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Metabolic Health in the Horn of Africa: Insights from the 2020 Somalia and Somaliland Health and Demographic Surveys

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Background:

The epidemiology of insulin resistance (IR) and its role in cardiometabolic disorders, such as diabetes and heart disease, remains underexplored in rural and nomadic communities. Few studies compare these populations within the same region. Using survey data from Somalia and Somaliland, this study examines differences in metabolic disease burden amid urbanization, dietary change, and shifting lifestyles.

Methods:

This retrospective cohort study analyzed data from the 2020 Somalia (SHDS) and Somaliland (SLHDS) Health and Demographic Surveys. National prevalence estimates for chronic disease, diabetes, hypertension, cardiovascular outcomes (heart disease and stroke), and behavioral risk factors (tobacco and khat use) were extracted from published tables to calculate prevalence ratios (PR) and coefficients of variation (CV) by sex and residential setting (urban, rural, nomadic).

Results:

Among those with physician-diagnosed chronic disease (Somalia 5.7%; Somaliland 6.9%), diabetes accounted for 20.4% and 19.1%, and hypertension for 33.3% and 41%, respectively. Diabetes prevalence was about fivefold higher in urban than nomadic groups in Somalia (1.5% vs 0.3%; PR = 5.3) and nearly tenfold higher in Somaliland (2.0% vs 0.2%; PR = 9.4). Males had a higher diabetes burden (Somalia PR = 1.3; Somaliland PR = 1.5), while females had higher hypertension (Somalia 34.7%; Somaliland 45.4%). Diabetes variability across settings (CV: Somalia 50%; Somaliland 73%) indicated marked geographic disparity.

Conclusion:

Urbanization increases metabolic disease, but nomadic groups, though using khat more often, do not show higher hypertension. More complete data, including lipid profiles, are needed to understand emerging cardiometabolic risks.

Keywords:

Insulin resistance, Urbanization, Metabolic disease, Cardiometabolic risk

Abbreviations:

Insulin resistance (IR), Somaliland Health and Demographic Surveys (SLHDS), Somalia Health and Demographic Surveys (SHDS)

Funding and Competing Interests:

We did not receive any funding for this study. We declare that we have no competing interests.

Ethics Approval:

We used publicly available, de-identified data from the 2020 Somalia Health and Demographic Survey (SHDS) and the 2020 Somaliland Health and Demographic Survey (SLHDS). Because the data were already anonymized and collected under national ethical approval, we did not need additional ethical approval for this analysis.

Background:

Type 2 diabetes and other cardiometabolic disorders represent a growing public health challenge worldwide. This increasing burden reflects the complex interaction between biological susceptibility, environmental exposures, lifestyle behaviors, and broader socioeconomic changes. By 2045, approximately one-quarter of adults aged 75–79 years are projected to have diabetes, a major cardiovascular risk factor. (1). Approximately 80% of individuals with diabetes reside in low- and middle-income countries, where rapid demographic and epidemiological transitions are contributing to an increasing burden of noncommunicable diseases (NCDs) (2). Sub-Saharan Africa is particularly vulnerable, with diabetes cases projected to increase by 129% between 2021 and 2045, representing the fastest projected growth of any region (1). Despite these trends, the epidemiology of cardiometabolic disease remains inadequately characterized in many parts of sub-Saharan Africa, particularly among rural and nomadic populations.

Across Somalia and Somaliland, urbanization and changing lifestyles may be contributing to an emerging burden of cardiometabolic disease. Shifts in dietary patterns, including increased consumption of processed foods high in refined carbohydrates, sodium, and unhealthy fats, may contribute to metabolic risk (3,4). Urban living may also be associated with reduced physical activity as occupations become more sedentary, and motorized transportation becomes increasingly common. These changes may contribute to overweight and obesity, both of which are associated with insulin resistance, hypertension, and dyslipidemia (5-7). Additional exposures, including tobacco use, psychosocial stress, and economic insecurity, may further influence cardiometabolic health. However, the extent to which these factors contribute to differences in disease burden across residential settings in Somalia and Somaliland remains poorly understood.

Limited healthcare access presents an additional challenge to the prevention, detection, and management of cardiometabolic conditions in the region. Healthcare infrastructure remains unevenly distributed, with shortages of trained healthcare professionals, limited diagnostic resources, and substantial geographic barriers to accessing medical services (8). High out-of-pocket healthcare expenditures may further discourage preventive care and delay the diagnosis and treatment of chronic diseases (9). These challenges may be particularly pronounced among rural and nomadic populations, whose geographic mobility and distance from established healthcare facilities can limit access to routine screening and long-term disease management. As a result, differences in reported cardiometabolic disease across residential settings may reflect not only variation in underlying disease risk but also disparities in healthcare access and diagnostic opportunities.

Somalia and Somaliland provide a distinctive setting for examining these disparities. Although the two settings share historical, linguistic, and cultural ties, their governance structures and healthcare systems have developed different trajectories since Somaliland's declaration of independence in 1991 (10). These differences may influence healthcare delivery, disease surveillance, and access to preventive services. At the same time, both settings contain urban, rural, and nomadic populations with potentially different dietary patterns, physical activity levels, and healthcare-seeking behaviors. Examining cardiometabolic disease across these residential settings may therefore provide valuable insights into geographic and demographic disparities within the broader Somali region.

Despite growing recognition of the burden of NCDs in Somalia and Somaliland, population-level comparisons of cardiometabolic conditions across urban, rural, and nomadic communities remain limited. Previous investigations have examined selected cardiometabolic risk factors in urban

populations, including Hargeisa, Somaliland, while other studies have evaluated cardiovascular disease using national survey data (11,12). However, comparatively little attention has been directed toward differences in reported diabetes and hypertension across residential settings, particularly among nomadic populations. This gap is important because nomadic communities may experience distinct lifestyle exposures and barriers to healthcare access that influence both cardiometabolic risk and the likelihood of receiving a diagnosis.

To address these gaps, this study uses data from the 2020 Somalia Health and Demographic Survey (SHDS) and the 2020 Somaliland Health and Demographic Survey (SLHDS) to characterize reported cardiometabolic disease across urban, rural, and nomadic populations. Specifically, we examine differences in self-reported physician-diagnosed diabetes, hypertension, and other chronic conditions by sex and residential setting, alongside selected behavioral risk factors, including tobacco and khat use. By comparing populations across distinct residential environments within the broader Somali region, this study aims to identify disparities in reported cardiometabolic disease and highlight potential gaps in disease detection and healthcare access. These findings may inform future epidemiological investigations and support the development of context-specific strategies for cardiometabolic disease screening, prevention, and management.

Study Design and Data Sources

This study was a secondary cross-sectional analysis of publicly available data from the 2020 Somalia Health and Demographic Survey (SHDS) and the 2020 Somaliland Health and Demographic Survey (SLHDS). Both surveys collected information on demographic

characteristics, household conditions, healthcare access, chronic disease diagnoses, and selected behavioral risk factors. Published aggregate survey tables were used to examine differences in reported cardiometabolic disease burden between Somalia and Somaliland, with particular emphasis on variations by sex and residential setting.

Data were extracted from published survey reports, including estimates of chronic disease, diabetes, hypertension, heart disease, stroke, tobacco use, and khat consumption. All analyses were conducted using aggregate estimates rather than individual-level participant data.

Study Population

The SHDS included 98,992 individuals, comprising 48,354 males and 50,683females, from 15,841 interviewed households, with a reported household response rate of 99.7%. The SLHDS included 24,797 individuals, comprising 11,486 males and 13,011 females, from 6,044 interviewed households, with a reported household response rate of 95.8%.

Respondents were categorized by sex and residential setting (urban, rural, or nomadic) according to the classifications used in the original survey reports. Age-specific estimates were also examined to characterize patterns of reported chronic disease across age groups.

The analysis included available aggregate estimates for the selected health outcomes. Because the survey questions applied to different eligible populations, the overall survey population did not necessarily represent the denominator for every outcome. Behavioral risk factor estimates for tobacco and khat use were reported among household members aged 10 years and older.

Study Variables and Outcome Measures

The primary outcomes were self-reported physician-diagnosed diabetes and hypertension. Secondary outcomes included the presence of at least one reported chronic disease, heart disease, and stroke.

Chronic disease prevalence was defined as the proportion of respondents reporting at least one physician-diagnosed chronic condition. Diabetes was reported in the published tables as the proportion of respondents with chronic disease who reported a diabetes diagnosis. Accordingly, diabetes was examined both as a proportion of reported chronic disease and as a derived estimate of diabetes prevalence in the corresponding survey population.

The principal comparison variables were geographic setting (Somalia or Somaliland), sex (male or female), and residential classification (urban, rural, or nomadic). Age-specific chronic disease estimates were examined descriptively.

Selected behavioral risk factors, including tobacco use and khat consumption, were also examined by sex and residential setting. These variables were analyzed descriptively and were not used to establish causal relationships with cardiometabolic outcomes.

The available data did not include direct measurements of fasting glucose, glycated hemoglobin (HbA1c), fasting insulin, lipid profiles, or blood pressure. Consequently, insulin resistance and undiagnosed cardiometabolic disease could not be directly assessed.

Data Extraction and Statistical Analysis

Published prevalence estimates were extracted from the SHDS and SLHDS reports and organized by geographic setting, sex, residential classification, and disease category. Descriptive statistics were used to summarize reported chronic disease burden and selected behavioral risk factors.

Because diabetes estimates were reported as a proportion of respondents with chronic disease, derived population-level diabetes prevalence was calculated by multiplying the prevalence of at least one reported chronic disease by the proportion of respondents with chronic disease who reported diabetes: Diabetes prevalence = Chronic disease prevalence × Proportion of individuals with chronic disease who have diabetes. This calculation assumes that the two estimates were derived from the same underlying population and that individuals reporting diabetes were included among respondents reporting at least one chronic disease.

Prevalence ratios (PRs) were calculated to compare disease burden between population groups. For each comparison, the PR was defined as the prevalence in the comparison group divided by the prevalence in the reference group: PR = Prevalence in comparison group ÷ Prevalence in reference group. Urban-to-nomadic PRs were calculated using derived population-level diabetes prevalence estimates, with nomadic populations serving as the reference group. Sex-specific comparisons were also examined, with females serving as the reference group for male-to-female diabetes comparisons.

To describe variation in the proportion of chronic disease attributable to diabetes across residential settings, the coefficient of variation (CV) was calculated using the urban, rural, and nomadic diabetes percentages reported among respondents with chronic disease: CV = (Standard deviation ÷ Mean prevalence) × 100, where the standard deviation (SD) represents the variation in prevalence estimates across urban, rural, and nomadic populations, and the mean prevalence represents the average of these three estimates. The CV was interpreted as a descriptive measure of relative variation across residential settings rather than a measure of statistical uncertainty.

All analyses were descriptive and based on published aggregate estimates. Individual-level regression analyses and adjustment for potential confounding variables were not performed.

Confidence intervals and hypothesis testing were not conducted for the derived comparisons because the necessary outcome-specific denominators and survey-design variance information were unavailable.

Ethical Considerations

This study used publicly available, de-identified aggregate data from the 2020 Somalia Health and Demographic Survey and the 2020 Somaliland Health and Demographic Survey. No identifiable participant information was accessed, and no direct contact with human participants occurred. As the study involved secondary analysis of publicly available aggregate data, additional institutional ethics approval was not sought.

Results

Table 1. Sex-Specific Differences in Cardiometabolic Disease Burden in Somalia and Somaliland

Cardiometabolic Condition	Somalia (SHDS 2020)			Somaliland (SLHDS 2020)		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
Any chronic disease	4.7	6.7	5.7	5.8	8.0	6.9
Diabetes (among chronic disease respondents)	23.6	18.2	20.4	23.8	15.8	19.1
Estimated diabetes prevalence*	1.11	1.22	1.17	1.38	1.26	1.32
Hypertension	31.2	34.7	33.0	34.9	45.4	40.3
Heart disease	3.6	6.6	5.1	5.6	7.7	6.7
Stroke	2.3	1.2	1.8	4.6	1.8	3.1

Table 1 summarizes sex-specific differences in reported cardiometabolic disease across Somalia and Somaliland. Females reported a higher overall proportion of chronic disease than males in both settings, while diabetes accounted for a greater proportion of chronic disease diagnoses among males. Hypertension and heart disease were more frequently reported among females, whereas stroke was more frequently reported among males.

Table 2. Residential Differences in Cardiometabolic Disease Burden Across Urban, Rural, and Nomadic Populations in Somalia and Somaliland

Cardiometabolic Condition	Somalia (SHDS 2020)			Somaliland (SLHDS 2020)		
	Urban (%)	Rural (%)	Nomadic (%)	Urban (%)	Rural (%)	Nomadic (%)
Any chronic disease	6.5	4.7	3.5	8.4	6.5	3.9
Diabetes (among chronic disease respondents)	22.8	14.6	7.9	23.8	10.3	5.5
Estimated diabetes prevalence*	1.48	0.69	0.28	2.00	0.67	0.21
Hypertension	33.9	33.2	25.1	43.1	41.5	26.3
Heart disease	5.4	5.4	4.3	6.8	7.8	5.3
Stroke	1.6	1.9	1.3	3.2	2.6	1.6

Table 2 presents differences in reported cardiometabolic disease across urban, rural, and nomadic populations. Chronic disease and estimated diagnosed diabetes prevalence were highest among urban populations and lowest among nomadic populations in both settings. Reported hypertension followed a similar pattern, while heart disease and stroke demonstrated less consistent residential differences.

Table 3. Sex- and Residence-Specific Patterns of Tobacco and Khat Consumption in Somalia and Somaliland

Behavior	Somalia (SHDS 2020)			Somaliland (SLHDS 2020)		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
Tobacco use	7.9	0.8	4.2	14.3	1.1	7.3
Khat use	9.0	0.4	4.5	18.2	0.8	8.9

Behavior by Residential Setting	Somalia (SHDS 2020)			Somaliland (SLHDS 2020)		
	Urban (%)	Rural (%)	Nomadic (%)	Urban (%)	Rural (%)	Nomadic (%)
Tobacco use	3.9	4.1	5.8	6.4	8.4	8.2
Khat use	4.1	4.7	6.2	8.4	9.7	11.1

Table 3 summarizes tobacco and khat consumption by sex and residential setting. Both behaviors were more common among males and were reported more frequently in Somaliland than Somalia. Khat consumption was highest among nomadic populations in both settings, whereas tobacco use was highest among nomadic residents in Somalia and rural residents in Somaliland.

Table 4. Urban-to-Nomadic Prevalence Ratios of Estimated Diagnosed Diabetes in Somalia and Somaliland

Residential Setting	Somalia (SHDS 2020)		Somaliland (SLHDS 2020)	
	Estimated diabetes prevalence (%)	Urban-to-nomadic prevalence ratio	Estimated diabetes prevalence (%)	Urban-to-nomadic prevalence ratio
Urban	1.48	5.36	2.00	9.32
Rural	0.69	—	0.67	—
Nomadic	0.28	—	0.21	—

Table 4 presents the urban-to-nomadic prevalence ratios for estimated diagnosed diabetes. Urban populations demonstrated 5.36-fold higher estimated prevalence than nomadic populations in Somalia and 9.32-fold higher prevalence in Somaliland.

Figure 1. Chronic Disease Prevalence by Residential Setting in Somalia and Somaliland

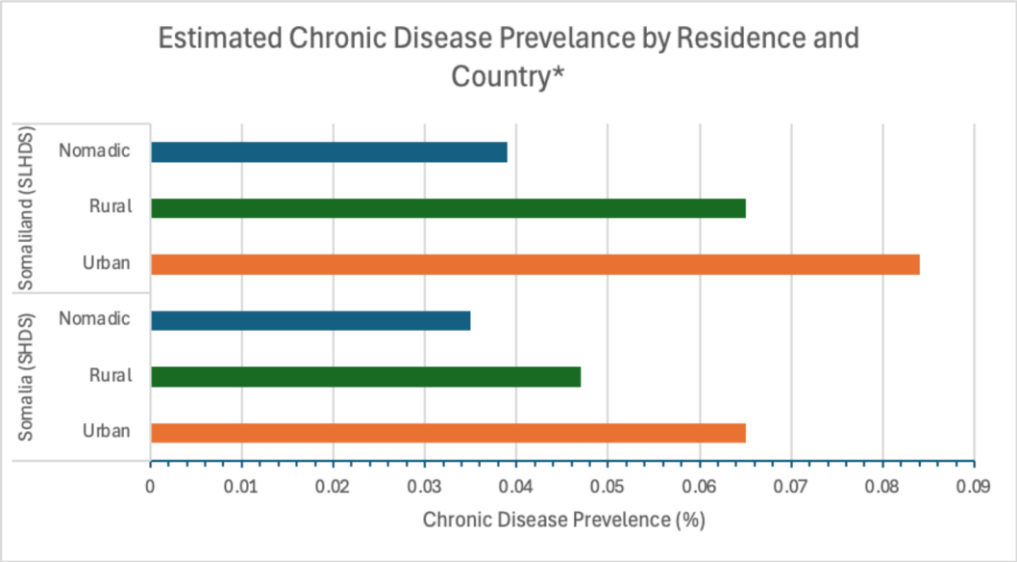


Figure 1 illustrates chronic disease prevalence by residential setting in Somalia and Somaliland. Prevalence was highest among urban populations and lowest among nomadic populations in both settings, with consistently higher rates observed in Somaliland.

Figure 2. Proportion of Reported Diabetes Among Respondents With Chronic Disease by Residential Setting in Somalia and Somaliland

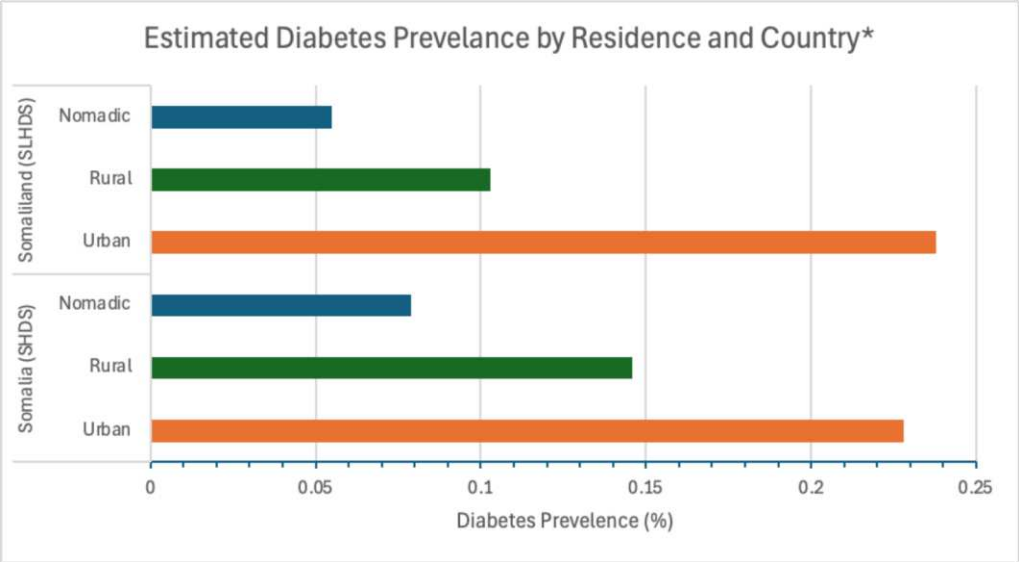


Figure 2 illustrates reported diabetes among respondents with chronic disease across residential settings in Somalia and Somaliland. The proportion was highest among urban populations and lowest among nomadic populations in both settings, with a more pronounced residential difference in Somaliland.

Study Population and Survey Characteristics

The 2020 Somalia Health and Demographic Survey (SHDS) included 97,640 individuals from 15,761 households, with a household response rate of 99.3%. The survey population consisted of 47,523 males and 50,117 females. The 2020 Somaliland Health and Demographic Survey (SLHDS) included 35,965 individuals from 5,994 households, with a household response rate of 95.8%, comprising 17,231 males and 18,734 females. These surveys provided aggregate information on self-reported chronic disease and selected behavioral risk factors across urban, rural, and nomadic populations.

Overall Burden of Chronic Disease

The proportion of respondents reporting a physician-diagnosed chronic disease was higher in Somaliland (6.9%) than in Somalia (5.7%). In both populations, females reported a greater proportion of chronic disease than males. In Somalia, chronic disease was reported by 6.7% of females compared with 4.7% of males. Similarly, in Somaliland, the corresponding proportions were 8.0% and 5.8%, respectively.

Differences were also observed across residential settings. In Somalia, the proportion reporting chronic disease was highest among urban populations (6.5%), followed by rural (4.7%) and nomadic populations (3.5%). A similar pattern was observed in Somaliland, where chronic disease was reported by 8.4% of urban residents, 6.5% of rural residents, and 3.9% of nomadic residents (Tables 1 and 2).

Diabetes Burden Across Residential Settings

Among respondents reporting chronic disease, the proportion reporting diabetes was 20.4% in Somalia and 19.1% in Somaliland. In both settings, this proportion was highest among urban populations and lowest among nomadic populations.

In Somalia, diabetes was reported by 22.8% of urban respondents with chronic disease, compared with 14.6% of rural and 7.9% of nomadic respondents. In Somaliland, the corresponding proportions were 23.8%, 10.3%, and 5.5%, respectively.

Estimated population-level diagnosed diabetes prevalence was calculated by multiplying the proportion reporting chronic disease by the proportion of chronic disease respondents reporting diabetes. In Somalia, the resulting estimates were 1.48% among urban populations, 0.69%

among rural populations, and 0.28% among nomadic populations. In Somaliland, estimated prevalence was 2.00%, 0.67%, and 0.21%, respectively.

The urban-to-nomadic prevalence ratio was 5.36 in Somalia and 9.32 in Somaliland, indicating substantially higher estimated diagnosed diabetes prevalence among urban populations in both settings (Tables 2 and 4).

Sex Differences in Diabetes

Among respondents with chronic disease, diabetes was more frequently reported by males than females in both Somalia and Somaliland. In Somalia, 23.6% of males with chronic disease reported diabetes compared with 18.2% of females. In Somaliland, the corresponding proportions were 23.8% and 15.8%.

However, estimated population-level diagnosed diabetes prevalence showed smaller differences between sexes. In Somalia, estimated prevalence was 1.11% among males and 1.22% among females. In Somaliland, estimated prevalence was 1.38% among males and 1.26% among females.

These findings demonstrate that sex differences in diabetes varied according to whether the outcome was expressed as a proportion of chronic disease respondents or as an estimated prevalence in the broader population (Tables 1 and 4).

Hypertension, Heart Disease, and Stroke

Reported hypertension was more common among females than males in both survey populations. In Somalia, the reported proportions were 34.7% among females and 31.2% among males. In Somaliland, the corresponding proportions were 45.4% and 34.9%.

Across residential settings, reported hypertension was highest among urban populations in both settings. In Somalia, the proportions were 33.9% among urban residents, 33.2% among rural residents, and 25.1% among nomadic residents. In Somaliland, the corresponding proportions were 43.1%, 41.5%, and 26.3%.

Heart disease was reported more frequently among females than males in Somalia (6.6% vs. 3.6%) and Somaliland (7.7% vs. 5.6%). In contrast, stroke was reported more frequently among males than females in Somalia (2.3% vs. 1.2%) and Somaliland (4.6% vs. 1.8%).

In Somalia, reported heart disease was 5.4% among both urban and rural populations and 4.3% among nomadic populations. In Somaliland, heart disease was reported by 6.8% of urban residents, 7.8% of rural residents, and 5.3% of nomadic residents.

Stroke proportions were 1.6%, 1.9%, and 1.3% across urban, rural, and nomadic populations in Somalia, compared with 3.2%, 2.6%, and 1.6% in Somaliland, respectively (Tables 1 and 2).

Tobacco and Khat Consumption

Tobacco and khat consumption varied considerably by sex and residential setting. Overall tobacco use was 4.2% in Somalia and 7.3% in Somaliland, while khat use was 4.5% and 8.9%, respectively.

Both behaviors were substantially more common among males. In Somalia, tobacco use was reported by 7.9% of males and 0.8% of females, while khat use was reported by 9.0% and 0.4%, respectively. In Somaliland, tobacco use was 14.3% among males and 1.1% among females, while khat use was 18.2% and 0.8%, respectively.

Across residential settings, tobacco use was highest among nomadic populations in Somalia (5.8%) compared with urban (3.9%) and rural populations (4.1%). In Somaliland, tobacco use was 6.4% among urban residents, 8.4% among rural residents, and 8.2% among nomadic residents.

Khat use was highest among nomadic populations in both settings. In Somalia, khat use was reported by 6.2% of nomadic residents, 4.7% of rural residents, and 4.1% of urban residents. In Somaliland, the corresponding proportions were 11.1%, 9.7%, and 8.4%, respectively (Table 3).

Descriptive Comparisons

The derived urban-to-nomadic diagnosed diabetes prevalence ratios were 5.36 in Somalia and 9.32 in Somaliland. These ratios were calculated from aggregate survey estimates and were not adjusted for potential confounding variables.

Discussion

This study examined patterns of self-reported cardiometabolic disease and selected behavioral risk factors across urban, rural, and nomadic populations in Somalia and Somaliland using data from the 2020 Health and Demographic Surveys. Several important findings emerged. First, the proportion of individuals reporting a physician-diagnosed chronic disease was higher in Somaliland (6.9%) than in Somalia (5.7%), with females reporting a greater burden than males in both settings. Second, estimated diagnosed diabetes prevalence demonstrated a pronounced residential gradient, with urban populations exhibiting approximately 5.4-fold and 9.3-fold higher prevalence than nomadic populations in Somalia and Somaliland, respectively. Third, although males accounted for a greater proportion of diabetes diagnoses among respondents with chronic disease, the estimated population-level prevalence of diagnosed diabetes showed smaller

and less consistent sex differences. Finally, tobacco and khat consumption were substantially more common among males, with khat use highest among nomadic populations despite their comparatively lower reported hypertension proportions. Collectively, these findings highlight important demographic and geographic differences in reported cardiometabolic disease and suggest that both underlying disease risk and disparities in healthcare access may influence observed patterns.

Urbanization and Cardiometabolic Disease

Residential setting emerged as an important dimension of variation in reported cardiometabolic disease across Somalia and Somaliland. In both settings, the proportion of respondents reporting a physician-diagnosed chronic disease was highest among urban populations and lowest among nomadic populations. This pattern was particularly evident for estimated diagnosed diabetes prevalence, which decreased from 1.48% in urban populations to 0.69% in rural populations and 0.28% in nomadic populations in Somalia. A similar gradient was observed in Somaliland, where estimated prevalence decreased from 2.00% in urban populations to 0.67% in rural populations and 0.21% in nomadic populations. Consequently, urban populations demonstrated approximately 5.4-fold and 9.3-fold higher estimated diagnosed diabetes prevalence than nomadic populations in Somalia and Somaliland, respectively. These findings suggest substantial geographic differences in the distribution of previously diagnosed diabetes.

The observed residential gradient is consistent with broader evidence demonstrating a greater burden of diabetes in urban populations. According to the International Diabetes Federation, global diabetes prevalence among adults aged 20–79 years was estimated at 12.1% in urban populations compared with 8.3% in rural populations in 2021 (12). Urbanization may contribute to cardiometabolic risk through changes in dietary patterns, reduced occupational physical

activity, and increasing exposure to sedentary lifestyles. In Somaliland, Ahmed et al. (2019) identified several noncommunicable disease risk factors among adults in Hargeisa, including elevated blood pressure, overweight, obesity, and metabolic abnormalities (5). These findings provide important local context for understanding cardiometabolic risk in urban communities. However, the present study did not directly measure dietary intake, physical activity, obesity, or metabolic biomarkers across residential settings, preventing determination of whether these factors explain the observed differences.

Importantly, disparities in healthcare access may also contribute to the residential gradient. Urban residents may have greater opportunities for routine medical evaluation and blood glucose testing, whereas rural and nomadic populations may encounter geographic, financial, and logistical barriers to obtaining healthcare. Because the survey outcomes were based on self-reported physician diagnoses rather than direct biochemical measurements, lower reported prevalence among nomadic populations may partly reflect undiagnosed disease. The International Diabetes Federation has also emphasized the substantial burden of undiagnosed diabetes in sub-Saharan Africa and limitations in available population-based surveillance data (13). Therefore, the observed differences should not be interpreted solely as differences in underlying metabolic risk.

The more pronounced urban-to-nomadic diabetes prevalence ratio in Somaliland warrants particular consideration. Although both survey populations demonstrated similar residential patterns, Somaliland had a higher estimated urban prevalence and a lower estimated nomadic prevalence than Somalia. This combination contributed to a larger relative disparity. Nevertheless, the ratio should be interpreted cautiously because relatively small differences in low prevalence estimates can produce substantial differences in relative measures. Furthermore,

without individual-level information on age, socioeconomic status, healthcare utilization, and other potential confounders, the factors responsible for the difference between Somalia and Somaliland cannot be determined.

Collectively, these findings highlight the need to distinguish between the prevalence of diagnosed disease and the true underlying burden of cardiometabolic conditions. Future population-based investigations incorporating direct blood glucose measurements and standardized assessments of cardiometabolic risk factors would help clarify whether the observed residential differences reflect metabolic risk, disparities in disease detection, or a combination of both.

Sex Differences in Cardiometabolic Disease

Sex-specific differences were observed in the distribution of reported cardiometabolic disease across Somalia and Somaliland. Females reported a higher overall proportion of physician-diagnosed chronic disease than males in both Somalia (6.7% vs. 4.7%) and Somaliland (8.0% vs. 5.8%). Similarly, hypertension was more frequently reported among females, with a particularly pronounced difference in Somaliland. These findings suggest that sex may be an important dimension of variation in the reported chronic disease burden across both populations.

Previous research in Somaliland provides additional context for these findings. In a population-based study conducted in Hargeisa, Ahmed et al. (2019) reported that overweight and obesity were substantially more common among women than men (62.9% vs. 23.4%), while low physical activity was reported by 81.5% of women compared with 58.0% of men (5). These findings suggest that differences in cardiometabolic risk factors may contribute to sex-specific patterns of chronic disease. However, the same study found relatively similar levels of measured

hypertension among women and men (36.1% vs. 33.1%), highlighting that sex differences may vary according to the population studied and the method used to identify disease.

An additional finding was the difference between the proportion of chronic disease respondents reporting diabetes and estimated diabetes prevalence in the broader population. Among respondents with chronic disease, diabetes was more frequently reported by males in both Somalia (23.6% vs. 18.2%) and Somaliland (23.8% vs. 15.8%). However, after accounting for the sex-specific proportion reporting any chronic disease, estimated diagnosed diabetes prevalence was 1.11% among males and 1.22% among females in Somalia, compared with 1.38% and 1.26%, respectively, in Somaliland. These findings demonstrate that a higher proportion of diabetes diagnoses within the chronic disease subgroup does not necessarily indicate a higher prevalence of diagnosed diabetes in the overall population.

Several factors may contribute to these patterns, including differences in age distribution, healthcare utilization, physical activity, obesity, and opportunities for disease screening. Notably, Ahmed et al. (2019) observed substantial increases in hypertension and other cardiometabolic risk factors with advancing age among both women and men in Hargeisa (5). Without individual-level age adjustment or direct clinical measurements, the present analysis cannot determine whether the observed sex differences reflect underlying disease risk, differences in population composition, or variation in healthcare access and diagnosis.

Taken together, these findings highlight the importance of considering sex-specific patterns when developing cardiometabolic prevention and screening strategies. They also emphasize the need for future studies incorporating age-adjusted estimates, anthropometric measurements, and biochemical assessments to better characterize differences in cardiometabolic health between males and females across Somalia and Somaliland.

Tobacco and Khat Use

Tobacco and khat use demonstrated notable differences by sex and residential setting across Somalia and Somaliland. Both behaviors were substantially more common among males than females, particularly in Somaliland. Khat use was also highest among nomadic populations in both settings, despite lower reported hypertension among these populations compared with urban and rural residents. These findings highlight differences in behavioral risk factors across residential settings and raise questions about their relationship with cardiovascular health.

Khat is widely consumed in parts of the Horn of Africa and contains psychoactive compounds, particularly cathinone, that produce sympathomimetic effects. Previous research has associated khat consumption with increased blood pressure and heart rate, suggesting potential cardiovascular consequences. A comparative study conducted among adults in southern Ethiopia by Geta et al. (2019) examined the association between chronic khat chewing and blood pressure, providing regional evidence relevant to its potential cardiovascular effects (14). Tobacco use is also an established risk factor for cardiovascular disease, contributing to endothelial dysfunction, vascular injury, and increased cardiovascular morbidity.

Interestingly, nomadic populations demonstrated higher reported khat use alongside lower reported hypertension. However, these findings should not be interpreted as evidence of a protective effect or an absence of cardiovascular risk associated with khat consumption. The present analysis examined aggregate survey estimates and could not establish whether individuals reporting khat use also had hypertension. Differences in age distribution, healthcare access, diagnostic opportunities, and other cardiovascular risk factors may contribute to these contrasting patterns. Furthermore, tobacco and khat use were assessed among household members aged 10 years and older, whereas chronic disease estimates may reflect a different

eligible population, limiting direct comparisons between behavioral exposures and reported disease outcomes. Future studies incorporating individual-level exposure data, measured blood pressure, and relevant demographic and clinical characteristics are needed to clarify the cardiovascular implications of khat and tobacco use in Somalia and Somaliland.

Healthcare Access and Disease Detection

Healthcare access is an important consideration when interpreting the geographic differences observed in this study. Somalia and Somaliland face substantial challenges in noncommunicable disease prevention and management, including limited healthcare infrastructure, shortages of trained healthcare professionals, and financial barriers to medical services (9,10). These challenges may be particularly important for rural and nomadic populations, where geographic distance and mobility can complicate access to routine screening and continuity of care. Previous research across sub-Saharan Africa has documented substantial gaps in hypertension diagnosis and treatment, highlighting the importance of healthcare access when interpreting population-based disease estimates.

Because the surveys relied on self-reported diagnoses, the observed disease patterns may reflect differences in both underlying disease burden and opportunities for diagnosis. A scoping review of community-based hypertension care in sub-Saharan Africa identified underdiagnosis and undertreatment as major public health challenges and examined alternative models for expanding access to care. These findings support the possibility that individuals with limited access to healthcare services may have undetected cardiometabolic conditions. In the present study, the substantially lower estimated diagnosed diabetes prevalence among nomadic populations may therefore reflect differences in disease detection alongside potential differences in metabolic risk.

However, the available survey data do not permit direct assessment of screening history or undiagnosed disease.

Differences between Somalia and Somaliland also warrant further investigation. Somaliland demonstrated a higher overall proportion of reported chronic disease and greater relative variation in diabetes reporting across residential settings. These differences may reflect population characteristics, healthcare utilization, diagnostic opportunities, or survey-related factors. However, the present analysis cannot establish the relative contribution of these explanations. Further studies incorporating healthcare access indicators, screening histories, and standardized clinical assessments would help clarify whether geographic differences in reported disease reflect underlying cardiometabolic burden or variation in disease recognition.

Public Health Implications

These findings highlight opportunities to strengthen cardiometabolic disease prevention, detection, and surveillance in Somalia and Somaliland. The higher estimated diagnosed diabetes prevalence among urban populations suggests that diabetes prevention and management should remain important public health priorities in these communities. However, the lower reported prevalence among nomadic populations should not be interpreted as evidence of lower healthcare needs, particularly given the possibility of undiagnosed disease. Strengthening access to routine blood pressure and glucose screening across residential settings may improve the identification of individuals with previously unrecognized cardiometabolic conditions.

Community-based healthcare approaches may offer opportunities to address barriers to disease detection in underserved populations. A systematic review by Mengesha et al. (2024) examined community-based hypertension interventions across sub-Saharan Africa, including health

education, home-based screening, referral, and treatment services. Although several studies reported improvements in blood pressure outcomes and linkage to care, the authors emphasized limitations in the strength and consistency of the available evidence. Similarly, a scoping review of community-based hypertension care models identified potential benefits of out-of-facility services while highlighting challenges related to long-term engagement and integration into existing healthcare systems. These findings suggest that community-based screening, mobile outreach services, and referral pathways may be worth evaluating for rural and nomadic populations in Somalia and Somaliland, although their local feasibility and effectiveness remain uncertain.

The observed sex differences in reported chronic disease and behavioral risk factors also suggest the importance of considering population-specific prevention needs. Higher reported tobacco and khat use among males may warrant focused health education and cardiovascular risk reduction efforts, while differences in hypertension reporting emphasize the need for equitable screening opportunities. Finally, improved population-based surveillance incorporating measured blood pressure, fasting glucose or HbA1c, anthropometric indicators, and individual-level behavioral and healthcare access data would provide a more comprehensive assessment of cardiometabolic disease burden. Such information would help distinguish underlying disease prevalence from differences in diagnosis and guide future prevention strategies across urban, rural, and nomadic communities.

Strengths and Limitations

This study has several strengths. It draws on population-level survey data from Somalia and Somaliland and examines reported cardiometabolic disease across urban, rural, and nomadic populations. The inclusion of nomadic communities is particularly valuable because these

populations are often underrepresented in chronic disease research. The analysis also incorporates sex-specific comparisons and selected behavioral risk factors, providing a broader descriptive assessment of cardiometabolic health across the region.

Several limitations should be acknowledged. First, chronic disease diagnoses were self-reported and were not confirmed through clinical examination or laboratory testing. Consequently, the findings may underestimate the true burden of diabetes, hypertension, and other cardiometabolic conditions, particularly among populations with limited healthcare access. Second, diabetes prevalence estimates were derived by combining the proportion of respondents reporting chronic disease with the proportion of those respondents reporting diabetes. These calculations assume compatible denominators and should be interpreted as approximate estimates of previously diagnosed disease.

Third, the analysis relied on published aggregate tables rather than individual-level survey records. This prevented adjustment for potential confounding variables, including age, socioeconomic status, healthcare access, body mass index, and other lifestyle characteristics. It also limited the ability to examine individual-level associations between behavioral risk factors and cardiometabolic outcomes. Fourth, the cross-sectional design prevents conclusions about causality or changes in disease burden over time. Although urbanization may influence cardiometabolic risk, the observed differences cannot establish the effects of urbanization itself.

Finally, the absence of direct biochemical measurements prevented assessment of insulin resistance, undiagnosed diabetes, and dyslipidemia. The coefficients of variation were based on three residential categories and should therefore be interpreted as descriptive measures rather than estimates of population-level variability or statistical uncertainty.

Conclusion

This study identified substantial differences in self-reported cardiometabolic disease across Somalia and Somaliland, particularly between urban and nomadic populations. Estimated diagnosed diabetes prevalence was considerably higher in urban populations, while females reported a greater overall burden of chronic disease and a higher proportion of hypertension diagnoses. Tobacco and khat use also varied across demographic and residential groups, with khat consumption highest among nomadic populations despite lower reported hypertension proportions.

These findings suggest that both lifestyle differences and disparities in healthcare access may contribute to observed patterns of diagnosed cardiometabolic disease. However, the reliance on self-reported diagnoses limits conclusions about the true underlying disease burden. Strengthening cardiometabolic screening and population-based surveillance, particularly in rural and nomadic communities, may help identify undiagnosed diseases and support more equitable prevention and management strategies across the region.

Consent to Participate

This study utilized publicly available, aggregated secondary data from the 2020 Somalia Health and Demographic Survey (SHDS) and Somaliland Health and Demographic Survey (SLHDS). No participants were directly recruited or contacted for this study. Therefore, additional informed consent was not required for this secondary analysis.

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