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Global, Regional, and Socio-Demographic Trends in Early-Onset Ischemic Heart Disease (1990–2023): A Brief Epidemiological Report

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Short Report

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Abstract

Background

Although ischemic heart disease (IHD) mortality has declined among older adults in high-income countries, younger populations might be facing a less favorable cardiometabolic risk landscape. We examined global, regional, and socio-demographic trends in early-onset IHD (ages 15–49 years) from 1990 to 2023.

Methods

Estimates of deaths, incidence, and disability-adjusted life years (DALYs) for IHD in individuals aged 15–49 were extracted from the Global Burden of Disease Study 2023. Truncated age-standardized rates (15–49 years) and estimated annual percentage changes (EAPCs) with 95% confidence intervals were calculated for the world and across Socio-demographic Index (SDI) quintiles.

Results

Early-onset IHD accounted for 19.1 million DALYs (95% UI: 17.2–21.1) and 675 000 deaths (95% UI: 608 000–742 000) worldwide in 2023. The global age-standardized mortality rate declined modestly (EAPC − 0.39%, 95% CI: −0.45 to − 0.33); absolute DALYs, however, rose 34% from 1990. In high-SDI regions, the mortality decline appears to have plateaued after 2010 (EAPC − 0.04%, 95% CI: −0.12 to + 0.04), while low-middle SDI regions experienced a sustained increase (EAPC + 0.62%, 95% CI: +0.51 to + 0.73). Males accounted for 73.8% of early-onset IHD deaths globally.

Conclusions

These observations suggest that early-onset IHD could be an escalating global challenge, marked by a diverging burden between high-SDI and lower-SDI settings. Renewed, age-targeted prevention and metabolic screening for adults under 50 may be urgently warranted.

Introduction

Ischemic heart disease (IHD) remains the leading cause of cardiovascular death worldwide[1]. Over three decades, advances in acute coronary care, revascularisation, and preventive pharmacotherapy have substantially lowered age-standardised IHD mortality in older adults, particularly in high-income settings[2]. Beneath these aggregate trends, however, age-specific patterns may tell a different story.

Emerging evidence suggests that young adults (15–49 years) are experiencing a stagnation—or even a reversal—of previously favourable IHD trends[3,4]. Early-onset IHD imposes a disproportionate societal

cost through lost productive life-years, prolonged disability, and frequently delayed diagnosis. At the same time, the global rise in adolescent obesity, metabolic syndrome, and early-onset type 2 diabetes threatens to erode the gains that took decades to achieve[5,6]. Whether historical declines are truly stalling in younger cohorts, and how this varies by socio-demographic context, remains incompletely characterised.

This brief report draws on the Global Burden of Disease Study 2023 to examine global, regional, and SDI-stratified trends in early-onset IHD burden between 1990 and 2023.

Methods

Data Source

Data were extracted from the Global Burden of Disease Study 2023 (GBD 2023) via the Institute for Health Metrics and Evaluation (IHME) GBD Results Tool (https://vizhub.healthdata.org/gbd-results/)[7]. The GBD synthesises vital registration, verbal autopsy, hospital records, and surveys using Bayesian meta-regression (DisMod-MR 2.1)[8].

Case Definition and Stratification

· Cause: Ischemic heart disease (ICD-10 codes I20–I25).

· Age group: 15–49 years (early-onset IHD), partitioned into 5-year brackets.

· Time frame: 1990 through 2023.

· Geography: Global and five SDI quintiles (High, High-middle, Middle, Low-middle, Low).

· Sex: Male, female, and combined.

Metrics

Primary metrics were deaths (absolute count and age-standardised mortality rate [ASMR] per 100 000), DALYs (absolute count and age-standardised DALY rate per 100 000), and incidence (age-standardised incidence rate per 100 000). Age-standardised rates were computed using the GBD world population standard restricted to the 15–49 age band (truncated age-standardisation). All estimates are presented with 95% uncertainty intervals (UI).

Temporal Analysis

Temporal trends were assessed via the estimated annual percentage change (EAPC). The natural logarithm of the age-standardised rate was regressed on calendar year:

ln(rate) = alpha+beta(year)+epsilon

The EAPC and its 95% confidence interval (CI) were derived as:

EAPC = 100×(exp(beta) -1)

A 95% CI entirely above zero suggested a significant increase; a CI entirely below zero suggested a significant decrease; inclusion of zero indicated a non-significant change. Because broad EAPCs can conceal inflections, we also computed EAPCs for two sub-periods (1990–2005 and 2010–2023) based on visual inspection of the temporal plots. A formal joinpoint analysis was beyond the scope of this brief report and remains a recognised limitation.

Results

Global Burden in 2023

In 2023, early-onset IHD caused an estimated 675 000 deaths (95% UI: 608 000–742 000) and 19.1 million DALYs (95% UI: 17.2–21.1 million) among adults aged 15–49. Notably, 73.8% of these deaths occurred in males.

Trends 1990–2023

Globally, the age-standardised mortality rate for early-onset IHD showed a modest decline between 1990 and 2023 (EAPC − 0.39%, 95% CI: −0.45 to − 0.33). Despite this, the absolute number of DALYs rose by 34%—an increase that probably reflects population growth and heightened exposure to metabolic risk factors. Age-standardised incidence changed negligibly (EAPC − 0.08%, 95% CI: −0.15 to + 0.01).

SDI-Stratified Trends

Marked heterogeneity was apparent across SDI quintiles (Table 1, Fig. 1).

· High SDI: Rapid mortality declines occurred between 1990 and 2005 (EAPC − 2.1%, 95% CI: −2.4 to − 1.8). After 2010, however, the decline all but stopped: the EAPC for 2010–2023 was − 0.04% (95% CI: −0.12 to + 0.04), which is not statistically distinguishable from zero. This finding is consistent with a plateau.

· Low-middle SDI: ASMR increased significantly over the full period (EAPC + 0.62%, 95% CI: +0.51 to + 0.73), with no evidence of deceleration.

· Middle SDI and Low SDI both showed modest increases (EAPC + 0.22%, 95% CI: +0.12 to + 0.32, and + 0.31%, 95% CI: +0.18 to + 0.44, respectively).

· High-middle SDI followed an intermediate path: a slow overall decline (EAPC − 0.29%, 95% CI: −0.38 to − 0.20) but a flattening trend in the most recent decade.

Table 1
Early-onset IHD burden by SDI quintile, 1990 and 2023

SDI Quintile	Deaths 1990 (thousands)	Deaths 2023 (thousands)	ASMR EAPC 1990–2023 (95% CI)	EAPC 2010–2023 (95% CI)
Global	590 (530–650)	675 (608–742)	−0.39% (− 0.45 to − 0.33)	−0.15% (− 0.23 to − 0.07)
High SDI	152 (136–168)	101 (90–113)	−1.12% (− 1.24 to − 1.00)	−0.04% (− 0.12 to + 0.04)
High-middle	128 (114–142)	115 (102–128)	−0.29% (− 0.38 to − 0.20)	−0.11% (− 0.23 to + 0.01)
Middle SDI	158 (140–176)	215 (192–238)	+ 0.22% (+ 0.12 to + 0.32)	+ 0.19% (+ 0.07 to + 0.31)
Low-middle SDI	98 (86–110)	158 (141–175)	+ 0.62% (+ 0.51 to + 0.73)	+ 0.58% (+ 0.45 to + 0.71)
Low SDI	54 (46–62)	86 (74–98)	+ 0.31% (+ 0.18 to + 0.44)	+ 0.33% (+ 0.18 to + 0.48)

ASMR = age-standardised mortality rate (truncated to 15–49 years); EAPC = estimated annual percentage change; UI = uncertainty interval; CI = confidence interval. Values rounded to three significant figures. Data source: GBD 2023.

Sex Disparities

The male-to-female mortality ratio remained approximately 2.8:1 throughout the study period. In high-SDI regions, the post-2010 plateau was more pronounced in young females (female EAPC 2010–2023: +0.02%, 95% CI: −0.08 to + 0.12; male EAPC: −0.09%, 95% CI: −0.17 to − 0.01). This pattern coincides with reported increases in obesity and metabolic dysfunction among women of reproductive age—a relationship that, although suggestive, requires cautious causal interpretation.

Discussion

Central to these findings is a dual burden: high-income countries may have lost momentum in curbing early-onset IHD, while low- and middle-income countries face a mounting epidemic. The overall global ASMR decline of − 0.39% conceals a sharp SDI-driven divergence.

In high-SDI settings, the post-2010 plateau (EAPC indistinguishable from zero) raises the possibility that traditional prevention strategies—largely designed for older adults—have reached their limits in younger populations[2,3]. Rising rates of obesity, physical inactivity, and early-onset type 2 diabetes could be

offsetting the benefits of tobacco control and lipid management[5,6]. Yet alternative explanations, such as improved diagnostic sensitivity or changes in cause-of-death coding, cannot be completely excluded. For females, the near-static mortality trend is particularly concerning in the context of gestational metabolic disorders and rising stress-related myocardial infarction rates, though attributing causality remains difficult with ecological data[3].

In lower-SDI regions, rapid nutritional transition and urbanisation, coupled with limited acute coronary care and secondary prevention, probably drive the observed increases. It could be argued that the epidemiological transition is simply occurring at a faster pace than the health system's capacity to adapt—a pattern that has been suggested in other non-communicable disease trends[9].

Limitations

Some caution is warranted. GBD estimates are model-based, and vital registration systems remain incomplete in low-resource settings, which may introduce systematic bias[7,8]. Truncated age-standardisation, while appropriate for this age band, limits direct comparability to whole-population rates. The EAPC calculations assume linearity on the log scale; a more refined joinpoint analysis might reveal additional inflection points not captured here. Individual-level risk behaviours were not analysed, so the ecological associations described should not be interpreted as individual-level proof. Despite these constraints, the GBD framework arguably provides the most comprehensive lens available for global trend surveillance.

Conclusions

What emerges is not a story of triumph, but one of transition and persistent inequality. Early-onset IHD is not declining globally in absolute terms; in some regions, it is rising sharply, and even where it is falling, progress appears to have stalled. High-SDI nations might need to investigate why mortality reductions have flatlined in adults under 50, while lower-SDI nations could benefit from integrated primary prevention programmes that do not wait until traditional screening ages. Clinical guidelines might consider extending systematic cardiometabolic risk evaluation to younger populations—an approach that, although resource-intensive, may yield substantial long-term dividends[10].

Declarations

· Ethics Approval: Not applicable (secondary analysis of publicly available, anonymised aggregate data).

· Consent for Publication: Not applicable.

· Data Availability: All data are publicly available via the IHME GBD Results Tool (https://vizhub.healthdata.org/gbd-results/).

· Competing Interests: None declared.

· Funding: None.

· Authorship: Single-author manuscript.

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Figures

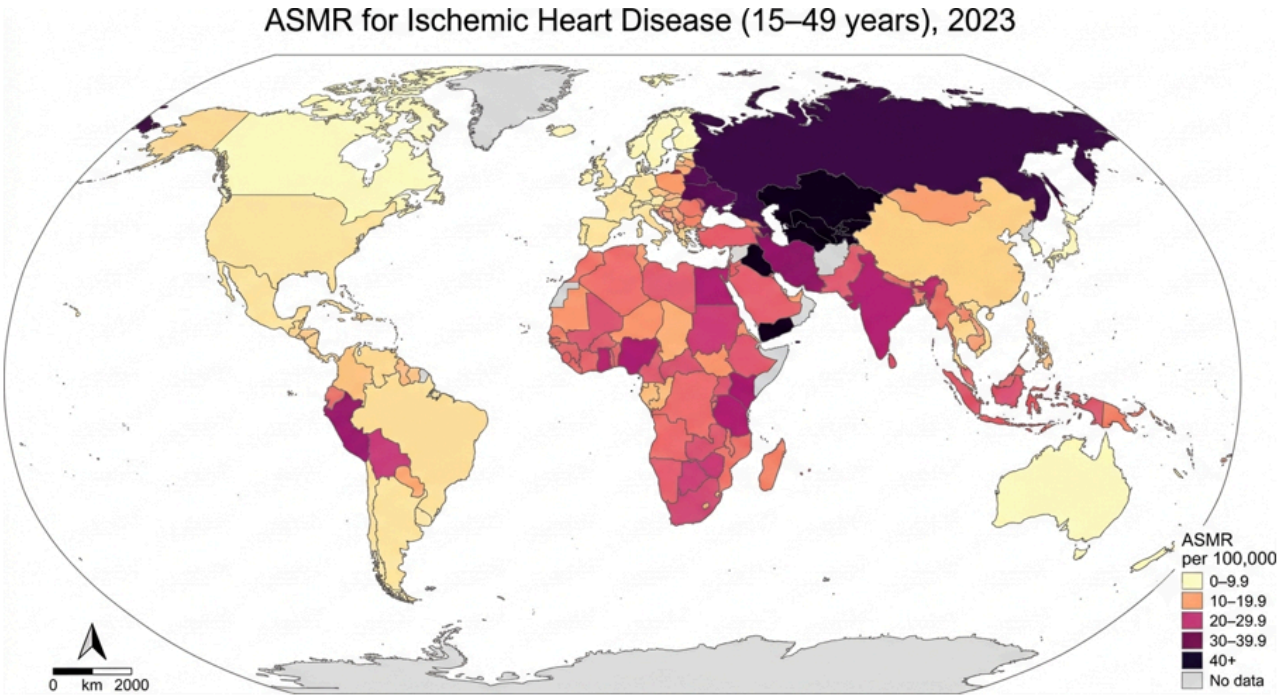


Figure 1

Age-standardised mortality rate (per 100 000 population aged 15–49) for ischemic heart disease by country, 2023. Darker shades indicate higher mortality rates. Countries in grey represent missing or suppressed data. The map highlights the disproportionate burden in low- and middle-income regions. Data source: Global Burden of Disease Study 2023.

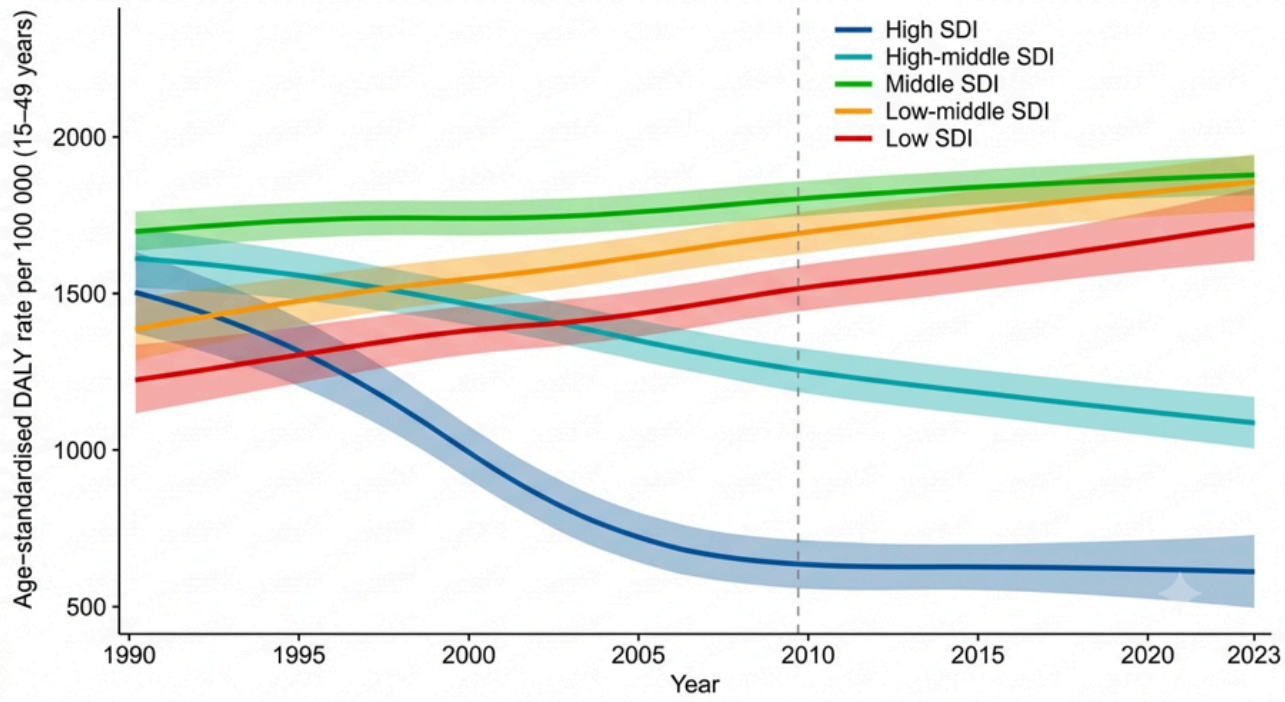


Figure 2

Age-standardised DALY rate (per 100 000 population aged 15–49) for ischemic heart disease, stratified by Socio-demographic Index (SDI) quintile, 1990–2023. Shaded bands represent 95% uncertainty intervals. The vertical dashed line at 2010 marks the approximate inflection point after which the decline in High SDI regions plateaued. DALY = disability-adjusted life years. Data source: Global Burden of Disease Study 2023.