Hypertension Prevalence and Mortality in Rwanda (2022–2023): Insights from STEPS and CRVS Data

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EXECUTIVE SUMMARY

Hypertension remains a public health challenge in Rwanda, contributing to preventable deaths from cardiovascular diseases. This report analyzes 2022-2023 data to identify trends and propose actionable solutions. Analysis of data revealed:

- Gender disparity persists, with women facing higher hypertension mortality (6.31/100,000) than men (4.98/100,000), likely due to biological risks and healthcare access barriers.
- District differences in prevalence and mortality rates demand attention, as Muhanga District records the highest prevalence (32%) while Nyarugenge has the highest mortality (13.1/100,000), reflecting uneven healthcare access and referral patterns.

The report highlights the need for enhanced public health interventions, including widespread screening, improved hypertension management, and education campaigns to raise awareness about lifestyle modifications. Recent progress offers hope, as Rwanda's Noncommunicable Diseases Strategic Plan (2020–2025) and Community Health Workers (CHWs) network provide a foundation for scalable interventions.

INTRODUCTION

Hypertension, commonly known as high blood pressure, is a major public health issue with an estimated 1.28 billion adults aged 30-79 years diagnosed with the condition worldwide [1,2]. It is a leading risk factor for cardiovascular diseases, stroke, kidney failure, and premature mortality. The prevalence of hypertension has been steadily increasing, largely due to changes in lifestyle, diet, and an aging population. According to the World Health Organization (WHO), hypertension affects 27% of the adult population in sub-Saharan Africa [2,3]. Rwanda is no exception.

Hypertension affects 16% of adults in Rwanda and adds to the growing burden of non-communicable diseases (NCDs), putting more pressure on the health system [4]. The condition often remains undiagnosed and untreated due to limited awareness and insufficient screening programs.

This report aims to present the current state of hypertension in Rwanda, and associated mortality. By understanding the factors contributing to the rise of hypertension in Rwanda, policymakers and healthcare providers can better design targeted interventions to reduce its mortality and impact on the health system.

METHODS

This study employed a dual-data approach to analyze hypertension in Rwanda. For prevalence

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data, we utilized the 2022 STEPwise approach to NCD risk factor surveillance (STEPS) Survey, a nationally representative study that implemented multi-stage cluster sampling across all districts [5]. The STEPs survey data incorporated population weights to ensure national representativeness. Trained personnel collected blood pressure measurements using standardized protocols with calibrated digital devices, with results expressed as percentages to align with WHO reporting standards for population surveys. The prevalence calculation followed the formula: (Number of hypertensive adults ÷ Total surveyed adults) × 100, with age-standardization using the WHO reference population.

Mortality analysis relied on the 2023 Civil Registration and Vital Statistics (CRVS) system, which aggregates death records from all health facilities nationwide. Hypertension-related deaths were identified using the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10 codes) (I10-I15) [6]. Mortality rates were calculated per 100,000 population using 2022 national census. The rate formula was: (Hypertension-attributed deaths ÷ Mid-year population) × 100,000.

Data processing involved rigorous cleaning in Microsoft Excel to address duplicates and outliers. Analytical procedures included descriptive statistics, and cases were stratified by gender, and district. Visualization tools (Python's Matplotlib/ Geopandas and Excel) generated district-level comparative charts.

The differing rate metrics (percentages for prevalence vs. per 100,000 for mortality) were intentionally selected to meet distinct analytical needs: percentages effectively communicate population burden, while standardized mortality rates enable precise tracking of relatively rare events and support cross-national benchmarking.

POPULATION DISEASE TRENDS

Analysis of the data indicates that hypertension-related mortality in Rwanda varies by gender. As shown in Table 1, the total number of deaths attributed to hypertension in 2023 was 750, with a mortality rate of 5.66 per 100,000 people. Males accounted for 320 deaths, with a mortality rate of 4.98 per 100,000, while females had a higher mortality rate of 6.31 per 100,000, with a total of 430 deaths.

Figure 1 provides a graphical representation of hypertension prevalence across the 30 districts in Rwanda. In 2022, Gatsibo district had the lowest prevalence rate (13%) while Muhanga district had the highest (32%), with the overall national prevalence rate being 16.2%.

Figure 2 illustrates hypertension-related mortality by province. Kigali City recorded the highest number of deaths attributed to hypertension, with a total mortality rate of 8.4 per 100,000 population. Females contributed a larger share, with a rate of 9.5 per 100,000. In contrast, the Eastern Province had the lowest mortality rate at 4.1 per 100,000, with males exhibiting a slightly higher death rate than females.

Figure 3 presents the hypertension mortality rate per 100,000 in Rwanda by district in 2023. Although Gatsibo district had the lowest prevalence of hypertension in 2022, Kirehe had the lowest mortality rate per 100,000 (2.4) in 2023. Although Nyarugenge district was below the national prevalence rate (12% vs. 16.2%) in 2022, it had the highest mortality rate (13.1) in 2023.

DISCUSSION

The findings of this report highlight gender disparities in hypertension-related mortality in Rwanda, with females exhibiting a higher mortality rate (6.31 per 100,000) compared to males (4.98 per 100,000). This finding aligns with global trends where women, particularly in low- and middle-income countries in Africa, often experience higher hypertension-related morbidity and mortality due to biological factors, healthcare

Table 1: *Hypertension-related mortality rates by gender in Rwanda, 2023.*

Gender	Population	Hypertension related deaths	Mortality rate per 100,000
Male	6,429,326	320	4.98
Female	6,817,068	430	6.31
Total	13,246,394	750	5.66

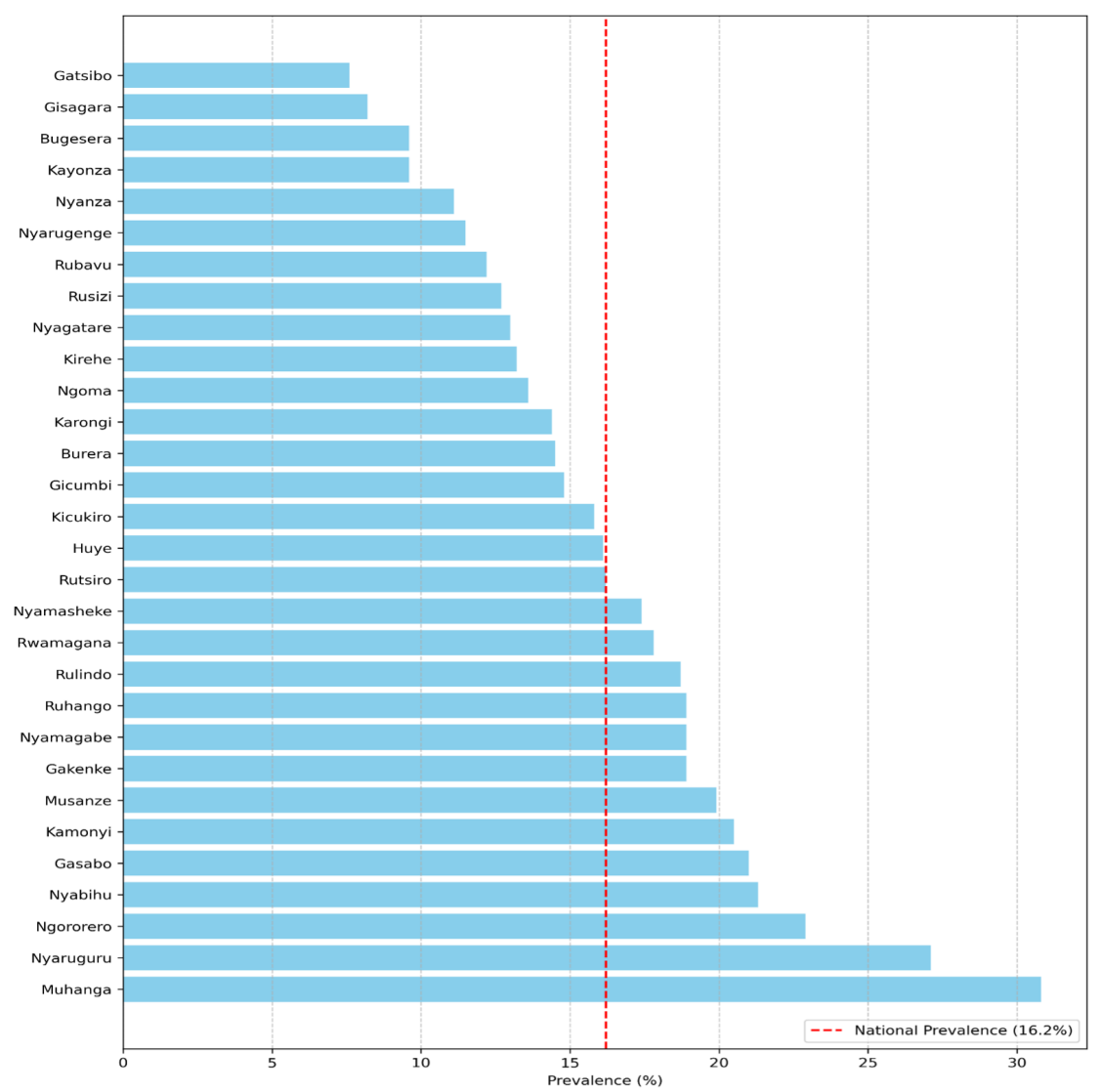

Figure 1: *Hypertension prevalence by district in Rwanda, 2022.*

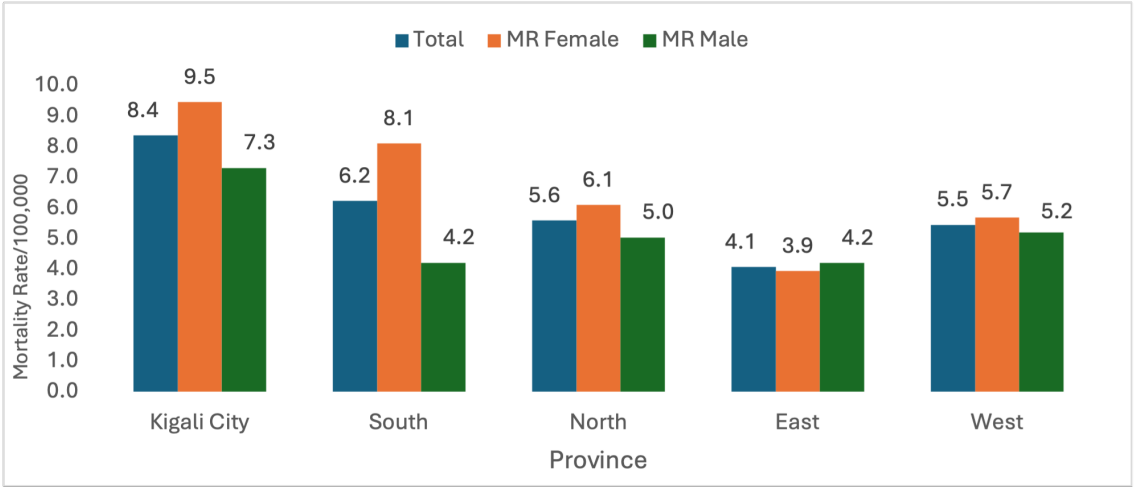

Figure 2: *Hypertension mortality rates by gender and provinces in Rwanda, 2023*

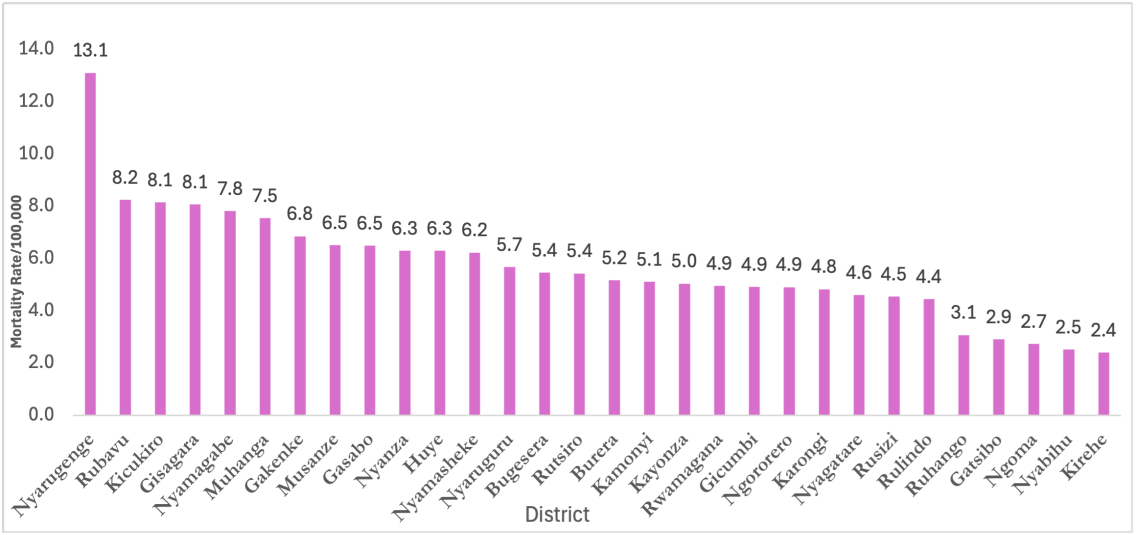

Figure 3: *Hypertension mortality rates per 100,000 people by district in Rwanda, 2023*

access disparities, and sociocultural barriers [7]. For instance, hormonal changes during menopause and pregnancy-related complications can exacerbate hypertension risks in women [8,9]. Additionally, cultural norms may delay women from seeking timely medical care, leading to advanced disease stages at diagnosis

The report also reveals district disparities, with Nyarugenge district recording the highest mortality rate (13.1 per 100,000) in 2023, while Muhanga had the highest prevalence (32%) in the 2022 STEPS survey [5]. This discrepancy can be attributed to differences in data collection methodologies used. The CRVS data, which tracks mortality, may reflect Nyarugenge's status as a hub for referral health facilities, including the University Teaching Hospital (one of the largest), where severe cases from other districts are often managed, thereby inflating mortality figures. In contrast, the STEPS survey, a population-based assessment, captures prevalence through community screenings, which may explain Muhanga's higher prevalence, possibly due to localized risk factors like diet or lifestyle [3]. Such methodological variations underscore the need for integrated data systems to harmonize findings for policy action.

Rwanda has made notable progress in addressing hypertension through policies like the Rwanda Non-Communicable Diseases (NCDs) Strategic Plan (2020–2025), which emphasizes community-based screenings and task-shifting to community health workers (CHWs) [10]. The integration of hypertension management into the national CHW program has improved early detection, particularly in rural areas [11]. However, challenges persist, including limited access to medications and diagnostic tools in peripheral facilities, which disproportionately affect women and rural populations [4].

Limitations: This study has some limitations. First, the reliance on CRVS data may underreport hypertension-related deaths due to misclassification or incomplete records, especially in rural areas. As of 2024, the CRVS completeness rate was 41%. Second, the STEPS survey's cross-sectional design limits causal inferences. Third, regional disparities in healthcare infrastructure, such as Nyarugenge's referral status, may skew mortality data. Finally, the analysis does not account for comorbidities like diabetes, which could influence mortality rates.

RECOMMENDATIONS

To effectively reduce hypertension-related mortality and prevalence in Rwanda, the following evidence-based and actionable recommendations are proposed: (1) the Rwanda Biomedical Centre should expand community-based hypertension screening through trained Community Health Workers, prioritizing high-burden districts like Muhanga and Nyarugenge while leveraging existing digital reporting tools; (2) the Ministry of Health must improve rural access to treatment by decentralizing antihypertensive medications

to health centers and training nurses to manage uncomplicated cases, supported by Rwanda's existing drug supply system; (3) targeted public awareness campaigns led by the Rwanda Broadcasting Agency and local leaders should promote salt reduction and regular blood pressure checks through radio, SMS, and community outreach programs; and finally (4) health facilities should integrate hypertension data into DHIS2 for real-time monitoring, while annual district audits and improved death reporting ensure accurate tracking of intervention outcomes.

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