Prevalence, awareness, treatment, and control of hypertension in Bissau, Western Africa

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Abstract
Hypertension is the leading preventable risk factor for cardiovascular diseases. In Guinea–Bissau there are no previous population-based hypertension surveys. Therefore, the authors aimed to estimate the prevalence, awareness, treatment, and control of high blood pressure among adults living in Bissau. A sample (n = 973) of dwellers in Bissau, aged 18–69 years, was assembled through stratified and cluster sampling. Patients underwent face-to-face interviews and blood pressure measurements following the World Health Organization Stepwise Approach to Chronic Disease Risk Factor Surveillance. The prevalence of hypertension was 26.9%, and 51.4% of hypertensive individuals were aware of their condition, of whom 51.8% reported having received pharmacological treatment in the previous 2 weeks. Among the latter, 49.9% had blood pressure values below 140/90 mm Hg. These findings show that hypertension has become a major public health problem in Guinea-Bissau, emphasizing the urgent need to develop and implement national strategies for the prevention and management of hypertension.

KEYWORDS
Western Africa, awareness, drug therapy, Guinea-Bissau, health surveys, hypertension

1 INTRODUCTION

Cardiovascular diseases are the main cause of premature death globally and hypertension is the leading preventable risk factor.1 Over the past decades, hypertension has transitioned from a condition that largely affects high-income countries (HIC) to one that is highly prevalent in low- and middle-income countries (LMIC), including Sub-Saharan Africa.2

In Guinea–Bissau, cardiovascular diseases are estimated to be the second most frequent cause of death with arterial hypertension and dietary factors having an important contribution to the overall number of disability-adjusted life years (DALY).3 However, previous estimates on the burden of hypertension were extrapolated from other countries. Hence, this study aimed to estimate the prevalence, awareness, treatment and control of high blood pressure among adults 18–69 years living in Bissau.
2 METHODS

This is a population-based cross-sectional study, based on the methods proposed by the World Health Organization (WHO) Stepwise approach to Surveillance (STEPS) to Chronic Disease Risk Factor.4

A stratified and cluster sampling frame defined using data from the most recent census was used to select a sample of Bissau dwellers. Fifty primary sampling units (PSU) out of 408 geographical clusters were randomly selected, with a similar probability within each of the eight sectors of the city (strata). In each selected cluster, all households were listed and a total of 373 were randomly selected, with a probability proportional to the number of inhabitants in the corresponding strata. In each selected household, dwellers aged 18–69 years present at home at that time were considered eligible and were listed (as reported by the head of the family or the dweller answering the door, when the former was not present). The first individuals listed were invited, up to a maximum of three. A total of 18 patients refused to participate (1.8%), and 995 were evaluated between January and March 2021.

Blood pressure was measured on a single occasion by nonphysician trained interviewers, using an automatic sphygmomanometer (OMRON M3) with an appropriate cuff size. After a 10-min rest, blood pressure was measured twice, 3 min apart, and a third measurement was performed, after 3 min, if the difference between the first two was higher than 10 mm Hg for systolic or diastolic blood pressure.5 For analysis, the mean of the two first measurements or the mean of the last two when three measurements were done were used. Only one measurement was available for 18 participants, which was used for data analysis. Further, 146 participants with a difference higher than 10 mm Hg between the first two measurements had no data on a third measurement, the average of the first two was used for data analysis. Arterial hypertension was defined as systolic blood pressure ≥ 140 mm Hg and/or diastolic blood pressure ≥ 90 mm Hg and/or antihypertensive drug treatment in the previous 2 weeks. Hypertensive patients were considered aware of hypertension if they had been told by a health professional, in their lifetime, that they had hypertension/high blood pressure or when reporting a pharmacological treatment for hypertension. Participants reporting having used antihypertensive medication in the previous 2 weeks were considered treated pharmacologically for hypertension. Control was defined as systolic blood pressure < 140 mm Hg and diastolic blood pressure < 90 mm Hg among treated hypertensive patients.

2.1 Statistical analysis

From the 995 participants evaluated, 22 who had an unreported age were excluded and a total of 973 were considered for data analysis. All analyses were conducted considering the sampling weights, and adjusting for strata and clustering at the primary sampling unit level using Stata version 15 (StataCorp, College Station, TX, USA). Each participant was assigned a sample weight computed considering the probability of selection at each stage of sampling, as follows: 1/probability of selection of the corresponding PSU * probability of selection of the corresponding household within the PSU * probability of selection of the participant within the household). These weights were further corrected for the prevalence estimates to reflect the sex and age distribution of the population in the city of Bissau, as reported in the latest census.

2.2 Ethics

The study protocol was approved by the Guinea–Bissau National Ethics Committee for Health (097/CNES/INASA/2020).

3 RESULTS

Sample characteristics are described in Table S1.

The overall prevalence of hypertension was 26.9%, which was higher among men than women (29.6% vs. 24.2%). A total of 51.4% of the hypertensive individuals were aware of their health condition, of whom 51.8% reported having received pharmacological treatment in the previous 2 weeks. Among the latter, 49.9% had blood pressure values below 140/90 mm Hg. Women were more frequently aware of their condition than men (54.5% vs. 48.7%, respectively). Women also presented higher levels of reported pharmacological treatment (55.1%) than men (48.7%) and were more likely to have controlled blood pressure values (54.0% vs. 45.5%), as seen in Figure 1.

Significantly higher mean systolic (129.7 vs. 121.8 mm Hg, p < .001), but not diastolic blood pressure (80.7 vs. 79.3 mm Hg, p = .169), were observed among men. The prevalence of hypertension increased with age, and was higher among participants with no formal education (Table 1).

4 DISCUSSION

To our knowledge, this is the first study addressing the prevalence, awareness, treatment and control of hypertension in Bissau.

Although direct comparisons between studies are limited by methodological heterogeneity, our estimates of the prevalence of hypertension are in line with data reported from other African cities such as Accra in Ghana (28.3%) and Dakar in Senegal (27.5%),5,6 but lower than those reported in the adult urban population aged over 24 years in Mozambique.7 The prevalence of hypertension was higher among patients with a lower educational level, as in other urban areas in LMIC,5,6 which is likely to reflect the fact that older residents in Bissau are more likely to have no formal education than younger individuals. High blood pressure was also found to be more prevalent among those with a higher income, in accordance with previous studies showing that a higher socioeconomic position may have an influence in the lifestyles of individuals, predisposing them to arterial hypertension.8

In the present study, awareness of hypertension was similar to the observed in recent surveys conducted in African countries,7 but higher than in other studies from African urban settings.5,10 We found
**FIGURE 1** Prevalence, awareness, treatment and control of hypertension among adults aged 18–69 years in Bissau

**TABLE 1** Prevalence of hypertension, and mean systolic and diastolic blood pressure among women and men, according to sociodemographic characteristics

| Participants' characteristics | Women | | | Men | | |
|------------------------------|------|-----------------|-----------------|
|                              | Hypertension % (95%CI) | SBP Mean (95%CI) | DBP Mean (95%CI) | Hypertension % (95% CI) | SBP Mean (95%CI) | DBP Mean (95%CI) |
| All participants             | 24.2 (19.9–29.0) | 121.8 (119.8–123.8) | 79.3 (77.7–80.9) | 29.6 (25.2–34.4) | 129.7 (127.5–131.9) | 80.7 (79.1–82.4) |
| Age, years                   | | | | | | |
| 18–24                        | 7.8 (3.5–16.7) | 116.1 (114.1–118.9) | 73.0 (71.9–74.1) | 10.6 (5.6–19.2) | 122.3 (120.1–126.5) | 74.4 (72.1–76.7) |
| 25–34                        | 15.2 (11.4–20.0) | 115.7 (113.5–117.9) | 76.5 (74.3–78.7) | 19.9 (13.0–29.2) | 126.8 (124.4–129.1) | 78.7 (76.7–80.7) |
| 35–44                        | 31.1 (22.7–40.9) | 124.5 (119.8–129.2) | 83.7 (80.6–86.7) | 48.9 (34.3–63.7) | 133.5 (126.5–140.6) | 87.0 (81.0–93.0) |
| 45–54                        | 55.9 (36.9–73.4) | 140.3 (130.8–150.0) | 90.2 (84.2–96.2) | 37.5 (21.1–57.4) | 133.9 (127.1–140.6) | 85.8 (81.0–93.0) |
| 55–69                        | 70.8 (48.5–86.2) | 140.5 (133.2–144.9) | 90.3 (86.1–94.5) | 87.2 (63.3–96.4) | 152.1 (142.0–162.0) | 91.3 (85.9–96.8) |
| Education, years             | | | | | | |
| No school                    | 42.3 (27.9–58.1) | 129.9 (124.3–135.5) | 85.8 (82.3–89.4) | 47.3 (24.5–71.3) | 135.7 (124.3–135.5) | 86.0 (80.9–91.1) |
| 1–6                          | 17.9 (11.2–27.3) | 122.0 (118.2–124.3) | 78.8 (76.0–81.7) | 30.5 (18.5–45.9) | 132.1 (125.9–138.3) | 82.1 (75.9–88.4) |
| 7–12                         | 20.3 (12.9–30.4) | 119.8 (116.6–123.0) | 77.4 (74.6–80.1) | 25.8 (17.6–36.2) | 128.9 (125.0–132.7) | 79.1 (77.1–81.1) |
| > 12                         | 20.8 (12.6–32.4) | 115.6 (112.7–118.4) | 76.1 (73.2–79.0) | 31.4 (20.6–44.8) | 128.0 (124.1–131.6) | 81.2 (78.5–83.9) |
| Income, USD/year*            | | | | | | |
| No income                    | 26.2 (17.7–37.1) | 121.6 (119.0–124.3) | 79.1 (76.8–81.3) | 29.2 (20.8–39.2) | 129.2 (125.8–132.6) | 78.6 (75.8–81.5) |
| 1–569                        | 9.1 (3.8–20.3) | 118.2 (114.0–122.3) | 78.1 (74.2–82.0) | 23.2 (6.0–58.7) | 124.7 (117.2–132.2) | 78.0 (72.6–83.3) |
| 570–1899                     | 23.0 (13.3–36.7) | 124.5 (118.9–130.0) | 81.1 (77.3–84.8) | 21.9 (11.9–36.7) | 128.7 (124.7–132.7) | 81.6 (78.9–84.4) |
| ≥ 1900                      | 26.7 (13.2–46.5) | 121.7 (111.5–131.8) | 78.4 (73.9–82.8) | 30.6 (14.7–64.7) | 132.8 (123.7–140.6) | 83.1 (77.2–88.9) |

**Abbreviations**: CI, confidence interval; DBP, diastolic blood pressure; SBP, systolic blood pressure.

*The conversion between the local currency (XOF) and United States dollars (USD) was performed using the exchange rate 1 XOF = 0.0018 USD.

that awareness was more frequent among women, as in previous studies.\textsuperscript{6,7,10} This may reflect the fact that women have more frequent contact with healthcare services through maternity and child health programs, which allow for the detection of high blood pressure during pregnancy or postpartum visits.\textsuperscript{6,7,10}

The low prevalence of treatment and control among hypertensive individuals in our study may be attributed to factors such as poor access to health facilities, high cost of drugs, and poverty.\textsuperscript{11} The national health system priorities are mostly directed to the control of communicable diseases, acute disorders, and child and maternal healthcare, neglecting to some extent noncommunicable diseases, including hypertension. For example, medications used in the treatment of the main infectious diseases (Malaria, Tuberculosis and HIV) are free of charge, whereas hypertensive patients have to buy
antihypertensive drugs with out-of-pocket costs – which increases the cost of healthcare and may consequently contribute to poor treatment and control of hypertension.\textsuperscript{12} Moreover, it can be extremely challenging for individuals with a low income to continue with the lifelong management of chronic conditions.\textsuperscript{13} Most of their available resources are used for basic needs, and healthcare expenses threaten their financial capacity to maintain subsistence.\textsuperscript{14}

Targeted prevention and control measures are needed to face this high burden of hypertension. A strategic plan on noncommunicable diseases and population health education may contribute to improve hypertension prevention and management in the country. Such a strategic plan could include interventions, such as increasing opportunities for exercise through environmental engineering around the city, antismoking legislation, and food labeling for salt content and lipids.\textsuperscript{10}

The present study was based on the standard STEPS methodology and the participation rate was high. However, some limitations need to be considered. The prevalence of hypertension is likely to be overestimated, because blood pressure measurements were made on a single occasion. However, this approach has been followed in similar STEPS surveys conducted in other settings, and therefore the comparability with other similar surveys is not compromised. Our study was conducted in the capital city of Guinea–Bissau, which precludes generalization to rural regions and smaller urban settings. Finally, participants within each household were not randomly selected, which may have contributed to an oversampling of women and older participants. However, a weight correction based on the expected age and sex distribution of the population was implemented to minimize these imbalances.

5 | CONCLUSIONS

The current study shows that hypertension must be regarded as a major public health problem in Guinea–Bissau, which needs to be monitored. The already high prevalence and suboptimal management of hypertension emphasize the urgent need to develop and implement national strategies for the prevention and management of high blood pressure.

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CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTIONS

Ruben Turé - Conceived and designed the analysis, Collected the data, Performed the analysis, Albertino Damasceno - Reviewed the paper. Mouhammed Djicó - Reviewed the paper. Nuno Lunet - Performed the analysis, Reviewed the paper.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher’s website.

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