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*Original Article*

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# Factors Associated with Hypertension among Urban Dwellers with Sedentary Lifestyle: A Cross-Sectional Study

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**Abstract**

**Background:** Hypertension is a serious public health problem and an important research area due to its worldwide high prevalence and being a prime risk factor for cardiovascular diseases and other complications. In developing countries, hypertension is more prevalent among the urban population who lead a sedentary lifestyle. **Objective:**This study aimed to investigate the prevalence and risk factors of hypertension among urban dwellers with sedentary life. **Methodology:** This cross-sectional study was conducted among the adult population (18 years and above) living in one of the urban areas of Dhaka (Dania Union, Kadamtali Thana), Bangladesh. The study was conducted from January 2018 to October 2018, using a simple random sampling technique for data collection. The adult respondents were enrolled in this study who were staying at home and leading a sedentary lifestyle. Univariate analysis and binary logistic regression analysis were performed to examine the risk factors of hypertension of the study population. **Results:** A total of 149 adults were enrolled in this study. The mean (±SD) age of the study population was 51.20 (±14.65) years. About four out of 10 study population were found to be hypertensive in this study. The adjusted logistic regression analysis revealed that increased age groups, i.e., 50 to 60 years old [AOR: 3.11, 95% CI: 1.01 – 9.66] and 60 years old and above [AOR: 5.83, 95% CI: 1.73 – 20.06], and family history of hypertension (AOR: 3.59, 95% CI: 1.34 - 9.63) had a positive and significant association with hypertension. However, people with high socioeconomic status showed 71 percent less likelihood of being hypertensive than the lower ones. **Conclusion:** The prevalence of hypertension among the people leading a sedentary lifestyle was significantly higher in this study. Increasing physical activity, maintaining proper antihypertensive medication, and regular follow-up of hypertension for older adults might inhibit the increased prevalence of hypertension in urban areas. *[Journal of National Institute of Neurosciences Bangladesh, July 2020;6(2): 129-134]*

**Keywords:** Hypertension; urban dwellers; sedentary lifestyle; Bangladesh

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## Introduction

Hypertension is one of the most common non-communicable diseases (NCDs), which significantly increases the risks of heart, brain, kidney, and other diseases[1]. Globally, around 1.13 billion people have hypertension, where most (two-thirds) of them live in low- and middle-income countries[2]. The worldwide prevalence of hypertension has been projected to

increase from 26 percent in 2000 to 29 percent by 2025[3]. Though the increasing prevalence of hypertension is significantly observed among low-income and middle-income countries (LMICs), the overall prevalence remains steady or decreasing in high-income countries[4].

In South Asia, about three out of 10adult people are suffering from hypertension with a secular trend, which indicatesthat the burden of hypertension is increasing over time[5]. Such an increase in hypertension prevalence in South Asia, including Bangladesh, could be attributed mostly to some modifiable and preventivebehavioural risk factors such as- unhealthy diet, excess weight gain, excess sodium intake, smoking, tobacco consumption, alcohol abuse, and chronic stress, including ageing and urbanization[6-8]. One of the underlying but suspected risk factors of hypertension is the sedentary lifestyle of the urban population[9]. Moreover, a sedentary lifestyle is associated with a broad range of cardio-metabolic factors, includinginsulin resistance, increased hemoglobin A1c, obesity, elevated cholesterol levels, and metabolic syndrome[10].

A recent Bangladeshistudy revealed that more than one-fourthof people have hypertension, and urban women were more prone to develop hypertension than men[11]. The prevalence is more dominant among those urban women staying at households, leading modern lifestyle having more stress, performing less manual work, and maintaining faulty dietary habits than the rural women[12].

The suspected risk factors which might elevate blood pressure among the urban Bangladeshipeople with a sedentary lifestyle have not been clearly established in earlier literature[13]. Though several studies investigated the associated risk factors of hypertension among urban and rural populations, the specific population group leadinga sedentary lifestyle in urban areas has been lagged behind in these studies. So, it was aimed to conduct this studytomeasure the prevalence and risk factors of hypertension among urban adults who had a sedentary lifestyle in a selected urban area of Dhaka.

## Methodology

This cross-sectional study was conducted at Dania Union (the smallest administrative, geographic unit), situated in Kadamtaliand JatrabariThana (subdistrict), Dhaka. According to the Population and Housing Census-2011, this union has a 3.32 sq.km land area with approximately 261,000 population[14]. The adult population (aged more than 18 years) witha sedentary lifestyle living in Dania union was the target population of this study. A semi-structured questionnaire was prepared based on the WHO STEP wise approach to surveillance Questionnaire to collect the participants' necessary information[15]. This study was conducted from January 2018 to October 2018 for ten months. A simple random sampling technique was used in the data collection system. A complete list of the households was prepared before the data collection where the number of the household was the base of our sampling frame. Simple random sampling was followed to select the households. One respondent was identified by the KISH method from each sampled household and interviewed. We skipped for the next household in case of non-participant or absence of potential candidates. The sample size calculations were completed based on the standardized approach outlined in the WHO STEPS methodology[15]. Considering the 10% non-response rate and two design effects, we were finally able to enroll 149 adult respondents in this study.

**Outcome variable:** Hypertension was the outcome variable of this study. Blood pressure was recorded three times at 5 minutes intervals in an upright sittingposition, in the right arm, using a digital BP machine (OMRON, Model HEM-7120) as per World Health Organization (WHO) guidelines. The average of the last two readings of BP was used in the analyses. Hypertensive participants were defined as those with systolic blood pressure (SBP) equal to or more than 140 mm of Hg and/or diastolic blood pressure (DBP) equal to or more than 90 mm of Hg or those who were at antihypertensive medication[16-17].

**Exposures:** The following independent variables were used as covariates for analyses: age, gender (male/female), family members, education, socioeconomic status, smoking habit (non-smoker, ever smoker), salt intake history (everyday, sometimes, and never), tobacco usage habit (no, yes), waist-hip ratio (WH ratio), and body mass index (BMI). The weight of each respondent was measured by a digital weight machine. This machine was placed ona flat surface to measure weight (to the nearest 10 grams). Respondents'height was measured by a standard measuring tape. For both the measurements (height, weight) the respondents were instructed to be barefooted and remove any heavy clothing.We measured the height and weight to calculate BMI according to standard protocol. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. Overweight and obesity were defined as BMI $\geq$ 25.0 – 29.9 kg/m2 and BMI $\geq$ 30 kg/m2, respectively[18]. Waist circumference was measured by

putting a non-elasticmeasuring tape at the midpoint between the lower margin of the last rib and the top of the hip bone (at the level of umbilicus) at the end of expiration. The non-elastic tape was used to measure waist circumference to the nearest 0.1 cm. Waist-Hip ratio (WHR) was measured by using a standard measuring tape. Abdominal obesity was diagnosed when WHR was >0.90 in males and >0.85 in females.

**Statistical analysis:** Univariate analysis and binary logistic regression analysis were performed to examine the risk factors of hypertension of the study population. All the analyses were performed using Statistical Package for Social Sciences (SPSS version 25.0) software. Ethical permission was obtained from the Institutional Review Board of BSMMU, Dhaka (Memo Number: 2018/841).

Table 1: Association of hypertension with different characteristics of respondents (n = 149)

| **Characteristics** | **Hypertension** | | | | **AOR [95% CI]a** |
|---|---|---|---|---|---|
| | **Frequency (%)** | **No n (%)** | **Yes n (%)** | **P values (χ2)** | |
| **Gender** | | | | P = 0.80 | |
| Male | 19 (12.8) | 11 (57.9) | 8 (42.1) | | 1 (Ref.) |
| Female | 130 (87.2) | 80 (61.5) | 50 (38.5) | | 1.51 (0.34 – 6.71) |
| **Age group** | | | | P = 0.03 | |
| 30 – 40 | 50 (33.6) | 36 (72.0) | 14 (28.0) | | 1 (Ref.) |
| 41 – 50 | 27 (18.1) | 20 (74.1) | 7 (25.9) | | 0.68 (0.21 – 2.25) |
| 51 – 60 | 31 (20.8) | 16 (51.6) | 15 (48.4) | | 3.11*(1.01 – 9.66) |
| 61 and above | 41 (27.5) | 19 (46.3) | 22 (53.7) | | 5.83**(1.73 – 20.06) |
| **Educational qualification** | | | | P = 0.26 | |
| No formal education/illiterate | 54 (36.2) | 32 (59.3) | 22 (40.7) | | 1 (Ref.) |
| Up to grade V | 16 (10.7) | 7 (43.8) | 9 (56.3) | | 1.59 (0.40 – 6.35) |
| Grade VI to X | 37 (24.8) | 22 (59.5) | 15 (40.5) | | 1.17 (0.41 – 3.36) |
| Grade XI. and above | 42 (28.2) | 30 (71.4) | 12 (28.6) | | 0.69 (0.22 – 2.13) |
| **Socio-economic status** | | | | P = 0.09 | |
| Lower | 44 (29.5) | 21 (47.7) | 23 (52.3) | | 1 (Ref.) |
| Middle | 56 (37.6) | 38 (67.9) | 18 (32.1) | | 0.28* (0.10 – 0.76) |
| Upper | 49 (32.9) | 32 (65.3) | 17 (34.7) | | 0.29* (0.11 – 0.82) |
| **Salt intake history** | | | | P = 0.94 | |
| Never | 12 (8.0) | 7 (58.3) | 5 (41.7) | | 1 (Ref.) |
| Everyday | 70 (47.0) | 44 (62.9) | 26 (37.1) | | 1.31 (0.28 – 6.20) |
| Sometimes | 67 (45.0) | 40 (59.7) | 27 (40.3) | | 0.95 (0.19 – 4.64) |
| **Use of tobacco products** | | | | P = 0.13 | |
| No | 133 (89.3) | 84 (63.2) | 49 (36.8) | | 1 (Ref.) |
| Yes | 16 (10.7) | 7 (43.8) | 9 (56.3) | | 2.43 (0.65 – 8.99) |
| **Smoking history** | | | | P = 0.63 | |
| Non-smoker | 147 (98.7) | 90 (61.7) | 57 (38.8) | | - |
| Ever smoker | 2 (1.3) | 1 (50.0) | 1 (50.0) | | - |
| **Any family history of hypertension** | | | | P = 0.19 | |
| No | 40 (26.4) | 28 (70.0) | 12 (30.0) | | 1 (Ref.) |
| Yes | 109 (73.8) | 63 (57.8) | 46 (42.2) | | 3.59* (1.34 – 9.63) |
| **Body Mass Index (BMI)** | | | | P = 0.80 | |
| Normal | 58 (38.9) | 37 (63.8) | 21 (36.2) | | 1 (Ref.) |
| Underweight | 4 (2.7) | 2 (50.0) | 2 (50.0) | | 1.53 (0.14 – 16.27) |
| Overweight | 66 (44.3) | 38 (57.6) | 28 (42.4) | | 1.44 (0.61 – 3.40) |
| Obese | 21 (14.1) | 14 (66.7) | 7 (33.3) | | 1.10 (0.31 – 3.87) |
| **WH ratio** | | | | P = 0.25 | |
| Normal (<90 cm M, <80 cm F) | 91 (61.1) | 17 (73.9) | 6 (26.1) | | 1 (Ref.) |
| Abdominally obese (≥90 cm M, ≥80 cm F) | 58 (38.9) | 74 (58.7) | 52 (41.3) | | 2.40 (0.70 – 8.18) |
| **Total** | **149** | **91 (61.1)** | **58 (38.9)** | | |

Ref., reference; AOR, Adjusted Odds Ratio; n, total observation; P values (χ2), P values obtained from chi-square;a95% confidence intervals;Level of significance: *p<0.05, **p<0.01, ***p<0.001

## Results

The mean (± SD) age of the study population was 51.20 (± 14.65) years old, where about nine out of 10 were female. Most of the respondents were from middle-income families, didn't use tobacco products, never smoked, had no family history of hypertension, and abdominally obese. In this study, the prevalence of hypertension was about 39 percent. From the bivariate analysis, 61 and above-aged populations (53.7% vs. 28.0%) and lower socioeconomic status (52.3% vs. 34.7%) were significantly more hypertensive than the people of less than 40 years old and higher socioeconomic status, respectively. Though abdominally obese people reported being more hypertensive than the normal population, the association was insignificant. In the adjusted logistic regression analysis, though increased age group showed a significant and positive association, the higher socioeconomic status showed a negative association with hypertension. People of 51 to 60 years old and 61 above age group showed 3.11 times and 5.83 times higher odds of having hypertension than 30 to 40 years old where people with high socioeconomic status showed 71 percent less likelihood of being hypertensive than the lower ones (Table 1).

## Discussion

In this study, the prevalence and the risk factors of hypertension among the urban population with a sedentary lifestyle have been investigated. About four out of 10 people, who were leading a sedentary lifestyle, were affected by hypertension. The selected study site, Dania union, is the most densely populated area of Kadamtalithana. People of similar urban areas usually lead sedentary lifestyles due to improved socioeconomic and educational status, change their dietary pattern from a traditional diet to processed and fast foods, and live their daily life with stress, urban congestion, and traffic problem[19]. Such congested living conditions and the absence of physical movement due to rapid unplanned urbanization may contribute largely to the elevated prevalence of hypertension among these sedentary populations of Dania union. Additionally, this finding is consistent with different studies worldwide[9,11]. A study from Bangladesh revealed that participants who were from urban areas and the majority of the study population were female were found to be 10 percent more hypertensive than the rural and male population[11]. Again, about 42 percent of people in the USA had elevated blood pressure who were not engaged with an active lifestyle[9].

This study disclosed that blood pressure was elevated with the increase of age in both bivariate and adjusted analyses. This finding was similar in most of the studies, conducted in different regions of the world[20-22]. An increase in blood pressure has always been taken as an inevitable consequence of ageing in urbanized societies, leading to hypertension in a high proportion of elderly subjects[22]. Elevated blood pressure, which increases with age, is mostly related to arterial and arteriolar stiffness changes. Large artery stiffness (LAS) is occurred mainly due to arteriosclerotic structural alterations and calcification. This leads to earlier reflected pressure waves from the arterioles towards the heart during blood pressurewave propagation. Again, these pressure waves arrive back during systole increasing central systolic blood pressure and widening PP[20].

On the other hand, the increase in DBP up to the age of 50 is mostly due to increased peripheral vascular resistance (PVR) in small vessels. However, both LAS and PVR contribute to an increase in SBP. Again, DBP increases with PVR but decreases with the increase in LAS. Although PVR may initiate hypertension, it is the acceleration of LAS that inclines to the steeper rise in SBP after 50 years of age[23].

Like other studies, this study found that people with a family history of hypertension showed a significant and positive association with hypertension. In the study ofShirakawaet al[24], it was revealed that a family history of hypertension had an additive impact on the age-associated increase in the risk of hypertension. On the other hand,Tozawaet al[25] reported that the greater the number of family members with hypertension was, the greater the prevalence of hypertension and BP in the probands, irrespective of the conventional risk factors for hypertension. For these reasons, people with a family history of hypertension tend to be hypertensive also by themselves.

Like this study, there isample evidence linking socioeconomic status (SES) with the conventional risk factor for hypertension[8,26-27]. These studies reported an increased prevalence of hypertension among the lowest SES in income, occupation, and education compared with the highest SES. The associations were comparatively more significant in developing countries and urban areas[26]. The health system standards and quality control measurements depend on the individual's SES and affordability. This aspect likely

explains by the study ofAntignacet al[28] which showed that uncontrolled hypertension was significantly associated with low individual wealth in low- but not in middle-income countries. Another aspect could explain the elevation of BP among the poor people, that is, the prescribed drugs. Though the number of prescribed antihypertensive drugs did not differ across the individual wealth categories, Antignacet al[28] found that the pharmacological class of antihypertensive medications did differ across individual wealth categories. In their study, patients belonging to higher wealth categories were more frequently prescribed angiotensin receptor blockers. These patients were also more likely to be prescribed β-blockers but less likely to receive diuretics. Finally, the choice of prescribed antihypertensive drugs could be influenced by the socioeconomic status of the patient, and poorer patients being less frequently prescribed expensive antihypertensive drugs. These facts may explain the lower prevalence of hypertension among the wealthy population.

There are some limitations to this study. First, the male-female ratio of the study population was not distributed equally. Since most of the urban male population are engaged with work to maintain their livelihood, comparatively more female populations stay at home and lead sedentary lives. So, because of the face-to-face data collection at daytime, female respondents were more prevalent in the present study. Second, the data were collected from an urban residential area in Dhaka city, where most of the residents were lower-middle class, workless people. So, it is noteworthy that this study was not representative of the diverse group of people (slum dwellers or working population) living in Dhaka and might not represent other parts of Bangladesh.Further studies collecting population-level data from urban and rural areas might provide a comprehensive scenario about the prevalence and risk factors for systemic hypertension in Bangladesh. Third, because of this study's cross-sectional nature, causal inferences couldn't be possible to draw. And finally, blood samples of the participants for further biochemical, molecular, and genetic analysis were not possible to collect due to resource constraints. Apart from theselimitations, random selection was followed in every stage of the sampling frame in this study. Most importantly, this study was conducted with a face-to-face interview. So in-depth data collection and comprehensive understanding were ensured.

## Conclusion

The prevalence of hypertension among the people leading a sedentary lifestyle is found more in this study. The elevated level of BP is positively associated with increased age group and family history of hypertension. But hypertension showsa negative association with higher socioeconomic status. Workless people should maintain a healthy diet with regular physical exercise for reducing elevated BP. Additional effective ways such as- losing overweight,curtailing the excess consumption of sugar and refined carbohydrates, eating more potassium, less sodium and processed foods' and trying meditation or yoga at home, etc. can lower elevated BP immediately. Along with these suggested practices, proper medication and regular BP check-ups are vital for the older aged population to check hypertension. And, finally, Govt. should monitor strictly to maintain the quality of anti-hypertension drugs, so that poor people don't get deprived of getting proper medication to inhibit hypertension.

## References

1. Centers for Disease Control and Prevention. High Blood Pressure Symptoms, Causes, and Problems [Internet]. National Center for Chronic Disease Prevention and Health Promotion: Division for Heart Disease and Stroke Prevention; 2020 May [cited 2020 Sep 22]. Available from: https://www.cdc.gov/bloodpressure/about.htm

2. World Health Organization. Hypertension [Internet]. 2019 Sep [cited 2020 Sep 22]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension

3. World Health Organization. A global brief on hypertension : silent killer, global public health crisis: World Health Day 2013 [Internet]. Geneva: World Health Organization; 2013. Available from: https://apps.who.int/iris/handle/10665/79059

4. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet. 2012;380(9859):2224–60.

5. Zhou B, Bentham J, Cesare MD, Bixby H, Danaei G, Cowan MJ, et al. Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19•1 million participants. The Lancet. 2017;389(10064):37–55.

6. Hasan M, Sutradhar I, Akter T, Das Gupta R, Joshi H, Haider MR, et al. Prevalence and determinants of hypertension among adult population in Nepal: Data from Nepal Demographic and Health Survey 2016. PloS One. 2018;13(5):e0198028.

7. Mendis S. Hypertension: a silent contributor to the global cardiovascular epidemic. In 2013. p. 1–6. (Corpus ID: 74140104).

8. Thawornchaisit P, de Looze F, Reid CM, Seubsman S, Sleigh A. Health-Risk Factors and the Prevalence of Hypertension: Cross-Sectional Findings from a National Cohort of 87 143 Thai Open University Students. Glob J Health Sci. 2013;5(4):126–41.

9. Sohn M-W, Manheim LM, Chang RW, Greenland P, Hochberg MC, Nevitt MC, et al. Sedentary behavior and blood pressure

control among osteoarthritis initiative participants. Osteoarthr Cartil OARS Osteoarthr Res Soc. 2014;22(9):1234–40.
10. Healy GN, Matthews CE, Dunstan DW, Winkler EAH, Owen N. Sedentary time and cardio-metabolic biomarkers in US adults: NHANES 2003-06. Eur Heart J. 2011;32(5):590–7.
11. Chowdhury MAB, Uddin MdJ, Haque MdR, Ibrahimou B. Hypertension among adults in Bangladesh: evidence from a national cross-sectional survey. BMC Cardiovasc Disord. 2016;16(1):22.
12. Kaur M. Blood pressure trends and hypertension among rural and urban Jat women of Haryana, India. Coll Antropol. 2012;36(1):139–44.
13. Islam AKMM, Majumder AAS. Hypertension in Bangladesh: a review. Indian Heart J. 2012;64(3):319–23.
14. Bangladesh Bureau of Statistics, Minnesota Population Center. Population and Housing Census 2001 [Internet]. Minneapolis, MN: University of Minnesota; 2015 [cited 2020 Aug 22]. Available from: https://www.ipums.org/projects/ipums-international/d020.v6.4
15. World Health Organization. Noncommunicable Diseases and Mental Health Cluster. WHO STEPS surveillance manual : the WHO STEPwise approach to chronic disease risk factor surveillance / Noncommunicable Diseases and Mental Health, World Health Organization. STEPS Approche STEPwise OMS Pour Surveill Facteurs Risque Mal Chron Man Surveill STEPS OMS [Internet]. 2005;(WHO/NMH/CHP/SIP/05.02). Available from: https://apps.who.int/iris/handle/10665/43376
16. Bonita R., de Courten M., Dwyer T., Jamrozik K. WR. Surveillance of Risk Factors for Noncommunicable Diseases: The WHO STEPwise Approach. World Health Organ. 2002;
17. Booth GL, Kapral MK, Fung K, Tu J V. Relation between age and cardiovascular disease in men and women with diabetes compared with non-diabetic people: a population-based retrospective cohort study. Lancet. 2006;368(9529):29–36.
18. Misra A, Vikram NK, Gupta R, Pandey RM, Wasir JS, Gupta VP. Waist circumference cutoff points and action levels for Asian Indians for identification of abdominal obesity. Int J Obes. 2006;30(1):106–11.
19. Chowdhury MZI, Rahman M, Akter T, Akhter T, Ahmed A, Shovon MA, et al. Hypertension prevalence and its trend in Bangladesh: evidence from a systematic review and meta-analysis. Clin Hypertens. 2020;26(1):10.
20. Buford TW. Hypertension and Aging. Ageing Res Rev. 2016;26:96–111.
21. Chaudhry SI, Krumholz HM, Foody JM. Systolic Hypertension in Older Persons. JAMA. 2004 Sep 1;292(9):1074–80.
22. Pinto E. Blood pressure and ageing. Postgrad Med J. 2007;83(976):109–14.
23. Vlachopoulos C, O'Rourke M, Nichols WW. McDonald's Blood Flow in Arteries: Theoretical, Experimental and Clinical Principles. 6th Edition. London: CRC Press; 2011. 768 p.
24. Shirakawa T, Ozono R, Kasagi F, Oshima T, Kamada N, Kambe M. Differential impact of family history on age-associated increase in the prevalence of hypertension and diabetes in male Japanese workers. Hypertens Res Off J Jpn Soc Hypertens. 2006;29(2):81–7.
25. Tozawa M, Oshiro S, Iseki C, Sesoko S, Higashiuesato Y, Tana T, et al. Family history of hypertension and blood pressure in a screened cohort. Hypertens Res Off J Jpn Soc Hypertens. 2001;24(2):93–8.
26. Leng B, Jin Y, Li G, Chen L, Jin N. Socioeconomic status and hypertension: a meta-analysis. J Hypertens. 2015;33(2):221–9.
27. Mejía-Lancheros C, Estruch R, Martínez-González MA, Salas-Salvadó J, Corella D, Gómez-Gracia E, et al. Socioeconomic Status and Health Inequalities for Cardiovascular Prevention Among Elderly Spaniards. Rev Esp Cardiol Engl Ed. 2013;66(10):803–11
28. Antignac M, Diop IB, Macquart de Terline D, Kramoh KE, Balde DM, Dzudie A, Ferreira B, Houenassi MD, Hounsou D, Ikama MS, Kane A. Socioeconomic Status and Hypertension Control in Sub-Saharan Africa: The Multination EIGHT Study (Evaluation of Hypertension in Sub-Saharan Africa). Hypertension. 2018;71(4):577-84.