ORIGINAL ARTICLE

Hypertension in Older Adults in Jamaica: Prevalence, Treatment and Control

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ABSTRACT

Objective: *To examine the prevalence, treatment and control and associated risk factors for hypertension among older adults in Jamaica.*

Methods: *Four parishes in Jamaica were surveyed using a cross-sectional study design involving 2943 participants. The survey used a cluster sampling methodology with probability-proportional-to-size. A subsample of 373 persons was randomly selected for assessment with regard to hypertension prevalence, treatment and control.*

Results: *The sample consisted of 373 older adults with the majority (56.6%) being female. The age of the participants ranged from 60 to 100 years, with the median age being 70 (interquartile range = 13) years. Reported prevalence of hypertension was 61.7% and significantly (*$p < 0.001$*) more females than males (71.4%* vs *49.1%, respectively) reported having hypertension. There was no significant difference in being diagnosed with hypertension by age groups, area of residence, highest level of education and union status. Among older adults who reported having hypertension, the majority (90.0%) were being treated while one in ten (10%) reported not being treated. "Based on the Eighth Joint National Committee (JNC-8) definition of control, among older adults who reported having hypertension, only slightly more than a third (34.8%) were controlled; the majority (65.2%) were uncontrolled.*

Conclusion: *The low level of hypertension control documented is of concern given the availability of medication subsidies and the priority attention being given to chronic disease. Further research is needed regarding facilitators and barriers to hypertension control to identify the best interventions to increase control levels.*

Keywords: Control, hypertension prevalence, Jamaica, older adults, treatment

La Hipertensión en los Adultos Mayores en Jamaica: Prevalencia, Tratamiento y Control

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RESUMEN

Objetivo: *Examinar la prevalencia, tratamiento y control, así como los factores de riesgo asociados con la hipertensión entre los adultos mayores en Jamaica.*

Métodos: *Cuatro parroquias en Jamaica fueron encuestadas usando un diseño de estudio transversal que abarcó 2943 participantes. La encuesta utilizó una metodología de muestreo*

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por conglomerados con probabilidad proporcional al tamaño. Una submuestra de 373 personas fue seleccionada aleatoriamente para su evaluación con respecto a la prevalencia, tratamiento y control de la hipertensión.

Resultados: *La muestra constó de 373 adultos mayores, de los cuales la mayor parte (56. 6%) eran mujeres. La edad de los participantes fluctúo de 60 a 100 años, siendo la edad mediana 70 años (rango intercuartil = 13). La prevalencia de hipertensión reportada fue 61.7%, y significativamente (*$p < 0.001$*) más hembras que varones (71.4% vs 49.1%, respectivamente) reportaron tener hipertensión. No hubo diferencia significativa alguna en ser diagnosticado con hipertensión por grupos de edad, área de residencia, nivel más alto de educación, y estado de la unión. Entre los adultos mayores que reportaron tener hipertensión, la mayoría (90.0%) estaban siendo tratados, mientras que uno de cada diez (el 10%) reportaron no tener tratamiento. Basándose en la definición de control ocho del Comité Nacional Conjunto (JNC, siglas en inglés) entre los adultos mayores que reportaron tener hipertensión, sólo poco más de un tercio (34.8%) eran controlados. La mayoría (65.2%) no eran controlados.*

Conclusión: *El bajo nivel de control de la hipertensión documentado es asunto de preocupación, dada la disponibilidad de subsidios para medicamentos y la atención prioritaria que se da a las enfermedades crónicas. Se necesitan investigaciones adicionales sobre facilitadores y barreras al control de la hipertensión para identificar mejores intervenciones para aumentar los niveles de control.*

Palabras clave: Control, prevalencia de la hipertensión, Jamaica, adultos mayores, tratamiento

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INTRODUCTION

High systolic blood pressure accounts for more than 10 million deaths and 208 million lost disability-adjusted life-years (DALYs) annually (1). The estimated global (2010) age-standardised prevalence of hypertension in adults aged ≥ 20 years was 31.1%, with the prevalence being higher in low- and middle-income countries (31.5%). The prevalence of hypertension in low-and middle countries is increasing (2); in Jamaica, the prevalence of hypertension was estimated to be 25.0% in persons aged 15–74 years (3). Among older adults (60 years or older), in Jamaica, the prevalence of hypertension increased from 43.4% in 1989 to 61.4% in 2012; this represents a percentage change of 41.4% (4). The prevalence is expected to further increase in the coming years given the continued and increased screening for non-communicable diseases [NCDs] (5), ageing of the population (6, 7) and the greater exposure to risk factors seen among younger adults today (8).

The clinical presentation of hypertension is insidious with few, if any, symptoms in the early phases of the disease and many people are unaware that they have the disease and go untreated (10). There is also substantive evidence that even if diagnosed by a doctor, many do not achieve hypertension control (9–11). Globally, just more than a third (36.9%) of adults with hypertension receive treatment and only 13.8% have controlled disease (2). The situation is thought to be worse in low- and middle-income countries like Jamaica (9, 2), because many older adults are not well educated and have low-health literacy. Treatment and control of hypertension have well been established as an effective mechanism for the prevention of complications (12–15).

This study reports hypertension prevalence, treatment and control and associated predictors among a sample of older adults in Jamaica. Identified risk factors are important for public health policy and programmes that seek to increase awareness and improve control and treatment in developing countries such as Jamaica.

SUBJECTS AND METHODS

Using a cross-sectional study design, 2943 older adults were recruited from four parishes in Jamaica. These parishes together represent 47% of the nation's population and together reflect the age, gender and urban/rural profile of the country.

The survey used a two-stage cluster sampling methodology with the first and second stage cluster units being enumeration districts and households, respectively.

A probability-proportional-to-size methodology was used. The methodology of sampling followed the cluster selection principles of the Statistical Institute of Jamaica [STATIN] (16) and The World Health Organization common cluster survey principles and have been described in detail elsewhere (4).

The pre-coded interviewer-administered survey instrument contained 196 questions addressing socio-economic factors, lifestyle behaviours, health status, health insurance and access/utilization behaviours.

Subgroup sampling

Random selection of 377 subjects from the larger survey was done. The sample size was calculated assuming the 95% confidence level, 5% error margin and estimated hypertension prevalence of 50% which statistically yield a required sample size of approximately, 377; (see www.raosoft.com/samplesize.html for online sample size calculator used). Due to attrition from death and migration, 373 persons were ultimately obtained.

Data collection

The data collection team consisted of four medical doctors with an average of twenty years of medical experience. All took part in a three-day training programme to standardised measurement procedures.

Each participant had height, weight and arterial blood pressure measured. Height was measured to the nearest 0.1 cm using a meter ruler with the patients standing with their back against a wall, feet flat and facing forward. Periodically calibrated non-digital weighing scales were used to measure weight. Persons stood unsupported without shoes on scales.

Blood pressure was measured by MDF® Calibra™ Pro anaeroid sphygmomanometers. Ambulant participants remained seated for at least five minutes before blood pressure was taken. The individual was seated in a chair with back support and right arm bared and supported at heart level. Appropriate cuff sizes were used to ensure accurate measurements. Those participants unable to sit or bedbound had measurements taken in the supine position. Average blood pressure from three measurements, three minutes apart was used as the patients' blood pressure. Older adults, not previously diagnosed with hypertension, found with elevated blood pressure levels were referred to health providers.

Outcome measures

Self-reported doctor-diagnosis was deemed as having hypertension; ascertained by the question "Has a doctor ever told you that you have hypertension". Hypertension treatment was defined as having doctor-diagnosed hypertension and answering yes to the question "Have you been given medication for hypertension". Based on Eighth Joint National Committee (JNC 8) criteria and participants' age (60 years or more) hypertension control was defined as average systolic blood pressure of less than 150 mmHg and average diastolic blood pressure of less than 90 mmHg. For participants with self-reported doctor-diagnosed diabetes, control was defined as average systolic blood pressure of less than 140 mmHg and average diastolic blood pressure less than 90 mmHg (17). Height and weight measurements for each participant were used to calculate body mass index (BMI) that allowed further categorisation into underweight, normal weight, overweight and obese.

Data analysis

The data were analysed with the assistance of the Statistical Package for Social Sciences, version 17. Chi-square tests were used to assess relationships between variables. Binary logistic regression was used to determine crude and adjusted odds ratios for predictors of dependent variables of having hypertension, treatment and control.

Ethical considerations

This study protocol was approved by the University Hospital of the West Indies/ The University of the West Indies, Faculty of Medical Sciences, Mona, Ethics Committee, Mona, Jamaica. Study participants or their legal guardians provided informed consent.

RESULTS

Sociodemographic characteristics

The sample consisted of 373 older adults with the majority (56.6%, n = 211) being female. Age ranged from 60 to 100 years; median age being 70 (IQR = 13) years. The majority (78.9%) of respondents was between 60 to 79 years and most (74.1%) were urban-dwelling. Approximately 75% of older adults reported their highest level of education as primary school and below. By marital status, 66.0% were not in a union. Significantly (χ^2 (1) = 12.5, $p < 0.001$) more females (73.7%) than males (56.2%)) were not in union (Table 1).

The Government of Jamaica offers medication subsidies for chronic diseases, through the National Health Fund (NHF) and the Jamaica Drugs for the Elderly Programme (JADEP) and 77.0% and 73.1% of the

Table 1: Sociodemographic characteristics of the sample by gender

Variable	Gender % (n)		Total % (n)	*p*-value
	Male	Female		
Age (years) (n = 369)				
60–69	49.7 (80)	43.3 (90)	46.1 (170)	
70–79	31.7 (51)	33.7 (70)	32.8 (121)	0.413
≥ 80	18.6 (30)	23.1 (48)	21.1 (78)	
Area of residence (n = 370)				
Urban	69.6 (112)	77.5 (162)	74.1 (274)	0.084
Rural	30.4 (49)	22.5 (47)	25.9 (96)	
Highest level of education (n = 371)				
Primary and below	73.8 (118)	76.3 (161)	75.2 (279)	0.573
Secondary and above	26.3 (42)	23.7 (50)	24.8 (92)	
Union status (n = 371)				
In union	43.8 (71)	26.3 (55)	34.0 (126)	< 0.001
Not in union	56.2 (91)	73.7 (154)	66.0 (245)	
NHF Medication subsidy (n = 196)				
Yes	74.0 (54)	78.9 (97)	77.0 (151)	0.431
No	26.0 (19)	21.1 (26)	23.0 (45)	
Use NHF Medication subsidy (n = 133)				
Yes	91.3 (42)	89.7 (78)	90.2 (120)	0.761
No	8.7 (4)	10.3 (9)	9.8 (13)	
JADEP Medication subsidy (n = 197)				
Yes	77.5 (55)	70.6 (89)	73.1 (144)	0.299
No	22.5 (16)	29.4 (37)	26.9 (53)	
Use Medication subsidy JADEP (n = 127)				
Yes	91.8 (45)	91.0 (71)	91.3 (116)	0.874
No	8.2 (4)	9.0 (7)	8.7 (11)	
Self-reported doctor diagnosed diabetes				
Yes	19.5 (31)	33.2 (69)	27.2 (100)	0.004
No	80.5 (128)	66.8 (139)	72.8 (267)	
BMI (kg/m^2) (n = 366)				
Underweight	9.4 (15)	3.9 (8)	6.3 (23)	
Normal weight	50.9 (81)	34.8 (72)	41.8 (153)	< 0.001
Overweight	27.7 (44)	25.1 (52)	26.2 (96)	
Obese	11.9 (19)	36.2 (75)	25.7 (94)	
Ever-smoked				
Yes	74.1 (120)	28.4 (60)	48.3 (180)	< 0.001
No	25.9 (42)	71.6 (151)	51.7 (193)	
Seen health professional in last 12 months				
Yes	76.4 (120	89.4 (185)	83.8 (305)	0.001
No	23.6 (37)	10.6 (22)	16.2 (89)	

sample had NHF and JADEP cards, respectively; corresponding use of these cards being 90.2% and 91.3%. Possession and use of cards were similar by gender (Table 1).

More females (33.2%) than males (19.5%) reported doctor-diagnosis of diabetes (χ^2 (1) = 8.5, p = 0.004). The majority (51.9%) of older adults was either overweight or obese, while 41.8% was normal weight. There were significant differences in BMI by gender (χ^2 (3) = 30.9, $p < 0.001$), with 61.3% of females as compared to 39.6% of males being either overweight or obese.

The prevalence of ever-smoking was 48.3%, with more males (74.1%) than females (28.4%) reporting having ever-smoked (χ^2 (1) = 76.4, $p < 0.001$). Most (83.8%) older adults reported having seen a health professional in the last month with more females (89.4%) so reporting than males (76.4%) [χ^2 (1) = 11.0, p = 0 .001] (Table 1).

Hypertension prevalence

Hypertension was reported by 61.7% (n = 229) of respondents and more frequently reported by females (71.4%) than males (49.1%) (χ^2 (1) = 19.3, $p < 0.001$).

No significant differences were found in hypertension prevalence by age group, area of residence, highest level of education, or union status. Greater proportions of older adults who reported ownership of NHF or JADEP cards reported having hypertension, (χ^2 (1) = 14.1, $p < 0.001$ and χ^2 (1) = 9.3, $p = 0.002$ respectively). No associations were found between using these cards and having hypertension (Table 2).

There was a significant association between older adults who reported hypertension and self-reported doctor-diagnosed diabetes (χ^2 (1) = 32.5, $p < 0.001$). The majority (85.0%) of older adults who reported having hypertension also reported diabetes. No significant association was found between BMI category and self-report of hypertension. There was a significant association between older adults who reported having hypertension and having ever-smoked (χ^2 (1) = 5.0, $p = 0.025$). A lower proportion (55.9%) of older adults who self-reported ever-smoking reported having hypertension, when compared with those who never-smoked (67.2%). Most (69.2%) older adults who reported visiting a health professional in the last 12 months reported having hypertension [χ^2 (1) = 50.4, $p < 0.001$] (Table 2).

Hypertension treatment

Among older adults reporting hypertension, two categories of persons were defined based on receiving medication: treated or not treated. Among older adults who reported having hypertension, the majority (90.0%, n = 206) were treated while 10% (n = 23) reported not being treated with medication.

There was no statistical association between hypertension treatment and gender, age groups, area of residence, highest level of education, union status and NHF or JAPED card ownership. A significant association was found for older adults who reported using their NHF and JADEP cards (χ^2 (1) = 9.8, $p = 0.002$ and χ^2 (1) = 12.3, $p < 0.001$) and hypertension treatment; with the majority (95.8% and 96.5) who reported using their NHF and JADEP medication subsidy cards also reporting being on hypertension treatment. Seeing a health professional in the last 12 months (χ^2 (1) = 6.3, $p = 0.012$) and ever-smoking (χ^2 (1) = 7.0, $p = 0.008$) were also significantly related to hypertension treatment; persons who saw a health professional in the last 12 months were more likely to be treated (Table 2).

Hypertension control

Among older adults who reported having hypertension, two categories of persons were defined based on level of control: controlled or uncontrolled using the JNC 8 criteria. Among older adults who reported having hypertension, more than a third (34.8%, n = 79) were controlled; the majority (65.2%, n = 148) were uncontrolled.

More than a third of males (37.2%) and females (33.6%) who reported having hypertension were controlled. Control rates did not differ by gender or age. Approximately a fifth (23.6%) of rural dwellers and 38.6% of urban dwellers were controlled (χ^2 (1) = 4.1, $p = 0.043$); a statistically significant difference (Table 2).

There were no significant differences in hypertension control by highest level of education, union status, owning and using NHF or JADEP medication subsidy cards and reporting diabetes, ever-smoking and seeing a health profession in the last 12 months. There were significant differences in hypertension control by BMI category (χ^2 (3) = 14.4, $p = 0.002$); 39.3% and 21.9% of overweight and obese older adults, respectively, were controlled (Table 2).

For logistic regression to determine independent predictors for each outcome (hypertension prevalence, treatment and control), variables found to be significantly associated or approaching statistical significance ($p \leq 0.1$) in bivariate analysis were entered in each model. The Hosmer-Lemeshow goodness-of-fit test reported good fit for all models [$p > 0.05$] (Table 3 – 5).

The only independent predictors of having hypertension identified in regression analysis were "seeing a health professional in the last 12 months" (aOR 5.3, 95% CI 1.3, 21.9) and "self-reported doctor-diagnosis of diabetes" [aOR 2.5, 95% CI 1.1, 5.8] (Table 3).

There were no independent predictors for hypertension treatment (Table 4). With regards to hypertension control the only independent predictor was BMI with the lowest category underweight being eight times more likely to report control (aOR 8.00, 95% CI 1.37, 46.7) (Table 5).

DISCUSSION

Hypertension prevalence (61.7%) was high and similar to that found in the larger study (4). These results are consistent with reports from South Africa (77.9%), Russia (71.7%) and Ghana [57.1%] (10) and among Filipino Immigrants in the USA [72.1%] (18). In Jamaica, the prevalence of hypertension among older adults has increased from 41.4% in 1989 to 61.4% in 2012 (4). This increase can be partially explained by the increased screening of older adults, a part of a wider Ministry of Health strategic plan to increase awareness

Table 2: Hypertension prevalence, treatment and control levels among older adults by sociodemographics

Variables	HTN Prevalence % (n)				HTN Treatment % (n)				HTN Control % (n)			
	Total (n)	Yes	No	*p*-value	Total (n)	Yes	No	*p*-value	Total (n)	Controlled	Uncontrolled	*p*-value
Gender												
Male	371	49.1 (79)	50.9 (82)	< 0.001	229	84.8 (67)	15.2 (12)	0.060	227	37.2 (29)	62.8 (49)	0.586
Female		71.4 (150)	28.6 (60)			92.7 (139)	7.3 (11)			33.6 (50)	66.4 (99)	
Age (years)												
60–69		56.5 (95)	43.5 (73)			92.6 (88)	7.4 (7)			32.6 (31)	67.4 64)	
70–79	367	65.3 (79)	34.7 (42)	0.110	228	83.5 (66)	16.5 (13)	0.063	226	34.6 (27)	65.4 (51)	0.692
≥ 80		69.2 (54)	30.8 (24)			94.4 (54)	5.6 (3)			39.6 (14)	60.4 (32)	
Area of residence												
Rural	368	57.9 (55)	42.1 (40)	0.344	228	85.5 (47)	14.5 (8)	0.208	226	23.6 (13)	76.4 (42)	0.043
Urban		63.4 (173)	36.6 (100)			91.3 (158)	8.7 (15)			38.6 (66)	61.4 (105)	
Highest level of education												
Primary and below	369	60.3 (167)	39.7 (110)	0.304	228	91.0 (152)	9.0 (15)	0.359	226	34.3 (57)	65.7 (109)	0.926
Secondary and above		66.3 (61)	33.7 (31)			86.9 (53)	13.1 (8)			35.0 (21)	65.0 (39)	
Union status												
In union	369	62.7 (79)	37.3 (47)	0.737	227	92.4 (73)	7.6 (6)	0.355	225	30.4 (24)	69.6 (55)	0.274
Not in union		60.9 (148)	39.1 (95)			88.5 (131)	11.5 (17)			37.7 (55)	62.3 (91)	
NHF (medication subsidy)												
Yes	196	79.5 (120)	20.5 (31)	< 0.001	143	94.2 (113)	5.8 (7)	0.776	142	38.7 (46)	61.3 (73)	0.726
No		51.1 (23)	48.9 (22)			95.7 (22)	4.3 (1)			34.8 (8)	65.2 (15)	
Use NHF												
Yes	133	80.0 (96)	20.0 (24)	0.793	106	95.8 (92)	4.2 (4)	0.002	105	37.9 (36)	62.1 (59)	0.896
No		76.9 (10)	23.1 (3)			70.0 (7)	30.0 (3)			40.0 (4)	60.0 (6)	
JADEP (medication subsidy)												
Yes	197	78.5 (113)	21.5 (31)	0.002	143	96.5 (109)	3.5 (4)	0.145	142	35.7 (40)	64.3 (72)	0.665
No		56.6 (30)	43.4 (23)			90.0 (27)	10.0 (3)			40.0 (12)	60.0 (18)	
Use JADEP												
Yes	127	76.7 (89)	23.3 (27)	0.700	98	98.9 (88)	1.1 (1)	< 0.001	97	36.4 (32)	63.6 (56)	0.857
No		81.8 (9)	18.2 (2)			77.8 (7)	22.2 (2)			33.3 (3)	66.7 (6)	
Self-reported doctor-diagnosed diabetes												
Yes	367	85.0 (85)	15.0 (15)	< 0.001	225	91.8 (78)	8.2 (7)	0.544	223	28.2 (24)	71.8 (61)	0.098
No		52.4 (140)	47.6 (127)			89.3 (125)	10.7 (15)			39.1 (54)	60.9 (84)	
BMI (kg/m^2)												
Underweight		43.5 (10)	56.5 (13)			100.0 (10)	0.0 (0)			80.0 (8)	20.0 (2)	
Normal weight	364	57.9 (88)	42.1 (64)	0.112	223	88.6 (78)	11.4 (10)	0.478	222	34.5 (30)	65.5 (57)	0.002
Overweight		64.2 (61)	35.8 (34)			88.5 (54)	11.5 (7)			39.3 (24)	60.7 (37)	
Obese		68.1 (64)	31.9 (30)			93.8 (60)	6.3 (4)			21.9 (14)	78.1 (50)	
Ever-smoked												
Yes	371	55.9 (100)	44.1 (79)	0.025	229	84.0 (84)	16.0 (16)	0.008	227	33.3 (33)	66.7 (66)	0.683
No		67.2 (129)	32.8 (63)			94.6 (122)	5.4 (7)			35.9 (46)	64.1 (82)	
Seen health professional in last 12 months												
Yes	362	69.2 (211)	30.8 (94)	< 0.001	222	93.4 (197)	6.6 (14)	0.012	220	34.9 (73)	65.1 (136)	0.077
No		19.3 (11)	80.7 (46)			72.7 (8)	27.3 (3)			9.1 (1)	90.9 (10)	

Table 3: Predictors of having hypertension (n = 190)

Variables	HTN Prevalence % (n)		
	OR	Adjusted odds ratio (aOR)	95% confidence interval (CI)
Gender			
Male	ref	ref	ref
Female	2.60***	2.34	(0.97, 5.65)
NHF (medication subsidy)			
No	ref	ref	ref
Yes	3.7***	1.88	(0.75, 4.69)
JADEP (medication subsidy)			
No	ref	ref	ref
Yes	2.80**	1.60	(0.64, 3.96)
Self-Reporting Doctor-Diagnosed Diabetes			
No	ref	ref	ref
Yes	5.14***	2.48	(1.06, 5.78)
Ever Smoke			
No	ref	ref	ref
Yes	0.62*	1.57	(0.64, 3.87)
Seen Health Professional in last 12 months			
No	ref	ref	Ref
Yes	9.39***	5.33	(1.30, 21.88)

** = p < .05; ** = p < .01; *** = p < .001; Hosmer–Lemeshow goodness-of-fit (χ2 (7) = 4.69, p = .70)*

of chronic disease and improve treatment and control (5). Increased access to media forms (print, electronic and social media) may also be a factor. Additionally, increased longevity of older adults may have resulted in greater exposures to risks factors for hypertension contributing to rising prevalence.

Similar to other studies (10, 18), significantly more females reported having hypertension. The gender disparity may be explained by evidence from this population showing men having poor health-seeking behaviour (19) and decreased healthcare utilization for blood pressure checks (20).

The majority (> 78%) of older adults reporting having hypertension also owned medication subsidy cards. This likely stems from the fact that once persons are diagnosed with chronic illnesses that are covered under the medication subsidy programmes, healthcare staff will routinely refer or guide those clients to receive these cards. There were, however, no significant differences among older adults in terms of usage of these cards as it relates to having hypertension. This could be due to: 1) patients lack of funds to use these cards which require a small co-pay 2) many older adults, although reporting having hypertension, may not have the requisite documents to receive the NHF card, in particular, a valid birth

Table 4: Predictors of hypertension treatment (n = 87)

Variables	HTN Treatment % (n) *§*		
	OR	Adjusted odds ratio (aOR)	95% confidence interval (CI)
Gender			
Male	ref	ref	ref
Female	2.26	1.42	(0.06, 35.03)
Age (years)			
60–69	ref	ref	ref
70–79	0.40	2.03E + 07	(0,..)¥
≥ 80	1.35	3.36E + 14	(0,..)
Use NHF			
No	ref	ref	ref
Yes	9.86**	0.00	(0,..)
Use JADEP			
No	ref	ref	ref
Yes	25.14*	0.00	(0,..)
Ever smoke			
No	ref	ref	ref
Yes	0.30*	0.00	(0,..)
Seen health professional in last 12 months			
No	ref	ref	ref
Yes	5.28*	†	–

** = p < 0.05; ** = p <0.01; *** = p < 0.001;*
Hosmer-Lemeshow goodness-of-fit (χ^2 (4), = 0.48, p = 0.97),

§ complete observations were available for 87 cases with regard to variables used for prediction of hypertension treatment in logistics regression.

¥ 0,.. indicates upper limit of confidence interval (CI) not defined (infinite estimate)

† aOR not calculated, since for all 87 cases the value was a constant (all saw a health professional in last 12 months)

Table 5. Predictors of hypertension Control (n = 211)

Variables	HTN Control# % (n)		
	OR	Adjusted odds ratio (aOR)	95% confidence interval (CI)
Residence			
Rural	ref	ref	ref
Urban	2.03*	2.16	(0.98, 4.75)
Self-reporting doctor-diagnosed diabetes			
No	ref	ref	ref
Yes	0.61	0.64	(0.34, 1.22)
BMI (kg/m^2)			
Normal weight	ref	ref	ref
Underweight	7.60*	8.00	(1.37, 46.70)
Overweight	1.23	1.05	(0.51, 2.17)
Obese	0.53	0.48	(0.22, 1.06)
Seen health professional in last 12 months			
No	ref	ref	ref
Yes	5.37	8.64	(0.86, 86.98)

** = p < 0.05; ** = p < 0.01; *** = p < 0.001; Hosmer-Lemeshow goodness-of-fit (χ^2 (6) = 2.08, p = 0.91)*

certificate or tax-payer registration number (TRN) and 3) older adults, although not reporting having hypertension, may have other chronic illnesses causing them to receive and use medication subsidy cards.

Co-morbidity of hypertension with diabetes is well documented (4, 21, 22) and in this sample 85.0% of persons who reported having hypertension also reported having diabetes. The high levels of co-morbidity (between hypertension and diabetes) increases the propensity for medical complications among older adults. Additionally, the cost and economic burden imposed by chronic diseases like hypertension on developing countries such as Jamaica are considerable (23). Against the background of rapid population ageing in these countries (9) and slow economic growth (24) there is a heightened imperative for control of hypertension.

Seeing a health professional in the last 12 months was a predictor of having hypertension; this may be explained by the fact that persons visiting a health professional would be more likely to be screened and hence, more likely to report having hypertension. Alternatively, persons experiencing symptoms or complications perceived to be related to hypertension are also more likely to visit a health professional. The pathophysiology of diabetes is known to predispose to hypertension which explains the observed association. Additionally the cost and economic burden imposed by chronic diseases like hypertension on developing countries such as Jamaica are considerable (23).

A high proportion (90.0%) of older adults who reported having hypertension also reported receiving medications for hypertension. This is expected since medication subsidies are highly accessed by this population. Significantly higher proportions (NHF 95.8% *vs* 70.0% and JADEP 96.5% *vs* 90.0%) of older adults who report using their medication subsidy cards also reported being on treatment. This high level of hypertension treatment suggests that the implemented medication subsidy policy has facilitated greater access.

There were no independent predictors of hypertension treatment in our study. This argues for further research regarding variables not included in our study. Treatment may be the result of the interplay of factors such as severity of disease, practice norms and promulgated treatment protocols, and levels of adherence among older adults.

Among older adults that reported having hypertension, just more than a third (34.8%) achieved hypertension control. Low level of hypertension control have been reported in India (14.1%), Mexico (11.8%) and the Russian Federation [10.5%] (10) and Filipino American Immigrants [21.7 %] (18). Comparable figures to those in our study have been documented among hospital patients in Jamaica [30.3%] (25) and among patients accessing care in the public primary care setting (26.8%) [95% CI 22.7%, 30.9%] (26). Older adults in the lowest BMI category were eight times more likely to have their hypertension controlled than persons who were normal weight, alluding to the importance of weight/BMI in the management and control of hypertension.

The low level (34.8%) of hypertension control is of concern against a background of 'no-user fees' which purports to increase access and coverage, chronic disease medication subsidies and health education and promotion efforts. Evidence has shown that the former has resulted in increased numbers of persons access-ing care at public health centres which has caused overcrowding, long wait time, shorter patient-doctor interaction time and lower quality of healthcare (27, 28). The latter factors may be responsible for the observed lower rates of control. Other possible contributors to low rates of control are the lack of chronic disease self-management, low health literacy and the inherent difficulty in achieving lifestyle changes. Poor health literacy has been identified as a major obstacle in the management of cardiovascular diseases (29). Previous work (30) indicates that persons with low health literacy are less likely to make necessary lifestyle changes and practice lower levels of self-management. There are reports in Jamaica that low literacy and low health literacy levels present challenges to chronic disease management (19, 31). Low health literacy is a matter of national concern; if individuals do not appreciate what medications they are taking and why, then adherence is likely to be compromised (31). Consequently control in cases of hypertension will be suboptimal.

CONCLUSION

The high prevalence of hypertension and high treatment levels is this study makes the finding of low levels of control alarming, in the context of available medication subsidies and the priority attention given by health authorities to chronic disease. Identifying the best strategies and interventions to increase levels of control, especially among older adults, requires further research into the facilitators and barriers to hypertension control.

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AUTHOR CONTRIBUTIONS

Eldemire-Shearer was the principal investigator; Eldemire-Shearer, James, Waldron, Laws, Harris and Holder-Nevins conceived and planned the work that led to the paper. Waldron and James interpreted the evidence and were responsible for data management. All authors reviewed the manuscript and contributed to the intellectual content of the paper and approved the final version.

REFERENCES

1. GBD 2013 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. Lancet 2015; published online Sept 11. http://dx.doi.org/10.1016/S0140–6736 (15) 00128–2.
2. Mills KT, Bundy JD, Kelly TN, Reed JE, Kearney PM, Reynolds K et al. Global Disparities of Hypertension Prevalence and Control: A Systematic Analysis of Population-based Studies from 90 Countries. Circulation 2016; **134:** 441–50.
3. Ferguson TS, Francis DK, Tulloch-Reid MK, Younger NO, McFarlane SR, Wilks RJ. An update on the burden of cardiovascular disease risk factors in Jamaica: findings from the Jamaica Health and Lifestyle Survey 2007-2008. West Indian Med J 2011; **60:** 422–8.
4. Mitchell-Fearon K, Waldron N, James K, Laws H, Holder-Nevins D, Eldemire-Shearer D. Hypertension and diabetes prevalence in older persons in Jamaica, 2012. West Indian Med J 2014; **63:** 416–23.
5. Ministry of Health, Jamaica. Strategic and Action Plan for the Prevention and Control Non-Communicable Diseases (NCDS) in Jamaica 2013 – 2018. [Internet]. 2008 Available from http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/jamaica/national-strategic-and-action-plan-for-the-prevention-and-control-non-communicable-diseases-ncds-in-jamaica-2013-2018.pdf.
6. Eldemire-Shearer D. Ageing: the response yesterday, today and tomorrow. West Indian Med J 2008; **57:** 577–88.
7. World population ageing 1950-2050. [Internet]. United Nations [2002]. Available from: http://www.un.org/esa/population/publications/worldageing19502050/.
8. Aboderin I, Kalache A, Ben-Shlomo Y, Lynch JW, Yajnik CS, Kuh D et al. Life course perspectives on coronary heart disease, stroke and diabetes: key issues and implications for policy and research. [Internet] World Health Organization [2002] Available from: http://apps.who.int/iris/bitstream/handle/10665/67174/WHO_NMH_NPH_02.1.pdf;jsessionid=9C8987F51EF180769F25BA151CA19C24?sequence=1.
9. World Health Organization. A global brief on hypertension: Silent killer, global public health crisis. [Internet] [2013] Available from: http://apps.who.int/iris/bitstream/handle/10665/79059/WHO_DCO_WHD_2013.2_eng.pdf?sequence=1.
10. Lloyd-Sherlock P, Beard J, Minicuci N, Ebrahim S, Chatterji S. Hypertension among older adults in low- and middle-income countries: prevalence, awareness and control. Int J Epidemiol 2014; **43:** 116–28
11. Chow CK, Teo KK, Rangarajan S, Islam S, Gupta R, Avezum A et al. Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. JAMA 2013; **310:** 959–68.
12. Makridakis S, DiNicolantonio JJ. Hypertension: empirical evidence and implications in 2014 Open Heart 2014; **1:**e000048.
13. WRITING GROUP MEMBERS, Roger VL, Go AS et al. heart disease and stroke statistics—2012 update: a report from the American Heart Association. Circulation 2012; **125:** e2-e220.
14. Gu Q, Dillon CF, Burt VL, Gillum RF. Association of hypertension treatment and control with all-cause and cardiovascular disease mortality among US adults with hypertension. Am J Hypertens 2010; **23:** 38–45.
15. Benner JS, Smith TW, Petrilla AA, Klingman D, Goel S, Tang SSK et al. Estimated prevalence of uncontrolled hypertension and multiple cardiovascular risk factors and their associated risk of coronary heart disease in the United States. J Am Soc Hypertens 2008; **2:** 44–53.
16. Statistical Institute of Jamaica. Population and housing census 2011: general report, volume 1. 2012. [2012]. [Internet] Available from: http://www.jis.gov.jm/pdf/General%20Report%20Census%202011%20Revised%20Copy%20Oct.%2019.pdf.
17. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J et al. Evidence-based guideline for the management of high blood pressure in adults: Report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA 2014; **311:** 507–20.
18. Ursua R, Aguilar D, Wyatt L, Tandon SD, Escondo K, Rey M et al. Awareness, treatment and control of hypertension among Filipino immigrants. J Gen Intern Med 2014; **29:** 455–62.
19. Morris C, James K, Laws H, Eldemire-Shearer D. Health status and health-seeking behaviour of Jamaican men fifty-five years and over. West Indian Med J 2011; **60:** 322–9.
20. Mitchell-Fearon K, Willie-Tyndale D, Waldron N, Holder-Nevins D, James K, Laws H et al. Cardio-vascular disease and cancer: a dichotomy in utilization of clinical preventive services by older adults in a developing country. Gerontol Geriatr Med 2015; **1:**2333721415611821.
21. Cheung BMY, Li C. Diabetes and hypertension: is there a common met-abolic pathway? Curr Atheroscler Rep 2012; **14:** 160–66.
22. Long AN, Dagogo-Jack S. The comorbidities of diabetes and hypertension: mechanisms and approach to target organ protection. Journal of clinical hypertension (Greenwich, Conn). 2011; **13:** 244–251.
23. Mitchell-Fearon K, McKoy-Davis J, Willie-Tyndale D, Abdulkadri AO, Eldemire-Shearer D. The economic burden of hypertension among older persons: lessons from a developing nation. J Public Health Dev Ctries 2017; **3:** 347–57.
24. International Monetary Fund, IMF Sees Subdued Global Growth, Warns Economic Stagnation Could Fuel Protectionist Calls. [2016] [Internet] Available from http://www.imf.org/en/News/Articles/2016/10/03/AM2016-NA100416-WEO.
25. Gossell-Williams M, Williams-Johnson J, Williams E, Levy P. A Case for a Holistic Approach to the Improvement of Compliance among Hypertensive Patients: A Hospital Review. West Indian Med J 2014; **63:** 271–73.
26. Harris MA, Ferguson TS, Figueroa JP. Improved hypertension control among primary care patients in Jamaica between 1995 and 2913. Global J of Medicine and Public Health 2016; **5:** 1–9.
27. Caribbean Policy Research Institute (CaPRI), No user fee policy in public hospitals in Jamaica. [2013] [Internet] Available from http://www.capricaribbean.com/documents/no-user-fee-policy-public-hospitals-jamaica.
28. Malcolm T. Effects of eliminating user fees on utilization of healthcare services in Jamaica (Unpublished doctoral dissertation, 2013). Walden University, Baltimore, Maryland.
29. Safeer RS, Cooke CE, Keenan J. The impact of health literacy on cardiovascular disease. Vasc Health Risk Manag 2006; **2:** 457–64.
30. Gazmararian JA, Williams MV, Peel J, Baker DW. Health literacy and knowledge of chronic disease. Patient Educ Couns 2003; **51:** 267–75.
31. Hartzler ML, Chen AMH, Murphy BL, Rodewald SJ. Evaluation of Jamaican knowledge of diabetes and health beliefs. Christian Journal for Global Health 2014; **1:** 19–28.
32. Coverson D. Health literacy in rural Jamaica: Visual aides to assist and increase medication adherence. MOJ Public Health 2015; **2:** 00038. DOI: 10.15406/mojph.2015.02.00038.