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Cardiovascular Disease Prevalence in Bangladesh: A Comparative Analysis of the Literature

Saidunnessa[1], Sufi Sumsul Yeaman[2,*], Mohammad Ali Asraf Suhag[3], Md. Mohasin Uddin[4]

[1]Department of Cardiology, Woodlands Hospital, Singapore

[2]Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia

[3]Department of Medicine, Sadar Hospital, Sunamganj, Bangladesh

[4]Department of Cardiology, Labaid Cardiac Hospital, Dhaka, Bangladesh

[*]Correspondence should be addressed to Sufi Sumsul Yeaman, shakkhor95@gmail.com

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Abstract

Background: Cardiovascular diseases (CVDs) are the leading cause of non-communicable disease mortality worldwide, and Bangladesh is undergoing a rapid epidemiological transition. Hypertension, the dominant modifiable CVD risk factor, has shown a pronounced upward trajectory over the past three decades. This review compares the methodology, scale, and cardiovascular outcomes of the available Bangladeshi literature to characterize the burden and its determinants.

Methods: Evidence was drawn from nationally representative surveys, systematic reviews and meta-analyses, regional cross-sectional studies, and hospital-based series. Studies were compared by design, setting, sample size, population, and reported outcomes, with particular attention to how differing diagnostic thresholds and study settings shape prevalence estimates.

Results: Pooled hypertension prevalence rose from roughly 11–14% in the late 1990s–early 2000s to an age-standardized 26.2% in the 2017–18 national survey, and to 48.0–50.5% when the 2017 ACC/AHA threshold (≥130/80 mmHg) is applied in place of JNC 7 (≥140/90 mmHg). Among adults ≥35 years, prevalence increased from 25.8% (2011) to 39.4% (2018). Women now surpass men in hypertension prevalence from their early thirties, undiagnosed hypertension reaches 59.9% of cases, and effective blood-pressure control remains as low as 11–12.7% nationally. Coronary artery disease ranged from 4.5% in rural samples to 17.2% among diabetic hospital patients, and rural areas showed the steepest recent surges in prevalence.

Conclusions: Despite methodological heterogeneity, the literature converges on a consistent message: urbanization, ageing, and lifestyle change are driving a rising CVD burden across both urban and rural Bangladesh, and stricter diagnostic guidelines imply that close to half of adults may be hypertensive. Strengthening diagnosis, treatment adherence, and control alongside attention to regionally distinctive exposures is an urgent public-health priority. Alongside these measures, integrating sensitive circulatory and non-invasive biomarkers into primary screening protocols may further improve early risk stratification and help prevent long-term cardiovascular complications.

Keywords: Cardiovascular disease, Hypertension, Prevalence, Bangladesh, Epidemiological transition, Non-communicable disease, ACC/AHA guideline

Introduction

Cardiovascular diseases (CVDs) are the leading contributor to non-communicable disease (NCD) mortality globally, and Bangladesh is experiencing a rapid epidemiological transition in which the burden of chronic vascular conditions is expanding quickly. Demographic ageing, urbanization, and economically driven lifestyle change have combined to raise the prevalence of CVD risk factors, most conspicuously hypertension (HTN), across the population.

Characterizing this landscape is essential for aligning national public-health policy and clinical practice with the true scale of the problem. Yet prevalence estimates in the literature

vary widely, reflecting differences in study design, sampling, setting, and the diagnostic thresholds applied. This review evaluates the Bangladeshi evidence on CVD and hypertension prevalence, drawing together local cross-sectional surveys, large national biomarker assessments, systematic reviews, and hospital-based series. By comparing methodologies alongside outcomes, it aims to distinguish genuine epidemiological trends from artefacts of measurement, and to identify where the evidence base remains thin.

Methods

This is a narrative comparative review of published studies reporting the prevalence of cardiovascular disease and its principal risk factors in Bangladeshi adults. Sources were grouped by study design in order to make their strengths, limitations, and comparability explicit. Four categories were distinguished:

Nationally representative surveys: Large-scale studies such as the Bangladesh Demographic and Health Survey (BDHS) provide the most robust evidence for national trends [4,10,16], typically using multistage, geographically clustered sampling of thousands of households [18].

Systematic reviews and meta-analyses: These aggregate primary studies to derive pooled prevalence estimates [1,3,5], for example, Saquib et al. synthesized 29 studies to track secular trends across 15 years [1].

Regional and localized cross-sectional studies: Targeted work in specific urban areas such as Dhaka [8,11] or rural villages such as Keraniganj [27] offers granular, community-level insight into risk factors.

Clinical and hospital-based studies: Research at tertiary facilities such as the National Institute of Cardiovascular Diseases (NICVD) and BIRDEM General Hospital focuses on patient populations and typically yields higher prevalence than general-population samples [7,14,25].

For each study, the design, setting, sample size, target population, and reported cardiovascular outcomes were extracted and tabulated (**Tables 1** and **2**). Particular attention was paid to the diagnostic definition used, most importantly the contrast between the older JNC 7 threshold (≥140/90 mmHg) and the 2017 ACC/AHA threshold (≥130/80 mmHg), because this single methodological choice substantially alters reported prevalence.

Results

Hypertension prevalence and secular trends

Hypertension is the most extensively studied cardiovascular risk factor in Bangladesh. Pooled estimates for 1995–2010 indicated a prevalence of about 13.7% [1], but more recent national data show a marked rise: the 2017–18 BDHS reported an age-standardized prevalence of 26.2% among adults aged 18–95 years [10]. When the 2017 ACC/AHA guideline (≥130/80 mmHg) is applied instead of JNC 7 (≥140/90 mmHg), reported prevalence roughly doubles, with some studies indicating rates of 48.0–50.5% among adults [21,24].

The secular trend is unmistakable. Among adults aged ≥35 years, prevalence increased from 25.8% in 2011 to 39.4% in 2018 [16]. Gender patterns have also shifted: whereas earlier studies frequently reported higher rates in men, recent evidence indicates that women in Bangladesh surpass men in hypertension prevalence as early as their thirties [9]. This early onset warrants closer scrutiny of chronic psychosocial stress, as sustained hypothalamic–pituitary–adrenal (HPA) axis activation and altered cortisol secretion may heighten sympathetic drive and promote premature vascular stiffening in young adults; among university students, salivary cortisol has been linked to emotional intelligence and stress-management skills [33]. Alongside rising prevalence, the care cascade remains weak: undiagnosed hypertension accounts for 59.9% of hypertensive individuals [13], and effective blood-pressure control is achieved in only about 11–12.7% of cases nationally [10,23].

Coronary artery disease and stroke

Coronary artery disease (CAD) prevalence differs sharply between general and clinical populations. Rural studies have reported CAD at 4.5% [2], whereas hospital-based studies of diabetic patients report rates as high as 17.2% [25]. Other hospital-based descriptive series report lipid disorders (>48%), heart failure (28.5%), and myocardial infarction (20.9%) [7]. Because these figures capture clinically manifest disease, they are likely to miss subclinical myocardial strain and early ischemic burden, which could be detected with sensitive circulatory biomarkers such as cardiac troponin I (cTnI); salivary cTnI has been shown to correlate positively with cortisol in children, suggesting an interaction with neuro-endocrine stress responses [34]. Stroke remains a major concern: general systematic reviews estimate a weighted pooled prevalence near 1% [5], while hospital cohorts report stroke in up to 17.1% of cardiovascular patients [7], a gap that reflects the selection inherent in tertiary-care samples rather than a true population figure.

Urban–rural disparities

Geographic disparities are pronounced but narrowing. Urban areas traditionally show higher CVD prevalence (around 8%) than rural areas (around 2%) [5]. However, the rate of increase in rural settings is accelerating: one study found rural hypertension prevalence rising from 36% in 2011

to 64% in 2017–18, a faster climb than in urban centers [12]. While urbanization drives risk through sedentary lifestyles and dietary change, the rural surge indicates that cardiovascular risk factors are now penetrating every geographic sector of the country [5,19].

Comparative synthesis of the literature

Tables 1 and **2** summarize the methodological features and cardiovascular outcomes of selected key studies. **Table 1** juxtaposes design, setting, sample size, and population context; **Table 2** aligns the principal outcomes, the reported statistic, and the information each study did not report. Read together, they show how national surveys with large probability samples anchor the population estimates, while hospital-based and localized studies contribute higher, setting-specific figures, and finer detail on risk correlates.

Risk Factors and Demographic Determinants

Across study designs, a consistent set of determinants emerges:

Age and sex: Advancing age is universally associated with higher risk [10,14,16]. Female sex is linked to higher hypertension prevalence in recent surveys [9,15], while CAD is more often reported in men [2].

Obesity and BMI: A body-mass index ≥25 kg/m^2 is a critical predictor; the largest relative increase in hypertension (97%) has been observed among obese individuals [16,24].

Lifestyle behaviors: Smoking (cigarette and biri), physical inactivity, and unhealthy diets high in salt and fat are major contributors [8,27,29]; low physical activity is especially common among urban residents [1].

Socioeconomic status: Higher wealth and education paradoxically correlate with higher hypertension prevalence in many studies [12,19,26], although low educational attainment is associated with poorer control [10].

Environmental exposures: Arsenic in drinking water and increasing salinity in coastal regions are noted as regionally distinctive cardiovascular risks [20,28,31]. Longitudinal evidence from the Health Effects of Arsenic Longitudinal Study (HEALS) cohort in Araihazar reinforces this link, showing that reductions in urinary arsenic are associated with substantially lower mortality from chronic diseases, including cardiovascular disease [32].

Table 1. Comparison of study design, setting, and sample size across selected studies.

Study	Study design	Setting	Sample size	Population context
[1]	Systematic review / meta-analysis	National	29 studies (pooled)	General population
[2]	Cross-sectional	Rural villages	Not reported	Adults ≥18 years
[4]	Secondary analysis (BDHS)	National	11,686	Adults
[5]	Systematic review / meta-analysis	National	129,740	Bangladeshi adults
[6]	Descriptive cross-sectional	Urban (Dhaka)	403 prescriptions	Cardiology patients
[7]	Descriptive study	Urban (Dhaka)	853	Hospital-based (NICVD / NHF)
[8]	Cross-sectional survey	Urban (Dhaka)	730	Residents ≥25 years
[9]	Secondary analysis (BDHS)	National	12,476	Adults ≥18 years
[10]	National survey (BDHS)	National	12,904	Adults 18–95 years
[11]	Cross-sectional	Urban (Dhaka)	200	Residents 18–65 years
[13]	National survey (BDHS)	National	8,835	Adults 35+ years
[14]	Cross-sectional	Urban (NICVD, Dhaka)	200	Indoor / outdoor patients
[16]	National survey (2 BDHS waves)	National	23,539	Adults 18+ years
[18]	National NCD survey	National	Representative	Adults ≥25 years
[19]	National survey (BDHS)	National	7,839	Adults ≥35 years
[23]	Observational study	Urban (BIRDEM)	599	Officials >50 years
[25]	Cross-sectional	Urban (BIRDEM)	221	T2DM patients 30–70 years
[26]	Population-based survey	Urban	27,792	Residents vs. migrants
[27]	Cross-sectional descriptive	Rural (Keraniganj)	199	Adults ≥20 years

Table 2. Comparison of reported cardiovascular outcomes across selected studies.

Study	Key cardiovascular outcome(s)	Reported prevalence / statistic	Not reported
[1]	Pooled hypertension	13.7% (pooled)	Morbidity / mortality specifics
[2]	Coronary artery disease	4.5% overall; 6.0% male	Sample size; mortality
[4]	HTN trends (2011–2018)	13-point increase	Specific clinical values
[5]	Weighted pooled CVD	5.0% overall; 8% urban	Subgroup CIs
[7]	Lipid disorder; HTN; heart failure	>48%; 30%; 28.5%	Uncertainty intervals
[8]	Age-adjusted HTN	23.7% overall	Mortality rates
[9]	HTN sex–age interaction	Women higher from early 30s	Measurement details
[10]	Age-standardized HTN	26.2% overall	Divisional detail
[11]	High BP; CVD	BP 27.1% (M) / 18.4% (F); CVD 11.2% (M)	Analysis approach
[13]	Undiagnosed HTN	59.9% of hypertensives	Mortality / morbidity
[14]	HTN prevalence	43% overall; 60.3% (>50 yrs)	Mortality outcomes
[16]	HTN increase (≥35 yrs)	25.8% (2011) → 39.4% (2018)	Regional prevalence
[18]	HTN and pre-hypertension	HTN 20%; pre-HTN 43%	Analysis approach
[19]	HTN prevalence (≥35 yrs)	26.4% overall; 32.4% (F)	Morbidity specifics
[21]	HTN (ACC/AHA guideline)	50.5% overall	Morbidity outcomes
[22]	HTN guideline comparison	40.7% (ACC/AHA) vs. 17.9% (JNC 7)	Sampling approach
[23]	Effective BP control	11% national; 68.8% study group	Analysis approach
[25]	CAD in diabetic patients	17.2%	Mortality rates
[27]	HTN in rural setting	15.6%	Measurement method

Discussion

The literature reveals a striking convergence of findings despite considerable methodological diversity. Estimates from probability-based national surveys, pooled meta-analyses, community studies, and hospital series differ in absolute magnitude, yet all point in the same direction: cardiovascular risk, and hypertension in particular, is rising rapidly and broadly across Bangladesh. The apparent doubling of hypertension prevalence when the ACC/AHA threshold replaces JNC 7 [21,22,24] is a useful reminder that a substantial share of the variation between studies is definitional rather than biological—two studies of the same population can report 17.9% or 40.7% depending solely on the cut-off adopted [22]. Any comparison of prevalence figures must therefore begin with the diagnostic criterion, not the headline percentage.

A second theme is the shifting demographic distribution of risk. The finding that women overtake men in hypertension prevalence from their early thirties [9] departs from global patterns and has direct implications for screening, which has often been oriented toward older men. Coupled with the very high proportion of undiagnosed disease [13] and the low rates of effective control [10,23], this suggests that the greatest gains are available not from new detection technology but from strengthening the existing care cascade: case-finding, treatment initiation, and adherence.

Third, the erosion of the urban–rural gap is consequential for health-system planning. The rapid rural surge in hypertension [12] indicates that cardiovascular prevention can no longer be treated as a predominantly metropolitan concern; primary-care and community-level interventions will need national reach. Finally, the regionally distinctive exposures, arsenic contamination and coastal salinity [28,31], mean that a uniform national strategy may under-serve climate-vulnerable and environmentally exposed communities, for whom context-specific measures are warranted; encouragingly, arsenic exposure is modifiable, and its mitigation has recently been linked to reduced chronic-disease mortality, including cardiovascular death, in a long-term Bangladeshi cohort [32].

Taken together, the evidence supports a dual response: population-level measures targeting diet, salt intake, tobacco, and physical inactivity, and health-system measures to close the diagnosis-to-control gap. Moreover, identifying early non-invasive markers of vascular and autonomic regulation, such as salivary apelin and cortisol [33,35], could enhance

community-level risk stratification prior to the onset of fixed arterial hypertension, although their predictive value for cardiovascular outcomes in Bangladeshi populations has yet to be established. The consistency of the underlying signal across heterogeneous methods lends confidence that this trajectory is real rather than an artefact of any single study design.

Limitations of the Evidence Base

Self-report versus clinical measurement: Studies relying on self-reported diagnosis substantially underestimate prevalence relative to objective measurement [17,22].

Regional imbalance: Much focused research clusters around Dhaka and a few divisions, potentially missing variation in regions such as Barisal or Sylhet [1,6].

Scarcity of longitudinal data: Most studies are cross-sectional, limiting inference about causal relationships between risk factors and disease onset [20].

Missing outcomes in primary reporting: Reviews repeatedly note under-reporting of mortality, specific morbidity outcomes, and uncertainty intervals in primary studies [1,20], as reflected in the "not reported" column of **Table 2**.

Research Gaps and Future Directions

Nationwide clinical surveys: There is an urgent need for large-scale, nationwide surveys that combine clinical measurement with socioeconomic analysis to characterize hypertension comprehensively [20].

Mechanistic studies: The contributions of ACE gene polymorphism, hypovitaminosis D, and mass arsenic exposure to cardiovascular health remain inadequately studied [20]; recent cohort evidence linking arsenic mitigation to reduced cardiovascular mortality [32] represents progress but warrants replication with cardiovascular-specific endpoints and prevalence measures.

Treatment and control: With control rates as low as 11–12.7% [10,23], research on strengthening the hypertension care cascade and improving adherence, including to generic medicines, is needed [6,18].

Biomarker-based risk stratification: Studies are needed to test whether sensitive circulatory and non-invasive biomarkers, such as cTnI and salivary apelin and cortisol, add predictive value to blood-pressure-based screening in Bangladeshi primary-care and community settings [33–35].

Conclusion

The prevalence of cardiovascular disease and hypertension in Bangladesh has reached alarming levels and continues to rise. Across methodologically varied studies, the core findings are consistent: urbanization and lifestyle change are driving a surge in cardiovascular risk factors in both urban and rural populations. Under contemporary diagnostic guidelines, nearly half of the adult population may be hypertensive, imposing a heavy and growing burden on the health system. Future efforts should prioritize improving diagnostic awareness, enhancing treatment adherence and control, and addressing the diverse lifestyle and environmental risk factors specific to the Bangladeshi context. Alongside these priorities, integrating sensitive circulatory and non-invasive biomarkers into primary screening protocols could support earlier risk stratification and help prevent long-term cardiovascular complications.

Declarations

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Conflicts of interest

The authors declare that they have no competing interests.

Ethical approval

Not applicable. This article is a review of previously published literature and did not involve new data collection from human participants or animals.

Consent to participate / for publication

Not applicable.

Data availability

Not applicable. All data discussed in this review are available in the cited, published sources.

Author contributions

Conceptualization and drafting of the manuscript: Sufi Sumsul Yeaman; Literature search and screening: Md. Mohasin Uddin; Data extraction and synthesis: Mohammad Ali Asraf Suhag; Critical revision for important intellectual content: Saidunnessa. All authors read and approved the final manuscript.

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