**Appendix (Supplementary Materials)**

**The burden of cardiovascular disease in Asia from 2025 to 2050: a forecast analysis for East Asia, South Asia, South-East Asia, Central Asia, and high-income Asia Pacific regions**

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Contents

[Supplementary Figure 1: Model Validation 4](#_Toc167884151)

[Supplementary Figure 2: Crude mortality associated with cardiovascular diseases by age-group in 2025 and 2050 6](#_Toc167884152)

[Supplementary Figure 3: Projected proportion of crude cardiovascular disease A) mortality and B) disability-adjusted life years in 2025 and 2050 7](#_Toc167884153)

[Supplementary Figure 4: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in Central Asia from 2025 to 2050 8](#_Toc167884154)

[Supplementary Figure 5: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in East Asia from 2025 to 2050 9](#_Toc167884155)

[Supplementary Figure 6: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in South Asia from 2025 to 2050 10](#_Toc167884156)

[Supplementary Figure 7: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in South-East Asia from 2025 to 2050 11](#_Toc167884157)

[Supplementary Figure 8: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in high-income Asia-Pacific from 2025 to 2050 12](#_Toc167884158)

[Supplementary Table 1: GBD 2019 classification of countries and territories within Asia Super-Region grouped by GBD Region, and World Bank Income Group 13](#_Toc167884159)

[Supplementary Table 2: Definitions of cardiovascular causes based on GBD 2019 14](#_Toc167884160)

[Supplementary Table 3: Definitions of risk factors based on GBD 2019 15](#_Toc167884161)

[Supplementary Table 4: Asian ranking of cardiovascular causes of total crude mortality, DALY, and prevalence numbers in 2025 and 2050 16](#_Toc167884162)

[Supplementary Table 5: Asian ranking of cardiovascular causes of crude mortality, DALY, and prevalence rates (per 100,000 population) in 2025 and 2050 17](#_Toc167884163)

[Supplementary Table 6: Asian ranking of cardiovascular causes of age-standardised mortality, DALY, and prevalence rates (per 100,000 population) in 2025 and 2050 18](#_Toc167884164)

[Supplementary Table 7: Crude prevalence rates (per 100,000 population) attributable to cardiovascular causes in 2050 19](#_Toc167884165)

[Supplementary Table 8: Age-standardised prevalence rates (per 100,000 population) attributable to cardiovascular causes in 2050 20](#_Toc167884166)

[Supplementary Table 9: Crude prevalence numbers attributable to heart failure as an impairment 21](#_Toc167884167)

[Supplementary Table 10: Crude mortality rates (per 100,000 population) attributable to cardiovascular causes in 2050 22](#_Toc167884168)

[Supplementary Table 11: Age-standardised mortality rates (per 100,000 population) attributable to cardiovascular causes in 2050 23](#_Toc167884169)

[Supplementary Table 12: Crude DALY rates (per 100,000 population) attributable to cardiovascular causes in 2050 24](#_Toc167884170)

[Supplementary Table 13: Age-standardised DALY rates (per 100,000 population) attributable to cardiovascular causes in 2050 25](#_Toc167884171)

[Supplementary Table 14: Asian ranking of cardiovascular risk factors of total crude mortality and DALY numbers in 2025 and 2050 26](#_Toc167884172)

[Supplementary Table 15 Asian ranking of cardiovascular risk factors of age-standardised mortality and DALY rates (per 100,000 population) in 2025 and 2050 27](#_Toc167884173)

[Supplementary Table 16: Crude mortality rates (per 100,000 population) attributable to cardiovascular risk factors in 2050 28](#_Toc167884174)

[Supplementary Table 17: Age-standardised mortality rates (per 100,000 population) attributable to cardiovascular risk factors in 2050 29](#_Toc167884175)

[Supplementary Table 18: Crude DALY rates (per 100,000 population) attributable to cardiovascular risk factors in 2050 30](#_Toc167884176)

[Supplementary Table 19: Age-standardised DALY rates (per 100,000 population) attributable to cardiovascular risk factors in 2050 31](#_Toc167884177)

# Supplementary Figure 1: Model Validation

This figures demonstrate the overall performance of the selected model, Poisson regression, compared to the autoregressive integrated moving average (ARIMA) (0,2,0) model, both of which have been used as time series forecasting models of large national registries.

The ARIMA models are increasingly used in the literature. The selection of a specific ARIMA model was based on the celebrated Box-Jenkins approach, which requires the inspection of two plots, namely partial autocorrelation function (PACF) and autoregression function (ACF). In time series analysis, the PACF and ACF are pivotal tools for understanding the temporal dependencies within a dataset. The ACF measures the correlation between observations in a time series at varying lags, while the PACF measures the correlation between observations at a particular lag, controlling for the effects of the intervening lags. These functions provide insights into the potential presence of autoregressive (AR) and moving average (MA) components in a time series. Additionally, the Augmented Dickey-Fuller (ADF) test is employed to ascertain the stationarity of a time series through differencing. The ADF test assists in determining the order of differencing ( d ) required to achieve stationarity. By analysing the decay of correlations in the ACF and PACF plots and conducting the ADF test, we can infer the appropriate values of ( p ), ( d ), and (q) to construct an effective ARIMA model for forecasting and analysing time series data*.*

The Poisson distribution has also been shown to be an appropriate model for crude and age-adjusted mortality rates. However, there are several assumptions that underpin the Poisson regression model. As the Poisson distribution assumes a ratio of 1, where the mean and variance are equal, there is a small amount of overdispersion. Dispersion was examined with the deviance-based statistics, and the issue was handled with scaling of the estimated standard errors. In addition, we have applied robust standard errors to deal with the potential problem of heteroscedastic errors. These adjustments do not affect the estimated coefficients of the Poisson models.

A graph of a graph showing the number of numbers and the number of the numbers

Description automatically generated with medium confidenceInternal validation of the model was done by splitting the dataset into 1990 to 2009, where the model is fitted, and 2010 to 2019, where the model is assessed with the actual GBD data. The forecast accuracy of the models were compared with root mean square errors (RMSE) and mean errors (ME), where error is defined as the deviation of the actual value from the forecast value. However, as there are no universal cut-offs for RMSE and ME as this depends on the data and the forecasting models considered, our study compared the forecast models on relative ground using the RMSE and ME. The lower the RMSE the more accurate are the forecasts. Similarly, the lower the reported ME, the lower the bias. In the performance assessment, the Poisson model has a lower RMSE and ME value which indicates a higher accuracy and lower bias, compared to the ARIMA model. Examples of the model validation were provided for A) mortality, B) prevalence and C) DALY rates.

A) The figure demonstrates the performance of the Poisson Regression was superior to the performance of the ARIMA (0,2,0) model for mortality rates.

*A graph showing the number of years

Description automatically generated*

B) The figure shows the performance of the Poisson Regression was superior to the performance of the ARIMA (3,1,0) model for prevalence rates.

*A graph with numbers and a line

Description automatically generated*

C) The figure demonstrates the performance of the Poisson Regression was superior to the performance of the ARIMA (0,1,1) model for DALY rates.

In terms of the goodness-of-fit for the forecast Poisson regression models, the overall performance was measured using the Pearson statistic and deviance statistic. Both of these statistics are approximately chi-square distributed with *n* – *k* – 1 degrees of freedom, where *n* is the number of classes and *k* the number of parameters estimated. When a test is rejected, there is a statistically significant lack of fit. Otherwise, there is no evidence of lack-of-fit. High p-values observed in the forecast models indicate no evidence of lack-of-fit. The Poisson regression models fit well for the mortality, prevalence and DALY rates with different densities and distributions, as follows:

Goodness-of-fit for Poisson regression model pertaining to CV mortality rates in Asia:

Deviance goodness-of-fit for = 1.3667, p = 1.0000; Pearson goodness-of-fit = 1.3679, p = 1.0000.

Goodness-of-fit for Poisson regression model related to CV prevalence rates in Asia:

Deviance goodness-of-fit for = 3.1159, p = 1.0000; Pearson goodness-of-fit = 3.1161, p = 1.0000.

Goodness-of-fit for Poisson regression model pertaining to CV DALY rates in Asia:

Deviance goodness-of-fit for = 13.5764, p = 0.9899; Pearson goodness-of-fit = 13.5872, p = 0.9899.

# Supplementary Figure 2: Crude mortality associated with cardiovascular diseases by age-group in 2025 and 2050



Age is presented in years.

# Supplementary Figure 3: Projected proportion of crude cardiovascular disease A) mortality and B) disability-adjusted life years in 2025 and 2050

*Inner circles depict projected proportions for 2025, outer circles depict projected proportions for 2050*



# Supplementary Figure 4: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in Central Asia from 2025 to 2050



# Supplementary Figure 5: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in East Asia from 2025 to 2050



# Supplementary Figure 6: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in South Asia from 2025 to 2050



# Supplementary Figure 7: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in South-East Asia from 2025 to 2050



# Supplementary Figure 8: Projected trends in the age-standardised mortality rates per 100,000 population of cardiovascular diseases and risk factors in high-income Asia-Pacific from 2025 to 2050



# Supplementary Table 1: GBD 2019 classification of countries and territories within Asia Super-Region grouped by GBD Region, and World Bank Income Group

|  |  |  |  |
| --- | --- | --- | --- |
| Super Region | Region | Country Name | Income Classification |
| Asia |  |  |  |
|  | Central Asia |  |  |
|  |  | Armenia | Upper middle income |
|  |  | Azerbaijan | Upper middle income |
|  |  | Georgia | Upper middle income |
|  |  | Kazakhstan | Upper middle income |
|  |  | Kyrgyzstan | Lower middle income |
|  |  | Mongolia | Lower middle income |
|  |  | Tajikistan | Low income |
|  |  | Turkmenistan | Upper middle income |
|  |  | Uzbekistan | Lower middle income |
|  | East Asia |  |  |
|  |  | China | Upper middle income |
|  |  | Democratic People's Republic of Korea | Low income |
|  |  | Taiwan (Province of China) | High income |
|  | High-income Asia Pacific |  |  |
|  |  | Brunei Darussalam | High income |
|  |  | Japan | High income |
|  |  | Republic of Korea | High income |
|  |  | Singapore | High income |
|  | South Asia |  |  |
|  |  | Bangladesh | Lower middle income |
|  |  | Bhutan | Lower middle income |
|  |  | India | Lower middle income |
|  |  | Nepal | Lower middle income |
|  |  | Pakistan | Lower middle income |
|  | Southeast Asia |  |  |
|  |  | Cambodia | Lower middle income |
|  |  | Indonesia | Upper middle income |
|  |  | Lao People's Democratic Republic | Lower middle income |
|  |  | Malaysia | Upper middle income |
|  |  | Maldives | Upper middle income |
|  |  | Mauritius | High income |
|  |  | Myanmar | Lower middle income |
|  |  | Philippines | Lower middle income |
|  |  | Seychelles | High income |
|  |  | Sri Lanka | Lower middle income |
|  |  | Thailand | Upper middle income |
|  |  | Timor-Leste | Lower middle income |
|  |  | Vietnam | Lower middle income |

Based on the United Nations reference, West Asia comprises of the following countries **Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, State of Palestine, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates and Yemen.** Some of these countries were included in other GBD-super regionssuch as Middle East or Africa.

# Supplementary Table 2: Definitions of cardiovascular causes based on GBD 2019

|  |  |
| --- | --- |
| Causes | GBD Definition |
| Cardiovascular Diseases | This aggregate cause incorporates death and disability resulting from 11 cardiovascular causes, led by ischaemic heart disease, stroke, and hypertensive heart disease, as well as disability due to heart failure. Both atherosclerotic and nonatherosclerotic cardiovascular diseases are included. |
| Ischemic Heart Disease (IHD) | IHD is defined as disease of the coronary arteries, usually from atherosclerosis, leading to myocardial infarction (MI) or ischaemia, following the Fourth Universal Definition of MI and, for stable angina, physician diagnosis. Incidence is estimated for any MI. |
| Hypertensive Heart disease (HHD) | Hypertensive heart disease is structural heart disease defined by its underlying cause (systemic hypertension), resulting in left ventricular hypertrophy, diastolic dysfunction, and clinical heart failure with either preserved or reduced systolic function. |
| Stroke | Stroke was defined according to WHO criteria of rapidly developing clinical signs of usually focal disturbance of cerebral function lasting more than 24 hours or leading to death. This Level 3 aggregate cause incorporates multiple Level 4 subtypes of stroke. |
| Atrial fibrillation and flutter | Atrial fibrillation, a supraventricular arrhythmia due to progressive atriopathy, is defined by surface ECG diagnosis based on irregular RR intervals (in the absence of complete AV block) and no distinct P waves. Atrial flutter is defined by surface ECG diagnosis of atrial flutter waves. |
| Rheumatic heart disease (RHD) | RHD is a chronic autoimmune valvulitis due to rheumatic fever resulting from streptococcal pharyngitis. We defined RHD as a clinical diagnosis by a physician. Screening studies using echocardiography followed the World Heart Federation criteria for RHD. |
| Aortic aneurysm | Aortic aneurysms represent full-thickness dilation of the aorta, usually due to atherosclerosis, elevated blood pressure, or inflammation of the blood vessel. We include both abdominal and thoracic aortic aneurysms in our estimates of cause-specific mortality. |
| Cardiomyopathy and Myocarditis | This aggregate Level 3 cause incorporates death and disability resulting from cardiomyopathy and myocarditis. This group consists of the Level 4 causes alcoholic cardiomyopathy, myocarditis, and other cardiomyopathy. |
| Endocarditis | The case definition for acute endocarditis was a clinical diagnosis of infective endocarditis—a bacterial or fungal infection of the heart, usually adherent to heart valves or chordae. The long-term sequelae of heart failure due to endocarditis are reported separately. |
| Non-rheumatic Valvular Heart Disease | Non-rheumatic valvular heart disease is an aggregate of three Level 4 causes: calcific aortic valve disease, degenerative mitral valve disease, and other non-rheumatic valve diseases. |
| Peripheral Artery Disease | Peripheral artery disease is a Level 3 cause defined as having an ankle-brachial index (ABI) of less than 0·90, with intermittent claudication defined as leg pain on exertion among those with an ABI below that threshold. |
| Other Cardiovascular and Circulatory Diseases | This aggregate cause incorporates less common cardiovascular diseases that are not modelled independently. |

# Supplementary Table 3: Definitions of risk factors based on GBD 2019

|  |  |
| --- | --- |
| Risk factors | GBD Definition |
| High systolic blood pressure | We estimated brachial SBP in mm Hg. We used a TMREL of SBP ranging from 110 to 115 mm Hg. |
| High fasting plasma glucose | High fasting plasma glucose is defined as serum fasting plasma glucose of greater than 4·8–5·4 mmol/L. |
| High body-mass index | High BMI for adults (ages 20 and older) is defined as BMI greater than 20–25 kg/m2. High BMI for children (ages 1–19) is defined as being overweight or obese based on International Obesity Task Force standards. |
| High LDL cholesterol | We estimated blood concentration of low-density lipoprotein (LDL) in units of mmol/L. We used a TMREL with a uniform distribution between 0·7 and 1·3 mmol/L. |
| Kidney dysfunction | Kidney dysfunction is defined as estimated glomerular filtration rate (eGFR) less than 60 ml/min/1·73m2or albumin to creatinine ratio (ACR) greater than or equal to 30 mg/g. The TMREL is ACR less than 30 mg/g and eGFR greater than or equal to 60 ml/min/1·73m2. |
| Dietary risks | An aggregate risk factor for all GBD dietary risks: diet low in whole grains, fruit, fibre, legumes, nuts and seeds, omega-3 fatty acids, PUFA, vegetables, milk, and calcium; and diet high in sodium, trans fats, red or processed meat, and sugar-sweetened beverages. |
| Tobacco | Tobacco includes tobacco smoking, chewing tobacco use, and second-hand smoke exposure. |
| Low physical activity | Low physical activity was measured in total metabolic equivalents (METs) and was defined as average weekly physical activity (at work, home, transport-related, and recreational) of less than 3000–4500 MET minutes per week. |
| Air pollution | Air pollution includes ambient particulate matter pollution (PM2.5), household air pollution from the use of solid fuels for cooking (HAP), and ambient ozone pollution. |
| Non-optimal temperature | Non-optimal temperature is an aggregate of the burden attributable to low and high temperatures. Heat and cold effects relate to effects above and below the TMREL. The population-weighted mean TMREL is 25·6°C. |
| Other environmental risks | Other environmental risks includes exposure to residential radon and both acute and chronic exposure to lead. |

# Supplementary Table 4: Asian ranking of cardiovascular causes of total crude mortality, DALY, and prevalence numbers in 2025 and 2050

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rank | Cardiovascular Causes | Mortality | | DALYs | | Prevalence | |
|  | | 2025 | 2050 | 2025 | 2050 | 2025 | 2050 |
| Cardiovascular diseases | | 12,593,659 | 24,075,611 | 274,787,878 | 461,527,334 | 349,055,680 | 729,499,264 |
| 1 | Ischemic heart disease | 6,242,127 | 14,059,284 | 131,428,960 | 258,671,120 | 147,008,000 | 338,028,352 |
| 2 | Stroke | 4,870,965 | 7,465,113 | 107,386,248 | 150,610,000 | 71,699,856 | 144,251,008 |
| 3 | Hypertensive heart disease | 664,767 | 1,044,756 | 12,515,924 | 17,502,456 | 14,646,041 | 33,923,776 |
| 4 | Rheumatic heart disease | 237,639 | 209,478 | 8,010,063 | 6,658,138 | 25,591,136 | 39,687,100 |
| 5 | Atrial fibrillation and flutter | 164,247 | 473,975 | 4,977,917 | 12,105,500 | 37,713,788 | 89,796,272 |
| 6 | Other cardiovascular and circulatory diseases | 128,171 | 209,047 | 3,942,670 | 5,187,597 | 16,251,814 | 30,474,094 |
| 7 | Cardiomyopathy and myocarditis | 96,523 | 171,630 | 2,488,241 | 3,239,876 | 844,335 | 1,694,853 |
| 8 | Aortic aneurysm | 93,906 | 237,116 | 1,769,443 | 3,850,567 |  | - |
| 9 | Non-rheumatic valvular heart disease | 52,571 | 112,309 | 1,005,130 | 1,714,325 | 14,847,360 | 33,087,188 |
| 10 | Endocarditis | 30,191 | 51,185 | 771,737 | 908,714 | 222,077 | 512,023 |
| 11 | Peripheral artery disease | 12,554 | 41,718 | 491,545 | 1,079,043 | 70,906,752 | 151,001,808 |

DALY – disability-adjusted life year

# Supplementary Table 5: Asian ranking of cardiovascular causes of crude mortality, DALY, and prevalence rates (per 100,000 population) in 2025 and 2050

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rank | Cardiovascular Causes | Mortality | | DALYs | | Prevalence | |
|  | | 2025 | 2050 | 2025 | 2050 | 2025 | 2050 |
| Cardiovascular diseases | | 275.8 | 558.2 | 5,966.8 | 10,341.4 | 7,398.9 | 15,259.9 |
| 1 | Ischemic heart disease | 136.3 | 333.8 | 2,829.5 | 5,788.3 | 3,049.9 | 6,941.8 |
| 2 | Stroke | 107.7 | 167.7 | 2,363.6 | 3,373.0 | 1,531.9 | 3,041.7 |
| 3 | Hypertensive heart disease | 14.2 | 22.3 | 265.8 | 383.2 | 315.4 | 717.7 |
| 4 | Rheumatic heart disease | 5.5 | 5.5 | 181.7 | 170.8 | 550.3 | 868.2 |
| 5 | Atrial fibrillation and flutter | 3.5 | 10.3 | 107.5 | 261.8 | 820.4 | 1,957.9 |
| 6 | Other cardiovascular and circulatory diseases | 2.5 | 4.0 | 77.2 | 102.2 | 321.3 | 602.9 |
| 7 | Aortic aneurysm | 2.1 | 6.0 | 39.1 | 89.6 | - | - |
| 8 | Cardiomyopathy and myocarditis | 2.1 | 4.1 | 54.5 | 89.3 | 17.1 | 36.2 |
| 9 | Non-rheumatic valvular heart disease | 1.1 | 2.6 | 20.2 | 35.3 | 329.8 | 792.7 |
| 10 | Endocarditis | 0.7 | 1.2 | 17.4 | 25.0 | 4.7 | 10.9 |
| 11 | Peripheral artery disease | 0.2 | 0.8 | 10.3 | 23.0 | 1,551.6 | 3,365.3 |

# Supplementary Table 6: Asian ranking of cardiovascular causes of age-standardised mortality, DALY, and prevalence rates (per 100,000 population) in 2025 and 2050

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rank | Cardiovascular Causes | Mortality (95%UI) | | DALYs (95%UI) | | Prevalence (95%UI) | |
|  | | 2025 | 2050 | 2025 | 2050 | 2025 | 2050 |
| Cardiovascular diseases | | 241.6 (238.7 - 244.5) | 186.0 (181.7 - 190.4) | 4,898.2 (4,859.0 – 4,937.3) | 3,757.6 (3,698.3 – 3,817.0) | 6,181.6 (6,152.8 – 6,210.4) | 6,270.9 (6,212.2 – 6,329.6) |
| 1 | Ischemic heart disease | 120.0 (117.8 - 122.3) | 115.2 (110.7 - 119.6) | 2,339.7 (2,301.8 – 2,377.5) | 2,208.7 (2,137.7 – 2,279.7) | 2,602.6 (2,591.9 – 2,613.3) | 2,721.6 (2,699.7 – 2,743.6) |
| 2 | Stroke | 95.5 (92.3 - 98.7) | 63.4 (59.0 - 67.8) | 1,954.9 (1,909.2 – 2,000.5) | 1,320.9 (1,257.0 – 1,384.8) | 1,265.9 (1,245.1 – 1,286.7) | 1,277.2 (1,236.4 – 1,318.0) |
| 3 | Hypertensive heart disease | 12.6 (11.5 - 13.8) | 7.7 (6.3 - 9.1) | 220.1 (202.2 - 238.1) | 132.6 (111.1 – 154.0) | 264.1 (260.3 - 267.9) | 250.0 (243.0 - 256.9) |
| 4 | Rheumatic heart disease | 4.5 (4.4 - 4.5) | 1.9 (1.9 – 2.0) | 143.7 (142.4 – 145.0) | 68.5 (67.3 - 69.7) | 477.7 (469.7 - 485.6) | 517.0 (496.2 - 537.8) |
| 5 | Atrial fibrillation and flutter | 3.6 (3.5 - 3.6) | 3.5 (3.4 - 3.6) | 92.5 (91.3 - 93.7) | 92.0 (89.7 - 94.4) | 670.6 (658.5 - 682.6) | 678.0 (653.0 - 702.9) |
| 6 | Other cardiovascular and circulatory diseases | 2.5 (2.5 - 2.5) | 1.9 (1.9 – 2.0) | 75.4 (74.7 - 76.1) | 59.4 (58.2 - 60.6) | 291.1 (288.1 – 294.0) | 325.2 (318.7 - 331.6) |
| 7 | Cardiomyopathy and myocarditis | 2.0 (1.9 - 2.1) | 1.7 (1.5 - 1.8) | 49.8 (47.8 - 51.8) | 40.4 (37.4 - 43.5) | 16.4 (16.2 - 16.6) | 13.6 (13.2 – 14.0) |
| 8 | Aortic aneurysm | 1.9 (1.9 – 2.0) | 2.1 (2.0 - 2.2) | 32.4 (32.0 - 32.8) | 33.9 (33.0 - 34.8) | - | - |
| 9 | Non-rheumatic valvular heart disease | 1.2 (1.2 - 1.3) | 1.2 (1.1 - 1.2) | 19.8 (19.5 – 20.0) | 16.5 (16.1 – 17.0) | 267.7 (263.9 - 271.4) | 284.6 (276.8 - 292.3) |
| 10 | Endocarditis | 0.6 (0.6 - 0.7) | 0.6 (0.5 - 0.6) | 15.3 (14.9 - 15.7) | 11.6 (10.9 - 12.4) | 4.6 (4.6 - 4.6) | 4.6 (4.5 - 4.7) |
| 11 | Peripheral artery disease | 0.3 (0.3 - 0.3) | 0.3 (0.3 - 0.3) | 9.2 (9.1 - 9.3) | 8.5 (8.4 - 8.6) | 1,253.3 (1,246.6 – 1,260.0) | 1,172.9 (1,159.0 – 1,186.7) |

UI – Uncertainty intervals

# Supplementary Table 7: Crude prevalence rates (per 100,000 population) attributable to cardiovascular causes in 2050

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular Causes | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| Prevalence | % change | Prevalence | % change | Prevalence | % change | Prevalence | % change | Prevalence | % change | Prevalence | % change |
| Cardiovascular diseases | 15,259.9 | 106.2 | 6,938.8 | 18.8 | 23,821.4 | 141.5 | 11,012.7 | 85.4 | 11,391.4 | 103.8 | 21,881.5 | 73.2 |
| Ischemic heart disease | 6,941.8 | 127.6 | 3,256.6 | 14.9 | 9,788.2 | 156.7 | 3,268.1 | 93.9 | 6,837.4 | 128.5 | 5,354.1 | 91.3 |
| Peripheral artery disease | 3,365.3 | 116.9 | 1,004.5 | 20.5 | 6,359.9 | 162.5 | 3,067.4 | 102.5 | 1,596.1 | 111.8 | 4,937.7 | 49.6 |
| Stroke | 3,041.7 | 98.6 | 1,124.5 | 9.8 | 5,534.9 | 143.0 | 3,004.5 | 76.2 | 1,402.5 | 84.9 | 5,467.3 | 74.7 |
| Atrial fibrillation and flutter | 1,957.9 | 138.7 | 722.2 | 19.7 | 3,310.8 | 185.7 | 1,483.8 | 105.3 | 1,413.2 | 129.4 | 1,110.9 | 61.9 |
| Rheumatic heart disease | 868.2 | 57.8 | 789.5 | 18.9 | 548.4 | 28.3 | 442.3 | 39.1 | 1,292.2 | 67.4 | 97.6 | 34.4 |
| Non-rheumatic valvular heart disease | 792.7 | 140.3 | 856.1 | 78.6 | 1,663.1 | 257.8 | 134.8 | 123.9 | 30.1 | 156.6 | 6,729.5 | 92.4 |
| Hypertensive heart disease | 717.7 | 127.6 | 119.4 | 0.7 | 1,630.9 | 159.9 | 620.6 | 96.7 | 206.8 | 145.7 | 760.1 | 161.6 |
| Other cardiovascular and circulatory diseases | 602.9 | 87.6 | 134.6 | 7.2 | 878.6 | 146.2 | 528.8 | 63.2 | 474.6 | 67.0 | 710.1 | 38.5 |
| Cardiomyopathy and myocarditis | 36.2 | 111.3 | 19.5 | 8.3 | 37.8 | 172.9 | 78.0 | 123.3 | 2.2 | 156.5 | 277.4 | 92.2 |
| Endocarditis | 10.9 | 130.0 | 0.7 | 19.8 | 10.3 | 139.0 | 19.7 | 123.0 | 3.4 | 134.8 | 78.0 | 172.7 |

% change – Percentage change from 2025

# Supplementary Table 8: Age-standardised prevalence rates (per 100,000 population) attributable to cardiovascular causes in 2050

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular Causes | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| Prevalence | % change | Prevalence | % change | Prevalence | % change | Prevalence | % change | Prevalence | % change | Prevalence | % change |
| Cardiovascular diseases | 6,270.9 | 1.4 | 7,665.7 | 0.3 | 6,545.3 | 5.0 | 5,908.2 | 0.9 | 6,442.8 | 2.8 | 4,093.3 | -16.9 |
| Ischemic heart disease | 2,721.6 | 4.6 | 4,214.3 | 0.4 | 2,555.0 | 6.4 | 1,725.8 | 0.2 | 3,755.1 | 5.4 | 800.6 | -16.9 |
| Stroke | 1,277.2 | 0.9 | 1,060.7 | -11.5 | 1,574.6 | 8.8 | 1,569.3 | -2.2 | 771.9 | -0.6 | 1,059.3 | -14.5 |
| Peripheral artery disease | 1,172.9 | -6.4 | 1,246.4 | 2.2 | 1,527.4 | 3.8 | 1,600.1 | 2.9 | 898.8 | -2.0 | 633.0 | -39.5 |
| Atrial fibrillation and flutter | 678.0 | 1.1 | 958.0 | 5.0 | 758.6 | 5.8 | 816.6 | 3.2 | 780.8 | 1.9 | 171.3 | -28.6 |
| Rheumatic heart disease | 517.0 | 8.2 | 667.9 | 4.9 | 350.2 | -5.7 | 296.7 | 3.9 | 723.5 | 6.8 | 20.2 | -32.8 |
| Other cardiovascular and circulatory diseases | 325.2 | 11.7 | 133.8 | -1.2 | 357.7 | 39.1 | 318.8 | 7.8 | 281.9 | -1.4 | 328.3 | -4.2 |
| Non-rheumatic valvular heart disease | 284.6 | 6.3 | 783.1 | 38.3 | 417.5 | 49.4 | 66.7 | 16.5 | 15.9 | 28.1 | 1,445.8 | -1.6 |
| Hypertensive heart disease | 250.0 | -5.4 | 166.0 | -11.5 | 364.7 | -8.1 | 340.8 | -0.2 | 112.5 | 1.2 | 73.8 | -9.4 |
| Cardiomyopathy and myocarditis | 13.6 | -17.2 | 23.1 | -8.8 | 8.3 | -9.7 | 43.2 | 8.0 | 1.2 | -0.2 | 40.7 | -18.8 |
| Endocarditis | 4.6 | 0.8 | 0.9 | 9.9 | 3.6 | 8.9 | 13.4 | 27.1 | 2.1 | 14.0 | 5.8 | -19.4 |

% change – Percentage change from 2025

# Supplementary Table 9: Crude prevalence numbers attributable to heart failure as an impairment

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Total Asia** | **Central Asia** | **East Asia** | **Southeast Asia** | **South Asia** | **High-income Asia Pacific** |
| 2019 | 27,609,413 | 313,585 | 16,052,563 | 3,875,222 | 3,740,285 | 1,963,328 |
| 2020 | 27,773,122 | 302,715 | 16,032,423 | 3,951,747 | 3,887,358 | 1,969,740 |
| 2025 | 32,737,948 | 315,301 | 18,991,124 | 4,794,117 | 4,568,786 | 2,211,623 |
| 2030 | 38,590,304 | 328,411 | 22,495,838 | 5,816,050 | 5,369,663 | 2,483,209 |
| 2035 | 45,488,852 | 342,065 | 26,647,330 | 7,055,823 | 6,310,928 | 2,788,145 |
| 2040 | 53,620,604 | 356,288 | 31,564,956 | 8,559,869 | 7,417,191 | 3,130,527 |
| 2045 | 63,206,024 | 371,101 | 37,390,108 | 10,384,525 | 8,717,373 | 3,514,954 |
| 2050 | 74,504,968 | 386,531 | 44,290,256 | 12,598,131 | 10,245,469 | 3,946,587 |
| % change | 127.6 | 22.6 | 133.2 | 162.8 | 124.2 | 78.4 |

% change – Percentage change from 2025

# Supplementary Table 10: Crude mortality rates (per 100,000 population) attributable to cardiovascular causes in 2050

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular Causes | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change |
| Cardiovascular diseases | 558.2 | 102.4 | 424.3 | 13.2 | 942.1 | 147.4 | 468.7 | 81.6 | 367.6 | 85.3 | 408.0 | 68.8 |
| Ischemic heart disease | 333.8 | 144.9 | 236.5 | 4.3 | 602.5 | 238.0 | 192.1 | 90.4 | 238.4 | 104.9 | 116.4 | 31.0 |
| Stroke | 167.7 | 55.7 | 101.6 | -0.2 | 280.9 | 67.2 | 219.9 | 74.7 | 86.0 | 53.0 | 93.6 | 8.2 |
| Hypertensive heart disease | 22.3 | 57.5 | 31.0 | 59.0 | 30.0 | 51.7 | 33.0 | 76.8 | 13.4 | 62.7 | 16.1 | 65.7 |
| Atrial fibrillation and flutter | 10.3 | 194.0 | 3.8 | 39.4 | 13.8 | 214.4 | 7.5 | 158.6 | 7.7 | 223.7 | 33.3 | 214.1 |
| Aortic aneurysm | 6.0 | 183.5 | 3.3 | 89.2 | 3.6 | 145.2 | 3.8 | 132.8 | 3.0 | 133.2 | 76.8 | 334.0 |
| Rheumatic heart disease | 5.5 | 0.9 | 1.8 | -41.9 | 2.8 | -31.9 | 0.7 | -30.9 | 9.3 | 8.8 | 4.9 | 64.2 |
| Cardiomyopathy and myocarditis | 4.1 | 93.8 | 41.7 | 165.6 | 4.3 | 92.7 | 5.7 | 69.6 | 0.8 | 70.5 | 8.3 | 47.9 |
| Other cardiovascular and circulatory diseases | 4.0 | 60.0 | 2.4 | -5.2 | 2.5 | 51.7 | 2.8 | 42.5 | 5.2 | 60.4 | 8.5 | 105.6 |
| Non-rheumatic valvular heart disease | 2.6 | 137.8 | 1.5 | 150.2 | 0.6 | 49.4 | 0.8 | 78.7 | 1.8 | 105.1 | 38.8 | 237.2 |
| Endocarditis | 1.2 | 82.6 | 0.5 | 65.0 | 0.3 | 6.7 | 2.0 | 60.5 | 1.0 | 88.2 | 8.1 | 166.5 |
| Peripheral artery disease | 0.8 | 265.7 | 0.2 | 62.8 | 0.7 | 265.6 | 0.5 | 192.4 | 0.9 | 313.6 | 3.1 | 253.3 |

% change – Percentage change from 2025

# Supplementary Table 11: Age-standardised mortality rates (per 100,000 population) attributable to cardiovascular causes in 2050

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular Causes | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change |
| Cardiovascular diseases | 186.0 | -23.0 | 675.8 | 1.4 | 216.7 | -20.3 | 278.3 | -6.8 | 207.2 | -19.1 | 21.6 | -60.8 |
| Ischemic heart disease | 115.2 | -4.1 | 415.8 | 0.2 | 180.3 | 31.9 | 112.0 | -3.0 | 140.8 | -5.9 | 8.4 | -60.8 |
| Stroke | 63.4 | -33.6 | 167.4 | -6.6 | 79.1 | -34.9 | 134.2 | -8.5 | 50.6 | -31.7 | 6.7 | -67.7 |
| Hypertensive heart disease | 7.7 | -39.2 | 65.4 | 67.9 | 7.1 | -49.4 | 19.4 | -10.6 | 8.2 | -31.1 | 0.7 | -63.6 |
| Atrial fibrillation and flutter | 3.5 | -2.0 | 9.5 | 43.5 | 3.4 | -6.4 | 5.1 | 20.5 | 4.8 | 15.6 | 1.8 | -19.4 |
| Aortic aneurysm | 2.1 | 11.7 | 4.9 | 72.8 | 0.9 | -3.9 | 2.3 | 16.6 | 1.7 | 1.5 | 6.6 | 41.1 |
| Rheumatic heart disease | 1.9 | -56.5 | 2.1 | -45.8 | 0.8 | -72.0 | 0.4 | -61.2 | 5.8 | -43.1 | 0.3 | -53.5 |
| Other cardiovascular and circulatory diseases | 1.9 | -22.1 | 3.4 | -10.3 | 0.8 | -34.3 | 1.9 | -16.9 | 3.2 | -23.7 | 0.7 | -33.8 |
| Cardiomyopathy and myocarditis | 1.7 | -15.0 | 48.3 | 132.9 | 2.0 | 0.7 | 3.7 | -5.9 | 0.5 | -16.0 | 0.7 | -52.8 |
| Non-rheumatic valvular heart disease | 1.2 | -5.9 | 2.2 | 131.6 | 0.2 | -40.9 | 0.4 | -6.3 | 1.0 | -9.6 | 1.7 | -23.7 |
| Endocarditis | 0.6 | -8.7 | 0.6 | 49.4 | 0.1 | -45.9 | 1.3 | -0.1 | 0.6 | -2.9 | 0.6 | -15.7 |
| Peripheral artery disease | 0.3 | 20.5 | 0.4 | 56.9 | 0.2 | 16.9 | 0.3 | 42.4 | 0.5 | 59.2 | 0.2 | -11.0 |

% change – Percentage change from 2025

# Supplementary Table 12: Crude DALY rates (per 100,000 population) attributable to cardiovascular causes in 2050

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular Causes | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change |
| Cardiovascular diseases | 10,341.4 | 73.3 | 9,764.2 | 15.0 | 14,153.4 | 96.3 | 10,574.5 | 69.5 | 8,329.4 | 66.8 | 4,378.4 | 22.8 |
| Ischemic heart disease | 5,788.3 | 104.6 | 5,052.3 | 5.5 | 8,054.5 | 161.3 | 4,329.9 | 82.7 | 5,290.9 | 85.0 | 1,157.1 | 0.7 |
| Stroke | 3,373.0 | 42.7 | 2,445.7 | 1.3 | 4,997.7 | 47.2 | 4,907.4 | 61.0 | 1,973.0 | 42.9 | 1,466.3 | -5.0 |
| Hypertensive heart disease | 383.2 | 44.1 | 521.3 | 40.3 | 417.6 | 26.6 | 717.8 | 70.9 | 248.6 | 47.3 | 128.2 | 20.5 |
| Atrial fibrillation and flutter | 261.8 | 143.5 | 118.0 | 33.9 | 396.2 | 176.6 | 206.1 | 118.1 | 201.0 | 149.4 | 321.9 | 105.4 |
| Rheumatic heart disease | 170.8 | -6.0 | 73.8 | -44.7 | 53.8 | -43.8 | 34.5 | -31.6 | 311.7 | -0.8 | 30.3 | -2.0 |
| Other cardiovascular and circulatory diseases | 102.2 | 32.5 | 66.0 | -16.4 | 50.8 | 10.0 | 87.2 | 21.2 | 141.5 | 37.9 | 114.9 | 37.5 |
| Aortic aneurysm | 89.6 | 129.0 | 76.0 | 81.9 | 69.7 | 117.9 | 74.1 | 119.0 | 60.8 | 112.0 | 718.6 | 219.6 |
| Cardiomyopathy and myocarditis | 89.3 | 63.9 | 1,349.0 | 150.2 | 60.3 | 14.5 | 125.1 | 41.8 | 21.6 | 47.8 | 94.2 | 2.2 |
| Non-rheumatic valvular heart disease | 35.3 | 74.6 | 39.6 | 108.6 | 18.4 | 48.9 | 17.1 | 62.6 | 35.5 | 78.5 | 256.6 | 106.1 |
| Endocarditis | 25.0 | 43.8 | 16.0 | 55.0 | 3.0 | -46.4 | 54.7 | 33.2 | 26.4 | 57.7 | 51.1 | 57.2 |
| Peripheral artery disease | 23.0 | 123.8 | 6.6 | 21.8 | 31.3 | 135.5 | 20.7 | 103.5 | 18.3 | 158.8 | 39.3 | 77.1 |

DALY – disability-adjusted life year; % change – Percentage change from 2025

# Supplementary Table 13: Age-standardised DALY rates (per 100,000 population) attributable to cardiovascular causes in 2050

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular Causes | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change |
| Cardiovascular diseases | 3,757.6 | -23.3 | 11,424.5 | -5.4 | 3,412.8 | -27.0 | 5,715.1 | -8.5 | 4,556.6 | -18.3 | 513.0 | -56.4 |
| Ischemic heart disease | 2,208.7 | -5.6 | 6,718.9 | -5.5 | 2,405.9 | 14.6 | 2,263.6 | -2.9 | 3,003.6 | -6.3 | 154.0 | -59.2 |
| Stroke | 1,320.9 | -32.4 | 3,002.1 | -12.3 | 1,412.7 | -37.0 | 2,744.2 | -11.1 | 1,121.1 | -29.0 | 210.2 | -60.1 |
| Hypertensive heart disease | 132.6 | -39.8 | 789.8 | 34.0 | 98.0 | -53.2 | 379.9 | -10.9 | 142.9 | -30.8 | 10.0 | -62.8 |
| Atrial fibrillation and flutter | 92.0 | -0.5 | 183.9 | 22.5 | 93.3 | -1.2 | 119.8 | 9.6 | 113.7 | 6.8 | 35.0 | -23.7 |
| Rheumatic heart disease | 68.5 | -52.3 | 66.8 | -52.2 | 17.5 | -73.4 | 24.4 | -50.1 | 185.5 | -41.5 | 3.7 | -61.9 |
| Other cardiovascular and circulatory diseases | 59.4 | -21.2 | 72.3 | -24.1 | 22.8 | -38.5 | 58.4 | -17.5 | 88.1 | -20.9 | 31.6 | -26.3 |
| Cardiomyopathy and myocarditis | 40.4 | -18.8 | 1,297.6 | 115.8 | 40.3 | -23.6 | 83.0 | -8.6 | 13.5 | -13.3 | 23.6 | -48.2 |
| Aortic aneurysm | 33.9 | 4.6 | 86.3 | 56.4 | 19.4 | -3.6 | 41.0 | 17.3 | 33.0 | 1.7 | 103.6 | 34.9 |
| Non-rheumatic valvular heart disease | 16.5 | -16.5 | 44.6 | 79.6 | 5.8 | -31.6 | 9.5 | -8.6 | 20.2 | -9.9 | 19.8 | -36.3 |
| Endocarditis | 11.6 | -24.1 | 15.8 | 37.4 | 1.6 | -67.5 | 36.7 | -6.3 | 16.9 | -3.7 | 7.6 | -34.6 |
| Peripheral artery disease | 8.5 | -7.7 | 9.7 | 8.0 | 7.7 | -10.4 | 11.8 | 3.1 | 10.2 | 11.1 | 3.8 | -37.3 |

DALY – disability-adjusted life year; % change – Percentage change from 2025

# Supplementary Table 14: Asian ranking of cardiovascular risk factors of total crude mortality and DALY numbers in 2025 and 2050

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular Risk Factors |  | Mortality | | | DALYs | | | |
|  | Rank | 2025 | 2050 | Rank | Rank | 2025 | 2050 | Rank |
| High systolic blood pressure | 1 | 6,900,116 | 13,126,491 | 1 | 1 | 154,966,608 | 272,869,152 | 1 |
| Dietary risks | 2 | 4,779,521 | 8,284,857 | 2 | 2 | 113,407,288 | 179,144,928 | 2 |
| Air pollution | 3 | 3,084,438 | 4,847,413 | 6 | 3 | 77,082,408 | 113,177,216 | 6 |
| High LDL cholesterol | 4 | 2,911,384 | 6,338,057 | 4 | 4 | 70,556,480 | 136,527,712 | 4 |
| High fasting plasma glucose | 5 | 2,721,067 | 6,807,206 | 3 | 5 | 54,626,368 | 127,138,480 | 5 |
| Tobacco | 6 | 2,350,903 | 3,797,302 | 7 | 6 | 61,726,836 | 94,893,568 | 7 |
| High body-mass index | 7 | 2,008,726 | 5,840,517 | 5 | 7 | 59,919,420 | 169,204,448 | 3 |
| Kidney dysfunction | 8 | 1,253,162 | 2,787,952 | 8 | 8 | 26,773,828 | 53,413,744 | 8 |
| Non-optimal temperature | 9 | 783,914 | 1,391,539 | 9 | 9 | 14,839,173 | 22,995,622 | 9 |
| Other environmental risks | 10 | 761,770 | 1,303,164 | 10 | 10 | 15,843,872 | 22,450,076 | 10 |
| Low physical activity | 11 | 405,547 | 947,120 | 11 | 11 | 6,559,191 | 13,613,055 | 11 |

DALY – disability-adjusted life year

# Supplementary Table 15 Asian ranking of cardiovascular risk factors of age-standardised mortality and DALY rates (per 100,000 population) in 2025 and 2050

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular Risk Factors |  | Mortality (95%UI) | | | DALYs (95%UI) | | | |
|  | Rank | 2025 | 2050 | Rank | Rank | 2025 | 2050 | Rank |
| High systolic blood pressure | 1 | 130.4 (128.8 – 132.0) | 105.4 (102.9 - 107.9) | 1 | 1 | 2,724.6 (2,692.0 – 2,757.3) | 2,248.7 (2,196.8 – 2,300.7) | 1 |
| Dietary risks | 2 | 89.8 (88.8 - 90.8) | 68.3 (66.8 - 69.8) | 2 | 2 | 1,973.6 (1,957.8 – 1,989.5) | 1,505 (1,480.5 – 1,529.4) | 2 |
| Air pollution | 3 | 56.8 (55.3 - 58.3) | 40.4 (38.4 - 42.5) | 6 | 3 | 1,336.6 (1,309.6 – 1,363.6) | 962.5 (924.3 – 1,000.8) | 6 |
| High LDL cholesterol | 4 | 55.2 (54.4 - 56.1) | 51.9 (50.3 - 53.5) | 4 | 4 | 1,227.7 (1,212.7 – 1,242.7) | 1,160 (1,132.3 – 1,187.7) | 4 |
| High fasting plasma glucose | 5 | 53.0 (50.3 - 55.8) | 56.7 (50.8 - 62.6) | 3 | 7 | 991.0 (952.8 – 1,029.2) | 1,067.7 (985 – 1,150.5) | 5 |
| Tobacco | 6 | 42.3 (41.1 - 43.5) | 31.8 (30 - 33.7) | 7 | 5 | 1,054.9 (1,030.2 – 1,079.7) | 797.5 (758.6 - 836.5) | 7 |
| High body-mass index | 7 | 35.1 (34.9 - 35.3) | 46.9 (46.2 - 47.6) | 5 | 6 | 1,008 (999.0 – 1,017.1) | 1,428.5 (1,401.4 – 1,455.7) | 3 |
| Kidney dysfunction | 8 | 24.2 (23.5 - 24.8) | 23.3 (22.1 - 24.6) | 8 | 8 | 477.3 (466.0 - 488.6) | 452.4 (431.2 - 473.5) | 8 |
| Non-optimal temperature | 9 | 15.3 (15.0 - 15.7) | 11.4 (10.9 - 12) | 10 | 10 | 268.3 (262.7 - 273.8) | 195.4 (186.9 - 204) | 10 |
| Other environmental risks | 10 | 15.0 (14.5 - 15.5) | 12 (11.2 - 12.8) | 9 | 9 | 289.4 (279.6 - 299.3) | 205.8 (191.5 - 220.1) | 9 |
| Low physical activity | 11 | 8.4 (8.3 - 8.6) | 7.4 (7.1 - 7.7) | 11 | 11 | 124.5 (122.5 - 126.4) | 109.4 (105.9 - 112.9) | 11 |

DALY – disability-adjusted life year; UI – uncertainty interval

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular  Risk Factors | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change |
| High systolic blood pressure | 294.7 | 95.5 | 231.1 | 7.6 | 464.8 | 128.3 | 301.7 | 87.7 | 203.6 | 88.5 | 92.0 | -0.8 |
| Dietary risks | 183.9 | 76.3 | 156.2 | -3.9 | 279.9 | 99.2 | 143.4 | 58.6 | 148.8 | 80.9 | 64.8 | 6.0 |
| High fasting plasma glucose | 156.3 | 166.3 | 330.5 | 160.4 | 157.2 | 138.3 | 165.9 | 179.7 | 151.0 | 190.5 | 40.8 | 34.0 |
| High LDL cholesterol | 146.6 | 133.7 | 108.8 | 4.7 | 263.9 | 210.9 | 100.7 | 94.5 | 98.3 | 101.4 | 57.1 | 22.7 |
| High body-mass index | 145.0 | 236.5 | 129.5 | 30.3 | 152.3 | 216.7 | 196.4 | 278.4 | 132.1 | 269.2 | 15.5 | 7.0 |
| Air pollution | 105.7 | 57.3 | 60.1 | -8.2 | 160.9 | 74.1 | 69.3 | 32.5 | 93.9 | 61.4 | 12.7 | -5.3 |
| Tobacco | 85.3 | 65.6 | 68.5 | 2.2 | 152.6 | 92.8 | 89.2 | 71.7 | 47.2 | 50.0 | 18.7 | -23.9 |
| Kidney dysfunction | 61.1 | 129.1 | 49.9 | 31.7 | 103.7 | 188.9 | 58.8 | 114.5 | 38.5 | 99.2 | 25.0 | 26.3 |
| Non-optimal temperature | 31.7 | 86.0 | 33.6 | 2.0 | 63.2 | 101.1 | 10.5 | 87.6 | 20.5 | 122.1 | 19.0 | 13.0 |
| Other environmental risks | 27.9 | 71.2 | 11.5 | 12.8 | 40.8 | 88.1 | 14.1 | 67.5 | 27.8 | 66.9 | 2.5 | 0.1 |
| Low physical activity | 20.9 | 152.6 | 10.5 | 6.0 | 35.4 | 213.8 | 12.3 | 117.8 | 16.1 | 139.6 | 13.5 | 45.6 |

# Supplementary Table 16: Crude mortality rates (per 100,000 population) attributable to cardiovascular risk factors in 2050

% change – Percentage change from 2025

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular  Risk Factors | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change | Mortality | % change |
| High systolic blood pressure | 105.4 | -19.2 | 385.2 | 2.0 | 126.4 | -13.1 | 176.1 | -3.4 | 118.3 | -14.0 | 7.1 | -69.2 |
| Dietary risks | 68.3 | -23.9 | 260.2 | -9.1 | 80.6 | -19.7 | 81.9 | -17.7 | 86.8 | -15.6 | 5.2 | -66.3 |
| High fasting plasma glucose | 56.7 | 6.9 | 546.2 | 138.8 | 48.2 | -3.4 | 106.0 | 43.9 | 83.6 | 24.5 | 2.9 | -60.1 |
| High LDL cholesterol | 51.9 | -6.0 | 170.9 | -3.1 | 79.5 | 24.5 | 56.6 | -0.6 | 58.1 | -4.1 | 4.3 | -62.5 |
| High body-mass index | 46.9 | 33.5 | 171.7 | 15.1 | 40.6 | 30.4 | 100.5 | 103.4 | 73.8 | 82.3 | 2.0 | -56.8 |
| Air pollution | 40.4 | -28.8 | 85.3 | -17.6 | 44.9 | -29.5 | 39.1 | -30.4 | 51.7 | -25.5 | 1.3 | -66.1 |
| Tobacco | 31.8 | -24.9 | 84.9 | -10.6 | 42.8 | -18.3 | 45.8 | -11.8 | 26.1 | -27.7 | 2.7 | -67.9 |
| Kidney dysfunction | 23.3 | -3.4 | 78.2 | 21.4 | 31.1 | 16.5 | 34.5 | 12.2 | 23.5 | -6.8 | 1.7 | -63.2 |
| Other environmental risks | 12.0 | -20.1 | 21.5 | 12.7 | 12.9 | -20.8 | 9.2 | -7.3 | 18.9 | -16.9 | 0.2 | -70.9 |
| Non-optimal temperature | 11.4 | -25.5 | 57.6 | -2.9 | 17.8 | -22.6 | 6.7 | -0.8 | 11.3 | -3.0 | 1.3 | -66.7 |
| Low physical activity | 7.4 | -12.4 | 24.4 | 8.4 | 10.1 | 6.6 | 7.8 | 5.6 | 10.0 | -3.7 | 0.7 | -64.2 |

# Supplementary Table 17: Age-standardised mortality rates (per 100,000 population) attributable to cardiovascular risk factors in 2050

% change – Percentage change from 2025

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular  Risk Factors | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change |
| High systolic blood pressure | 6,075.3 | 80.3 | 5,305.1 | 8.1 | 8,190.6 | 100.0 | 7,080.7 | 80.8 | 4,775.9 | 76.8 | 1,233.9 | -17.5 |
| High body-mass index | 4,189.2 | 226.7 | 3,498.4 | 29.5 | 3,813.2 | 192.4 | 6,172.3 | 258.5 | 4,025.3 | 259.2 | 315.9 | -6.0 |
| Dietary risks | 3,974.6 | 61.1 | 3,627.6 | -2.7 | 5,098.4 | 70.4 | 3,562.4 | 52.0 | 3,677.1 | 68.5 | 814.0 | -15.8 |
| High LDL cholesterol | 2,994.3 | 99.9 | 2,712.2 | 6.7 | 4,226.6 | 144.4 | 2,580.7 | 86.0 | 2,561.2 | 85.4 | 670.5 | -3.5 |
| High fasting plasma glucose | 2,937.7 | 149.6 | 6,467.1 | 155.7 | 2,597.1 | 112.4 | 3,013.2 | 161.3 | 3,106.0 | 170.5 | 532.4 | 13.6 |
| Air pollution | 2,459.6 | 47.4 | 1,532.8 | -7.0 | 3,162.4 | 54.2 | 1,852.9 | 29.0 | 2,463.6 | 54.8 | 227.2 | -17.1 |
| Tobacco | 2,105.2 | 56.9 | 1,845.0 | 0.4 | 3,315.0 | 75.5 | 2,570.8 | 70.7 | 1,308.8 | 45.6 | 431.9 | -27.5 |
| Kidney dysfunction | 1,152.0 | 102.0 | 1,100.0 | 29.7 | 1,626.2 | 139.0 | 1,360.9 | 102.5 | 843.3 | 83.1 | 284.5 | 2.4 |
| Non-optimal temperature | 536.6 | 66.6 | 718.7 | 3.0 | 883.6 | 64.8 | 208.6 | 73.4 | 456.8 | 106.0 | 163.0 | -17.2 |
| Other environmental risks | 482.0 | 42.3 | 222.0 | 7.3 | 582.2 | 46.2 | 280.6 | 45.6 | 543.4 | 42.2 | 22.4 | -30.9 |
| Low physical activity | 281.9 | 118.1 | 180.2 | 11.1 | 397.3 | 158.0 | 215.1 | 108.4 | 251.5 | 109.6 | 126.2 | 17.6 |

# Supplementary Table 18: Crude DALY rates (per 100,000 population) attributable to cardiovascular risk factors in 2050

DALY – disability-adjusted life year; % change – Percentage change from 2025

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cardiovascular  Risk Factors | Total Asia | | Central Asia | | East Asia | | Southeast Asia | | South Asia | | High-Income Asia Pacific | |
| DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change | DALYs | % change |
| High systolic blood pressure | 2,248.7 | -17.5 | 6,509.1 | -6.1 | 2,166.5 | -17.3 | 3,674.4 | -4.8 | 2,680.4 | -11.9 | 176.6 | -65.3 |
| Dietary risks | 1,505.0 | -23.7 | 4,439.8 | -15.3 | 1,398.5 | -26.5 | 1,807.9 | -19.0 | 2,056.4 | -14.1 | 134.2 | -62.2 |
| High body-mass index | 1,428.5 | 41.7 | 3,564.5 | 5.7 | 1,017.5 | 28.3 | 3,032.8 | 101.0 | 2,234.9 | 90.5 | 76.8 | -49.8 |
| High LDL cholesterol | 1,160.0 | -5.5 | 3,080.3 | -9.4 | 1,244.9 | 9.3 | 1,283.5 | -0.7 | 1,444.8 | -3.1 | 109.3 | -57.2 |
| High fasting plasma glucose | 1,067.7 | 7.7 | 8,740.0 | 125.0 | 751.3 | -9.3 | 1,760.7 | 38.7 | 1,698.7 | 27.9 | 63.8 | -56.0 |
| Air pollution | 962.5 | -28.0 | 1,698.1 | -21.8 | 870.4 | -32.9 | 946.6 | -30.2 | 1,338.2 | -22.0 | 43.9 | -60.2 |
| Tobacco | 797.5 | -24.4 | 1,857.4 | -17.6 | 904.1 | -22.3 | 1,215.9 | -10.6 | 719.7 | -25.1 | 100.0 | -61.9 |
| Kidney dysfunction | 452.4 | -5.2 | 1,350.3 | 12.7 | 461.9 | 3.2 | 714.3 | 8.4 | 484.6 | -8.2 | 33.2 | -60.6 |
| Other environmental risks | 205.8 | -28.9 | 321.1 | 0.2 | 173.5 | -34.6 | 163.8 | -17.4 | 347.7 | -24.0 | 2.6 | -73.4 |
| Non-optimal temperature | 195.4 | -27.1 | 933.0 | -8.7 | 246.9 | -30.4 | 117.7 | -4.7 | 251.0 | 1.5 | 21.2 | -66.9 |
| Low physical activity | 109.4 | -12.1 | 313.3 | 5.2 | 111.3 | -2.5 | 121.9 | 5.6 | 148.5 | -5.4 | 10.9 | -61.3 |

# Supplementary Table 19: Age-standardised DALY rates (per 100,000 population) attributable to cardiovascular risk factors in 2050

DALY – disability-adjusted life year; % change – Percentage change from 2025