death for Jamaican adults. However, data on the social determinants of these conditions are sparse. For this study we examined possible social determinants of health associated with medication non-use among Jamaican adults with hypertension and/or diabetes.

Methods: Data were from the Jamaica Survey of Living Conditions 2018. This national household survey included data on social determinants of health (SDoH) including education, age, social security program enrollment, income sources, self-rated health status, and self-reported health conditions. All descriptive analyses were performed across the five (SDoH) domains: social, economic, environmental, educational, and health. Multivariable logistic regression was used to estimate the weighted unadjusted and adjusted odds ratios and 95% confidence intervals (95% CI) to evaluate the association between the SDoH and medication non-use among adults with diabetes, hypertension, or both conditions.

Results: The mean age of the total sample of 2135 respondents was 60.9±14.7 years. The prevalence of diabetes in the study population was 36.2% (782) while hypertension was 87.1% (1843).

Across the five SDoH domains, age-group 25-34 (aOR=4.41, 95% CI: 1.18–16.53), NHF enrollment (aOR=0.55, 95% CI: 0.36–0.84), employment as a farmer (aOR=0.42, 95% CI: 0.22–0.77), rented or leased home (aOR=0.53, 95% CI: 0.34-0.83), residing in a rural area (aOR=2.42, 95% CI: 1.38–4.25) or other urban areas (aOR=2.72, 95% CI: 1.49-4.50), presence of diabetes (aOR=0.24, 95% CI: 0.24-0.75), and health perception less than good (aOR=0.61, 95% CI: 0.40-0.93) were associated with medication non-use among those with hypertension.

Among those with diabetes, age-group 25-34 (aOR=80.67, 95% CI: 6.30–981.51) and 35-44 (aOR=14.90, 95% CI: 1.27–174.66), male sex (aOR=1.23, 95% CI: 0.84-1.82), JADEP enrollment (aOR=2.27, 95% CI = 1.08–4.79), residing in rural areas (aOR=3.03, 95% CI: 1.06–8.72) or other urban areas (aOR=3.59, 95% CI: 1.24–10.43), and disability status (aOR=3.2 95%CI: 1.43–7.12) were associated with medication non-use.

Conclusion: Significant association of medication non-use were seen across all SDoH domains except educational attainment for adult persons with diabetes and hypertension in Jamaica.

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Acknowledgement

I wish to express my heartfelt appreciation and gratitude to my thesis chair Dr. Jeb Jones and thesis advisor Mrs. Denese McFarlane. You both believed in me, agreed to serve in this capacity and guided me with patience and grace. To the four men in my life, Daniel Ricketts, Andrew Ricketts, Nathaniel Greene, and Micah Greene, thank you for allowing me the time to focus when things were rough, being patient with me through times of stress and supporting me to the end. To Shanna and Gearie Smith and family, your hospitality and generosity knows no end and I am grateful for all you did to support my journey. To the faculty and staff of the EMPH program, my classmates, and friends, thanks.

CHAPTER 1

INTRODUCTION AND RATIONALE

Jamaica is an upper middle-income country. It is the third largest island in the Caribbean, the largest English-speaking Island in the Caribbean, and has an estimated total population of 2.8 million persons (*US Census Bureau*, 2018). Persons who are 20-64 years old account for approximately 61% of the population, and persons 65 years and older account for 9.3% (*US Census Bureau*, 2018; PIOJ, 2019). As the population continues to see improvements in life expectancy from 74 years in 2000 to 76 years in 2019 (see figure 1), the burden on the health care system will likely increase.

Jamaica has been implementing social protection systems since the 1886 Poor Relief Act which has supported the development of many programs to include cash transfer, food security assistance, fee waivers for health services, and health insurance. In May 2007, the Government of Jamaica (GOJ) removed user fees for access to public health facilities for persons aged 18 and below and on April 1, 2008, abolished user fees for all persons. Jamaica has a well-developed network of public health centers and hospitals to improve access to health care with over 341 health facilities across the fourteen parishes (PIOJ, 2019; Vision-2030, 2009). Jamaica also has a national pharmaceutical supply benefit for all persons with chronic diseases to be able to receive subsidy or free refills for over 800 commonly prescribed vital essential and necessary medications. Despite this and the accompanying increase in utilization of health care services, there continues to be a rise in disability and deaths caused by diabetes, cardiovascular disease and renal disease (Vision-2030, 2009).

In 2018, 5% of the adult population reportedly had diabetes and 13% had hypertension (PIOJ, 2021). In 2019, stroke, ischemic heart disease, and diabetes mellitus were among the top 5

causes for death in Jamaican males with rates of 76.0, 61.3, and 56.9 deaths per 100,000 population, respectively (IHME, 2019). Stroke, ischemic heart disease, and diabetes mellitus are also the top 3 cause of deaths for females with rates of 82.6, 49.3, and 78.0 per 100,000 population, respectively (IHME, 2019). The economic impact of non-communicable diseases (NCDs) on the public health system in Jamaica is significant.

Thesis Problem: The burden of NCDs in Jamaica, including diabetes and hypertension, is increasing (Razzaghi et al., 2019). Although the country has a no user fee policy for health care services and pharmaceuticals for all residents, chronic diseases still seem to be the major contributor of morbidity and mortality in Jamaica with diabetes being the leading cause of disability life years in 2019 according to The World Health Organization (WHO) (Figure 2). This thesis will examine the factors impacting medication non-use among patients with self-reported diabetes and hypertension.

Thesis Purpose: To evaluate the social determinants of health which contribute to medication non-use among adults over age 25 with self-reported hypertension and /or diabetes in Jamaica. This analysis will utilize data from the 2018 Jamaica Survey of Living Conditions. This is a national household survey of self-reported health status and socioeconomic conditions.

Approach: In 2009, Boume et al utilized the 2008 Jamaica Survey of Living conditions to determine that age, area of residence, and inability to work were associated with higher levels of chronic diseases (Boume & McGrowder, 2009). Studies have demonstrated that there is higher use of health care services for women compared to men and that health care utilization is associated with self-rated health status, physical distress, having a primary care provider, educational attainment, and age (Dunlop et al., 2000; Fylkesnes & Forde, 1992). There however, has not been any corresponding analysis of this type on the Jamaican population. This study will review the 2018 Jamaica Survey of Living Conditions as the primary data source to conduct a secondary data analysis to investigate medication non-use among adults in Jamaica who self-

report diagnosis of diabetes and hypertension and the associated socioeconomic factors among the sample. This household survey interviewed 4,547 households and 13,109 individuals of which 69.3% were between 15-64 years with 23.9% reporting at least one non-communicable disease (PIOJ, 2021). The data source will be used to conduct secondary analysis including logistic regression to determine the key factors associated with medication non-use.

The independent variables to be considered across the SDoH domains from the database include age, sex, geographic region (rural vs urban), and marital status. Socioeconomic variables such as educational level, employment status and enrollment in national social support benefits. Health care variables will be from the individual's perception of their own health, the self-report of NCDs, and disability status. Multivariable logistic regression models will be used to estimate the association between NCDs, self-reported health status, and medication non-use. The threshold for statistical significance will be set to $P<0.05$.

CHAPTER 2

Review of the Literature

Impact of Type 2 Diabetes and Hypertension on Public Health

According to the WHO 2023 report, non-communicable diseases (NCDs) remain the leading cause of morbidity and mortality worldwide. Epidemiologic transitions are occurring globally, with longer life expectancies and a growing mature population. United Nations in their 2012 Population Facts on Population Aging and Non Communicable Diseases highlighted that as populations age, NCDs cause a growing proportion of all deaths and that future population growth and population ageing will drive large increases in the burden of mortality due to NCDs (DESA, 2012). This is resulting in new dynamic burdens on individuals, communities, and health care systems. Hypertension and Type 2 diabetes mellitus (diabetes) are two major modifiable metabolic risk factors for cardiovascular diseases and stroke. They contribute to an increase in risk of heart disease and stroke and are among the leading causes of morbidity and mortality worldwide. diabetes is identified through laboratory findings of either an elevated fasting plasma glucose above 7.0 mmol/L or a glycosylated hemoglobin over 6.5% (American Diabetes, 2020). The diagnosis is often made by a clinician either through screening or on presentation of symptoms in an individual. Hypertension, as defined by the International Society of Hypertension criteria used for diagnosis in Jamaica, is a high blood pressure above normal with systolic measurements above 140 mmHg and/or diastolic measurements over 90 mmHg (MOHW, 2020; Unger et al., 2020). Hypertension is often asymptomatic and diagnosed primarily through screening. According to the Institute for Health Metrics and Evaluation, metabolic disease was the second leading cause of mortality worldwide with almost 20% of all deaths associated with high blood pressure and 11% associated with high fasting plasma glucose as a marker for diabetes (IHME, 2019). This situation shifted drastically when looking at the

Caribbean region where metabolic diseases were the leading cause of mortality in 2019. 19% of all deaths were associated with high blood pressure and 15% of all deaths in the region were associated with a high fasting plasma glucose (IHME, 2019).

In Jamaica, high fasting plasma glucose is the leading cause of deaths accounting for 25% of all deaths while high blood pressure is second, associated with 19% of all deaths in 2019 (IHME, 2019). The burden of NCD's in the Jamaican population by age group ranges from 7.5% in the 0-4 years age group to 68.4% in those over 65 (PIOJ, 2019). Hypertension also disproportionately affects people living in rural areas and the poorest quintile (PIOJ, 2019) leading to health disparities due to geographic locations as is seen in other areas (Vaughan et al., 2017) (Samanic et al., 2020). In 2019, 18% of all primary care health visits in Jamaica were associated with a diagnosis of hypertension and 2.3% were associated with diabetes (PIOJ, 2019) .

Role of Social Determinants of Health on Cardiovascular outcomes

Jamaica is the third largest island in the Caribbean and the largest English-speaking Island with a population estimate of 2,823,713 people (*US Census Bureau*, 2018). Approximately 65.7% are between 15-64 years (1,856,180) with 15% of this population (436,180 people) over the age of 60 years (*US Census Bureau*, 2018). In 2009, the government of Jamaica established the national vision statement of "Jamaica, the place of choice to live, work, raise families and do business" (Vision-2030, 2009). This statement is structured around improving many of the social determinants of health (SDoH) which are defined as forces, systems, and conditions that shape the environments in which people are born, live, learn, grow, work, play, and age that affect a wide range of health function and quality of life outcomes and risks (Chunara et al., 2024; *Healthy People 2030*; HHS-OASH; WHO, 2024). As Jamaica seeks to attain its vision 2030, it is imperative to understand the impact that SDoH play on the leading cause of morbidity and mortality, cardiovascular disease.

The SDoH is divided into five key domains: economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context (HHS-OASH). SDoH adversely affect cardiovascular health through the stress-mediated response (Madu et al., 2021). This occurs as adverse SDoH lead to increased stress and anxiety which result in an increased activity and stimulation of the hypothalamic pituitary axis and the sympathetic nervous system leading to a chronic inflammatory state, atherosclerosis, and, therefore, adverse cardiovascular events (Madu et al., 2021; Powell-Wiley et al., 2022). The impact SDoH has on chronic psychosocial and environmental stressors has also been used by Powell-Wiley et al., in the development of the SDoH and the biology of adversity framework (Powell-Wiley et al., 2022).

The five key domains of the SDoH have been found to adversely affect clinical outcomes among patients with diabetes (Awad et al., 2022). There are indications of a higher risk of mortality associated with inequities along the SDoH domains (Chang et al., 2024) and which also have adverse effects on patients living with diabetes (Cooper et al., 2024). Researchers have looked at the impact of race, insurance coverage, socioeconomic status, educational attainment, and social support status which indicate the importance of addressing the SDoH to improve diabetes control via medication adherence and to reduce mortality and morbidity associated with diabetes (Canedo et al., 2018; Silva-Tinoco et al., 2020; Walker et al., 2014, 2015) .

SDoH have also been reviewed for their effect on hypertensive patients and overall cardiovascular outcomes. Higher educational attainment has been shown to be associated with lower prevalence of cardiovascular risk factors among younger women and diabetes risk factors among Jamaican men (Ferguson et al., 2017). Health insurance coverage has also been shown to impact hypertension and cardiovascular health (Ogungbe et al., 2022) as have educational status and household income (Samanic et al., 2020).

Access to health care is a key domain of the SDoH. Universal health coverage (UHC) is one of the targets of the SDG 3 and aims for all individuals and communities to receive health services they need without suffering financial hardship (DESA, 2015; WHO, 2023). Jamaica's UHC coverage has increased to 75% in 2021 (WHO, 2023) up from 65% in 2017 (Ramsay et al., 2021). Jamaica has supported progress to UHC since April 1, 2008, through the abolition of user fees at public facilities and pharmacies. Despite this many persons still procure additional health insurance coverage from their place of employment or other private source. Jamaican's can also enroll in supplemental government health insurance plans to support private-public partnerships in accessing medications and services outside of the public health system at reduced costs. Insurance coverage has been shown to improve health outcomes (Samanic et al., 2020).

There remains a lack of information regarding how SDoH affect the persons living with hypertension and diabetes in Jamaica. Up until 2021 no study in Jamaica has looked at the SDoH of specific diseases in Jamaica. In 2021, Craig et al identified that advancing age and recent healthcare visits were significant predictors of multimorbidity and that private insurance coverage and higher educational attainment were associated with lower relative risk of metabolic disease (Craig et al., 2021). Issues such as race may not be a prominent feature in health outcomes in Jamaica due to the predominantly homogenous racial structure within the country. Other SDoH including education, urban vs rural residence, insurance status, and social support services may still impact health outcomes for Jamaicans. This thesis will look at the factors impacting medication non-use, as a health outcome indicator, among patients with self-reported diabetes and hypertension and will evaluate the socioeconomic factors which contribute to medication non-use among adults over 24 years old with self-reported hypertension and/or diabetes in Jamaica utilizing the data from the 2018 Jamaica National Survey of Living Conditions.

CHAPTER 3

Methodology.3

The Survey Method.

This secondary analysis was conducted using data from the Jamaica Survey of Living Conditions (JSLC) conducted in 2018. The JSLC is a joint national household survey on the living conditions of the Jamaican population. It is conducted by the Planning Institute of Jamaica (PIOJ) and the Statistical Institute of Jamaica (STATIN) and is a modification of the World Bank's Living Standards Measurement Study (Boume & McGrowder, 2009; Bourne, 2010). The 2018 Jamaica Survey of Living conditions dataset was provided through agreement from the Derek Gordon Databank, University of the West Indies.

The JSLC used a stratified random probability sampling technique with multiple stratifications and clustering to ensure that it represents the population, marital status, area of residence and social class of the Jamaican population. The total sample consisted of 13,109 individuals from 4,547 households and is weighted to reflect the population. Weighting is calculated as a composite of the design or base weights, non-response adjustment, and post stratification adjustments. The weight is adjusted to account for changes in the dwelling count of the selected primary sampling units (PSU). The sample as well as the population were divided into substrata for individuals based on parish, age, and sex. Therefore, the individual weights are applied to individuals in each parish by age and sex (PIOJ, 2021).

A face-to-face interview was used to conduct the JSLC. Representatives from STATIN visited each selected household and recorded the responses. Computer assisted personal interviewing (CAPI) supported the recording of responses on tablet computers in a data system called Electronic Data Collection System (eDaCS) (PIOJ, 2021). The questionnaire included areas of

sociodemographic data such as education, age, social security, self-rated health status, and self-reported health conditions. Survey teams were sent to each geographical area based on the sample size of that community led by STATIN (Bourne, 2010).

Data Analysis

This analysis describes the SDoH that are associated with medication non-use among persons aged 25 and older who self-report a diagnosis of diabetes and/or hypertension. Participants were categorized as having a diagnosis of diabetes, hypertension, or both conditions based on their response to whether they have ever been told by a healthcare worker that they had the relevant condition.

Descriptive statistics were used to analyze the socio-demographic characteristics and variables of this sample. Age was categorized in 10-year age bands between 25-84 with all persons aged 85 and older being placed in the final age category. The social determinants investigated were across all five domains including educational, economic, social, health and environmental. Categorical variables in all 5 social determinant domains were selected for consideration as outlined in Figure 4. Health perception was dichotomized to at least good if responses were 'good' and 'very good' and less than good if responses were 'fair', 'poor', or 'very poor'. Smoking was dichotomized to those who currently used either tobacco cigarettes or marijuana or those who did not currently use tobacco cigarettes or marijuana.

Univariable weighted logistic regression analysis was used to examine the relationship between the dependent variable (Medication Non-Use) and the independent categorical variables across all the five social determinant domains. The unadjusted (crude) odds ratios (OR) were estimated for each variable across all five social determinant of health domains.

The final model was determined from the variables whose univariable analyses had one or more levels demonstrating significance at $P < .05$.

The weighted adjusted odds ratios were calculated by logistic regression analysis on the final model.

All data were analyzed with SAS version 9.4 (SAS Institute Cary, NC).

IRB Approval

This study received an IRB Non-Human Subjects Research Determination.

CHAPTER 4

Results

A total of 13,109 individuals from 4,547 households completed the 2018 Jamaica Survey of Living Conditions; of these 2,174 had reported a diagnosis of hypertension and/or diabetes. The final sample size, after excluding persons under the age of 25, was 2,135 respondents; 1,351 (63.3%) reported they had hypertension only, 291 (13.6%) reported they had diabetes only, and 493 (23.1%) reported they had both hypertension and diabetes. 1,888 (88.5%) respondents used medication to treat their condition while 244 (11.4%) reported having never used medication to treat their condition.

Demographic characteristics of respondents stratified by medication use categorizations are presented in Table 1. Overall, the mean age for the sample was 60.9±14.7 years. with medication use having a slightly higher mean age range (61.9 ± 14.2 years) compared to no medication use (53.8 ± 16.0 years). Most of the sample were females (69.1%), 44.8% were never married, 75.0% were homeowners, and lived in rural areas (47.2%).

For the Social and community context (social domain), 63.2% of the sample had ever received PATHE benefits, 27% were receiving a pension, 58.6% were registered under that government provided national insurance scheme (NIS), 52.5% were enrolled in the national health fund (NHF), and 15.6% were enrolled in the Jamaica Drugs for the Elderly Program (JADEP). Across the variables in the economic stability domain, for the population quintiles 14.7% were in the poorest quintile and 28.0% in the wealthiest quintile. Food security was reported for 89.5% of the sample, 45.7% were gainfully employed within the past 30 days, 39.2% were employed by other persons, 21.7% were self-employed, 9.3% were farmers, 16,3% received a pension, and 13.5% and other income sources. Additional sources of economic support was received from local family members for 83.6%, 10.4% received support from family members overseas, 2.4%

from neighbors and friends, 1.3% from government, and 2.3% received no additional support. For the Neighborhood and built environment (environmental) domain, 75.0% owned their own home, 10.0% rented or leased, and 15.0% lived rent free. 63.5% had access to internet, 26.6% lived in the greater Kingston and metropolitan area, 26.2% lived in other urban areas, and 47.2% lived in rural areas. For the Education access and quality (education domain), 17.2% had received up to a primary education, 35.9% received a grade 9 education, 29.1% received high school education, and 17.8% received post-secondary education. In the health care access and quality (health) domain, 52.6% reported they had a health perception that was at least good, 5.5% currently smoked marijuana or tobacco cigarettes and 10.3% had a disability. Health insurance coverage had 16.5% having private insurance, 2.7% were enrolled in the government national insurance gold plan, 1.9% had other health insurance and 78.9% of respondents did not have any form of health insurance.

Demographic characteristic variables associated with medication use vs non-use among those with diagnosed hypertension are seen in Table 2. Of the 1843 participants who had a diagnosis of hypertension, 1622 (88.9%) used medication while 221 (11.1%) had never used medication. The mean medication use was (62.3 ± 14.3 years) compared to no medication use (53.6 ± 15.7 years). 69.8% of the sample were females, 45.5% were never married, 75.2% were homeowners, and 47.6% lived in rural areas.

Demographic characteristic variables associated with medication use vs non-use among those with diabetes are seen in Table 2. Of the 781 participants who reported a diagnosis of diabetes, 707 (91.3%) had used medication compared to 74 (8.7%) who had never used medication. The mean age range for medication use among persons with diabetes was (64.2 ± 13.4 years) compared to no medication use (58.4 ± 16.2 years). Most of the sample were females (69.8%), were never married (39.8%), were homeowners (77.4%), and lived in rural areas (45.1%). As we increased in the age groups, the proportion of persons who did not use medication reduced from

36% of persons 25-34 to 3% of persons over 85. A greater proportion of persons who were never married did not use medication 13% in comparison to the 4% of those divorced who never used medication.

Demographics:

Table 3 and 4 demonstrate the crude and adjusted odds ratio for the demographic variables for participants according to reported disease diagnosis.

The crude odds of medication non-use among participants diagnosed with either hypertension, diabetes, or the full sample, decreased with age compared to persons over the age of 85 and this is significant for all age groups until the age groups over 65 years old. The adjusted odds were significant for only persons aged 34 or less in the full sample (aOR = 6.23, 95% CI: 1.68 – 23.06) and in the presence of hypertension (aOR = 4.41, 95% CI: 1.18 – 16.53). For persons with a diagnosis of diabetes there was significance with wide confidence intervals for age 25-34 (aOR = 80.67, 95% CI: 6.30 – 981.51) and 35-44 (aOR = 14.90, 95% CI: 1.27 – 174.66).

The crude odds of medication non-use among males were higher than that of females for all persons in the sample (OR = 1.31, 95% CI: 0.94 - 1.82) as well as persons with either hypertension (OR = 1.29, 95% CI: 0.91 - 1.84) and this increased odd was not significant. For participants with diabetes, the higher crude odds for males compared to females was statistically significant (OR = 2.18, 95% CI: 1.20 - 3.69). A similar association remained when the odds were adjusted for other significant variables in the model. The adjusted odds of medication non-use among males was higher than that of females for all persons in the sample (aOR = 1.23, 95% CI: 0.84 - 1.82) as well as persons with a diagnosis of hypertension (aOR = 1.17, 95% CI: 0.77 – 1.77). For people with a diagnosis of diabetes this adjusted odds was statistically significant (aOR = 2.18, 95% CI: 1.08 – 4.38).

For the total sample, compared to persons who are widowed, married people (OR = 2.50, 95% CI: 1.19 - 5.26) and never married people (OR = 3.52, 95% CI: 1.71 - 7.24) have statistically significant higher crude odds of medication non-use regardless of health diagnosis. Among those with a diagnosis of hypertension, married (OR = 2.54, 95% CI: 1.18 - 5.47) and never married (OR = 3.54, 95% CI: 1.68 - 7.43) people had increased crude odds of medication non-use. Among those with a diagnosis of diabetes, only those who had never been married (OR = 5.01, 95% CI: 1.75 - 14.31) had increased crude odds of medication non-use compared to persons who were widowed. For all populations, persons who were divorced and separated also had higher crude odds of medication non-use compared to those who were widowed, but this increase is not statistically significant. These associations were no longer statistically significant in adjusted models.

Social Domain:

Table 5 shows the crude odds ratios for the social domain variables for participants according to reported disease diagnosis. The crude odds of medication non-use overall in the social domain were reduced for persons receiving pension (OR = 0.48, 95% CI: 0.31 - 0.71) and being enrolled in NHF (OR = 0.39, 95%CI: 0.28 - 0.55). These reductions in crude odds for medication non-use were also observed for persons with a hypertension diagnosis, receiving pension (OR = 0.43, 95% CI: 0.27 - 0.67) and being enrolled in NHF (OR = 0.41, 95%CI: 0.29 - 0.60). The crude odds of medication non-use were reduced for persons who had ever received PATHE benefit or enrolled with JADEP, but this was not statistically significant. Reductions in the crude odds of medication non-use were also noted for persons with a diagnosis of diabetes, but these were not statistically significant.

Table 6 shows the adjusted odds ratios for the social domain variables for participants according to reported disease diagnosis. The adjusted odds of medication non-use for the overall sample in the social domain were reduced for persons receiving a pension (aOR =0.59, 95% CI: 0.37 –

0.79) and enrolled in NHF (aOR = 0.54, 95% CI: 0.37 - 0.79). Enrollment in NHF was associated with reduced adjusted odds of medication non-use among persons with hypertension (aOR = 0.55, 95% CI: 0.36 – 0.84). Medication non-use had increased adjusted odds among those with a diagnosis of diabetes if they were enrolled on JADEP compared to persons not enrolled on JADEP (aOR = 2.27, 95% CI = 1.08 – 4.79). All other variables in the social domain were not statistically significant.

Economic Domain:

Table 7 shows the crude odds ratios for variables in the economic domain by disease status. The odds of medication non-use were increased for all persons in the sample who had demonstrated recent employment compared with persons who had no recent employment (OR = 1.59, 95% CI: 1.14 - 2.20). An increased odds for medication non-use was also observed for persons with hypertension (OR = 1.65, 95% CI: 1.16 - 2.35) as well as with diabetes (OR = 2.11, 95% CI: 1.16 - 3.84) for persons who had recent employment compared to persons who had no recent employment. The odds of medication non-use among the total sample and persons with hypertension were also reduced for farmers compared to persons who were otherwise employed as their main source of income ((OR = 0.55, 95% CI: 0.31 - 0.97), (OR = 0.52, 95% CI: 0.28 - 0.94) respectively). The odds of medication non-use were reduced for the full sample (OR = 0.27, 95% CI: 0.09 - 0.78) for persons who received support from overseas compared to persons who did not receive support. The odds of medication non-use for persons with a diagnosis of hypertension was reduced for persons when they received support from local family members (OR = 0.31, 95% CI: 0.10 - 0.90). There were no significant odds for persons with a diagnosis of diabetes based on source of income.

Table 8 shows the adjusted odds ratios for economic stability domain variables. Being a farmer as the main source of income compared to being otherwise employed, had a reduced adjusted odds for the total sample and for persons with hypertension (aOR = 0.43, 95% CI: 0.24 - 0.77),

(aOR = 0.42, 95% CI: 0.22 – 0.77) respectively). Receiving additional support from either overseas (aOR =0.30, 95% CI: 0.10 – 0.92) or from friends and neighbors (aOR = 0.19, 95% CI: 0.04 - 0.87) had a significant reduction in adjusted odds for medication non-use compared to not receiving support for the whole sample only.

Environmental Domain:

Table 9 shows the crude odds ratios for variables in the environmental domain by disease status. The data for the full sample revealed that renting or living rent free increased the odds of medication non-use compared with owning one's home (OR = 3.05, 95% CI: 1.91 - 4.86; OR = 2.17, 95% CI: 1.45 - 3.26, respectively). Increased crude odds of medication non-use among persons living rent free compared to those who owned their own residence was also observed among persons with diabetes (OR = 3.22, 95% CI: 1.59 - 6.53). Among those with hypertension, however, the crude odds of medication non-use were lower for persons who lived rent free compared to those who owned their home (OR = 0.53, 95% CI: 0.34 - 0.83).

The crude odds for geographical residence location was noted across all disease statuses to have an increased odds of medication non-use for persons who lived in either rural (OR = 2.01, 95% CI: 1.19 - 3.38) or other urban areas (OR= 2.63, 95% CI: 1.52 - 4.57) compared to persons who lived in the greater Kingston metropolitan area.

Table 10 shows the adjusted odds for the environmental domain variables. The above associations remained statistically significant in the adjusted model. The data for the full sample revealed that living rent free had a reduced adjusted odds of medication non-use compared with owning one's home (aOR = 0.53, 95% CI: 0.34 – 0.83). There is an increased adjusted odds of medication non-use among persons renting compared to those who owned their own residence for persons with a diagnosis of hypertension (aOR = 2.65, 95% CI: 1.54 – 4.45). There was an increased adjusted odds for persons living rent free compared to persons who owned their own home with a diagnosis of diabetes (aOR = 2.46, 95%CI: 1.13 – 5.37). Among those with

hypertension, the adjusted odds of medication non-use were increased for persons who rented or leased their home compared to those who owned their home (aOR = 0.53, 95% CI: 0.34 - 0.83).

The adjusted odds for geographical residence location was noted across all disease statuses to have an increased odds of medication non-use for persons who lived in either rural (aOR = 2.56, 95% CI: 1.48 – 4.45) or other urban areas (aOR= 2.81, 95% CI: 1.58 – 5.01) compared to persons who lived in the greater Kingston metropolitan area and similar increased adjusted odds for medication non-use for persons with a diagnosis of hypertension who lived in either rural (aOR = 2.42, 95% CI: 1.38 – 4.25) or other urban areas (aOR= 2.72, 95% CI: 1.49 - 4.50) compared to persons who lived in the greater Kingston metropolitan area and for persons with a diagnosis of diabetes who lived in either rural (aOR = 3.03, 95% CI: 1.06 – 8.72) or other urban areas (aOR= 3.59, 95% CI: 1.24 – 10.43) compared to persons who lived in the greater Kingston metropolitan area.

Educational Domain:

Table 11 shows that there was no statistical significance for the crude odds ratio for association with educational attainment and medication non-use when compared with attaining primary level education.

Health Domain:

Table 12 shows the crude odds for variables in the health domain by diseases status. Persons who had hypertension and also had a diagnosis of diabetes had reduced crude odds of medication non-use (OR = 0.44, 95% CI: 0.30 - 0.65). Those with a health perception that was less than good had reduced crude odds of medication non-use for both the full sample and those with hypertension (OR = 0.54, 95% CI: 0.38 - 0.76), (OR = 0.49, 95% CI: 0.34 - 0.70), respectively). Use of marijuana or tobacco cigarettes is associated with increased crude odds of

medication non-use both for the whole sample and those with hypertension (OR = 2.11, 95% CI: 1.27 - 3.52; OR =1.91, 95% CI: 1.10 - 3.31, respectively). Persons who had a diagnosis of diabetes had increased crude odds in medication non-use if they had the presence of a disability (OR = 2.31, 95% CI: 1.03 – 5.19).

Table 13 shows the adjusted odds variables in the health domain by disease status. Persons who had hypertension and also had a diagnosis of diabetes had a reduced adjusted odds of medication non-use (aOR = 0.24, 95% CI: 0.24 - 0.75). Participants with a diagnosis of hypertension had a reduced adjusted odds of medication non-use if they reported a health perception that was less than good (aOR = 0.61, 95% CI: 0.40 - 0.93). Participants with a diagnosis of diabetes had an increased adjusted odds of medication non-use if they had a disability compared to those who did not report a disability (aOR = 3.2 95%CI: 1.43 – 7.12).

CHAPTER 5

Discussion

Demographics

This analysis examined the association between of the variables in the SDoH domains and medication non-use among people with hypertension and diabetes in Jamaica. Significant associations of medication non-use overall were found in all domains except education. The demographic variables that demonstrated significant difference, at $p < 0.2$, between medication use and non-use included sex at birth, age group, and marital status. The variables from the health domain which demonstrated significant difference were diabetes diagnosis, smoking marijuana or tobacco cigarettes and health perception. The variables from the social domain which demonstrated significant difference were receiving a pension, enrollment in National Health Fund (NHF), and enrollment in Jamaica Drugs for the Elderly Program (JADEP). The variables from the economic domain which demonstrated significant difference were food security, recent employment status, source of income, and additional economic support. The variables from the environmental domain which demonstrated significant difference were home ownership, and geographical area. The variables in the education attainment domain were not statistically significant.

Variables that had a statistically significant association with medication non-use for hypertension across all domains included diabetes diagnosis, sex at birth, age group, marital status, enrollment in National Health Fund (NHF), enrollment in Jamaica Drugs for the Elderly Program (JADEP), food security, receiving a pension, recent employment status, source of income, additional economic support, smoking marijuana or tobacco cigarettes, health perception, home ownership, and geographical area.

For persons diagnosed with diabetes the variables that were significant when comparing medication use to non-use across all domains were age group, sex, marital status, recent employment, housing stability, access to technology, residential location, health perception, smoking status and disability status. Of note are the two additional variables included for patients with diagnosis of diabetes that access to technology and disability status were significantly associated with medication non-use vs use which is not the same for patients with hypertension. Persons with a diagnosis of diabetes had no variables in the social domain significantly associated with medication non-use. Food security and economic support, whether from employment or other sources, were not significantly associated with medication non-use for persons with diabetes.

Comparing the variables which were significantly associated with medication non-use among the full sample, persons with hypertension and persons with diabetes, we acknowledge the significant difference in sample size for the diagnosis specific analysis. The lower statistical power for diabetes with only 784 respondents compared to the power for hypertension with 1,366 respondents may in part explain some of the differences in significant variables such as disability and access to internet being significant in only the diabetes sub population. 94% of persons with diabetes used medication compared to only 89% of persons with hypertension. This difference is likely due to the “silent” nature of hypertensive disease compared to diabetes which more often presents with symptoms and complications early in the disease course.

Social Domain:

Health insurance has been shown to have increased health care access and services (Canedo et al., 2018; Ogungbe et al., 2022). When we look at the social domain, we see that while only 27% of the sample received a pension, only 6% of those who did receive a pension did not use medication.

However, situations such as health insurance did not show much difference on medication non use whether the person had private insurance (8% did not use) or no insurance (10%).

Enrollment in the national health fund and receiving a pension were associated with reduced odds of medication non-use. These government support systems rely on visiting a health care for enrollment and ongoing provider visits to receive the life certificate required annually to continue with pension payments. This combination results in significantly reducing the out-of-pocket expenses of most medications through the NHF. While the JADEP is still in place most people are automatically enrolled in this program without their knowledge and this may lead to biases in the analysis of this variable.

Economic Domain:

Persons who had greater economic stability had reduced odds of medication non-use. Persons who reported to have been recently employed and higher crude odds of medication non use possibly due to competing priorities. Farmers however reported a reduced crude odds of medication non use and this was significant for persons whose main source of income was farming compared to being employed by someone else remained significant when adjusted for other variables for persons with hypertension. Receiving economic support from any source with significance for persons who received from family overseas of friends this may be as a result of persons being able to afford health care outside of the burden and prolonged wait time associated with the public health facilities.

Environmental Domain:

The significant odds associated with medication non-use included housing stability and residence location across all disease status and access to technology for persons with diabetes. Living in poorer neighborhoods have been shown to be associated with poorer clinical outcomes (Awad et al., 2022) and housing insecurity can negatively impact disease control (Wan et al.,

2022) as was seen in this study. Other studies however have indicated that this domain did not have significant impact on health outcomes (Craig et al., 2021).

Educational Domain:

Previous studies demonstrated an positive associates on health care outcomes with increased education (Meisters et al., 2024; Walker et al., 2014) on education on health utilization and medication adherence. In this analysis however, the increased odds of medication non-use with increased educational attainment were not statistically significant and had wide confidence intervals. This finding is similar to other studies on the Jamaican population regarding health outcomes (Boume & McGrowder, 2009; Bourne, 2010) and African immigrants(Ogungbe et al., 2022) . In 2017, Feguson et.al further disaggregated the impact of education on health outcome and found that significance was found among persons with diabetes and hypertension for men and younger age groups (Ferguson et al., 2017).

Health Domain:

A lower health perception significantly associated with reduced odds of medication non-use. This may be attributed to a person's realization of the need for medication to be used to treat conditions or improved health seeking behavior due to the lower perception of health. Smoking, however, resulted in increased odds of medication non-use and further exploration may look at health perception and smoking status. The presence of a disability had an increased odds for persons with diabetes for medication non-use and this increase was significant. This is unexpected as persons with a disability may be more likely to also have a lower perception of their health and have increased health seeking behavior. Further studies may be warranted to explore this association of disability and increased odds for medication non-use further.

Conclusion

This secondary analysis demonstrated the complex impact of four of the five social determinants of health domains on medication non-use among adult Jamaicans with diabetes and hypertension. All domains had variables which were significantly associated with medication nonuse except the educational attainment. Reduced adjusted odds of medication non use were found for persons receiving a pension benefit, being enrolled in the national health fund being a farmer, receiving economic support from family overseas or friends and neighbors, or having a health perception of less than good. Increased adjusted odds of medication non use was found for younger persons, males, having worked in the past week, living outside the greater Kingston metropolitan area. or not owning your own home. Being enrolled in JADEP or having a disability if also having diabetes also increased the adjusted odds of medication nonuse.

Recommendations

The social ecological model developed by McLeroy and Bideau (McLeroy et al., 1988) is designed to comprehensively address issues in prevention planning and implementation for successful and sustained effectiveness. It is grounded on the four core principles across the understanding that behaviors have multiple levels of influence. This ecological model built, on the behavioral model, expands the levels of influence to be addressed in health promotional planning to include individual, interpersonal, organizational, community, and policy. The SEM relies on the understanding that the core principles, multiple levels of factors influence health behaviors, influences interact across levels, multi-level interventions should be most effective in changing behavior, and ecological models are most powerful when they are behavior-specific. Figure 3 depicts the key recommendations to address the public health gaps identified in this study outlined.

Recommendations along the social ecological framework will take the understanding that health is affected by the interaction between the individual and their environment. The individual level factors include the characteristics of the individual, their knowledge, attitudes, behavior, and self-concept and includes the developmental history of the individual (McLeroy et al., 1988). The recommendation of targeting health promotion activities for youths and males which can start within the educational system may support addressing public health on the individual level. Additional recommendation at the individual level will include addressing health literacy and capacity of persons once diagnosed before diseases become symptomatic. Health perception is another area that is associated with medication non-use. This area can be improved through public health education including raising awareness of the consequences of hypertension as a silent disease.(Powell-Wiley et al., 2022).

The interpersonal includes the formal and informal social network and social support systems that play a role in a person's health and health outcomes. On the interpersonal level we want to increase awareness of health care providers of the increased odds among youths and males for medication nonuse and to demonstrate the benefits of early NHF enrollment for all persons eligible.

Institutional or organizational factors which impact public health outcomes include the organizational characteristics, their rules and regulations for operations. Addressing organizational barriers to reduce the odds for medication nonuse we recommend avenues for increasing enrollment in NHF through pharmacies and to increase medication access to persons with chronic disease. This may be done either through multi-month medication dispensing or through home delivery of medication for some of the more vulnerable persons, especially persons with diabetes who are also living with a disability. In addition, with more than 60% of the population having access to the internet, looking at ways to incorporate telehealth services for populations at higher odds of medication non use to support improved uptake.

Relationships among organizations, institutions and informal networks may be defined within certain defined boundaries (McLeroy et al., 1988). On the community level the recommendation is to determine more male centered models of care and support of increase in health insurance and pension schemes while increasing methods by which persons may receive economic support from friends and families.

Finally on the policy level, which will look at national laws and policies, authorization for NHF enrollment authorization should be extended to registered pharmacists to improve the number of persons enrolled in this program and to improve access to health care for persons who live outside of the greater Kingston metropolitan area.

Limitations and Strengths:

The cross-sectional design of this national survey facilitated the determination of associations but not causation between medication non-use and social determinants of health.

The analysis for model selection was done using an unweighted logistic regression stepwise analysis with entry of 0.2 and exit of 0.25. For survey methods however, it has been reported that a more optimal method of model selection would be to use multilevel analysis and comparing both the weighted and unweighted results prior to sharing the model through a second order penalized quasi-likelihood linearization method (Salazar & San Sebastian, 2014) which was outside the scope of this program. Another option explored was to use proc glimmix which would allow for multilevel models for complex sample survey data (West et al., 2015) however the methodology for data preparation were also outside the scope of this program.

FIGURES

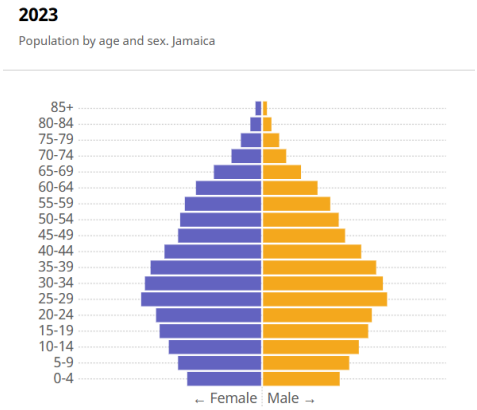

Figure 1: 2023 Population Pyramid for Jamaica, (Organization, 2024)

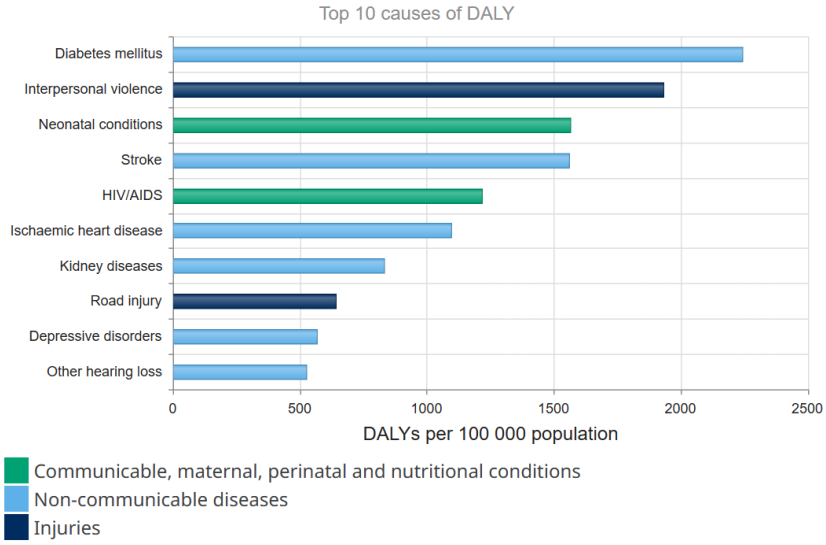

Figure 2: Top 10 Causes of Disability Adjusted Life Years for Jamaica 2019, (World Health Organization 2024)

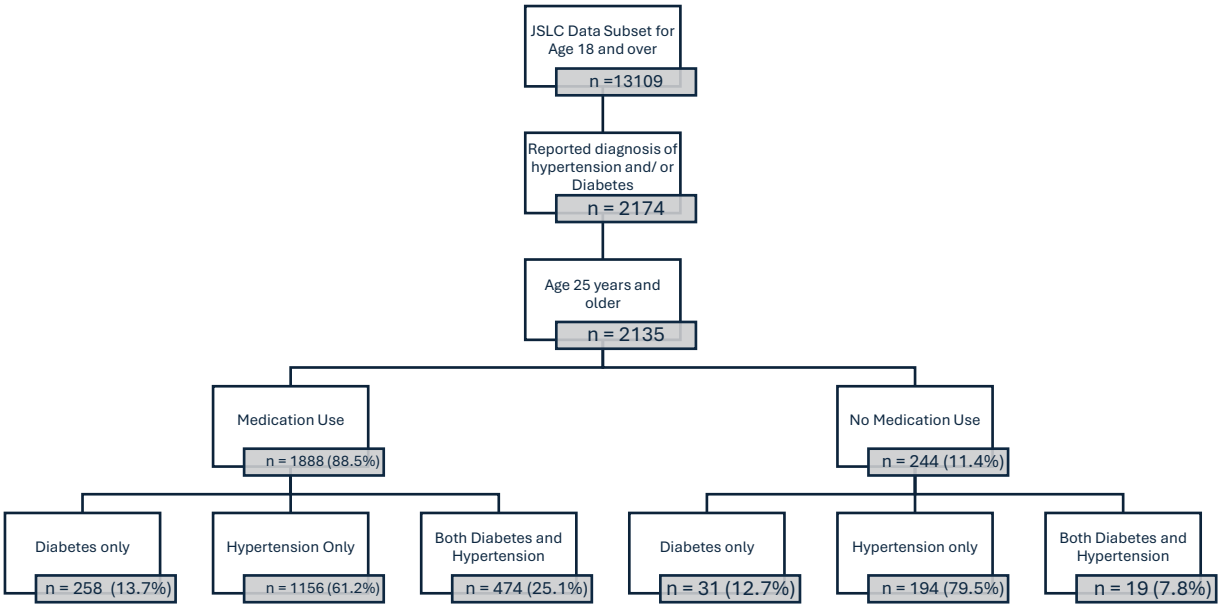

Figure 3: Sample Inclusion Criteria

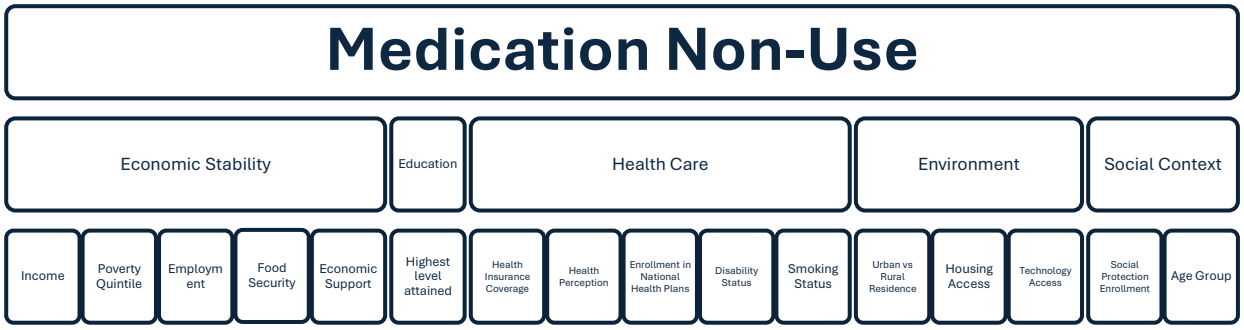

Figure 4: Social Determinants Domains and Variables Included in Analysis

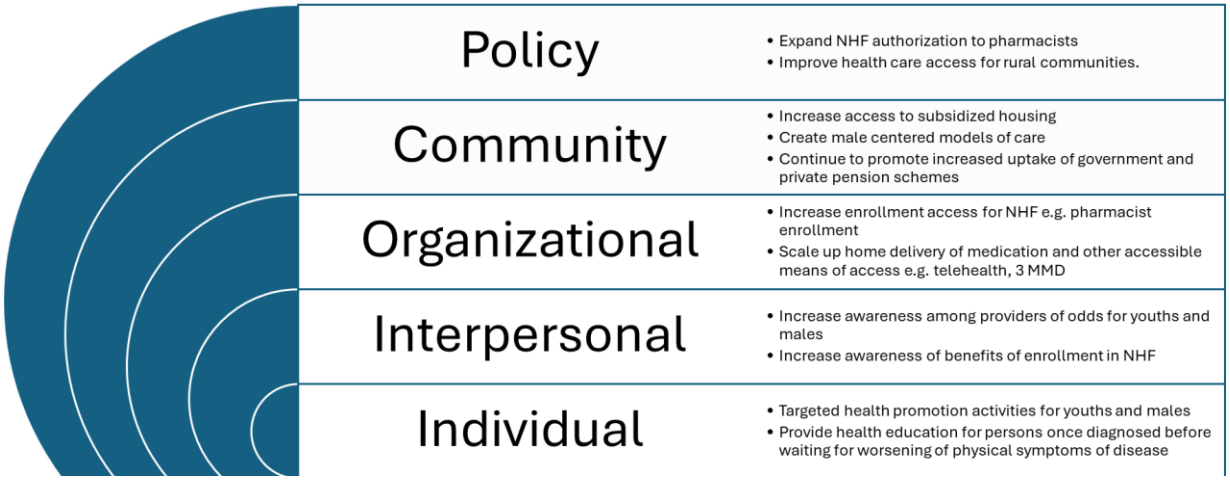

Figure 5: Socioecological Model for Recommendations

TABLES

Table 1: Demographic Characteristics of the Sample

Variables	Total Sample	Medication Use	No Medication Use	p - value
Sample Size (n, %)	2132	1888 (88.6%)	244 (11.4%)	
Age (mean ± SD)	60.9±14.7	61.9 ± 14.2	53.8 ± 16.0	
Health Status				
Diabetes	782 (36.2%)	732 (94.0%)	50 (6.0%)	<0.0001
Hypertension	1843 (87.1%)	1630 (89.5%)	213 (10.5%)	0.50
Age Group				
25-34 Years	94 (4.1%)	55 (63.9%)	39 (36.1%)	<0.0001
35-44 Years	182 (8.0%)	149 (84.3%)	33 (15.7%)	
45-54 Years	440 (20.1%)	389 (88.5%)	51 (11.5%)	
55 – 64 Years	551 (25.8%)	493 (90.4%)	58 (9.6%)	
65-74 Years	467 (21.4%)	431 (92.4%)	36 (7.6%)	
75-84 Years	284 (14.1%)	263 (92.9%)	21 (7.1%)	
85 and over	114 (6.5%)	108 (96.6%)	6 (3.4%)	
Sex				
Male	660 (30.9%)	566 (87.8%)	94 (12.2%)	0.11
Female	1472 (69.1%)	1322 (90.4%)	150 (9.6%)	
Marital Status				
Married	767 (35.7%)	689 (90.1%)	78 (9.9%)	0.0004
Never Married	967 (44.8%)	824 (86.7%)	143 (13.3%)	
Divorced	63 (3.3%)	59 (95.6%)	4 (4.4%)	
Separated	41 (1.6%)	37 (92.9%)	4 (7.9%)	
Widowed	294 (14.4%)	279 (95.8%)	15 (4.2%)	
Social Domain				
Ever Received PATHE Benefit	657 (63.2%)	587 (89.2%)	70 (10.8%)	0.78
Received Pension	531 (26.8%)	488 (94.0%)	43 (6.0%)	0.0002
Registered with NIS	1224 (58.6%)	1079 (89.5%)	145 (10.5%)	0.89
Enrolled in National Health Fund	1092 (52.5%)	1015 (93.6%)	77 (6.4%)	<0.0001
Enrolled in Jamaica Drugs for the Elderly	301 (15.6%)	285 (93.5%)	16 (6.5%)	0.08
Economic Stability Domain				
Per Capita Quintile				
Poorest	333 (14.7%)	294 (90.4%)	39 (9.6%)	0.56
Quint 2	370 (16.7%)	331 (87.9%)	39 (12.1%)	
Quint 3	437 (19.0%)	393 (90.9%)	44 (9.1%)	
Quint 4	451 (21.6%)	394 (88.0%)	57 (12.0%)	
Wealthiest	541 (28.0%)	476 (90.6%)	65 (9.4%)	
Food Security	1897 (89.5%)	1682 (90.0%)	215 (10.0%)	0.11
Recent Employment	992 (45.7%)	848 (87.3%)	144 (12.7%)	0.006
Main Source of Income		1881 (89.6%)	244 (10.4%)	
Employed by Another person	805 (39.2%)	696 (87.8%)	109 (12.2%)	0.13
Self Employed	457 (21.7%)	396 (88.5%)	61 (11.5%)	
Farmer	237 (9.3%)	217 (92.9%)	20 (7.1%)	
Pension	361 (16.3%)	331 (91.1%)	30 (8.9%)	
Other Source	265 (13.5%)	241 (92.4%)	24 (7.6%)	
Additional Source of Economic Support				
Family Members Local	1742 (83.6%)	1531 (89.2%)	211(10.8%)	0.06
Family Members Overseas	243 (10.4%)	228 (93.7%)	15 (6.3%)	

Neighbors and Friends	50 (2.4%)	46 (93.3%)	4 (6.7%)	
Government	39 (1.3%)	35 (91.7%)	4 (8.3%)	
No Support	51 (2.3%)	41 (80.0%)	10 (20.0%)	
Variables	**Total Sample**	**Medication Use**	**No Medication Use**	**p - value**
Environment Domain				
Housing Stability (n=2119)				
Owned	1552 (75.0%)	1407 (92.0%)	145 (8.0%)	<0.0001
Rent or Lease	201 (10.0%)	157 (79.2%)	44 (20.8%)	
Rent Free	366 (15.0%)	311 (84.2%)	55 (15.8%)	
Technology Access	1290 (63.5%)	1141 (90.3%)	149 (9.7%)	0.24
Residence Location				
Greater Kingston and Metropolitan Area	416 (26.6%)	388 (94.2%)	28 (5.8%)	0.001
Other Urban Area	632 (26.2%)	543 (86.1%)	89 (13.9%)	
Rural Area	1084 (47.2%)	957 (89.0%)	127 (11.0%)	
Education Domain				
Primary	346 (17.2%)	316 (92.4%)	30 (7.6%)	0.33
Grade 9	823 (35.9%)	738 (89.4%)	85 (10.6%)	
High School	619 (29.1%)	531 (88.1%)	88 (11.9%)	
Post Secondary	327 (17.8%)	287 (89.4%)	40 (10.6%)	
Health Domain				
Health Perception				
At Least Good	1092 (52.6%)	927 (87.0%)	165 (13.0%)	0.0004
Less than Good	1025 (47.4%)	948 (92.6%)	77 (7.4%)	
Current Smoke				
Marijuana or Cigarettes	127 (5.5%)	99 (81.3%)	28 (18.7%)	0.0035
Does not Smoke	2004 (94.5%)	1789 (90.2%)	215 (9.8%)	
Disability	209 (10.3%)	193 (90.3%)	16 (9.7%)	0.81
Health Insurance Coverage				
Private	324 (16.5%)	290 (91.7%)	34 (8.3%)	0.57
National Insurance Gold	54 (2.7%)	46 (85.6%)	8 (14.4%)	
Other	40 (1.9%)	38 (91.6%)	2 (8.4%)	
None	1714 (78.9)	1514 (89.3%)	200 (10.7%)	

Table 2: Sample Demographics of Persons with Diagnosis of Hypertension or Diabetes

	Hypertension				**Diabetes**			
	Total Sample	**Medication Use**	**No Medication Use**	**p - value**	**Total Sample**	**Medication Use**	**No Medication Use**	**p - value**
Sample Size (n, %)	1843	1622 (88.9%)	221 (11.1%)		781	707 (91.3%)	74 (8.7%)	
Variables								
Age (mean ± SD)		62.3 ± 14.3	53.6 ± 15.7			64.2 ± 13.4	58.4 ± 16.2	
Health Status								
Diabetes	493 (26.8%)	466 (93.8%)	27 (6.2%)	0.002	492 (64.4%)	449 (91.6%)	43 (8.4%)	0.74
Age Group								
25-34 Years	81 (4.3%)	49 (66.9%)	32 (33.1%)	<0.0001	19 (1.8%)	10 (54.8%)	9 (45.2%)	<0.0001
35-44 Years	150 (7.7%)	118 (82.2%)	32 (17.8%)		46 (4.9%)	38 (83.3%)	8 (16.7%)	
45-54 Years	381 (20.2%)	330 (87.1%)	51 (12.9%)		122 (14.3%)	115 (95.1%)	7 (4.9%)	
55 – 64 Years	462 (25.0%)	411 (89.2%)	51 (10.8%)		223 (28.8%)	200 (89.2%)	23 (10.8%)	
65-74 Years	417 (22.1%)	385 (92.2%)	32 (7.8%)		196 (23.7%)	184 (94.5%)	12 (5.5%)	
75-84 Years	247 (14.2%)	230 (93.0%)	17 (7.0%)		126 (17.9%)	113 (90.2%)	13 (9.8%)	
85 and over	105 (6.6%)	99 (96.1%)	6 (3.9%)		49 (8.6%)	47 (98.4%)	2 (1.6%)	
Sex								
Male	559 (30.2%)	474 (87.1%)	85 (12.9%)	0.15	240 (30.2%)	203 (86.9%)	37 (13.1%)	0.01
Female	1284 (69.8%)	1148 (89.7%)	136 10.3%)		541 (69.8%)	504 (93.2%)	37 (6.8%)	
Marital Status								
Married	640 (34.7%)	569 (83.3%)	71 (10.7%)	0.0004	300 (36.4%)	278 (91.9%)	22 (8.1%)	0.07
Never Married	846 (45.5%)	719 (86.0%)	127 (14.0%)		310 (39.8%)	266 (87.9%)	44 (12.1%)	
Divorced	54 (3.3%)	48 (93.5%)	6 (6.5%)		29 (3.8%)	28 (95.6%)	1 (4.4%)	
Separated	31 (1.2%)	28 (93.9%)	3 (6.1%)		18 (2.4%)	17 (92.1%)	1 (7.9%)	
Widowed	272 (15.3%)	258 (95.5%)	14 (4.5%)		124 (17.7%)	118 (97.0%)	6 (3.0%)	
Social Domain								
Ever Received PATHE Benefit	579 (63.2%)	515 (88.6%)	64 (11.4%)	0.998	227 (63.5%)	210 (93.2%)	17 (6.8%)	0.29
Received Pension	451 (26.1%)	415 (94.0%)	36 (6.0%)	0.0002	235 (33.4%)	215 (93.2%)	20 (6.8%)	0.25
Registered with NIS	1055 (58.8%)	926 (88.8%)	129 (11.2%)	0.89	432 (55.0%)	389 (91.7%)	43 (8.3%)	0.74
Enrolled in National Health Fund	938 (52.2%)	867 (92.9%)	71 (7.1%)	<0.0001	487 (65.3%)	449 (92.3%)	38 (7.7%)	0.23
Enrolled in Jamaica Drugs for the Elderly	261 (15.6%)	247 (92.8%)	14 (7.2%)	0.11	156 (23.1%)	143 (89.1%)	13 (10.9%)	0.38

	Hypertension				Diabetes			
	Total Sample	**Medication Use**	**No Medication Use**	**p - value**	**Total Sample**	**Medication Use**	**No Medication Use**	**p - value**
Economic Stability Domain								
Per Capita Quintile								
Poorest	301 (15.2%)	263 (89.6%)	38 (10.4%)	0.63	107 (13.1%)	100 (94.4%)	7 (5.6%)	0.60
Quint 2	323 (17.2%)	292 (88.4%)	31 (11.6%)		141 (16.3%)	122 (88.2%)	19 (11.8%)	
Quint 3	375 (18.4%)	337 (90.8%)	38 (9.2%)		166 (20.0%)	151 (93.0%)	15 (7.0%)	
Quint 4	388 (21.7%)	335 (86.7%)	53 (13.3%)		173 (22.5%)	160 (91.2%)	13 (8.8%)	
Wealthiest	456 (27.5%)	395 (89.4%)	61 (10.6%)		194 (28.1%)	174 (90.6%)	20 (9.4%)	
Food Security	1631 (89.3%)	1436 (89.3%)	195 (10.7%)	0.16	707 (89.8%)	640 (91.1%)	67 (8.9%)	0.54
Recent Employment	851 (45.6%)	718 (86.3%)	133 (13.7%)	0.006	307 (36.1%)	267 (31.7%)	74 (8.7%)	0.02
Main Source of Income								
Employed by others	676 (37.8%)	579 (86.6%)	97 (13.4%)	0.09	309 (39.7%)	275 (90.9%)	34 (9.1%)	0.67
Self Employed	401 (22.4%)	343 (87.7%)	58 (12.3%)		154 (19.6%)	137 (89.2%)	17 (10.8%)	
Farmer	210 (9.4%)	192 (92.6%)	18 (7.4%)		70 (7.3%)	66 (96.1%)	4 (3.9%)	
Pension	314 (16.6%)	288 (91.0%)	26 (9.0%)		140 (17.4%)	131 (91.3%)	9 (8.7%)	
Other Income Source	235 (13.8%)	213 (91.9%)	22 (8.1%)		108 (16.0%)	98 92.8%)	10 (7.2%)	
Additional Source of Economic Support								
Family Members Local	1492 (82.8%)	1306 (88.6%)	186 (11.4%)	0.15	635 (82.7%)	570 (90.8%)	65 (9.2%)	**
Family Members Overseas	216 (10.8%)	200 (92.8%)	16 (7.2%)		92 (11.0%)	87 (93.3%)	5 (6.7%)	
Neighbors and Friends	46 (2.4%)	41 (90.7%)	5 (9.3%)		18 (2.8%)	18 (100%)	0 (0%)	
Government	36 (1.5%)	32 (91.4%)	4 (8.6%)		16 (1.3%)	15 (95.2%)	1 (4.8%)	
No Support	46 (2.5%)	36 (79.6%)	10 (11.1%)		20 (2.1%)	17 (88.2%)	3 (11.7%)	
Environment Domain								
Housing Stability								
Owned	1341 (75.2%)	1207 (91.3%)	134 (8.7%)	<0.0001	597 (77.4%)	548 (93.0%)	49 (7.0%)	0.001
Rent or Lease	173 (9.7%)	131 (76.4%)	42 (23.5%)		59 (8.3%)	54 (93.1%)	5 (6.9%)	
Rent Free	319 (15.1%)	274 (12.8%)	45 (15.2%)		121 (14.3%)	101 (81.2%)	20 (18.8%)	
Technology Access	1110 (63.3%)	971 (89.2%)	139 (10.8%)	0.66	466 (62.1%)	429 (93.8%)	37 (6.2%)	0.005
Residence Location								
Greater Kingston and Metropolitan Area	361 (26.9%)	334 (93.5%)	27 (6.5%)	0.002	149 (26.0%)	141 (96.4%)	8 (3.6%)	0.03
Other Urban Area	531 (25.4%)	451 (84.7%)	80 (15.3%)		250 (28.8%)	227 (88.5%)	23 (11.5%)	
Rural Area	951 (47.6%)	837 (88.6%)	114 (11.4%)		382 (45.1%)	339 (90.3%)	43 (9.7%)	

	Hypertension				Diabetes			
	Total Sample	**Medication Use**	**No Medication Use**	**p - value**	**Total Sample**	**Medication Use**	**No Medication Use**	**p - value**
Education Domain								
Primary	309 (17.4%)	280 (91.6%)	29 (8.4%)	0.33	150 (22.4%)	140 (93.2%)	10 (6.8%)	0.72
Grade 9	705 (36.0%)	630 (89.2%)	75 (10.8%)		323 (36.7%)	292 (90.1%)	31 (9.9%)	
High School	531 (28.6%)	452 (86.8%)	79 (13.2%)		208 (27.1%)	184 (90.6%)	24 (6.4%)	
Post Secondary	282 (18.1%)	254 (88.8%)	37 (11.2%)		95 (13.8%)	87 (92.9%)	8 (7.1%)	
Health Domain								
Health Perception								
At Least Good	930 (51.6%)	777 (85.5%)	153 (14.5%)	<0.0001	317 (42.4%)	280 (89.1%)	37 (10.9%)	0.08
Less than Good	901 (48.4%)	833 (92.4%)	68 (3.7%)		457 (57.6%)	422 (93.3%)	35 (6.7%)	
Current Smoke								
Marijuana or Cigarettes	112 (5.6%)	88 (81.3%)	24 (16.7%)	0.0035	35 (4.3%)	27 (83.7%)	8 (16.3%)	0.10
Disability	185 (10.6%)	172 (90.5%)	13 (9.4%)	0.60	106 (14.7%)	93 (84.4%)	13 (15.6%)	0.03
Health Insurance Coverage								
Private	288 (17.0%)	257 (91.4%)	31 (8.6%)	0.50	105 (14.5%)	95 (91.8%)	10 (8.2%)	0.98
National Insurance Gold	47 (2.7%)	40 (86.7%)	7 (13.3%)		24 (3.3%)	23 (93.9%)	1 (6.0%)	
Other	34 (1.9%)	33 (94.3%)	1 (5.7%)		19 (2.1%)	18 (90.9%)	1 (9.1%)	
None	1474 (78.4%)	1292 (88.4%)	182 (11.6%)		633 (80.1%)	571 (91.2%)	62 (8.8%)	

Table 3: Crude Odds Ratio For Demographic Variables Medication Non-Use Among Sample Populations

Crude Odds Ratio – Demographic						
	Hypertension &/Or Diabetes (n = 2135)		**Hypertension (n = 1844)**		**Diabetes (n = 784)**	
Characteristic	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**
Age Group						
25-34	15.98	**5.47 - 46.67**	11.97	**3.98 - 36.04**	76.07	**7.44 - 777.6**
35-44	5.25	**1.86 - 14.82**	5.23	**1.83 - 14.93**	19.16	**2.15 - 171.10**
45-54	3.68	**1.35 - 10.04**	3.57	**1.30 - 9.80**	5.12	0.58 - 45.46
55-64	3.01	**1.11 - 8.16**	2.96	**1.08 - 8.16**	11.80	**1.49 - 93.82**
65-74	2.31	0.84 - 6.38	2.03	0.73 - 5.67	5.64	0.67 - 47.32
75-84	2.17	0.74 - 6.38	1.83	0.61 - 5.54	9.37	**1.09 - 80.42**
85+ (=0)						
Sex (Female = 0)	1.31	0.94 - 1.82	1.29	0.91 - 1.84	2.18	**1.20 - 3.69**
Marital Status						
Married	2.50	**1.19 - 5.26**	2.54	**1.18 - 5.47**	2.90	0.95 - 8.89
Never Married	3.52	**1.71 - 7.24**	3.54	**1.68 - 7.43**	5.01	**1.75 - 14.31**
Divorced	1.05	0.30 - 3.71	1.48	0.46 - 4.75	1.63	0.17 - 15.28
Separated	1.95	0.48 - 8.00	1.35	0.32 - 5.64	3.01	0.31 - 29.14
Widowed (=0)						

Table 4: Adjusted Odds Ratios For Demographic Variables For Medication Non-Use Among Persons Sample Population

Adjusted Odds Ratio – Demographic						
	Hypertension &/Or Diabetes (n = 2135)		**Hypertension (n = 1844)**		**Diabetes (n = 784)**	
Characteristic	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**
Age Group						
25-34	6.23	**1.68 – 23.06**	4.41	**1.18 – 16.53**	80.67	**6.30 – 981.51**
35-44	2.54	*0.72 - 8.95*	2.26	0.63 – 8.07	14.90	**1.27 – 174.66**
45-54	2.02	0.60 - 6.82	1.78	0.53 – 6.03	4.13	0.36 – 47.53
55-64	2.28	0.71 – 7.38	2.01	0.62 – 6.47	8.66	0.88 – 85.30
65-74	2.00	0.65 – 6.17	1.68	0.54 – 5.26	4.52	0.47 – 43.20
75-84	2.02	0.64 – 6.43	1.85	0.57 – 5.98	6.39	0.69 – 59.67
85+ (=0)						
Sex (Female = 0)	1.23	0.84 - 1.82	1.17	0.77 – 1.77	2.18	**1.08 – 4.38**
Marital Status						
Married	1.57	0.71 - 3.50	0.68	0.72 – 3.93	1.62	0.42 – 6.31
Never Married	1.51	0.68 - 3.35	1.62	0.70 – 3.79	2.42	0.65 – 9.12
Divorced	0.60	0.16 - 2.27	0.89	0.25 – 3.13	0.56	0.05 – 6.09
Separated	1.08	0.24 - 4.78	0.72	0.15 – 3.48	1.76	0.18 – 17.50
Widowed (=0)						

Boldface values indicate statistical significance ($p < 0.05$)
** indicates sample insufficient for analysis

Table 5: Crude Odds Ratio For Social Domain Variables For Medication Non-Use Among Sample Populations

Crude Odds Ratio – Social Domain						
	Hypertension &/Or Diabetes (n = 2135)		Hypertension (n = 1844)		Diabetes (n = 784)	
Characteristic	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval
Ever Received PATHE Benefit	0.92	0.57 - 1.49	1.01	0.60 - 1.70	0.69	0.29 - 1.69
Received Pension	0.48	0.31 - 0.71	0.43	0.27 - 0.67	0.60	0.30 - 1.18
Registered with NIS	1.02	0.74 - 1.42	1.01	0.72 - 1.44	0.93	0.51 - 1.70
Enrolled in National Health Fund	0.39	0.28 - 0.55	0.41	0.29 - 0.60	0.68	0.38 - 1.21
Enrolled in Jamaica Drugs for the Elderly	0.56	0.29 - 1.06	0.57	0.29 - 1.11	1.47	0.69 - 3.14

Table 6: Adjusted Odds Ratio For Social Domain Variables For Medication Non-Use Among Sample Populations

Adjusted Odds Ratio – Social Domain						
	Hypertension &/Or Diabetes (n = 2135)		Hypertension (n = 1844)		Diabetes (n = 784)	
Characteristic	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval
Received Pension	0.59	0.37 – 0.79	0.57	0.30 – 1.09	1.06	0.44 – 2.51
Enrolled in National Health Fund	0.54	*0.37 - 0.79*	0.55	0.36 – 0.84	0.78	0.42 – 1.47
Enrolled in Jamaica Drugs for the Elderly	1.29	0.65 – 2.57	1.25	0.61 – 2.57	2.27	1.08 – 4.79

Table 7: Crude Odds Ratio For Economic Stability Domain Variables For Medication Non-Use Among Sample Populations

Crude Odds Ratio – Economic Domain						
	Hypertension &/Or Diabetes (n = 2135)		Hypertension (n = 1844)		Diabetes (n = 784)	
Characteristic	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval
Per Capita Quintile						
Poorest (=0)						
Quint 2	1.28	0.74 - 2.23	1.10	0.61 - 1.98	1.87	0.66 - 5.29
Quint 3	0.93	0.54 - 1.60	0.86	0.49 - 1.52	1.22	0.43 - 3.52
Quint 4	1.27	0.75 - 2.12	1.29	0.75 - 2.21	1.55	0.52 - 4.67
Wealthiest	0.97	0.58 - 1.62	1.00	0.60 - 1.70	1.67	0.58 - 4.79
Food Security	0.67	0.40 - 1.10	0.70	0.41 - 1.19	1.44	0.52 - 4.00
Recent Employment	1.59	1.14 - 2.20	1.65	1.16 - 2.35	2.11	1.16 - 3.84
Main Source of Income						
Employed (=0)						
Self Employed	0.95	0.63 - 1.43	0.93	0.61 - 1.44	1.32	0.59 - 2.95
Farmer	0.55	0.31 - 0.97	0.52	0.28 - 0.94	0.43	0.14 - 1.31
Pension	0.70	0.42 - 1.18	0.64	0.37 - 1.12	1.03	0.43 - 2.51
Other Employment	0.59	0.34 - 1.03	0.56	0.31 - 1.00	0.83	0.35 - 1.97
Additional Source of Economic Support (ref = no support)			0.51	0.21 - 1.24	0.74	0.19 - 2.98
Family Members Local	0.49	0.21 - 1.14	0.31	0.10 - 0.90	0.55	0.10 - 3.13
Family Members Overseas	0.27	0.09 - 0.78	0.40	0.11 - 1.47	**	**
Neighbors and Friends	0.29	0.07 - 1.13	0.37	0.09 - 1.52	0.38	0.03 - 4.56
Government	0.36	0.09 - 1.45	**	**	**	**

Boldface values indicate statistical significance ($p < 0.05$)
** indicates sample insufficient for analysis

Table 8: Adjusted Odds Ratio For Economic Stability Domain Variables For Medication Non-Use Among Sample Populations

Adjusted Odds Ratio – Economic Domain						
	Hypertension &/Or Diabetes (n = 2135)		Hypertension (n = 1844)		Diabetes (n = 784)	
Characteristic	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval
Food Security	0.84	0.51 - 1.38	0.86	0.51 – 1.47	0.75	0.23 – 2.43
Recent Employment	1.10	0.70 – 1.72	1.07	0.67 – 1.72	1.89	0.94 – 3.79
Main Source of Income						
Employed (=0)						
Self Employed	0.90	0.58 – 1.40	0.86	0.55 – 1.36	1.02	0.45 – 2.33
Farmer	0.43	0.24 - 0.77	0.42	0.22 – 0.77	0.37	0.10 – 1.36
Pension	1.25	0.62 – 2.55	1.00	0.48 – 2.12	1.85	0.66 – 5.17
Other Employment	1.57	0.73 – 3.39	1.45	0.66 – 3.21	2.12	0.67 – 6.64
Additional Source of Economic Support (ref = no support)						
Family Members Local	0.54	0.23 – 1.27	0.56	0.23 – 1.33	0.87	0.19 – 3.99
Family Members Overseas	0.30	0.10 – 0.92	0.40	0.13 – 1.26	0.49	0.07 – 3.50
Neighbors and Friends	0.19	0.04 - 0.87	0.32	0.07 – 1.37	**	**
Government	0.35	0.08 – 1.68	0.12	0.90 – 1.95	0.22	0.01 – 3.92

Table 9: Crude Odds Ratio For Environmental Domain Variables For Medication Non-Use Among Sample Populations

Crude Odds Ratio – Environmental Domain						
	Hypertension &/Or Diabetes (n = 2135)		Hypertension (n = 1844)		Diabetes (n = 784)	
Characteristic	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval	Mean Estimate	95% Confidence Interval
Housing Stability						
Owned (=0)						
Rent or Lease	3.05	1.91 - 4.86	1.71	0.95 - 3.07	1.02	0.36 - 2.89
Rent Free	2.17	1.45 - 3.26	0.53	0.34 - 0.83	3.22	1.59 - 6.53
Technology Access	0.82	0.59 - 1.15	0.94	0.66 - 1.34	0.46	0.26 - 0.83
Residence Location						
Greater Kingston and Metropolitan Area (ref = 0)						
Other Urban Area	2.63	1.52 - 4.57	2.66	1.50 - 4.71	3.44	1.24 - 9.57
Rural Area	2.01	1.19 - 3.38	1.91	1.12 - 3.26	2.73	1.08 - 6.88

Boldface values indicate statistical significance ($p < 0.05$)
** indicates sample insufficient for analysis

Table 10: Adjusted Odds Ratio For Environmental Domain Variables For Medication Non-Use Among Sample Populations

Adjusted Odds Ratio – Environmental Domain						
	Hypertension &/Or Diabetes (n = 2135)		Hypertension (n = 1844)		Diabetes (n = 784)	
Characteristic	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**
Housing Stability						
Owned (=0)						
Rent or Lease	1.29	0.70 – 2.39	2.65	**1.57 – 4.45**	0.89	0.25 – 3.21
Rent Free	0.53	**0.34 - 0.83**	1.59	0.99 – 2.56	2.46	**1.13 – 5.37**
Residence Location						
Greater Kingston and Metropolitan Area (ref = 0)						
Other Urban Area	2.81	**1.58 – 5.01**	2.72	**1.49 – 4.50**	3.59	**1.24 – 10.43**
Rural Area	2.56	**1.48 – 4.45**	2.42	**1.38 – 4.25**	3.03	**1.06 – 8.72**

Table 11: Crude Odds Ratio For Educational Domain Variables For Medication Non-Use Among Sample Populations

Crude Odds Ratio – Educational Domain						
	Hypertension &/Or Diabetes (n = 2135)		Hypertension (n = 1844)		Diabetes (n = 784)	
Characteristic	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**
Education Attained						
Primary (=0)						
Grade 9	1.44	0.87 - 2.40	1.32	0.78 - 2.24	1.55	0.63 - 3.83
High School	1.64	0.98 - 2.75	1.66	0.97 - 2.84	1.42	0.54 - 3.70
Post Secondary School	1.44	0.80 – 2.60	1.37	0.74 - 2.51	0.83	0.26 - 2.63

Boldface values indicate statistical significance ($p < 0.05$)
** indicates sample insufficient for analysis

Table 12: Crude Odds Ratio For Health Domain Variables For Medication Non-Use Among Sample Populations

Crude Odds Ratio – Health Domain						
	Hypertension &/Or Diabetes (n = 2135)		Hypertension (n = 1844)		Diabetes (n = 784)	
Characteristic	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**
Diabetes Dx	0.44	**0.30 - 0.65**	0.44	**0.26 - 0.75**		
Hypertension Dx	1.18	0.74 - 1.86	--	--	0.97	0.54 - 1.75
Health Perception						
Less than good	0.54	**0.38 - 0.76**	0.49	**0.34 - 0.70**	0.60	0.33 - 1.09
Current Smoke						
Marijuana or Cigarettes	2.11	**1.27 - 3.52**	1.91	**1.10 - 3.31**	2.19	0.87 - 5.49
Disability	0.92	0.49 - 1.72	0.82	0.41 - 1.62	2.31	**1.03 - 5.19**
Health Insurance Coverage						
Private	0.75	0.46 - 1.22	0.70	0.42 - 1.16	0.92	0.40 - 2.11
National Insurance Gold	1.39	0.59 - 3.30	1.13	0.45 - 2.86	**	**
Other	0.76	0.18 - 3.28	0.44	0.06 - 3.33	1.09	0.14 - 8.56

Boldface values indicate statistical significance ($p < 0.05$)
** indicates sample insufficient for analysis

Table 13: Adjusted Odds Ratio For Health Domain Variables For Medication Non-Use Among Sample Populations

Adjusted Odds Ratio – Health Domain						
	Hypertension &/Or Diabetes (n = 2135)		**Hypertension (n = 1844)**		**Diabetes (n = 784)**	
Characteristic	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**	**Mean Estimate**	**95% Confidence Interval**
Diabetes Dx	0.42	***0.24 - 0.75***	0.67	0.39 – 1.15	--	--
Hypertension Dx	0.65	0.32, 1.35	--	--	1.31	0.63 – 2.72
Health Perception						
Less than good	0.70	*0.47 – 1.04*	0.61	**0.40 – 0.93**	0.68	0.33 – 1.39
Current Smoke						
Marijuana or Cigarettes	1.53	0.89 – 2.65	1.41	0.80 – 2.50	0.89	0.23 – 3.55
Disability	**	**	1.24	0.59 – 2.61	3.20	**1.43 – 7.12**

Boldface values indicate statistical significance ($p < 0.05$)
** indicates sample insufficient for analysis

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