




ORIGINAL RESEARCH

Global, Regional, and National Burden of Valvular Heart Disease, 1990 to 2021

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BACKGROUND: Valvular heart disease poses an escalating global health challenge with an increasing impact on mortality and disability. This study aims to comprehensively analyze the global burden of valvular heart disease.

METHODS AND RESULTS: Using the Global Burden of Disease 2021 data, we analyzed the prevalence and disability-adjusted life years, examining implications across demographics and geographic regions. In 2021, an estimated 54.8 million (95% uncertainty interval [UI], 43.3–67.6) cases of rheumatic heart disease, 13.3 million (95% UI, 11.4–15.2) cases of nonrheumatic calcific aortic valve disease (CAVD), and 15.5 million (95% UI, 14.5–16.7) cases of nonrheumatic degenerative mitral valve disease (DMVD) were reported globally. Despite the rising prevalence, disability-adjusted life years declined between 1991 and 2021. Among individuals aged 70 years or older, the age-standardized prevalences were 1803.6 per 100 000 (95% UI, 1535.5–2055.7) for CAVD and 2148.9 per 100 000 (95% UI, 2001.4–2310.1) for DMVD. Sub-Saharan Africa had the highest age-standardized prevalence for rheumatic heart disease; Conversely, high-income regions led in CAVD and DMVD prevalence. Rheumatic heart disease had the highest age-standardized prevalence of 1184.2 per 100 000 (95% UI, 932.4–1478.2) in low Socio-Demographic Index (SDI) regions, whereas CAVD peaked at 349.8 per 100 000 (95% UI, 303.6–395.8) in high SDI regions. The most substantial increases in age-standardized prevalences of CAVD from 1990 to 2021 occurred in the middle SDI and low-middle SDI regions. A parallel trend was noted for DMVD.

CONCLUSIONS: Rheumatic heart disease remains a significant burden in low SDI regions, whereas CAVD and DMVD pose challenges in high SDI regions with aging populations.

Key Words: Global Burden of Disease Study ■ nonrheumatic calcific aortic valve disease ■ nonrheumatic degenerative mitral valve disease ■ rheumatic heart disease ■ valvular heart disease

Valvular heart disease (VHD) represents an increasing public health issue worldwide, occurring most in an aging population and contributing significantly to morbidity, mortality, and decreased quality of life.^{1,2} Despite management advancements, including transcatheter therapies, VHD is often underdiagnosed and detected late; it is also undertreated and receives relatively little attention from the general public and policymakers.^{3,4} Inequalities exist in access to timely diagnosis and treatment between regions, leading to health

care disparities related to VHD. Addressing these gaps in disparities will require intensified efforts directed at prevention, early detection, and materially enhanced management strategies.^{5,6}

VHD includes a wide range of conditions, from rheumatic heart disease (RHD) to nonrheumatic calcific aortic valve disease (CAVD) and nonrheumatic degenerative mitral valve disease (DMVD), each with its regional pattern.⁷ RHD continues to be prevalent in low-resource settings, whereas degenerative valve

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This article was sent to Rushi V. Parikh, MD, Associate Editor, for review by expert referees, editorial decision, and final disposition.

Supplemental Material is available at <https://www.ahajournals.org/doi/suppl/10.1161/JAHA.124.037991>

For Sources of Funding and Disclosures, see page 33.

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CLINICAL PERSPECTIVE

What Is New?

- This study provides a comprehensive global analysis of valvular heart disease, highlighting the rising prevalence of calcific aortic valve disease and degenerative mitral valve disease in high SocioDemographic Index regions, whereas rheumatic heart disease remains a major burden in low sociodemographic index regions.

What Are the Clinical Implications?

- Clinicians should recognize the shifting burden of valvular heart disease, with an increasing emphasis on managing calcific aortic valve disease and degenerative mitral valve disease in aging populations of high-income countries, while continuing to address rheumatic heart disease in regions with low sociodemographic index.

Nonstandard Abbreviations and Acronyms

CAVD	nonrheumatic calcific aortic valve disease
DMVD	nonrheumatic degenerative mitral valve disease
EAPC	estimated annual percentage change
GBD	Global Burden of Disease
RHD	rheumatic heart disease
SDI	Socio-Demographic Index
UI	uncertainty interval
VHD	valvular heart disease

diseases are increasingly common in industrialized nations with aging populations.⁷ Previous research on VHD, including recent Global Burden of Disease (GBD) cardiovascular data updates, has outlined some of these disparities. However, much of this research either aggregated broader cardiovascular data or used data from prior years, limiting the ability to capture recent shifts in VHD burden across socioeconomic and health care development factors.^{8,9} Our study thus seeks to build upon these foundations by providing a refined analysis of how recent health care advancements and economic changes have impacted VHD trends globally, integrating up-to-date, region-specific insights.

Using the latest 2021 GBD data, our study aims to offer an in-depth assessment of VHD burden across global, regional, and national scales, with a specific

focus on the interplay between socioeconomic status, age, and sex in shaping VHD outcomes. By identifying regions and populations with heightened VHD burdens, we seek to inform targeted public health initiatives and health care policies to support equitable resource allocation, ultimately contributing to the reduction of VHD's global impact.

METHODS

Data Sources

All data and materials have been made publicly available at the Global Health Data Exchange and can be accessed at <http://ghdx.healthdata.org/gbd-results-tool>. The GBD 2021 initiative was to undertake an integrated assessment at the multinational level of the global disease burden. The current research extracts detailed data on VHD, including conditions such as RHD, CAVD, and DMVD, from all age groups. This involved obtaining data from national censuses, health surveys, vital statistics, disease registries, and environmental monitoring systems. Each data set had to be carefully assessed and standardized to provide further consistency and accuracy in the output for the key VHD metrics: prevalence, incidence, mortality, and disability-adjusted life-years (DALYs).

Because this study did not use identifiable patient data or include direct contact with individual patients or the public in the study design, the formulation of research questions, or outcome measure determination, ethical permission and informed consent were exempt in these circumstances. The approach thus provides assurance about ethical safeguarding while allowing a detailed, granular analysis of the global burden of VHD to inform strategies in public health and resource allocation globally.^{10,11}

Definitions in GBD 2021

Case definitions of the present study adapted from the recommendations by the American Heart Association/American Medical Association guidelines for VHD, described previously.^{2,8} In GBD data, the total VHD included RHD and nonrheumatic valve disease; then, in turn, nonrheumatic valve disease was defined as a summary of these 3 categories: CAVD, DMVD, and other nonrheumatic valve disease. CAVD was defined as progressive calcification of the aortic or annulus, causing a clinical diagnosis of aortic stenosis or regurgitation resulting in hemodynamically moderate or severe aortic stenosis or regurgitation. This definition also included cases of hemodynamically important CAVD due to progressive calcification of a bicuspid aortic valve. DMVD was defined as myxomatous degeneration of the mitral valve leading to hemodynamically moderate or severe regurgitation. Other nonrheumatic valve

disease included nonrheumatic valve disease not specifically classified as CAVD or DMVD.

This study assessed the burden of VHD focus on the key metrics: prevalence and DALYs. Prevalence refers to the proportion of individuals living with VHD at a particular time. Incidence measures the number of new cases of VHD that develop in a population over a given period, usually 1 year. Mortality is typically defined as the number of deaths directly related to VHD within a population. DALYs, on the other hand, offer a broader measure of the disease burden by calculating years of life lost due to premature death, along with years lost because of some type of disability in the population. To examine the relationship of the status of development of a region or country on VHD burden, the Socio-Demographic Index (SDI) was used. The SDI is the ranking of the average ranking for total fertility rate for women under 25 years, educational attainment for individuals 15 years and above, and per capita income with time-lag adjustment. The SDI values range from a value close to 0 (indicating low development) to a maximum value (indicating high development). These classify countries and territories into 5 quintiles of the level of development: low SDI, low-middle SDI, middle SDI, high-middle SDI, and high SDI.

Statistical Analysis

This study assesses the disease burden of VHD using age-standardized measures for prevalence, incidence, mortality, DALYs, and percent changes, with a robust analysis that incorporates a 95% uncertainty interval (UIs). The 95% UIs are defined by the 2.5th and 97.5th percentiles of the 1000 estimates. Moreover, the average annual percentage changes were estimated to show the temporal trends. The estimated annual percentage change (EAPC) in the age-adjusted rates was calculated to show the tendencies in the burden of VHD. When the EAPC is >0 , and the 95% UI is also >0 , it suggests an increasing trend in the age-standardization rate. Conversely, if the EAPC is <0 , and the 95% UI is ≤ 0 , it denotes a decline in age standardization rates. Furthermore, this study aims to determine the association of the SDI values with the burden of VHD across a wide range of geographical locations and different time periods. Mapping figures were created using [mapchart.net](https://www.mapchart.net). Statistical significance is defined as showing that the 95% UI does not include zero significantly; thus, associations of the SDI values with VHD burden in all contexts were significant.

RESULTS

Global VHD Burden and Its Trend

In 2021, the estimated number of cases was approximately 54.8 million (95% UI, 43.3–67.6) for

RHD, 13.3 million (95% UI 11.4–15.2) for CAVD, and 15.5 million (95% UI 14.5–16.7) for DMVD (Figure 1 and Table 1). From 1990–2021, the age-standardized prevalence of RHD and CAVD was 684.2 per 100 000 (95% UI 540.4–848.9) and 158.4 per 100 000 (95% UI 135.9–181.0), with a relative increase in EAPC of 46.4% (41.5%–51.3%) and 88.1% (77.1%–99.1%), respectively; conversely, the age-standardized prevalences for DMVD were 182.1 per 100 000 (95% UI, 170.0–196.1), with an EAPC of -9.5% (-5.5% to -13.5%) (Table 2 and Table S1).

Despite the increasing population numbers of RHD, CAVD, and DMVD, the total number of DALYs for these conditions decreased from 1990 to 2021 (Figure S1). In 2021, RHD, CAVD, and DMVD accounted for 13.4 million (95% UI, 11.5–15.8), 2.2 million (95% UI, 2.0–2.5), and 0.9 million (95% UI, 0.8–1.1) DALYs, respectively. The age-standardized DALYs across the world in 2021 were estimated at 4.47 per 100 000 (95% UI, 3.89–5.31) from RHD, 1.83 per 100 000 (95% UI 1.54–2) from CAVD, and 0.46 per 100 000 (95% UI, 0.39–0.51) from DMVD, respectively (Table 3 and Figure S2). Between 1990 and 2021, the age-standardized DALYs for RHD, CAVD, and DMVD decreased by an EAPC of -251.6% (-247.8% to -255.5%), -38.5% (28.0% to -48.9%) and -131.7% (-121.9% to -141.4%) (Table S2).

Sex and Age Differences of the Global VHD Disease Burden and Their Trends

Further investigation into the overall burden of VHD by age and sex reveals a significant correlation with increasing age and sex (Figure 2). The age-standardized prevalence of RHD is higher among women, with 754.8 per 100 000 (95% UI, 600.8–936.6), compared with men, with 614.2 cases per 100 000 (95% UI, 482.6–761.3). Conversely, CAVD and DMVD show higher age-standardized prevalences in men: CAVD affects 193.24 cases per 100 000 men (95% UI, 166.56–220.38) versus 128.88 cases per 100 000 women (95% UI, 110.13–147.63), and DMVD affects 257.92 cases per 100 000 men (95% UI, 240.96–278.21) versus 121.11 cases per 100 000 women (95% UI, 112.92–129.82). Additionally, men had a higher prevalence of DMVD compared with women across all age groups. This difference persists throughout life and becomes particularly pronounced with advancing age. The burden of DMVD in men is higher than in women and escalates notably after the age of 65 years. Among patients aged 70 to 74 years, the burden of DMVD in men is more than double that in women. The results also indicate that, for RHD, the prevalences gradually increase after the age of 20, peaking in the 25- to 29-year age bracket before showing a decline. Conversely, the prevalence of CAVD and DMVD in 2021 increase with age decades. The overall point prevalence of CAVD and DMVD in people

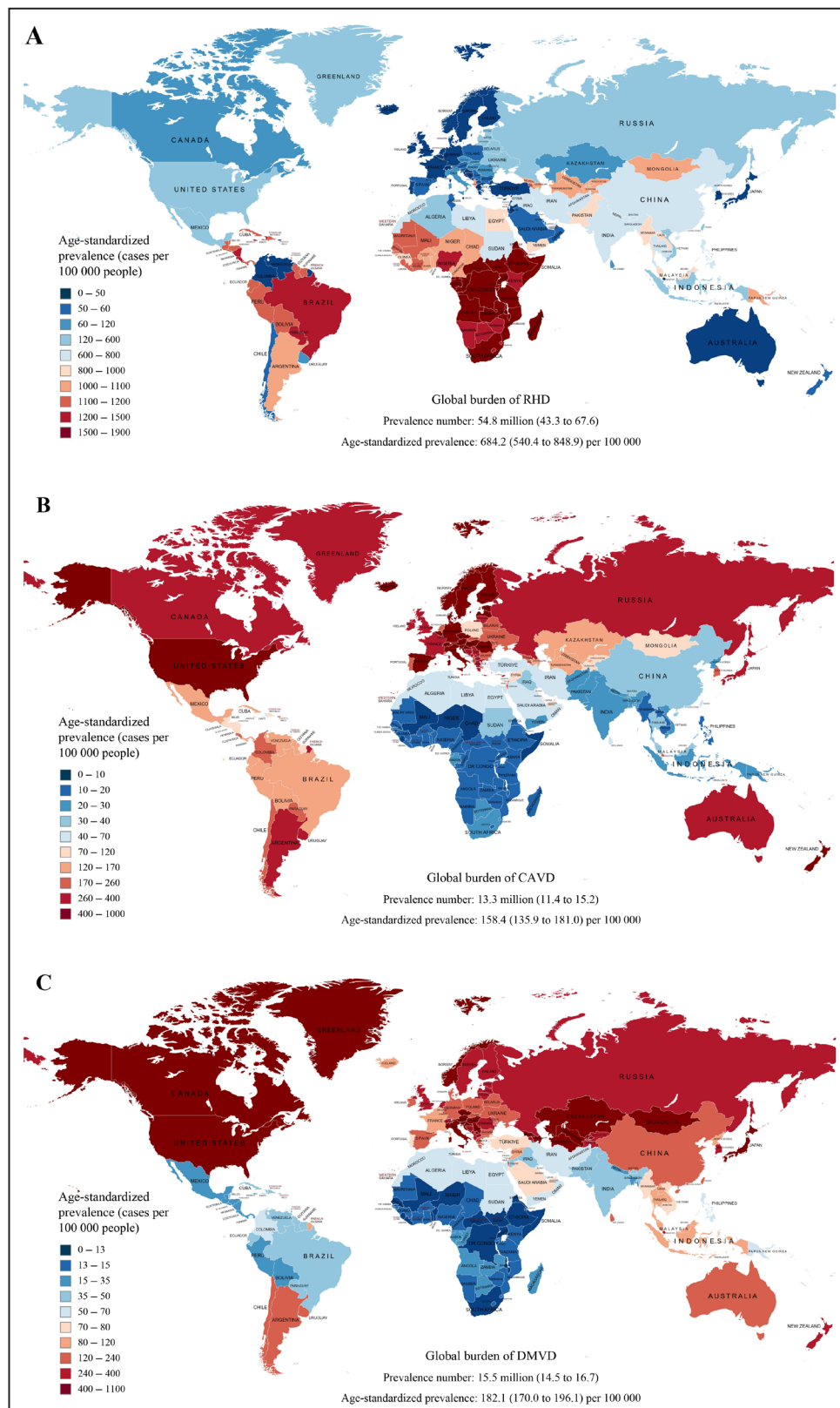


Figure 1. Global burden of age-standardized prevalence (cases per 100000 people) of valvular heart disease across 204 countries and territories in 2021.

A, RHD; B, CAVD; C, DMVD. Median estimate and 95% uncertainty intervals are shown. CAVD indicates nonrheumatic calcific aortic valve disease; DMVD, nonrheumatic degenerative mitral valve disease; and RHD, rheumatic heart disease.

Table 1. Prevalence and DALYs Numbers of VHD by Location in 2021

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
Global	54785119.44 (43328407.45– 67605542.12)	13426369.18 (11517020.93– 15780163.69)	13320896.13 (11422539.18– 15249410.95)	2242999.5 (2004168.08– 2459248.2)	15494647.39 (14457323.51– 16702737.62)	943258.35 (818239.26– 1134001.22)
Sex						
Female	30076211.63 (24108759.63– 37038189.45)	7391209.07 (6288401.99– 9018558.01)	6018666.77 (5139855.53– 6897468.51)	1141677.89 (966439.11– 1281683.97)	5665309.73 (5281762.04– 6073695.04)	509344.49 (414981.25– 614453.31)
Male	24708907.81 (19410885.72– 30536676.92)	6035160.11 (5008564.37– 8322032.79)	7302229.37 (6260246.93– 8340870.42)	1101321.61 (1006118.15– 1205564.96)	9829337.66 (9179555.55– 10615234.36)	433913.86 (358439.53– 527230.92)
SDI quintile						
Low SDI	12958321.05 (9858421.04– 16357169.91)	2386118.8 (1929849.74– 3028341.54)	85816.14 (68867.81–104073.56)	101674.14 (88877.82–130980.07)	115513.39 (101726.47–130948.85)	81576.98 (56424.64–109179.7)
Low-middle SDI	17101991.03 (13392335.89– 21406709.94)	5824804.92 (4895195.41– 7419970.76)	496397.06 (404011.7–589829.17)	245089.8 (199019.91– 292246.99)	597241.2 (530958.57–673731.71)	165113.23 (129855.69– 204532.31)
Middle SDI	18362476.65 (14423682.67– 22502207.06)	3646444.22 (3108666.58– 4314191.66)	1417738.74 (1134289.02– 1688923.53)	276277.93 (242966.99– 316115.82)	2131566.91 (1978433.73– 2317641.34)	175873.8 (152861.38– 212348.06)
High-middle SDI	4699544.4 (3965852.9– 5495121.89)	1068715.6 (918250.44– 1242045.76)	3440879.34 (2962648.59– 3931536.98)	394694.13 (352936.6– 434424.45)	4486460.86 (4187531.69– 4821464.83)	184648.78 (156704.19–228857.9)
High SDI	1622166.37 (1482172.65– 1780275.57)	492066.68 (434312.74– 539675.42)	7860601.13 (6819445.28– 8892888.68)	1222299.41 (1042435.2– 1341835.86)	8149324.64 (7632524.24– 8750586.9)	334695.16 (286437.52– 404529.66)
Central Europe, Eastern Europe, and Central Asia	1487730.35 (1296885.62– 1713939.29)	316624.79 (284562.27– 356470.13)	1930180.85 (1610856.25– 2268857.98)	179183.48 (163993.17– 199277.57)	1975644.87 (1777053.66– 2199163.52)	94188.02 (82809.13–113076.44)
Central Asia	852929.79 (668794.49– 1057725.98)	134794.72 (114123.98–160061.4)	113425.99 (93422.35– 135263.82)	5878.22 (5034.41–6994.94)	360192.94 (302399.85–433573.84)	10233.69 (7974.32–13440.39)
Armenia	34146.21 (27064.65–41845.68)	3615.67 (2702.95–4607.3)	7687.22 (6272.26–9471.87)	343.74 (277.69–430.47)	16508.39 (13686.73–19841.8)	449.88 (336.17–608.13)
Azerbaijan	116407.14 (92008.84–146332.95)	10643.68 (7780.23–14249.71)	13726.96 (10983.86–16794.29)	280.67 (196.55–404.48)	38532.18 (30931.51–47946.34)	573.9 (344.25–929.18)
Georgia	37579.89 (29977.29–45885.83)	7698.42 (6610.8–8938.7)	12708.25 (10505.29–15294.57)	1556.07 (1297.86–1830.76)	63550.93 (53898.48–75022.48)	2677.6 (2203.35–3332.57)
Kazakhstan	20395.61 (17362.46–24012.34)	11141.55 (8422.89–13661.77)	25609.27 (20808.32–31191.66)	1104.92 (895.16–1418.1)	68049.75 (54236.1–83619.84)	2029.79 (1536.02–2632.85)
Kyrgyzstan	69792.28 (54633.36–86768.77)	9098.48 (7356.95–11284.59)	5165.3 (4138.82–6387)	184.46 (146.95–234.87)	15571.81 (12685.8–19308.08)	381.68 (276.95–537.37)
Mongolia	35906.55 (27745.45–45047.8)	5003.01 (3979.74–6244.63)	2427.35 (1953.65–2975.78)	175.31 (125.53–234.06)	11861.64 (9620.12–14345.24)	419.48 (314.7–566.86)
Tajikistan	108972.69 (84745.15–138948.46)	10958.58 (8213.69–14599.01)	4654.2 (3744.24–5648.28)	60.68 (35.79–100.72)	18784.15 (14960.48–23747.11)	249.94 (130.11–431.72)
Turkmenistan	54404.17 (41939.93–68537.47)	8051.48 (6415.07–10145.06)	5003.21 (3981–6082.18)	190.94 (144.87–247.2)	14473.73 (11483.65–18552.46)	355.42 (256.03–501.49)
Uzbekistan	375325.25 (289798.86–468395.64)	68583.86 (55819.85–82425.42)	36444.23 (29815.25–43698.9)	1981.43 (1617.84–2383.67)	112860.36 (90906.55–141947.66)	3096.01 (2314.06–4233.52)
Central Europe	154126.45 (135460.73–176194.43)	69293.48 (61599.34–76621.37)	866860.01 (755597.05– 995396.94)	112642.26 (102497.53–123896.4)	678552.53 (594741.97–782443.12)	53614.28 (47715.98–61177.21)
Albania	29295.07 (23194.35–35987.51)	2663.56 (2011.76–3570.5)	11178.58 (9060.69–13826.3)	821.68 (593.09–1118.19)	13382.44 (10993.94–16469.87)	738.53 (505.2–1057.77)
Bosnia and Herzegovina	2537.18 (2041.45–3061.29)	1053.29 (808.42–1376.45)	20461.19 (16749.25–24433.34)	1771.24 (1221.79–2483.77)	25516.58 (21059.07–31070.46)	1938.12 (1396.11–2614.74)
Bulgaria	7314.84 (6169.97–8727.55)	6739.18 (5259.33–8323.75)	32194.47 (26971.46–37745.43)	3040 (2568.84–3586.57)	35213.12 (28411.92–43118.55)	2229.48 (1833.94–2691.84)

(Continued)

Table 1. Continued

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
Croatia	3914.06 (3406.41–4499.58)	2328.31 (2001.01–2681.51)	53550.85 (44547.06–64042.15)	6082.47 (5213.96–6918.41)	43290.41 (35914.76–55131.59)	2283.93 (1936.9–2766)
Czechia	12582.24 (10321.81–15223)	5854.21 (5099.88–6690.59)	124021.57 (102405.88–144567.09)	12287.95 (10704.44–13971.11)	111716.65 (93958.77–137734.33)	5371.53 (4607.85–6450.62)
Hungary	11874.08 (9734.8–14335.24)	5072.35 (4415.66–5776.41)	107342.71 (92815.83–124985.58)	18019.11 (16044.53–20026.66)	83485.35 (69388.89–100358.39)	7175.6 (6331.7–8104.64)
North Macedonia	1805.32 (1478.71–2201.78)	1226.83 (887.7–1570.72)	8983.75 (7449.76–10863.34)	647.73 (482.01–828.39)	8259.36 (6722.77–10182.67)	449.22 (278.86–615.93)
Montenegro	570.38 (466.53–691.93)	343.09 (264.62–429.05)	2786.97 (2285.18–3399.13)	162.43 (128.9–205.35)	2527.63 (2060.65–3118.54)	126.3 (89.56–164.01)
Poland	35816.28 (31112.18–41500.69)	21741.07 (19097.61–23894.09)	86546.59 (71770.42–102910.62)	38213.78 (34857.69–41146.91)	109777.52 (104726.28–115197.32)	15677.78 (14179.42–17264.16)
Romania	26442.48 (21339.87–31742.87)	12477.31 (10394.76–14459.33)	273998.29 (227915.28–319869.51)	10413.43 (8449.79–13039.5)	103387.97 (86030.94–125370.43)	5298.99 (4454.23–6381.55)
Serbia	8442.6 (6820.87–10296.47)	4271.95 (3236.47–5216.67)	62533.01 (52566.02–76000.53)	9145.33 (6920.8–11604.34)	90101.96 (74943.21–105191.04)	9083.2 (6480.59–11465.59)
Slovakia	8831.46 (7256.99–10684.64)	2702.76 (2250.57–3256.98)	23813.97 (19507.82–28874.46)	2530.81 (1986.28–3130.05)	18818.37 (15548.92–22456.05)	1161.08 (706.51–1539.78)
Slovenia	2457.1 (2003.9–3053.15)	1810.98 (1518.84–2081.19)	46830.6 (41049.34–53899.97)	7866.75 (6774.95–8863.32)	23198.6 (18908.16–28351.35)	1300.12 (1086.18–1581.66)
Eastern Europe	480674.1 (417737.1–551974.96)	112536.59 (101652–125986.27)	949894.85 (761766.27–1153178.23)	60663 (53910.17–70345.58)	936899.4 (862626.06–1026287.31)	30340.06 (24624.1–38510.71)
Belarus	23657.96 (19859.44–28330.59)	6512.02 (5316.37–7938.31)	37521.89 (30135.31–46381.23)	982.41 (755.42–1373.79)	37747.09 (29261.44–47406.3)	601.25 (386.43–974.01)
Estonia	3472.34 (2844.8–4240.91)	529.35 (449.24–623.79)	17662.82 (15176.11–21090.99)	1837.33 (1610.36–2103.15)	10442.31 (8463.43–12811.82)	469.92 (388.53–592.03)
Latvia	5689.41 (4742.35–6833.86)	1180.89 (1034.22–1370.24)	17585.33 (14454.94–21106.68)	1633.24 (1421.3–1879.78)	9973.58 (7958.01–12763.37)	354.42 (286.18–462.84)
Lithuania	7914.51 (6751.55–9450.31)	1563.06 (1330.59–1837.85)	18689.07 (15498.58–22393.3)	1687.56 (1448.88–1945)	18852.97 (15160.35–23337.99)	571.36 (442.73–771.65)
Republic of Moldova	6747.14 (5673.05–7992.51)	2222.01 (1909.99–2575.53)	12950.58 (10505.98–15825.53)	400.17 (306.76–526.31)	14455.92 (11522.34–17757.42)	511.46 (415.62–643.59)
Russian Federation	345165.59 (298099.93–395917.56)	75506.44 (68001.18–84216.67)	688402.87 (542805.72–840337.81)	47281.15 (42092.87–54427.89)	670197.24 (621490.95–727515.75)	23468.55 (19430.9–29276.16)
Ukraine	88027.16 (75345.31–102074.11)	25022.81 (19096.4–31863.65)	157082.29 (121347.28–192126.46)	6841.15 (5252.34–8836.27)	175230.29 (162440.28–190530.87)	4363.1 (3122.5–6056.05)
High-income	1826186.25 (1659128.1–2016866.01)	532290.76 (471902.03–583816.82)	8953451.39 (7785573.22–10109686.35)	1377200.08 (1171510.57–1512131.49)	9257572.14 (8695123.26–9917558.06)	366324.88 (309609.37–444620.76)
Australasia	21878.86 (18480.15–25737.6)	12631.12 (11323.05–13726.87)	192488.44 (165456.4–223129.6)	27116.28 (23305.63–29986.9)	115501.95 (98356.07–139123.02)	6560.88 (5673.84–7550.54)
Australia	17653.78 (14470.25–21094.65)	9434.82 (8378.63–10301.69)	154937.91 (130844.81–182487.3)	20716.41 (17706.53–23007.28)	87805.4 (71335.52–110848.36)	4954.08 (4273.6–5750.5)
New Zealand	4225.08 (3811.91–4744.3)	3196.29 (2898.73–3489.69)	37550.52 (31433.29–43592.5)	6399.87 (5581.26–7017.79)	27696.55 (26256.04–29274.26)	1606.8 (1391.25–1871.57)
High-income Asia Pacific	127242.35 (110034.69–145620.26)	68747.52 (56411.54–77247.02)	1447553.37 (1198036.5–1699764.57)	220492.33 (172645.85–252862.97)	1938172.58 (1818156.74–2065321.84)	70200.25 (56544.55–87585.89)
Brunei Darussalam	272.74 (227.75–321.38)	157.09 (132.47–185.9)	772.23 (639.24–930.66)	110.03 (87.16–134.31)	1272.07 (1063.91–1518.18)	64.28 (41.33–84.73)
Japan	103742.17 (90152.31–118791.75)	59673.67 (48034.03–67309.83)	1220291.03 (997281.13–1447934.48)	203734.93 (158015.9–233242.31)	1650169.44 (1573292.4–1730895.77)	63452.9 (51444.81–78385.77)

(Continued)

Table 1. Continued

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
Republic of Korea	21232.65 (17008.26–25444.38)	7997.42 (6700.27–9252.39)	208990.06 (170348.44–246191.46)	15787.9 (11909.73–19622.45)	260542.92 (213527.75–315746.36)	6084.82 (4071.96–8631.25)
Singapore	1994.79 (1624.9–2397.28)	919.33 (818.79–1015.07)	17500.05 (14591.34–20773.72)	859.47 (747.3–1002.4)	26188.15 (21548.36–31825.98)	598.24 (471.85–796.38)
High-income North America	793386.75 (722643–878343.52)	138478.94 (120450.96–153707.53)	2772453.82 (2360163.14–3202756.36)	382827.65 (333800.63–419028.8)	3932341.32 (3732847.12–4161754.94)	115612.81 (94261–149323.79)
Canada	79093.27 (64436.12–94747.74)	16322.76 (14483.44–18297.84)	246653.78 (201486.48–296682.35)	38212.69 (33281.49–41990.28)	316688.32 (262896.72–390391.92)	8417.12 (6703.07–11058.24)
United States	714196.3 (651023.85–787357.68)	122136.39 (105563.15–136332.61)	2525575.43 (2142065.11–2944195.24)	344568.99 (300109.13–378473.71)	3615214.64 (3442690.84–3783699.65)	107178.31 (87493.85–138274.42)
Greenland	84.74 (68.42–102.57)	17.63 (14.49–21.06)	181.14 (145.03–220.28)	39.96 (29.43–55.28)	376.71 (300.65–453.12)	15.57 (11.08–22.37)
Southern Latin America	495658.66 (397213.16–612188.56)	42657.79 (33494.96–55186.27)	234828.04 (202977.28–273602.42)	46479.98 (42450.47–50688.94)	123474.8 (102957.98–152016.88)	8346 (7420.75–9708.23)
Argentina	478602.21 (380732.45–595510.33)	37409.94 (28752.71–49597.05)	151543.59 (129531.92–178322.53)	34015.73 (31050.23–37265.14)	73854.34 (59770.36–92359.18)	4874.2 (4269.84–5756.58)
Chile	13845.07 (11389.49–16681.22)	4409.96 (3875.39–4955.72)	62789.79 (52291.09–74745.37)	6365.95 (5744.41–7100.01)	40269.22 (33281.78–48817.61)	2640.92 (2341.12–3056.18)
Uruguay	3184.02 (2610.95–3799.33)	835.54 (733.41–932.32)	20481.7 (17289.21–23827.93)	6095.74 (5441.06–6656.99)	9344.43 (7714.85–11573.72)	830.42 (740.2–954.28)
Western Europe	388019.62 (336175.23–453335.95)	269775.4 (236063.32–292770.84)	4306127.72 (3789648.99–4809887.14)	700283.85 (600115.84–766678.09)	3148081.49 (2910256.86–3407229)	165604.94 (142785.64–193313.9)
Andorra	51.4 (42.33–61.86)	19.2 (14.03–25.05)	448 (366.88–538.2)	51.74 (36.54–70.69)	211.92 (174.54–252.4)	11.64 (7.78–18.55)
Austria	10388.06 (9359.84–11721.34)	5939.19 (5171.54–6499.36)	165534.88 (127935.06–219203.64)	14488.23 (12355.02–16409.38)	90686.72 (72981.57–135157.07)	3983.58 (3357.15–4903.15)
Belgium	10286.28 (8433.43–12637.18)	6674.23 (5711.33–7430.67)	113557.26 (98240.69–129011.73)	21463.11 (17862.46–23871.41)	24735.39 (20587.96–30269.88)	3123.85 (2703.17–3490.78)
Cyprus	716.66 (580.68–889.26)	820.37 (677.15–965.8)	8698.81 (7558.4–10288.54)	1935.23 (1563.57–2396.61)	1726.26 (1438.99–2068.43)	301.63 (200.12–440.12)
Denmark	2393.63 (1891.35–2931.48)	2363.83 (2108.92–2560.52)	59159.12 (50818.79–69283.55)	8116.6 (7142.46–8915.02)	17241.77 (14564.29–20346.15)	1717.27 (1527.79–1915.71)
Finland	1921.84 (1550.83–2328.65)	1765.35 (1561.97–1929.65)	74693.78 (62945.41–90029.41)	10850.87 (9241.46–12022.37)	45551.57 (37318.04–54892.66)	2811.4 (2429.49–3246.54)
France	45927.49 (37565.54–55895.77)	34815.43 (29760.98–39091.06)	602473.12 (518025.37–699194.64)	106917.96 (90940.5–118310.35)	160776.66 (126367.54–198446.54)	9595.51 (8292.78–11327.9)
Germany	72481.15 (59059.55–88519.31)	86028.13 (73546.37–94309.21)	1140390.31 (971217.85–1317074.41)	189797.21 (160742.1–210417.84)	373800.93 (306801.27–444547.27)	44358.51 (38244.3–49451.95)
Greece	5806.49 (4870.67–6890.87)	3295.98 (2933.71–3622.93)	87743.41 (76199.15–99508.89)	16731.78 (14427.03–18374.52)	35392.92 (28516.69–46381.41)	3409.94 (2973.11–3865.84)
Iceland	113.6 (92.89–136.72)	76.81 (66.23–86.72)	3242.7 (2733.75–3781.98)	465.81 (395.14–520.14)	552.72 (445.65–675.66)	54.47 (47.02–61.44)
Ireland	2281.39 (1867.21–2745.56)	1208.56 (1032.44–1360.44)	27650.11 (22811.57–33189.68)	3342.18 (2870.94–3689.3)	12625.28 (10308.94–15241.26)	725.33 (622.01–843.53)
Israel	4657.51 (3804.03–5668.19)	3615.76 (3250.38–3959.67)	26607.93 (22435.03–30755.04)	7374.74 (6333.72–8086.61)	22952.38 (19075.47–27553.65)	1878.8 (1650.28–2140.56)
Italy	95610.24 (86755.28–106983.23)	47165.07 (40944.96–51672.47)	705739.09 (608569.98–803817.16)	76600.22 (64773.09–85167.78)	1466415.75 (1392643.56–1532945.12)	37678.51 (29333.15–50845.47)

(Continued)

Table 1. Continued

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
Luxembourg	486.18 (401.8–586.81)	232.58 (206.68–257.3)	5759.82 (4804.01–6935.91)	992.26 (873.04–1092.84)	3519.85 (2884.13–4270.74)	181.21 (155.15–212.27)
Malta	179.4 (147.09–216.82)	176.61 (153.98–199.07)	2356.21 (1972.51–2810.05)	379.86 (326.75–424.91)	1007.34 (836.06–1242.5)	99.39 (86.77–114.09)
Netherlands	9832.67 (7814.09–12021.98)	5336.25 (4699.55–5884.57)	68907.41 (57422.81–82588.06)	30468.43 (25936.23–33233.33)	107450.42 (87720.18–129834.49)	11018.74 (9604.47–12275.55)
Norway	2050.72 (1717.96–2443.48)	1411.06 (1242.35–1533.3)	44850.23 (36583.74–53979.48)	9705.46 (8291.84–10677.16)	95423.89 (90476.82–100579.66)	2103.63 (1582.48–2927)
Portugal	7911.55 (6680.37–9487.93)	6003.65 (5373.05–6604.29)	50593.52 (43505.44–58986.49)	16134.26 (13817.02–17588.5)	19752.39 (16453.76–25742.96)	2805.79 (2455.89–3119.25)
Spain	50588.66 (42295.48–60106.73)	36976.69 (31652.8–41294.71)	410231.87 (350520.07–474511.26)	73197.38 (61952.68–80519.71)	142532.02 (116973.49–195125.54)	16542.14 (13992.31–18540.6)
Sweden	3571.08 (3005.57–4279.03)	2510.38 (2148.3–2810.93)	117661.23 (92672.83–143103.68)	15151.62 (12737.24–17019.77)	69622.06 (64718.76–74784.24)	2659.45 (2183.2–3255.16)
Switzerland	6637.07 (5335.37–8104)	2825.14 (2502.35–3113.9)	88719.07 (74256.78–106350.36)	9843.42 (8243.2–11090.97)	52237.72 (42101.76–62860.88)	2560.9 (2160.19–3065.31)
United Kingdom	53722.74 (43915.18–66608.11)	20249.5 (18390.24–21788.79)	496826.58 (416024.78–578776.46)	85615.42 (76186.6–92742.86)	400855.76 (378160.03–422861.38)	17823.48 (15480.43–21498.08)
Monaco	29.63 (23.88–36.89)	11.72 (9.1–15.18)	262.74 (217.44–315.92)	24.36 (17.72–31.64)	122.64 (98.75–151.78)	9.03 (5.93–12.81)
Latin America and Caribbean	5597983 (4453361.99–6924054.26)	445429.18 (343379.2–591527.35)	901616.88 (742521.99–1068668.45)	165031.29 (153257.79–178667.78)	239580.8 (216899.12–268209.38)	83339.37 (77973.99–89680.97)
Andean Latin America	772124.9 (602547.65–972994.64)	50331.07 (35804.68–71852.01)	77587.91 (66209.7–89727.71)	9992.42 (8266.87–12213.73)	16249.71 (13104.15–19887.73)	3687.45 (2789.39–4541.38)
Bolivia (Plurinational State of)	138010.44 (106558.07–175760.83)	11188.95 (8058.32–15463.99)	10780.96 (8581.35–13149.93)	2132.75 (1562.14–2942.22)	2689.81 (2152.82–3285.55)	825.63 (422.44–1254.47)
Ecuador	205667.03 (158976.33–257544.74)	12742.72 (8727.53–18165.02)	25855.68 (23346.18–28702.54)	3283.72 (2643.9–4076.02)	5716.74 (4534.28–6879.32)	1780.42 (1416.03–2224.26)
Peru	428447.43 (337674.17–537940.86)	26399.4 (18414.72–38016.64)	40951.26 (33249.56–49527.66)	4575.95 (3489.04–6132.5)	7843.16 (6141.9–9807.07)	1081.4 (634.96–1486.79)
Caribbean	542930.34 (427970.79–671400.47)	68941.3 (53413.73–88952.14)	72780.51 (62508.09–84939.19)	13275.03 (11395.47–15249.52)	19884.76 (16459.4–23915.19)	7557.21 (6179.19–9098.05)
Antigua and Barbuda	1162.42 (922.68–1435.12)	80.48 (58.96–109.87)	132.92 (108.87–159.7)	17.04 (15.48–19.16)	52.98 (43.5–63.18)	14 (12.95–15.15)
Bahamas	4914.09 (3875.13–6129.99)	345.4 (248.68–470.49)	485.39 (397.48–586.78)	81.74 (66.13–100.27)	145.13 (116.72–181.12)	53.99 (43.42–67.42)
Barbados	3655.3 (2895.95–4503.58)	254.64 (184.97–345.67)	795.67 (651.01–954.71)	127.23 (103.61–156.14)	164.29 (131.34–203.23)	23.39 (18.7–29.37)
Belize	5322.07 (4171.2–6610)	369.7 (273.51–502.39)	319.56 (261.92–388.26)	26.77 (23.16–31.45)	125.85 (103.95–150.45)	50.36 (44.4–57.03)
Cuba	134221.91 (107776.94–163907.55)	12074.43 (9452.51–15652.84)	30270.37 (25666.47–35882.77)	4835.1 (4196.63–5470.45)	7364.99 (6074.92–8976.95)	2693.4 (2342.37–3088.91)
Dominica	834.72 (661.23–1032.96)	77.74 (59.11–100.95)	110.81 (91.67–135.27)	17.75 (13.78–22.55)	39.94 (31.84–48.57)	8.05 (4.99–11.15)
Dominican Republic	130980.9 (103836.77–162547.15)	11192.02 (8263.73–14899.79)	10649.4 (8931.98–12835.32)	1856.35 (1482.16–2292.28)	3618.85 (2895.98–4396.06)	904.88 (571.28–1196)
Grenada	1286.61 (1017.57–1591.54)	153.7 (125.66–192.11)	149.85 (121.45–192.13)	38.21 (32.4–44.4)	73.61 (60.95–86.43)	38.42 (32.51–44.04)
Guyana	9187.01 (7159.91–11373.35)	875.67 (680.61–1143.01)	822.7 (683.85–978.96)	310.46 (238.82–399.1)	305.32 (246.77–363.51)	191.16 (145.4–249.95)
Haiti	166343.2 (128626.26–209522.94)	34901.69 (22793.12–49854.07)	4421.87 (3553.88–5300.06)	2428.53 (1441.16–3669.21)	2448.58 (1961.88–2991.28)	2195.55 (1202.55–3451.15)
Jamaica	36521.06 (28617.27–45292.65)	3049 (2323.02–4018.42)	3009.98 (2453.47–3679.35)	219.18 (171.98–280.12)	974.89 (784.82–1209.11)	262.14 (204.9–336.16)

(Continued)

Table 1. Continued

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
Saint Lucia	2280.74 (1820.6–2807.78)	209.49 (164.73–270.15)	317.42 (264.17–381.74)	46.17 (38.61–54.97)	78.93 (62.86–98.9)	13.91 (11.49–16.96)
Saint Vincent and the Grenadines	1371.38 (1082.74–1676.78)	145.28 (117.43–181.27)	181.56 (152.25–220.93)	35.02 (30.66–39.85)	68.52 (55.98–83.1)	24.72 (21.51–28.36)
Suriname	6621.57 (5154.6–8143.07)	566.65 (434.14–742.27)	648.02 (535.47–809.39)	114.45 (82.38–149.35)	312.56 (256.7–379.49)	112.59 (75.27–145.73)
Trinidad and Tobago	16971.59 (13566.07–20952.21)	1488.75 (1139.29–1951.74)	2285.54 (1832.1–2774.17)	292.23 (228.22–362.39)	666.24 (529.49–843.38)	240.76 (187.04–304.37)
Bermuda	52.49 (42.84–63.14)	14.75 (12.52–17.81)	494.34 (415.38–592.51)	105.93 (91.51–127.61)	59.98 (48.2–72.57)	12.8 (10.86–15.51)
Puerto Rico	2718.09 (2206.55–3227.2)	767.07 (650.75–912.21)	14739.16 (12252.19–17660.02)	2220.65 (1855.92–2607.57)	2551.5 (2017.2–3162.3)	430.96 (361.5–510.79)
Saint Kitts and Nevis	34.01 (28.06–40.96)	15.79 (12.8–19.36)	85.67 (69.51–103.37)	13.62 (11.38–16.34)	33.11 (26.49–41.12)	9.09 (7.41–10.85)
United States Virgin Islands	77.82 (62.66–94.72)	26.01 (20.18–32.55)	397.31 (328.84–477.28)	39.37 (30.13–52.69)	126.57 (104.63–155.63)	21.3 (15.03–29.33)
Central Latin America	1265324.34 (1012910.88–1549246.19)	94722.69 (70081.35–126999.47)	395444.67 (324616.09–470756.28)	58211.74 (52220.94–65462.1)	91699.86 (80539.4–104481.17)	26377.29 (23036.09–30244.91)
Colombia	24516.43 (20219.49–28773.37)	4483.83 (3576.22–5405.75)	107882.42 (88970.4–127692.47)	17536.73 (14710.8–20668.31)	32368.72 (27200.52–38043.32)	12842.57 (10783.01–14995.93)
Costa Rica	65122.98 (51753.39–79726.32)	4025.42 (2816.76–5667.09)	12704.77 (10832.47–14962.7)	1926.92 (1682.35–2165.54)	1830.6 (1451.65–2298.94)	456.5 (398.43–514.84)
El Salvador	76717.98 (60096.38–95051.63)	4249.66 (2864.7–6244.15)	6983.58 (5668.68–8515.3)	500.27 (386.66–635.45)	1625.74 (1251.05–2041.15)	89.62 (52.61–127.07)
Guatemala	189478.64 (147728.88–235176.93)	9645.4 (6202.86–14398.3)	10199.1 (8388.56–12277.74)	1261.8 (1061.17–1486.5)	2922.34 (2256.73–3734.01)	538.11 (459.01–624.74)
Honduras	123297.23 (95322.47–153373.96)	7348.61 (4831.83–10533.58)	6438.85 (5246.38–7722.93)	1665.71 (1205.33–2196.32)	1762.99 (1384.55–2216.14)	620.94 (350.14–914.11)
Mexico	636338.98 (512204.1–781166.88)	52126.73 (38632.61–68840.07)	193866.2 (154208.01–238752.04)	26364.06 (23474.12–30154.72)	37709.18 (34543.47–41161.94)	6604.02 (5885.93–7445.05)
Nicaragua	86106.39 (67505.48–107963.36)	4958.54 (3356.59–7215.7)	5353.41 (4408.03–6347.78)	438.99 (348.05–539.61)	1321.93 (1037.6–1628.92)	156.71 (87.23–208.22)
Panama	50747.16 (40022.42–62500.05)	3143.09 (2222.05–4412.16)	6073.11 (4971.19–7350.17)	877.39 (699.54–1059.5)	1522.45 (1205.34–1913.72)	474.04 (379.87–573.05)
Venezuela (Bolivarian Republic of)	12998.56 (10622.83–15429.85)	4741.43 (3624.63–6159.28)	45943.25 (37107.44–55387.25)	7639.87 (5890.53–9866.08)	10635.92 (8541.3–13132.94)	4594.78 (3472.74–5953.21)
Tropical Latin America	3017603.42 (2401112.89–3738945.45)	231434.12 (175423–307151.52)	355803.79 (284980.97–430929.73)	83552.1 (77538.41–88492.71)	111746.47 (103635.17–120984.32)	45717.43 (43132.15–47817.26)
Brazil	2926390.96 (2327412.71–3628964.15)	225215.69 (170934.9–298565.14)	346026.1 (276681.41–420441.51)	80637.39 (75080.99–85316.64)	109272.5 (101497.18–118081.33)	44783.73 (42312.11–46806.54)
Paraguay	91212.46 (72012–112550.82)	6218.43 (4512.52–8575.83)	9777.69 (8134.01–11867.08)	2914.72 (2209.21–3778.68)	2473.97 (2027.24–2968.28)	933.69 (588.89–1278.08)
Algeria	260598.99 (204554.66–323012.53)	27488.35 (20839.08–35686.19)	19512.92 (16147.44–23804.48)	5256.87 (1884.79–7857.81)	21772.36 (18027.39–26555.78)	7467.94 (4618.25–13595.89)
Bahrain	664.99 (545.47–793.31)	232.36 (183.11–292.55)	680.4 (552.6–829.6)	211.77 (164.54–275.8)	487.11 (385.52–609.41)	94.08 (61.3–123.91)
Egypt	867010.25 (668836.26–1066680.45)	158604.2 (130765.94–189260.35)	35996.81 (29188–44034.06)	15320.57 (11623.6–19668.17)	37000.65 (29929.02–44646.14)	16171.65 (10877.02–20719.52)
Iran (Islamic Republic of)	661962.65 (520887.46–822025.27)	60747.55 (47883.66–77744.83)	40647.81 (33089.59–48725.1)	11502.83 (9569.56–15999.1)	42515.68 (39454.59–46154.56)	11189.06 (8663.54–13856.11)

(Continued)

Table 1. Continued

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
Iraq	315807.41 (243142.54–397037.77)	32295.25 (24667.37–40904.93)	9181.96 (7374.11–11228.32)	5680.96 (3111.66–8280)	10163.41 (8151.45–12723.88)	1778.74 (797.16–4401.65)
Jordan	3965.99 (3280.04–4725.39)	1766 (1409.64–2166.41)	4145.99 (3384.36–5096.26)	892.23 (693.55–1190.35)	2989.15 (2369.65–3710.69)	523.44 (346.54–688.02)
Kuwait	1927.03 (1554.51–2330.69)	606.25 (483.44–733.77)	2611.51 (2123.55–3104.53)	512.65 (439.48–608.05)	1482.57 (1194.34–1823.89)	185.65 (155.41–225.41)
Lebanon	2953.66 (2443.91–3467.59)	1931.29 (1630.37–2315.37)	3941.95 (3292.16–4681.43)	2198.23 (1782.17–2722.16)	3643 (2980.46–4363.04)	569.78 (396.6–804.48)
Libya	56128.29 (44050.59–69682.14)	5866.22 (4126.73–7877.95)	2777.43 (2264.15–3349.7)	1334.81 (366.24–2637.36)	2607.18 (2113.21–3186.3)	1606.67 (783.46–3439.2)
Morocco	291192.19 (224436.94–363636.09)	34763.42 (26299.66–45730.28)	16036.98 (13097.16–19510.53)	5734.47 (2278.27–8880.4)	20053.91 (16369.74–24298.02)	8830.69 (5534.13–16388.27)
Palestine	37671.55 (29250.29–46483.77)	3240.77 (2487.38–4298.83)	940.09 (751.97–1154.81)	251.21 (200.4–320.36)	1037.06 (830.71–1260.58)	171.15 (120.72–219.01)
Oman	1628.74 (1331.35–1957.88)	986.84 (669.6–1264.05)	1263.08 (1043.49–1542.02)	170.08 (121.97–221.36)	998.87 (811.7–1217.17)	185.22 (127.21–234.09)
Qatar	1062.77 (847.86–1313.62)	473.19 (360.68–626.75)	1023.14 (802.89–1294.91)	232.14 (163.21–327.33)	538.16 (421.45–671.09)	120.61 (73.04–172.43)
Saudi Arabia	15466.67 (12640.72–18344.08)	9716.1 (6383.75–13333.02)	12339.95 (9955.87–15050.72)	4136.35 (2871.68–5846.86)	12192.05 (10008.57–14714.06)	5404.55 (3474.74–7539.13)
Syrian Arab Republic	101435.97 (80283.53–124992.57)	12632.62 (9292.04–16873.56)	9598.69 (7802.44–11594.26)	5675.38 (3491.2–7973.07)	10206.77 (8094.36–12438.53)	4040.54 (2437.2–8112.64)
Tunisia	6789.79 (5682.76–8125.7)	4783.02 (3125.58–7347.06)	7648.27 (6168.74–9158.1)	1840.65 (682.33–3073.38)	7659.59 (6159.01–9321.46)	2236.14 (1256.5–4426.57)
Turkey	44925.08 (36847.28–53503.87)	22662.74 (18699.82–27160.17)	58801.88 (48315.95–70187.1)	20717.37 (15558.02–27520.48)	71931.48 (59886.94–87358.68)	22108.14 (17038.49–29961.66)
United Arab Emirates	86912.61 (67763.99–109241.37)	7146.85 (5161.95–10075.08)	4684.95 (3715.06–5945.9)	2162.13 (1660.67–2734.02)	2591.71 (2034.73–3229.16)	286.23 (187.04–446.13)
Yemen	276136.19 (211763.86–344811.39)	37362.51 (26391.28–52690.61)	4166.33 (3429.61–4953.86)	2844.22 (822.85–4904.69)	6642.48 (5350.99–7974.8)	4819.93 (2707.87–8121.81)
Afghanistan	199585.44 (150675.33–250902.63)	41047.2 (27762.56–56682.71)	2500.2 (2026.82–2992.1)	2492.7 (794.07–4715.36)	4187.43 (3462.53–5028.46)	4562.35 (1915.26–8508.99)
Sudan	271038.38 (206876.06–339051.77)	46452.24 (31712.1–68634.58)	7549.57 (6238.17–9140.76)	4341.48 (1476.29–7264.6)	9231.04 (7455.23–11097.5)	6166.28 (3263.99–12322.22)
North Africa and Middle East	3508136.71 (2763127.84–4300634.55)	511281.83 (414367.33–619226.2)	246279.61 (205246.82–291455.07)	93596.38 (68113.53–115366.96)	270183.65 (230370.16–317864.63)	98610.81 (78336.01–139383.26)
Bangladesh	1303866.28 (1013749.08–1622503.77)	688494.39 (490061.11–1115196.92)	35894.5 (28645.35–44212.88)	23408.08 (15484.41–33746.56)	46028.19 (36775.86–57347.4)	11 609 (7322.32–16792.91)
Bhutan	6139.23 (4791.88–7716.52)	2793.14 (1750.38–4907.37)	187.77 (148.64–226.99)	106.67 (76.22–150.16)	223.8 (177.77–281.65)	47.46 (29.84–72.53)
India	10505233.51 (8167607.1–13207286.41)	5745471.04 (4785744.86–7177709.92)	277346.32 (218386.63–341851.97)	199214.29 (155367.01–245177.43)	396863.67 (364587.3–431477.76)	108779.77 (76289.16–137786.47)
Nepal	222692.31 (173416.32–283325.93)	130802.05 (92063.8–190908.38)	6290.91 (5005.83–7836.76)	3906.39 (2661.36–5384.02)	7581.51 (6001.56–9538.26)	1891.58 (1143.21–2753.94)
Pakistan	2340910.88 (1835893.64–2921729.2)	1088918.92 (830076.62–1467662.27)	30133.16 (24026.62–37655.5)	25111.34 (18003.58–36089.03)	40478.52 (37073.24–44286.71)	15345.29 (9264.08–22491.21)
South Asia	14378842.21 (11206871.54–18056891.25)	7656479.54 (6440116.71–9619406.96)	349852.67 (276806.33–429247.39)	251746.76 (197291.73–310 183)	491175.68 (447265.44–539290.77)	137673.1 (95986.05–174664.02)
Southeast Asia, East Asia, and Oceania	12460997.84 (10102718.15–15051413.29)	2655419.13 (2234545.21–3145493.84)	871785.36 (673567.57–1069185.15)	73834.72 (61623.96–98528.99)	3195454.27 (3002128.87–3405089.8)	80679.54 (59466.96–116136.98)

(Continued)

Table 1. Continued

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
East Asia	9328417.12 (7615498.53–11300372.51)	2111741.37 (1712284.42–2582768.94)	719161.48 (554740.08–884832.44)	43823.04 (35365.77–55392.18)	2697966.35 (2558787.12–2843604.26)	58735.23 (42657.01–85576.49)
China	9073096.05 (7393885.7–10994319.08)	2051186.97 (1658964.07–2526905.11)	685550.03 (527565.64–848321.73)	36638.75 (28314.24–47287.15)	2598300.54 (2472060.29–2729051.53)	53735.73 (38123.41–79237.66)
Democratic People's Republic of Korea	198935.32 (157393.02–247474.58)	53011.05 (33958.56–91528.57)	6942.94 (5291.18–8758.12)	816.02 (457.96–1619.78)	26863.81 (21299.8–33311.18)	1100.03 (602.96–2585.34)
Taiwan (Province of China)	56385.75 (48088.16–65476.72)	7543.35 (6314.74–8858.48)	26668.51 (21439.01–32189.66)	6368.28 (5638.36–6936.1)	72802 (58847.62–88724.38)	3899.47 (3375.73–4634.03)
Oceania	140628.06 (109629.35–172056.14)	67730.16 (44723.62–107339.09)	1670.62 (1321.76–2032.32)	2015.78 (1394.81–2977.01)	4261.61 (3406.79–5357.03)	382.11 (235.81–645.88)
Viet Nam	126388.01 (108234.21–147515.22)	38772.73 (28467.54–51351.94)	21631.92 (16867.83–26688)	2307.06 (1282.42–5081.67)	70040.83 (55587.47–87511.64)	2244.09 (1181.34–5818.4)
Fiji	7898.04 (6283.87–9744.95)	3346.93 (2579.07–4292.97)	209.49 (163.34–259.87)	66.22 (49.83–85.32)	497.95 (389.15–623.12)	25.14 (16.92–34.83)
Kiribati	1290.5 (998.04–1607.7)	564.11 (423.84–764.81)	17.51 (13.92–21.38)	62.03 (40.45–84.54)	47.55 (36.96–59.13)	15.12 (9.06–26.94)
Marshall Islands	611.84 (478.99–752.71)	261.96 (184.9–367.57)	9.48 (7.39–11.74)	13.82 (8.39–22.02)	21.68 (17.53–27.03)	2.25 (1.24–4.02)
Micronesia (Federated States of)	1108.89 (868.8–1375.77)	405.38 (287.66–581.01)	24.29 (19.05–29.53)	25.75 (17.61–36.8)	45.32 (35.62–57.56)	3.26 (2–5.73)
Papua New Guinea	106179.02 (82546.37–130008.64)	55015.14 (33994.91–92058.6)	913.85 (719.08–1128.02)	1455.51 (877.66–2307.54)	2700.81 (2145.47–3414.01)	283.69 (156.72–498.68)
Samoa	2277.4 (1750.68–2792.17)	564.97 (417.36–796.93)	54.74 (43.16–66.33)	41.46 (30.82–58.86)	97.7 (77.88–119.8)	5.21 (3.2–9.04)
Solomon Islands	6940.32 (5336.26–8637.15)	2309.38 (1459.39–3595.33)	80.9 (62.25–98.64)	72.65 (46.84–111.14)	197.35 (153.75–241.95)	10.86 (6.78–18.69)
Tonga	1536.74 (1206.57–1881.8)	166.61 (129.88–216.62)	33.82 (26.98–41.34)	15.93 (11.6–24.14)	54.04 (42.98–67.51)	1.72 (1.02–2.79)
Vanuatu	3568.2 (2773.02–4399.18)	1471.97 (1036.29–2194.66)	43.92 (34.6–53.49)	53.97 (35.88–78.27)	100.89 (79.5–124.42)	7.78 (4.37–14.98)
American Samoa	567.57 (450.58–694.33)	122.39 (97.58–148.73)	24.01 (19.22–29.13)	15.87 (12.4–19.58)	40.19 (32.45–48.96)	3.69 (2.71–5.21)
Cook Islands	28.29 (23.79–33.28)	13.27 (10.35–16.39)	11.77 (9.19–14.4)	2.84 (1.97–5.13)	19.52 (15.31–24.86)	0.43 (0.24–0.74)
Guam	1678.04 (1321.95–2056.88)	209.32 (172.73–256.96)	122.45 (97.58–147.63)	62.49 (52.95–73.42)	179.76 (145.46–226.73)	3.46 (2.03–5.69)
Nauru	15.84 (13.59–18.34)	43.96 (32.18–58.14)	1.84 (1.45–2.25)	3.42 (2.17–5.31)	3.92 (3.12–4.9)	0.51 (0.28–1.05)
Niue	2.97 (2.5–3.51)	5.16 (4.28–6.22)	0.97 (0.75–1.19)	0.6 (0.48–0.91)	1.62 (1.28–2.04)	0.08 (0.04–0.14)
Northern Mariana Islands	554.08 (439.3–676.01)	81.62 (66.31–99.45)	32.81 (25.81–40.34)	24.34 (19.28–28.15)	37.28 (29.07–47.29)	0.53 (0.29–0.92)
Palau	34.97 (29.17–41.86)	63.03 (49.53–80.24)	9.76 (7.71–11.95)	4.77 (3.51–6.9)	16.61 (13.39–20.65)	0.76 (0.44–1.26)
San Marino	32.55 (26.62–39.26)	16.37 (10.97–22.58)	229.15 (189.66–272.02)	19.15 (12.91–26.82)	115.37 (92.82–142.94)	4.93 (3.31–6.93)
Tokelau	2.17 (1.83–2.55)	4.93 (4.05–6.32)	0.59 (0.47–0.73)	0.45 (0.35–0.68)	1.13 (0.9–1.4)	0.07 (0.04–0.13)
Tuvalu	19.38 (16.24–22.56)	39.13 (28.87–54.1)	3.41 (2.7–4.15)	3.18 (2.41–4.54)	6.96 (5.57–8.71)	0.38 (0.24–0.65)
Southeast Asia	2991952.66 (2395341.82–3658764.49)	475947.6 (384605.31–592730.7)	150953.26 (115913.59–183273.86)	27995.9 (21600.63–41439.75)	493226.31 (428683.64–566120.19)	21562.2 (15607.43–36749.42)
Cambodia	121327.94 (94362.49–152789.97)	16099.23 (11532.57–21733.03)	1912.97 (1449.72–2353.75)	235.27 (113.69–565.09)	7827.03 (6198.02–9640.51)	278.44 (149.94–705.49)

(Continued)

Table 1. Continued

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
Indonesia	604297.67 (499658.88–727450.74)	179417.52 (136555.77–249802.37)	45313.3 (34111.41–56433.48)	5831.63 (2593.13–13627.5)	165781.06 (152150.22–181285.8)	6213.64 (3307.76–16684.79)
Lao People's Democratic Republic	68685.65 (52426.08–86468.59)	11063.03 (7769.25–16535.79)	710.42 (541.43–905.94)	113.41 (48.4–269.2)	3160.22 (2499.64–3886.09)	133.97 (70.35–375.75)
Malaysia	282150.37 (223541.72–350123.02)	23513.69 (18202.15–30475.15)	9306.99 (7345.96–11495.14)	2690.38 (2288.61–3464.33)	26168.76 (21253.75–32589.95)	1239.15 (905.47–1594.24)
Maldives	4695.13 (3618.78–5890.88)	326.4 (235.79–448.51)	128.15 (104–151.96)	34.33 (26.52–44.58)	316.54 (256.49–384.44)	19.85 (13.85–26.94)
Myanmar	502712.96 (390700.2–626421.18)	72179.56 (54917.87–95640.87)	8511.66 (6507.99–10634.63)	1255.32 (607.43–3022.96)	34234.08 (26911.39–42381.91)	1334.39 (743.44–3448.84)
Philippines	741004.61 (570570.53–929343)	90015.96 (64925.92–120686.45)	13596.94 (10290.81–16800.99)	2832.87 (2280.46–3671.88)	50288.6 (46295.76–55046.26)	1908.65 (1101.18–2659.9)
Sri Lanka	16478.14 (13437.43–20076.48)	5931.94 (4283.32–8059.96)	12356.75 (9934.9–15012.24)	2012.89 (1339.67–2924.7)	32332.34 (26195.44–39399.68)	661.68 (438.36–1000.61)
Thailand	498059.96 (397369.27–609010.61)	35164.23 (25826.08–48430.5)	36445.94 (27986.32–44958.82)	10096.95 (7290.04–13692.8)	100098.66 (79333.16–123095.81)	7235.4 (4354.6–10147.14)
Timor-Leste	10658.69 (8105.24–13541.1)	1858.21 (1205.81–2976.02)	129.09 (98.62–158.75)	19.12 (8.02–45.91)	652.49 (514.16–809.23)	22.87 (11.82–61.34)
Mauritius	10462.08 (8287.45–13019.76)	878.36 (685.68–1131.69)	652.11 (516.19–792.02)	516.9 (474.21–547.15)	1511.92 (1217.89–1887.12)	232.66 (213.73–252.77)
Seychelles	858.3 (681.38–1055.21)	62.9 (46.28–85.15)	46.47 (37.18–56.72)	10.71 (5.62–13.9)	125.84 (102.23–153.23)	7.34 (4.71–12.98)
Sub-Saharan Africa	15525243.09 (11847432.53–19638659.42)	1308843.95 (984236.6–1741460.22)	67729.37 (55071.89–81529.78)	102406.79 (68593.32–139257.95)	65035.97 (55480.79–75702.25)	82442.62 (53913.76–115089.81)
Central Sub-Saharan Africa	2239968.69 (1712401.49–2866565.62)	194849.7 (136742.1–282999.44)	7684.17 (6108.63–9323.96)	14882.6 (9599.92–21789.02)	7308.31 (5802.2–8966.63)	11290.64 (6640.2–16644.48)
Angola	505492.43 (384542.14–642165.11)	45274.47 (32195.2–61501.69)	1705.16 (1365.56–2097.7)	3443.37 (2244.76–5053.63)	1868.39 (1476.79–2325.1)	2760.15 (1670.99–4221.93)
Central African Republic	90993.47 (70221.56–116087.93)	11112.27 (7335.74–17070.38)	220.78 (171.26–280.13)	626.15 (369.92–965.14)	257.6 (203.96–323.59)	563.32 (295.91–860)
Congo	93921.55 (72315.67–117880.32)	8185.31 (5877.75–11050.17)	452.73 (361.21–558.52)	862.6 (584.96–1223.02)	419.89 (341.85–521.33)	644.1 (374.3–895.83)
Democratic Republic of the Congo	1493303.06 (1145175.02–1909596.91)	126361.46 (85266.05–199025.03)	4958.96 (3918.2–6078.17)	9488.05 (5765.01–14732.85)	4477.03 (3512.49–5549.36)	7031.11 (3919.43–11028.28)
Equatorial Guinea	26114.02 (19657.49–33199.48)	1665.72 (1108.83–2393.09)	110.77 (89.06–134.26)	150.74 (86.44–240.37)	95.14 (76.48–117.16)	100.93 (52.66–166.84)
Gabon	30144.16 (23150.19–38082.41)	2250.47 (1619.08–3054.38)	235.76 (190.49–286.22)	311.68 (216.99–440.62)	190.25 (151.96–235.71)	191.04 (110.23–284.27)
Eastern Sub-Saharan Africa	6662576.2 (5087931.01–8414101.91)	514817.43 (380792.83–694533.78)	22929.15 (18357.29–27771.09)	37760.04 (24920.54–50626.28)	21886.02 (18403.88–25729.25)	30576.69 (20703.97–42521.25)
Burundi	203210.94 (155094.1–257545.49)	16617.09 (11753.31–22559.08)	527.04 (407.38–649.57)	997.45 (582.62–1465.75)	554.63 (434.24–681.95)	883.31 (514.86–1345.88)
Comoros	12427.24 (9687.75–15800.85)	986.22 (708.61–1326.93)	67.96 (54.21–85.19)	100.1 (59.48–157.18)	64.41 (50.92–80.16)	72.05 (41.38–113.51)
Djibouti	21212.1 (16689.14–26901.14)	1535.67 (1064.15–2122.1)	93.72 (73.1–117.81)	135.8 (82.79–219.58)	92.41 (71.22–116.03)	102.26 (61.49–160.98)
Eritrea	125612.61 (97802.38–157791.68)	10556.72 (7635.12–13862.53)	291.53 (225.96–359)	676.25 (427.31–996.74)	353.4 (280.37–436.63)	680.81 (426.54–1025.1)
Ethiopia	1676168.31 (1274342.33–2132850.8)	122524.83 (88805.88–167480.22)	4912.77 (3859.47–6087.45)	6436.25 (3922.22–9133.93)	4957.33 (4453.49–5497.8)	5590.6 (3887.4–8552.82)
Kenya	774716.83 (597680.72–979750.14)	50475.34 (34832.83–70957.77)	3442.26 (2715.96–4315.81)	4212.41 (3121.99–5650.5)	3021.12 (2721.75–3335.87)	3057.34 (2157.16–4326.59)

(Continued)

Table 1. Continued

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
Madagascar	452983.72 (351207.6–574575.69)	54258.88 (38895.71–73214.2)	1606.46 (1292.88–1993.94)	4654.74 (2950.81–6569.73)	1720.69 (1377.44–2124.69)	4785.74 (2918.93–6756.35)
Malawi	323422.46 (244128.23–415388.82)	22961.21 (15864.48–32187.18)	1039.33 (818.36–1292.44)	1964.62 (1215.61–2736.77)	902.96 (706.97–1133.71)	1351.38 (841.25–2089.21)
Mozambique	485181.61 (369892.25–621013.3)	42398.06 (31227.71–57445.5)	1583.85 (1274.89–1960.8)	3908.07 (2267.27–5868.66)	1498.99 (1177.84–1839.26)	2801.19 (1454.15–4471.9)
Rwanda	212231.17 (163345.33–267459.98)	15452.55 (10572.55–21926.25)	905.6 (710.17–1112.64)	1346.25 (794.69–2107.6)	848.13 (664.97–1062.83)	1056.57 (667.27–1644.97)
Somalia	324745.13 (247145.81–412650.26)	28973.26 (19751.37–43036.58)	566.28 (431.12–710.8)	1083.39 (466.14–1815.12)	547.84 (423.85–683.04)	1200.88 (551.53–1994.81)
United Republic of Tanzania	945635.58 (725671.23–1191312.5)	69321.29 (49074.37–95089.76)	4167.03 (3345.09–5045.44)	6323.64 (3779.87–10149.35)	3799.03 (3017.07–4701.86)	4142.5 (2411.9–6618.67)
Uganda	637154.43 (487175.54–804134.64)	42301.93 (28764.7–58784.61)	2087.89 (1676.27–2564.59)	3034.62 (1790.03–4565.51)	1918.13 (1500.46–2367.33)	2375.28 (1407.05–3828.43)
Zambia	317517.62 (242783.41–401406.46)	22113.21 (15125.75–31540.45)	1134.86 (926.82–1380.9)	2110.5 (1402.75–3045.31)	1119.08 (909.87–1366.77)	1805.14 (1152.38–2721.65)
South Sudan	144556.09 (110557.8–182822.46)	13892.97 (10231.36–18746.52)	482.61 (369.7–611.16)	743.09 (402.71–1178.99)	468.83 (366.24–582.36)	645.03 (333.9–1025.02)
Southern Sub-Saharan Africa	1273359.61 (999835.68–1591661.77)	131823.76 (104099.47–168016.75)	13442.15 (10821.3–16419.98)	12227.83 (10014.4–14946.3)	7598.34 (6778.55–8536.17)	8579.39 (6268.14–10726.99)
Botswana	36963.26 (28480.62–45787.83)	2856.33 (2029.88–3928.77)	306.85 (242.63–379.85)	215.89 (151.05–304.45)	251.8 (201.07–309.97)	183.66 (119.43–267.71)
Lesotho	27995.21 (21454.86–35810.13)	3334.14 (2398–4634.55)	179.74 (141.08–224.21)	233.2 (156.64–330.64)	155.47 (122.27–195.86)	251.72 (155.7–355.41)
Namibia	36334.51 (27948.54–45671.03)	3158.65 (2318.39–4265.82)	263.37 (206.71–324.01)	263.75 (180.04–380.61)	216.26 (171.91–271.82)	229.42 (146.5–356.1)
South Africa	934787.44 (734396.78–1170074.58)	74150.2 (56898.72–98354.22)	11438.68 (9141.56–14041.69)	9548.66 (7900.4–11634.58)	5911.52 (5375.7–6530.51)	5727.47 (4372.91–7409.98)
Zimbabwe	220293.6 (168397.13–275481.61)	46599.14 (34302.54–60192.55)	1140.33 (901.51–1380.64)	1833.16 (1236.67–2586.29)	980.43 (764.01–1237.35)	2053.04 (1234.69–3170.2)
Western Sub-Saharan Africa	5349338.59 (4084588.05–6761973)	467353.06 (346788.82–613917.62)	23673.89 (19211.64–28588.83)	37536.31 (23078–57537.87)	28243.29 (24380.92–32738.87)	31995.9 (19263.66–47152.71)
Eswatini	16985.59 (13017.87–21668.71)	1725.29 (1242.84–2323.53)	113.18 (88.4–138.46)	133.17 (83.53–203.53)	82.86 (65.09–102.52)	134.08 (76.82–197.4)
Benin	138712.57 (105413.55–173074.97)	11591.78 (8468.34–15482.21)	627.34 (503.04–768.96)	795.7 (460.86–1223.58)	727.56 (576.61–897.85)	677.36 (396.85–1023.67)
Burkina Faso	220445.46 (165275.5–281557.79)	25627.84 (18522.09–35060.24)	1041.1 (839.92–1254.18)	1917.97 (1040.13–2921.48)	1291.99 (1027.27–1624.17)	1770.31 (993.35–2762.74)
Cameroon	338055.69 (257121.86–428464.34)	28664.15 (20337.14–39345.41)	1913.07 (1550.75–2325.21)	3026.24 (1811.08–4503.85)	2021.05 (1609.09–2525.02)	2675.77 (1556.61–4094.47)
Cabo Verde	7033.41 (5438.38–8738.27)	505.56 (369.79–676.76)	77.74 (63.24–92.89)	87.48 (55.77–152.45)	74.37 (59.67–94.26)	52.67 (34.13–77.45)
Chad	163855.4 (122944.53–208541.97)	21138.06 (15697.37–27737.72)	570.72 (462.9–696.75)	1019.02 (527.56–1624.36)	832.64 (661.19–1041.51)	1127.23 (679.41–1717.91)
Côte d'Ivoire	300051.88 (229680.97–381095.17)	26214.11 (19074–35439.02)	1523.62 (1224.68–1868.44)	2450.45 (1371.31–3955.43)	1763.94 (1404.33–2232.98)	2110.35 (1173.02–3244.01)
Gambia	26799.19 (20532.7–34402.55)	2405.18 (1772.98–3339.69)	124.51 (101.31–150.64)	244.76 (145.51–372.82)	134.73 (108.12–168.82)	205.08 (123.87–297.87)
Ghana	371397.83 (286943.29–470685.29)	26234.5 (18908.74–35722.95)	2344.38 (1883.83–2870.3)	3985.33 (2585.38–5763.77)	2592.16 (2074.37–3219.84)	3150.19 (1880.45–4592.57)
Guinea	114028.29 (86300.06–144648.57)	13669.23 (9961.77–18032.43)	626.55 (508.29–759.47)	1099.3 (592.62–1716.97)	852.86 (685.2–1053.55)	1056.8 (603.15–1621.41)
Guinea-Bissau	22011.16 (16651.55–28219.6)	2615.54 (1945.09–3507.98)	77.19 (61.03–94.43)	204.39 (124.68–295.84)	106.61 (85.7–134.16)	222.35 (127.5–324.77)

(Continued)

Table 1. Continued

	RHD		CAVD		DMVD	
	Prevalence number	DALYs number	Prevalence number	DALYs number	Prevalence number	DALYs number
Liberia	61269.94 (47248.46–76742.72)	5546.16 (3975.9–7671.09)	284.47 (228.54–348.99)	458.25 (258.61–733.78)	273.35 (219.09–349.47)	395.96 (204.39–653.98)
Mali	258962.22 (196156.9–328742.56)	24167.96 (17678.43–32592.97)	854.04 (664.61–1040.29)	1307.61 (702.43–1996.71)	1094.08 (857.28–1386.31)	1473.79 (796.38–2153.38)
Mauritania	46124.19 (35539.28–58679.91)	3664.96 (2699.91–4995.17)	311.24 (246.27–376.23)	432.04 (287.36–688.37)	311.26 (244.84–388.76)	315.09 (187.67–460.57)
Niger	237841.76 (176202.88–304331.7)	26759.85 (18297.63–40043.28)	772.47 (613.2–944.61)	1134.45 (483.73–1842.83)	994.16 (798.82–1260.82)	1208.27 (602.8–2056.18)
Nigeria	2673375.92 (2047858.48–3392436.65)	214538.75 (150152.49–289592.51)	10770.62 (8663.56–13144.8)	16130.87 (9613.3–28329.56)	13131.74 (11947.57–14434.07)	12811.03 (7013.06–21126.39)
Sao Tome and Principe	2636.22 (2034.01–3325.09)	272.97 (188.97–380.17)	16.91 (13.56–20.85)	22.88 (14.34–39.33)	16.66 (13.23–20.79)	16.3 (10.49–25.61)
Senegal	176155.87 (133757.57–222477.38)	15266.61 (10725.49–20827.93)	864.15 (695.41–1055.34)	1595.04 (904.84–2562.04)	1019.7 (815.12–1287.3)	1314.79 (850.15–2030.36)
Sierra Leone	99463.38 (74649.53–126923.47)	9991.13 (7174.2–13588.75)	408.43 (328.81–495.18)	769.52 (417.52–1343.94)	481.8 (385.82–607.39)	675.07 (357.9–1080.74)
Togo	91055.81 (69957.22–113970.33)	8473.25 (6234.92–11342.23)	465.07 (374.34–564.83)	854.68 (517.7–1294.98)	522.3 (422.1–656.3)	737.12 (425–1111)

CAVD indicates nonrheumatic calcific aortic valve disease; DALYs, disability-adjusted life-years; DMVD, nonrheumatic degenerative mitral valve disease; RHD, rheumatic heart disease; SDI, Socio-Demographic Index; and VHD, valvular heart disease.

aged 70 years or older—the age group with the greatest burden of disease—was 1803.6 per 100 000 (95% UI, 1535.5–2055.7) for CAVD and 2148.9 per 100 000 (95% UI, 2001.4–2310.1) for DMVD, respectively.

Regional Differences of the Global VHD Disease Burden and Their Trends by GBD Regions

Geographical analysis of the burden from RHD, CAVD, and DMVD in 2021 by GBD regions revealed distinct regional disparities (Figure 3). Sub-Saharan Africa showed the highest age-standardized prevalences for RHD (1404.41 [95% UI, 1109.35–1758.62]), followed by Latin America and the Caribbean (911.75 [95% UI, 757.61–1115.15]), and South Asia (732.2 [95% UI, 575.83–916.47]). High-income regions led in CAVD prevalence (378.87 [95% UI, 330.17–428.08]), with Central Europe, Eastern Europe, and Central Asia following (291.21 [95% UI, 243.61–341.09]), and Latin America and the Caribbean (146.92 [95% UI, 120.89–174.01]). High-income regions also recorded the highest DMVD prevalence (393.7 [95% UI, 369.81–421.57]), followed by Central Europe, Eastern Europe, and Central Asia (295.2 [95% UI, 265.5–328.45]), and Southeast Asia, East Asia, and Oceania (116.14 [95% UI, 109.09–123.82]). Between 1990 and 2021, North Africa, the Middle East, Sub-Saharan Africa, and South Asia have seen an increase in the age-standardized prevalence of RHD. All regions have also witnessed rising age-standardized prevalences of CAVD (Figure S3). Particularly notable increases have

been observed in Central Europe, Eastern Europe, and Central Asia (92.9% increase [95% CI, 81.3%–105.3%]) and Southeast Asia, East Asia, and Oceania (84.9% increase [95% CI, 75.6%–96.2%]). Similarly, most regions have experienced an increase in age-standardized prevalences of DMVD. Significant increases were noted in Central Europe, Eastern Europe, and Central Asia (14.2% increase [95% CI, 10.6%–17.6%]) and Southeast Asia, East Asia, and Oceania (13.1% increase [95% CI, 9.7%–16.9%]). Conversely, Latin America, the Caribbean, North Africa, and the Middle East have shown stable trends, whereas Sub-Saharan Africa has seen a decrease of 6.4% (95% CI, 3.8%–8.8%) in DMVD prevalence. Notably, all regions have also witnessed decreasing age-standardized DALYs of RHD, CAVD, and CMVD (Figure S4).

Regional Differences of the Burden of VHD and Temporal Trends by SDI Regions

Geographical analysis of the burden from RHD, CAVD, and DMVD in 2021 by SDI regions also highlighted significant regional disparities. RHD had the highest age-standardized prevalence of 1184.2 per 100 000 for low SDI region, and CAVD had the highest age-standardized prevalences in high SDI with 349.8 (95% UI, 303.6–395.8) and in high-middle SDI regions with 172.9 (95% UI, 149.5–197.1) (Figure 4). Moreover, the highest increases in age-standardized prevalences of CAVD from 1990 to 2021 have been in the middle SDI and low-middle SDI regions, with a rise of 60.6% (95% CI, 54.8%–67.1%) and 44.4% (95% CI, 38.7%–51.0%)

Table 2. Age-Standardized Prevalence and Incidence of VHD by Location in 2021

	RHD		CAVD		DMVD	
	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)
Global	684.2 (540.41–848.9)	50.74 (40.1–63.06)	158.35 (135.92–181)	12.03 (10.43–13.56)	182.13 (169.95–196.07)	12.98 (12.11–13.89)
Sex						
Female	754.77 (600.82–936.66)	55.11 (43.62–68.68)	128.88 (110.13–147.63)	10.19 (8.74–11.47)	121.11 (112.92–129.82)	8.66 (8.09–9.25)
Male	614.2 (482.58–761.31)	46.52 (36.51–57.84)	193.24 (166.56–220.38)	13.97 (12.21–15.85)	257.92 (240.96–278.21)	17.67 (16.48–18.99)
SDI quintile						
Low SDI	1184.23 (932.41–1478.2)	84.89 (66.11–106.36)	17.64 (14.26–21.19)	1.89 (1.61–2.16)	24.77 (21.96–27.95)	2.16 (1.97–2.37)
Low-middle SDI	856.23 (676.01–1061.01)	60.46 (47.74–75.48)	36.62 (29.46–43.57)	3.19 (2.68–3.73)	44.67 (39.91–50.05)	3.68 (3.32–4.09)
Middle SDI	718.7 (564.1–889.1)	45.89 (36.14–57.57)	54.49 (43.43–64.98)	4.21 (3.43–5.01)	83.14 (77.41–89.93)	6.75 (6.29–7.29)
High-middle SDI	323.97 (270.17–386.65)	20.36 (16.96–24.6)	172.89 (149.52–197.05)	12.13 (10.38–13.88)	223.55 (208.8–240.01)	16.01 (14.99–17.11)
High SDI	89.18 (81.38–98.3)	6.78 (6.18–7.44)	349.64 (303.58–395.77)	29.98 (26.09–33.53)	364.24 (341.57–390.64)	28.49 (26.66–30.52)
Central Europe, Eastern Europe, and Central Asia	324.4 (275.14–384.21)	23.14 (19.17–27.81)	291.21 (243.61–341.09)	20.44 (17.12–24.12)	295.2 (265.5–328.45)	22.16 (19.97–24.76)
Central Asia	871.28 (685.87–1081.67)	56.67 (44.78–71.18)	146.37 (119.97–173.94)	10.06 (8.23–11.76)	496.93 (420.36–589.81)	36.89 (30.98–43.68)
Armenia	1114.26 (879.67–1368.22)	64.21 (49.81–79.22)	175.64 (144.05–215.78)	12.35 (9.95–14.83)	376 (312.08–447.89)	28.33 (23.06–33.8)
Azerbaijan	1029.48 (810.99–1288.04)	63.13 (49.45–80.24)	139.29 (111.66–170.96)	9.47 (7.48–11.69)	428.83 (351.47–520.93)	32.34 (26.66–39.36)
Georgia	1078.73 (847.53–1331.07)	65.53 (51.15–81.99)	207.16 (171.75–247.85)	14.88 (12.34–17.61)	1013.77 (860.9–1194.24)	79.7 (66.31–95.42)
Kazakhstan	107.96 (92.05–126.22)	7.18 (6.36–8.14)	147.89 (121.39–179.01)	10.22 (8.28–12.28)	406.66 (328.08–496.02)	31.16 (24.89–37.98)
Kyrgyzstan	1003.98 (789.42–1241.1)	66.35 (51.8–83.25)	112.18 (90.71–137.48)	7.71 (6.15–9.46)	366.15 (298.01–450.13)	27.54 (22.28–33.78)
Mongolia	1061.51 (819.93–1331.9)	71.32 (55.81–89.69)	111.91 (90–136.11)	7.73 (6.15–9.37)	596.93 (481.76–723.97)	43.61 (35.25–53.26)
Tajikistan	1061.51 (832.73–1343.73)	70.51 (54.48–90.12)	84.63 (68.1–102.42)	5.76 (4.62–7.01)	390.02 (310.45–485.36)	27.91 (21.96–34.91)
Turkmenistan	1023.27 (793–1285.78)	65.76 (51.29–83.61)	130.71 (103.14–158.89)	8.94 (7.07–10.92)	409.67 (330.85–519.18)	30.52 (24.31–38.03)
Uzbekistan	1060.64 (821.53–1328.71)	69.64 (53.99–87.93)	149.39 (121.97–178.02)	10.52 (8.58–12.57)	503.57 (411.49–625.75)	38.21 (30.97–47.64)
Central Europe	86.95 (77.16–98.2)	6.49 (5.83–7.19)	379.57 (330.44–437.56)	26.87 (23.56–30.71)	291.32 (254.9–334.97)	21.44 (18.85–24.57)
Albania	1076.53 (841.3–1332.79)	62.59 (48.68–79.26)	251.29 (204.19–308.98)	17.14 (13.74–20.95)	292.99 (242.09–358.27)	21.36 (17.41–26.11)
Bosnia and Herzegovina	44.53 (36.09–53.14)	3.25 (2.74–3.82)	322.48 (265.22–384.74)	22.96 (18.88–27.57)	394.25 (326.34–476.9)	29.36 (24.33–35.39)
Bulgaria	57.71 (49.2–67.71)	4.59 (4.05–5.22)	222.47 (187.29–262.97)	14.99 (12.49–17.77)	234.04 (189.29–285.65)	16.8 (13.63–20.55)
Croatia	45.32 (39.49–51.71)	3.94 (3.58–4.35)	576.92 (479.52–687.21)	42.31 (35.15–50.4)	459.16 (379.31–581.17)	34.01 (28.04–43.16)
Czechia	62.48 (52.01–74.96)	5.06 (4.4–5.8)	555.99 (459.07–650.53)	40.04 (33.12–47.22)	486.57 (406.73–598.64)	36.9 (30.68–45.59)
Hungary	64.18 (53.14–76.24)	5.1 (4.44–5.86)	533.43 (459.53–617.47)	38.84 (33.81–45.11)	404.35 (336.5–484.4)	30.37 (25.31–36.47)
North Macedonia	55.25 (45.34–66.57)	4.31 (3.75–5.01)	270.67 (225.19–323.14)	18.58 (15.18–22.37)	244.51 (200.13–301.44)	17.39 (14.45–21.27)
Montenegro	59.89 (49.56–72.08)	4.64 (4–5.42)	282.69 (232.23–343.47)	19.1 (15.47–23.4)	251.09 (206.59–308.86)	18.15 (14.91–22.61)
Poland	52.45 (46.03–59.8)	4.68 (4.13–5.38)	118.67 (100.03–140.48)	10.15 (8.57–11.75)	147.42 (141.04–154.67)	10.9 (10.37–11.42)
Romania	76.73 (63.14–90.86)	5.44 (4.58–6.42)	720.42 (597.53–846.5)	47.59 (40.09–55.29)	266.56 (220.77–321.87)	19.3 (16.04–23.41)

(Continued)

Table 2. Continued

	RHD		CAVD		DMVD	
	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)
Serbia	54.68 (44.7–66.52)	4.26 (3.67–5.05)	364.34 (307.03–441.11)	27.14 (22.74–32.98)	512.97 (426.21–602.41)	39.07 (32.82–45.36)
Slovakia	96.33 (80.09–115.98)	6.56 (5.62–7.84)	246.88 (202.4–297.06)	17.64 (14.3–21.53)	191.37 (158.71–227.51)	14.03 (11.48–16.85)
Slovenia	58.41 (47.87–71.62)	5.82 (5.12–6.73)	993.08 (871.18–1142.08)	78.55 (69.63–90.17)	499.79 (409.39–605.93)	38.31 (31.3–47.22)
Eastern Europe	150.14 (131.16–171.17)	8.54 (7.52–9.56)	264.72 (213.79–319.46)	19.38 (15.36–23.74)	258.75 (238.93–282.71)	19.16 (17.84–20.66)
Belarus	156.93 (132.45–187.15)	8.68 (7.49–10.09)	230.29 (185.73–283.57)	16.47 (13.15–20.28)	230.27 (178.92–286.81)	16.97 (12.95–21.31)
Estonia	152.34 (125.29–185.28)	7.97 (6.68–9.49)	616.95 (528.98–743.03)	47.83 (41.31–56.64)	365.15 (299.77–444.05)	27.92 (22.33–34.62)
Latvia	167.84 (141.53–200.64)	8.81 (7.39–10.37)	422.8 (348.81–507.24)	31.18 (25.72–37.13)	240.64 (192.82–303.2)	17.92 (14.3–22.88)
Lithuania	159.06 (136.45–187.4)	8.69 (7.57–10.09)	312.4 (258.88–372.81)	23.03 (18.79–27.63)	313.01 (252.6–388.02)	23.36 (18.69–28.63)
Republic of Moldova	121.65 (103.28–142.93)	6.89 (5.95–8)	215.01 (175.26–262.09)	15.09 (12.1–18.48)	238.3 (190.8–291.58)	17.25 (13.77–21.59)
Russian Federation	157.93 (137.73–179.65)	9 (7.9–10.12)	281.97 (224.31–343.38)	20.75 (16.24–25.53)	272.37 (253.37–294.52)	20.23 (18.86–21.64)
Ukraine	124.26 (106.77–142.72)	7.08 (6.18–8.04)	198.17 (155.29–242.19)	14.39 (11.02–17.7)	218.26 (202.46–236.93)	15.87 (14.73–17.13)
High-income	112.28 (100.55–127.01)	8.83 (7.93–9.89)	378.87 (330.17–428.08)	32.72 (28.6–36.55)	393.7 (369.81–421.57)	30.86 (28.92–32.99)
Australasia	48.1 (40.98–56.21)	3.74 (3.3–4.25)	332.99 (286.39–384.01)	30.99 (26.61–35.51)	200.85 (171.78–241.19)	16.1 (13.67–19.31)
Australia	46.54 (38.61–55.19)	3.51 (3.05–4.02)	318.05 (268.12–372.34)	29.29 (25–33.98)	181.32 (147.62–227.57)	14.41 (11.65–18.07)
New Zealand	56.25 (51.06–61.83)	4.92 (4.42–5.48)	415.32 (349.31–484.26)	40.14 (34.06–46.01)	306.37 (290.69–323.68)	24.87 (23.57–26.37)
High-income Asia Pacific	33.31 (28.78–38.14)	2.4 (2.12–2.73)	284.22 (238.29–333.61)	22.73 (18.8–26.51)	390.61 (366.97–418.01)	28.4 (26.52–30.46)
Brunei Darussalam	70.13 (58.34–83.2)	5.49 (4.83–6.31)	249.88 (206–297.21)	20.21 (17.05–23.6)	410.12 (343.71–488.55)	29.5 (24.46–35.41)
Japan	35.73 (31.23–40.55)	2.69 (2.36–3.07)	299.43 (249–354.3)	24.61 (20.21–28.99)	420.38 (402.86–441.94)	31.7 (30.23–33.23)
Republic of Korea	25.59 (20.72–30.45)	1.57 (1.33–1.82)	222.43 (181.93–261.13)	16.63 (13.42–19.34)	273.76 (225.77–329.98)	19.57 (15.78–23.89)
Singapore	25.19 (20.87–29.81)	1.38 (1.17–1.62)	206.07 (172.23–243.26)	14.68 (12.13–17.44)	304.04 (250–368.41)	21.34 (17.34–26.28)
High-income North America	122.33 (112.08–134.26)	9.91 (9–10.92)	403.07 (344.88–462.72)	36.68 (31.54–41.73)	562.8 (535.23–594.69)	43.57 (41.2–45.99)
Canada	114.13 (93.81–134.81)	8.87 (7.31–10.53)	326.37 (272.67–391.05)	29.51 (23.65–35.23)	414.21 (345.23–508.26)	31.49 (26.02–39.3)
United States	123.44 (112.81–135.61)	10.04 (9.06–11.04)	412.7 (352.7–479.22)	37.56 (32.17–43.23)	581.25 (554.34–608.6)	45.01 (42.75–47.16)
Greenland	137.88 (113.84–164.69)	10.73 (8.88–12.96)	299.17 (241.74–361.25)	28.48 (23.82–33.82)	605.58 (488.19–732.34)	47.56 (38.69–59.04)
Southern Latin America	705.21 (560.2–873.03)	42.87 (33.68–53.55)	262.02 (226.21–304.68)	22.85 (19.94–26.48)	138.06 (114.77–169.69)	10.38 (8.62–12.64)
Argentina	1014.45 (803.02–1264.51)	59.86 (46.6–75.31)	262.51 (224.86–308.26)	23.57 (20.57–27.38)	128.39 (103.52–160.66)	9.63 (7.77–11.99)
Chile	57.91 (48.03–69.24)	3.97 (3.41–4.67)	241.54 (201.81–286.78)	19.19 (16.12–23.03)	154.18 (127.62–186.36)	11.54 (9.52–13.89)
Uruguay	63.8 (52.38–76.41)	4.95 (4.29–5.73)	340.87 (286.91–396.14)	31.97 (27.69–36.84)	161.71 (132.65–199.01)	12.61 (10.3–15.69)
Western Europe	43.87 (38.06–51.01)	4.37 (3.95–4.84)	425.32 (375.41–477.97)	36.45 (32.41–40.39)	311.3 (287.65–337.34)	24.79 (22.86–26.81)
Andorra	35.47 (29.46–42.32)	3.12 (2.73–3.59)	289.48 (238.43–347.95)	23.14 (19.01–27.18)	137.22 (113.11–163.33)	10.9 (8.88–13.05)

(Continued)

Table 2. Continued

	RHD		CAVD		DMVD	
	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)
Austria	58.2 (52.78–64.9)	5.1 (4.71–5.55)	856.45 (662.85–1129.68)	68.79 (53.4–90.64)	469.77 (381.42–707.52)	37.46 (29.69–54.2)
Belgium	46.04 (38.14–55.87)	4.51 (3.94–5.16)	446.39 (383.61–511.45)	41.05 (35.97–45.83)	100.21 (83.62–121.26)	8.3 (6.83–10.06)
Cyprus	34.68 (28.29–42.38)	4.89 (4.37–5.46)	394.85 (344.04–463.64)	39.35 (35.28–44.28)	77.12 (64.35–92.1)	6.58 (5.55–7.87)
Denmark	21.61 (17.14–26.29)	2.04 (1.74–2.36)	460.77 (397.89–539.53)	38.91 (33.57–44.57)	131.89 (111.14–155.37)	10.92 (9.2–12.91)
Finland	17.44 (14.17–20.98)	1.43 (1.2–1.66)	544.74 (462.94–652.51)	45.06 (38.5–53.64)	323.73 (265.95–386.65)	26.41 (21.6–31.84)
France	35.19 (28.89–42.47)	3.61 (3.16–4.11)	389.82 (333.98–453.99)	35.35 (30.99–39.88)	108.73 (85.7–134.17)	8.63 (6.79–10.62)
Germany	38.99 (32.34–46.76)	4.43 (3.93–4.97)	537.93 (459.66–627.7)	46.19 (40–52.87)	178.09 (146.61–211.01)	15.08 (12.18–17.78)
Greece	27.3 (22.59–32.19)	2.2 (1.91–2.52)	328.84 (287.45–373.56)	28.38 (24.88–31.97)	137.95 (112.4–182.93)	10.87 (8.79–13.87)
Iceland	22.04 (18.21–26.55)	1.83 (1.58–2.12)	540.44 (459.51–627.94)	43.49 (36.33–50.35)	91.67 (73.97–111.09)	7.32 (5.82–9.01)
Ireland	30.58 (25.32–36.71)	2.61 (2.25–3)	337.75 (279.84–403.38)	27.81 (23.3–33.05)	151.37 (123.88–182.1)	12.15 (9.93–14.74)
Israel	39.14 (32.31–47.51)	3.79 (3.32–4.34)	205.55 (174.74–237.8)	19.97 (17.28–22.73)	175.36 (145.44–210.23)	14.2 (11.74–16.92)
Italy	68.61 (62.44–75.68)	6.05 (5.48–6.68)	448.63 (389.89–508.39)	35.93 (31.25–41.12)	924.86 (882.16–966.44)	72.88 (69.3–76.08)
Luxembourg	48.52 (40.32–58.07)	3.9 (3.36–4.53)	529.09 (441.25–636.89)	44.4 (37.69–52.87)	326.05 (267.82–394.75)	26.65 (21.76–32.4)
Malta	20.45 (16.92–24.6)	2.24 (1.98–2.54)	228.34 (191.83–269.96)	18.66 (15.89–21.97)	93.26 (77.72–114.78)	7.59 (6.28–9.41)
Netherlands	30.05 (24.13–35.86)	2.78 (2.39–3.24)	181.82 (152.14–216.72)	20.37 (17.87–23.29)	277.53 (227.79–335.78)	23.62 (19.24–28.36)
Norway	21.94 (18.37–25.97)	2.11 (1.79–2.47)	416.4 (338.08–499.46)	38.69 (32.24–45.44)	883.24 (839.58–929.2)	71.34 (67.54–75.07)
Portugal	35.83 (30.43–42.29)	3.18 (2.84–3.62)	187.42 (161.75–220.46)	17.55 (15.52–19.88)	75.25 (62.6–97.8)	6.2 (5.19–7.95)
Spain	55.48 (46.64–66.25)	5.32 (4.72–5.99)	400.76 (341.59–464.2)	33.02 (28.81–37.54)	139.38 (114.19–193.1)	11.58 (9.5–15.5)
Sweden	18.14 (15.29–21.33)	1.91 (1.64–2.21)	498.31 (397.16–606.71)	42.09 (33.91–50.76)	292.14 (272.4–316.1)	23.26 (21.57–24.9)
Switzerland	39.91 (32.81–48.63)	3.06 (2.6–3.63)	462.87 (389.65–555.08)	38.13 (32.21–45.46)	270.91 (219.92–327.29)	22.19 (17.56–26.8)
United Kingdom	43.56 (36.3–53.24)	4.93 (3.95–6.03)	353.39 (297.26–410.82)	31.45 (26.83–36.29)	283.42 (267.71–298.83)	23.27 (22–24.53)
Monaco	33.21 (26.99–40.6)	2.58 (2.18–3.13)	257.32 (215.95–308.62)	19.95 (16.46–23.89)	116.87 (94.3–143.2)	9.06 (7.14–11.24)
Latin America and Caribbean	901.82 (717.65–1115.87)	56.79 (44.52–71.23)	146.92 (120.89–174.01)	11.07 (9.18–13.06)	39 (35.22–43.52)	3 (2.76–3.3)
Andean Latin America	1122.6 (880.84–1408.91)	70.48 (55.05–89.74)	133.19 (113.31–154.29)	9.43 (8.03–10.96)	27.86 (22.48–34.06)	2.11 (1.75–2.55)
Bolivia (Plurinational State of)	1124.81 (875.96–1422.41)	74.21 (58.16–94.36)	121.73 (98.58–148.65)	8.96 (7.36–10.75)	30.49 (24.41–37.11)	2.4 (1.95–2.9)
Ecuador	1103.97 (854.01–1378.44)	70.1 (54.4–89.78)	159.01 (143.81–176.64)	11.41 (10.34–12.66)	35.11 (27.92–42.29)	2.75 (2.24–3.28)
Peru	1130.47 (892.78–1416.67)	69.44 (54.01–88.33)	123.3 (99.43–149.39)	8.59 (6.89–10.52)	23.56 (18.5–29.51)	1.71 (1.36–2.12)
Caribbean	1117.59 (878.6–1382.27)	73.45 (57.79–91.24)	134.62 (115.73–157.17)	9.7 (8.3–11.13)	36.94 (30.61–44.37)	2.75 (2.33–3.29)
Antigua and Barbuda	1212.66 (961.71–1501.85)	68.05 (52.84–86.41)	126.42 (102.86–150.55)	9.58 (7.77–11.26)	50.01 (41.23–59.26)	3.8 (3.18–4.53)
Bahamas	1175.01 (925.83–1468.96)	71.55 (55.06–90.52)	122.49 (100.94–148.29)	9.06 (7.55–11.01)	36.38 (29.63–45.19)	2.65 (2.16–3.28)
Barbados	1210.66 (950.51–1502.5)	71.13 (55.44–89.81)	151.66 (124.6–180.2)	11.26 (9.22–13.31)	31.78 (25.35–39.24)	2.3 (1.88–2.77)

(Continued)

Table 2. Continued

	RHD		CAVD		DMVD	
	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)
Belize	1163.65 (926.09–1433.83)	73.97 (57.83–94.29)	112.16 (91.93–134.77)	8.11 (6.61–9.75)	43.4 (36.01–51.79)	3.23 (2.75–3.77)
Cuba	1188.83 (941.05–1474.39)	69.83 (53.98–89.07)	153.52 (130.21–181.75)	11.01 (9.43–12.86)	38.05 (31.67–46.09)	2.78 (2.37–3.34)
Dominica	1190.02 (936.09–1474.46)	74.68 (57.85–93.59)	131.53 (108.91–159)	10.45 (8.7–12.34)	47.34 (38.26–57.2)	3.9 (3.27–4.58)
Dominican Republic	1140.61 (908.51–1410.97)	71 (55.84–88.38)	108.18 (90.6–130.16)	8.21 (6.89–9.81)	36.57 (29.29–44.27)	2.7 (2.21–3.25)
Grenada	1187.48 (933.72–1475.08)	73.25 (56.93–93.45)	129.87 (105.19–166.03)	10.53 (8.59–12.87)	63.78 (53–73.91)	5.4 (4.67–6.21)
Guyana	1157.46 (907.51–1428.22)	79.06 (62.18–99.71)	132.04 (109.79–155.77)	10.35 (8.71–12.04)	48.34 (39.54–57.37)	3.79 (3.25–4.38)
Haiti	1245.29 (972.24–1551.07)	90.03 (70.67–111.93)	66.97 (54.19–80.67)	5.51 (4.58–6.51)	36.2 (29.13–43.82)	2.89 (2.44–3.43)
Jamaica	1208.39 (948.53–1489.12)	70.75 (54.21–89.51)	96.19 (78.32–117.86)	6.78 (5.46–8.25)	31.46 (25.35–39.04)	2.3 (1.88–2.79)
Saint Lucia	1211.51 (955.08–1499.13)	74 (57.81–93.96)	132.2 (110.2–158.07)	9.97 (8.22–11.89)	33.03 (26.43–41.22)	2.45 (2.01–2.98)
Saint Vincent and the Grenadines	1175.98 (918.53–1449.35)	74.72 (57.64–94.84)	126.85 (106.16–154.44)	9.7 (8.13–11.7)	47.74 (39.24–57.73)	3.68 (3.14–4.38)
Suriname	1119.2 (872–1382.83)	71.3 (54.99–90.47)	103.78 (86.08–128.83)	7.87 (6.43–9.46)	49.95 (41.32–60.43)	3.84 (3.25–4.55)
Trinidad and Tobago	1182.66 (931.55–1468.07)	70.63 (54.81–88.61)	117.37 (94.57–141.45)	8.59 (6.93–10.35)	34.21 (27.21–43)	2.48 (2.01–3.06)
Bermuda	46.19 (38.23–54.89)	2.95 (2.46–3.49)	357.04 (300.5–428.94)	27.18 (23.24–31.79)	44.45 (36.23–54.03)	3.21 (2.66–3.82)
Puerto Rico	44.87 (37.05–53.09)	2.97 (2.47–3.47)	197.53 (165–236.45)	14.79 (12.37–17.5)	35.72 (28.47–43.54)	2.56 (2.06–3.15)
Saint Kitts and Nevis	51.61 (42.81–61.14)	3.63 (3.14–4.23)	127.38 (104.85–151.92)	9.85 (8.09–11.46)	48.87 (39.75–58.89)	3.83 (3.22–4.53)
United States Virgin Islands	51.55 (42.33–61.37)	3.44 (2.92–4.06)	206.59 (170.29–246.18)	15.53 (12.79–18.29)	66.58 (55.05–80.95)	5.1 (4.37–6.12)
Central Latin America	479.91 (383.87–587.9)	32.23 (25.7–40.03)	160.32 (131.28–191.12)	11.71 (9.64–13.86)	37.25 (32.81–42.38)	2.87 (2.57–3.21)
Colombia	45.36 (37.48–53.26)	2.98 (2.48–3.54)	194.54 (160.74–230.18)	14.28 (11.67–16.6)	58.77 (49.55–68.98)	4.73 (4.1–5.44)
Costa Rica	1290.11 (1030.51–1574.55)	72.26 (55.95–90.42)	230.47 (196.5–271.5)	16.63 (14.28–19.72)	33.39 (26.53–41.74)	2.49 (2.04–3.05)
El Salvador	1166.07 (918.94–1440.93)	75.69 (59.23–95.68)	111.68 (90.64–136.53)	7.82 (6.36–9.68)	26.06 (20.03–32.95)	1.96 (1.55–2.43)
Guatemala	1158.51 (919.12–1420.63)	79.53 (62.17–99.9)	95.75 (78.61–115.49)	7.12 (5.85–8.45)	27.28 (21.05–34.69)	2.09 (1.67–2.6)
Honduras	1175.78 (918.94–1463.5)	78.73 (60.74–99.4)	107.24 (87.12–128.92)	7.99 (6.54–9.59)	29.25 (23.05–36.14)	2.29 (1.85–2.81)
Mexico	470.31 (378.5–576.91)	29.82 (23.77–37.12)	156.78 (124.18–193.33)	11.47 (9.02–14.04)	30.49 (27.95–33.1)	2.3 (2.14–2.47)
Nicaragua	1233.46 (977.69–1531.17)	76.28 (59.39–96.58)	112.98 (92.79–134.53)	8.08 (6.66–9.56)	27.88 (21.63–34.53)	2.12 (1.69–2.59)
Panama	1161.41 (916.04–1431.12)	66.4 (51.96–83.28)	137.24 (112.51–166.29)	9.77 (7.95–11.87)	34.51 (27.31–43.43)	2.57 (2.06–3.16)
Venezuela (Bolivarian Republic of)	44.87 (37.03–53.09)	3.01 (2.53–3.49)	154.55 (124.94–187.01)	11.38 (9.32–13.62)	35.91 (28.84–44.25)	2.76 (2.29–3.43)
Tropical Latin America	1266.24 (1005.05–1572.84)	78.98 (61.26–99.83)	139.74 (111.9–169.21)	11.11 (8.97–13.36)	43.75 (40.64–47.26)	3.4 (3.2–3.63)
Brazil	1268.37 (1006.92–1575.54)	79.25 (61.47–100.29)	139.01 (111.14–168.76)	11.05 (8.88–13.3)	43.76 (40.72–47.2)	3.41 (3.2–3.63)
Paraguay	1211.11 (962.75–1489.21)	72.25 (55.74–90.19)	171.77 (142.14–209.49)	13.53 (11.35–16.03)	42.82 (35.19–51.28)	3.22 (2.73–3.82)
Algeria	574.42 (451.13–711.4)	37.27 (29.36–46.82)	55.59 (45.96–67.66)	4.5 (3.8–5.29)	65.5 (54.47–80.25)	5.28 (4.45–6.36)
Bahrain	59.95 (49.65–70.87)	4.36 (3.73–5.07)	77.47 (63.92–93.1)	6.69 (5.72–7.72)	61.12 (49.2–75.92)	4.83 (3.9–5.91)
Egypt	823.47 (640.14–1006.86)	52.4 (40.9–65.33)	59.54 (48.2–72.15)	4.8 (4–5.61)	69.23 (56.95–84.3)	5.68 (4.75–6.81)
Iran (Islamic Republic of)	709.91 (558.26–877.39)	44.44 (34.94–55.67)	52.44 (42.67–62.99)	4.19 (3.44–4.94)	59.58 (55.33–64.49)	4.81 (4.51–5.14)
Iraq	741.76 (575.05–921)	47.89 (37.74–59.48)	38.79 (31.22–47.07)	2.99 (2.45–3.54)	47.72 (38.33–60.04)	3.75 (3.07–4.64)
Jordan	41.42 (34.61–48.94)	2.7 (2.29–3.15)	55.84 (45.75–67.62)	4.2 (3.47–4.97)	43.45 (34.98–53.46)	3.3 (2.69–4.04)
Kuwait	50.51 (42.18–58.82)	3.19 (2.66–3.75)	88.48 (72.89–103.6)	7.08 (5.9–8.13)	55.15 (43.87–68.56)	4.11 (3.31–5.06)
Lebanon	49.61 (41.28–58.14)	3.46 (2.92–4.07)	64.98 (53.96–77.36)	4.99 (4.24–5.85)	59.26 (48.37–71.06)	4.69 (3.93–5.65)
Libya	718.59 (559.81–890.9)	44.99 (35.3–55.94)	52.85 (42.9–63.46)	4.12 (3.45–4.91)	56.5 (45.8–69.26)	4.49 (3.72–5.41)

(Continued)

Table 2. Continued

	RHD		CAVD		DMVD	
	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)
Morocco	751.15 (578.32–939.46)	48.83 (37.86–62.21)	47.33 (39.51–57.16)	3.95 (3.34–4.62)	62.17 (51.23–74.18)	5.09 (4.3–6.08)
Palestine	734.68 (582.31–903.18)	44.99 (34.95–56.25)	35.77 (28.79–43.36)	2.68 (2.19–3.16)	44.16 (35.28–54.42)	3.48 (2.82–4.29)
Oman	58.14 (47.92–69.69)	4.39 (3.72–5.07)	58.86 (49.08–72.22)	4.7 (3.97–5.52)	57.5 (46.03–70.93)	4.6 (3.78–5.67)
Qatar	65.92 (54.83–78.39)	5.07 (4.38–5.89)	95.97 (80.09–116.06)	8.02 (6.67–9.37)	64.9 (52.7–80.59)	5.02 (4.14–6.21)
Saudi Arabia	57.08 (47.34–67.56)	3.89 (3.31–4.59)	64.69 (52.46–78.29)	5.01 (4.14–5.93)	77.46 (64.23–93.75)	6.16 (5.21–7.42)
Syrian Arab Republic	718.27 (564.75–887.83)	46.14 (36.24–57.07)	74.34 (60.53–88.81)	6.36 (5.38–7.27)	87.37 (70.23–107.3)	7.47 (6.11–9.13)
Tunisia	53 (44.23–62.92)	3.92 (3.36–4.58)	57.97 (46.91–69.34)	4.56 (3.76–5.36)	59.37 (47.73–72.26)	4.75 (3.91–5.86)
Turkey	49.51 (40.69–58.54)	3.22 (2.69–3.82)	63.28 (52.15–75.32)	5.13 (4.37–5.92)	77.76 (64.92–94.32)	6.28 (5.37–7.58)
United Arab Emirates	699.35 (543.21–875.71)	40.17 (31.23–50.69)	82.14 (65.74–99.62)	6.13 (5.06–7.22)	74.83 (61.02–92.41)	5.8 (4.77–7.16)
Yemen	850.27 (668.06–1062.81)	60.23 (46.87–76.04)	29.12 (23.9–34.66)	2.66 (2.3–3.03)	53.51 (43.22–64.61)	4.49 (3.75–5.4)
Afghanistan	698.19 (550.94–858.63)	52.76 (41.79–65.57)	25.51 (20.89–30.61)	2.43 (2.09–2.82)	53.02 (43.5–64.5)	4.51 (3.84–5.42)
Sudan	628.31 (489.07–769.29)	44.19 (34.41–55.02)	38.74 (31.32–46.63)	3.28 (2.75–3.82)	53.35 (43.17–64.87)	4.38 (3.65–5.26)
North Africa and Middle East	540.77 (428.63–660.44)	37.29 (29.57–46.07)	55.12 (46.06–64.89)	4.47 (3.79–5.14)	65.49 (56.18–76.56)	5.32 (4.64–6.22)
Bangladesh	755.64 (588.79–937.02)	51.47 (39.54–65.17)	26.86 (21.53–32.95)	2.63 (2.22–3.06)	34.7 (27.9–43.37)	2.82 (2.33–3.5)
Bhutan	733.16 (576.89–916.42)	47.93 (37.58–60.27)	31.94 (25.28–38.61)	3.02 (2.53–3.48)	38.62 (30.79–48.37)	3.13 (2.59–3.83)
India	690.86 (539.59–867.33)	48.31 (37.83–61.05)	24.36 (19.17–29.9)	2.41 (1.99–2.85)	35.57 (32.87–38.49)	2.92 (2.73–3.12)
Nepal	692.51 (543.5–875.13)	48.43 (37.91–61.42)	28.51 (22.87–35.23)	2.84 (2.44–3.28)	34.7 (27.54–44.14)	2.88 (2.37–3.55)
Pakistan	991.01 (789.76–1235.97)	68.51 (53.96–86.55)	27.1 (21.46–33.89)	2.77 (2.27–3.27)	38.22 (35.19–41.59)	3.19 (2.98–3.42)
South Asia	732.2 (575.83–916.47)	51.33 (40.39–64.3)	24.88 (19.64–30.42)	2.46 (2.04–2.91)	35.67 (32.66–38.8)	2.93 (2.72–3.14)
Southeast Asia, East Asia, and Oceania	546.86 (435.47–670.83)	35.47 (28.25–43.86)	31.34 (24.21–38.06)	2.48 (1.95–3)	116.14 (109.09–123.82)	9.42 (8.85–10.03)
East Asia	614.54 (488.51–756.55)	39.64 (31.4–49.34)	33.15 (25.5–40.55)	2.57 (2–3.12)	124.23 (117.69–130.92)	10.24 (9.7–10.81)
China	619.85 (492.05–763.74)	39.86 (31.52–49.65)	32.68 (25.06–40.23)	2.52 (1.95–3.06)	123.87 (117.75–130.13)	10.23 (9.71–10.78)
Democratic People's Republic of Korea	710.71 (553.19–879.04)	48.63 (38.16–60.74)	21.91 (16.84–27.6)	1.8 (1.4–2.22)	86.37 (68.49–107.32)	7.2 (5.61–9.01)
Taiwan (Province of China)	140.35 (120.32–162.26)	8.43 (7.27–9.63)	61.47 (49.34–73.96)	5.65 (4.69–6.7)	166.49 (134.96–202.7)	13.17 (10.46–16.31)
Oceania	1000.63 (779.28–1219.8)	68.84 (54–85.1)	27.09 (21.54–32.45)	2.39 (1.95–2.85)	71.21 (57.8–88.53)	5.39 (4.32–6.78)
Viet Nam	124.33 (105.99–145.37)	8.6 (7.5–9.77)	23.4 (18.31–28.65)	2.04 (1.64–2.45)	78.39 (62.81–97.58)	6.17 (4.86–7.69)
Fiji	835.46 (664.6–1030.22)	54.89 (43.36–68.16)	30.95 (24.68–38)	2.72 (2.22–3.26)	74.12 (58.28–92.07)	5.77 (4.5–7.21)
Kiribati	1034.38 (808.65–1276.64)	74.8 (58.84–93.4)	28.8 (22.97–34.23)	2.72 (2.27–3.18)	80.36 (63.04–99.08)	6.28 (4.97–7.79)
Marshall Islands	1027.14 (808.97–1255.26)	71.83 (56.4–88.98)	33.15 (25.92–41.07)	3.1 (2.54–3.69)	79.75 (64.8–97.82)	6 (4.88–7.38)
Micronesia (Federated States of)	1031.06 (817.69–1265.04)	72.24 (56.98–90)	39.51 (30.93–47.83)	3.62 (2.93–4.36)	75.09 (59.74–93.39)	5.84 (4.64–7.18)
Papua New Guinea	1006.12 (785.66–1232.36)	69.31 (54.23–85.57)	21.89 (17.16–26.46)	2 (1.63–2.39)	69.15 (55.14–86.06)	5.22 (4.17–6.7)
Samoa	1090.66 (852.19–1338.28)	70.52 (54.83–88.75)	41.48 (32.91–50.18)	3.66 (2.97–4.42)	75.02 (60.21–93.4)	5.74 (4.6–7.16)
Solomon Islands	1002.32 (775.78–1239.08)	74.08 (57.71–91.81)	27.91 (21.67–34)	2.61 (2.12–3.14)	70.73 (55.55–88.35)	5.34 (4.22–6.55)
Tonga	1503.07 (1183.66–1844.85)	89.29 (69.18–110.61)	43.6 (34.69–53.38)	3.77 (3.06–4.56)	70.14 (55.8–87.62)	5.37 (4.23–6.71)
Vanuatu	1132.7 (887.28–1385.67)	78.36 (61.12–97.23)	29.46 (23.29–35.5)	2.72 (2.21–3.25)	70.27 (55.56–87.93)	5.35 (4.27–6.75)

(Continued)

Table 2. Continued

	RHD		CAVD		DMVD	
	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)
American Samoa	1123.51 (886.47–1376.69)	68.97 (54.08–85.85)	55.29 (44.1–66.34)	4.74 (3.83–5.68)	93.85 (76.26–115.12)	7.15 (5.71–8.75)
Cook Islands	123.78 (105.15–144.44)	7.94 (6.99–9.08)	44.84 (35.24–54.62)	3.59 (2.85–4.41)	73.75 (58.19–93.75)	5.52 (4.32–7.11)
Guam	1066.83 (835.1–1308.69)	61.59 (48.26–76.74)	58.16 (46.49–69.98)	4.95 (3.95–5.95)	84.59 (68.42–106.25)	6.37 (5.1–8.13)
Nauru	198.33 (168.61–232.23)	18.16 (16.17–20.26)	37.66 (29.81–45.48)	3.44 (2.8–4.15)	82.36 (66.48–102.54)	6.22 (4.97–7.77)
Niue	148.14 (125.93–173.23)	11.27 (9.97–12.72)	45.64 (35.59–55.34)	3.99 (3.2–4.79)	75.95 (60.22–95.18)	5.93 (4.74–7.37)
Northern Mariana Islands	1112.16 (875.8–1364.99)	62.07 (49.29–77.36)	73.3 (58.31–90.08)	6.41 (5.25–7.71)	84.07 (66.01–106.59)	6.43 (4.98–8.23)
Palau	158.96 (134.18–185.39)	12.61 (11.14–14.19)	49.37 (39.1–60.14)	4.27 (3.48–5.19)	86.04 (70.48–105.19)	6.41 (5.23–7.99)
San Marino	47.17 (38.8–56.85)	4.81 (4.19–5.46)	290.74 (241.53–346.7)	23.41 (19.44–27.4)	145.21 (117.42–180.48)	11.48 (9.18–14.13)
Tokelau	149.44 (126.25–174.98)	12.67 (11.17–14.43)	39.21 (31.3–48.25)	3.46 (2.78–4.17)	74.01 (58.95–91.61)	5.63 (4.45–7)
Tuvalu	171.55 (143.43–199.57)	17.34 (15.32–19.53)	35.07 (27.62–42.38)	3.21 (2.62–3.82)	71.72 (57.75–89.28)	5.52 (4.43–6.87)
Southeast Asia	409.86 (328.48–501.01)	28.17 (22.76–34.68)	25.31 (19.72–30.59)	2.22 (1.8–2.62)	83.99 (73.57–96.39)	6.5 (5.73–7.42)
Cambodia	681.89 (534.69–853.69)	48.8 (38.45–61.02)	17.32 (13.21–20.96)	1.57 (1.23–1.85)	72.43 (57.72–89.72)	5.65 (4.53–7.03)
Indonesia	206.73 (171.83–248.4)	15.43 (12.88–18.62)	21.55 (16.31–26.49)	1.94 (1.52–2.34)	81.66 (75.69–88.43)	6.36 (5.9–6.83)
Lao People's Democratic Republic	889.23 (687.05–1114.02)	62.09 (48.36–78.21)	17.57 (13.61–22.01)	1.59 (1.29–1.91)	81.63 (65.2–100.99)	6.32 (5–7.79)
Malaysia	822.53 (654.29–1013.56)	47.29 (37.23–59.69)	35.1 (27.99–43.45)	3.06 (2.46–3.68)	99.44 (81.16–124.46)	7.53 (6.06–9.53)
Maldives	764.79 (590.92–948.71)	45.3 (35.8–57.5)	43.15 (34.25–51.48)	4.04 (3.34–4.75)	114.6 (93.06–139.88)	8.88 (7.11–10.97)
Myanmar	861.59 (671.43–1073.34)	60.1 (47.14–75.9)	19.13 (14.8–23.41)	1.73 (1.41–2.08)	78.69 (62.52–97.21)	6.15 (4.89–7.66)
Philippines	626.91 (486.59–780.13)	42.3 (33.16–52.86)	18.41 (13.94–22.49)	1.66 (1.31–2.01)	69.86 (64.83–75.76)	5.43 (5.05–5.82)
Sri Lanka	62.94 (51.79–75.72)	4.57 (3.88–5.32)	45.8 (37.02–56.2)	4.09 (3.39–4.84)	120.4 (97.86–146.72)	9.65 (7.7–11.76)
Thailand	723.7 (568.89–892.54)	45.64 (35.68–57.83)	33.28 (25.62–40.9)	2.92 (2.32–3.52)	91.61 (72.79–112.77)	7.05 (5.65–8.75)
Timor-Leste	787.38 (614.53–993.16)	52.83 (40.89–66.5)	16.16 (12.56–19.68)	1.45 (1.17–1.72)	80.79 (63.56–99.92)	6.17 (4.88–7.65)
Mauritius	786.67 (620.98–982.3)	46.19 (36.22–58.34)	36.15 (28.79–43.57)	2.98 (2.44–3.52)	82.7 (67.1–102.35)	6.27 (5.04–7.8)
Seychelles	778.89 (613.62–960.16)	46.74 (36.88–58.86)	42.57 (34.1–51.9)	3.79 (3.12–4.54)	119.23 (97.1–144.94)	9.49 (7.69–11.6)
Sub-Saharan Africa	1404.41 (1109.35–1758.62)	96.14 (74.77–120.97)	14.08 (11.34–17.06)	1.6 (1.39–1.81)	13.05 (11.27–15.04)	1.26 (1.14–1.39)
Central Sub-Saharan Africa	1665.95 (1307.3–2090.81)	116.22 (90.61–147.07)	14.67 (11.85–17.89)	1.88 (1.66–2.12)	13.73 (10.91–16.74)	1.45 (1.25–1.66)
Angola	1643.36 (1289.62–2062.81)	110.54 (85.99–138.6)	15.32 (12.23–18.83)	1.96 (1.73–2.22)	16.49 (13.04–20.29)	1.67 (1.42–1.92)
Central African Republic	1668.92 (1302.75–2101.17)	122.8 (95.59–154.64)	10.83 (8.52–13.34)	1.58 (1.39–1.79)	12.43 (9.88–15.35)	1.44 (1.24–1.64)
Congo	1677.7 (1303.4–2094.76)	113.31 (88.14–142.51)	17.78 (14.4–21.53)	2.19 (1.94–2.44)	16.28 (13.26–19.94)	1.66 (1.45–1.92)
Democratic Republic of the Congo	1674.4 (1306.42–2111.01)	118.5 (91.98–150.8)	14.05 (11.35–17.2)	1.82 (1.6–2.05)	12.51 (9.85–15.41)	1.35 (1.15–1.56)
Equatorial Guinea	1638.51 (1282.07–2035.97)	103.15 (79.86–130.34)	22.99 (18.25–28.01)	2.66 (2.34–2.98)	19.2 (15.42–23.71)	1.85 (1.58–2.15)
Gabon	1619.98 (1270.78–2019.6)	102.13 (78.97–129.95)	23.68 (19.15–28.64)	2.68 (2.36–3.02)	18.61 (14.84–22.71)	1.84 (1.57–2.14)
Eastern Sub-Saharan Africa	1584.28 (1249.22–1977.41)	109.17 (84.65–137.66)	13.96 (11.03–17.01)	1.73 (1.51–1.95)	13 (11.04–15.16)	1.32 (1.18–1.47)
Burundi	1593.99 (1250.98–1985.76)	115.2 (88.48–147.03)	11.03 (8.59–13.62)	1.44 (1.25–1.62)	11.47 (9.02–14.16)	1.21 (1.03–1.4)
Comoros	1610.76 (1264.05–2041.42)	108.46 (83.96–137.67)	14.23 (11.48–17.59)	1.7 (1.47–1.92)	13.31 (10.54–16.33)	1.31 (1.1–1.52)
Djibouti	1591.38 (1259.92–1998.38)	105.15 (81.82–132.3)	14.88 (11.79–18.28)	1.77 (1.52–2.01)	14.61 (11.46–17.95)	1.42 (1.19–1.66)
Eritrea	1865.41 (1480.34–2332.94)	130.35 (101.92–163.49)	10.99 (8.63–13.63)	1.5 (1.31–1.69)	12.97 (10.37–15.87)	1.4 (1.2–1.61)

(Continued)

Table 2. Continued

	RHD		CAVD		DMVD	
	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)	Age-standardized prevalence (cases per 100 000 people) (95% UI)	Age-standardized incidence (cases per 100 000 people) (95% UI)
Ethiopia	1524.08 (1194.62–1913.92)	105.74 (81.22–134.09)	11.48 (8.95–14.19)	1.44 (1.22–1.66)	11.52 (10.44–12.67)	1.15 (1.07–1.24)
Kenya	1489.91 (1173.67–1851.62)	98.27 (76.67–124.44)	15.37 (12.1–18.78)	1.81 (1.53–2.08)	13.01 (11.87–14.23)	1.29 (1.2–1.38)
Madagascar	1596.03 (1252.59–2006.69)	112.37 (87.31–142.48)	14.25 (11.56–17.35)	1.81 (1.59–2.03)	15.1 (12.15–18.63)	1.55 (1.35–1.77)
Malawi	1670.5 (1311.23–2079.91)	117.56 (90.26–147.95)	14.58 (11.57–18.11)	1.81 (1.57–2.07)	12.15 (9.6–15.16)	1.29 (1.1–1.48)
Mozambique	1658.2 (1297.07–2090.53)	116.31 (90.4–148.16)	14.81 (11.81–18.36)	1.94 (1.71–2.18)	13.49 (10.66–16.69)	1.45 (1.25–1.67)
Rwanda	1568.27 (1234.88–1965.05)	109.36 (85.1–137.4)	15.2 (12.1–18.42)	1.97 (1.71–2.21)	13.54 (10.68–16.87)	1.43 (1.21–1.68)
Somalia	1615.82 (1261.09–2023.59)	121.45 (94.72–153.12)	9.63 (7.47–11.87)	1.34 (1.15–1.52)	8.91 (6.97–11.04)	1.05 (0.9–1.22)
United Republic of Tanzania	1668.4 (1307.98–2086.54)	110.52 (85.54–139.7)	16.65 (13.12–20.36)	2.01 (1.76–2.27)	14.81 (11.84–18.26)	1.48 (1.26–1.72)
Uganda	1554.82 (1210.44–1922.62)	105.8 (82.49–132.42)	14.51 (11.74–17.73)	1.75 (1.52–1.99)	12.8 (10.01–15.65)	1.29 (1.1–1.51)
Zambia	1642.06 (1291.83–2041.87)	112.49 (87.59–142.08)	17.22 (13.97–20.8)	2.23 (1.96–2.52)	16.47 (13.33–19.85)	1.7 (1.46–1.93)
South Sudan	1593.53 (1248.25–2013.94)	110.85 (85.8–140.64)	13.04 (10.03–16.13)	1.56 (1.35–1.76)	12.57 (9.8–15.51)	1.23 (1.02–1.43)
Southern Sub-Saharan Africa	1506.2 (1189.06–1867.03)	99.22 (77.31–125.64)	23.77 (19.01–28.8)	2.48 (2.11–2.87)	12.57 (11.31–14.07)	1.06 (0.99–1.15)
Botswana	1427.13 (1114.54–1758.43)	91.45 (71.63–113.95)	21.17 (17.02–25.77)	2.2 (1.89–2.55)	15.83 (12.77–19.42)	1.33 (1.16–1.53)
Lesotho	1415.38 (1103.11–1767.19)	99.07 (76.96–125.6)	17.58 (14.05–21.86)	1.97 (1.7–2.28)	13.86 (11.1–17.32)	1.3 (1.13–1.49)
Namibia	1436.62 (1126.77–1789.71)	91.74 (71.79–116.5)	19.45 (15.29–23.82)	2.1 (1.81–2.38)	14.77 (11.68–18.46)	1.26 (1.08–1.45)
South Africa	1541.14 (1217.47–1923.9)	100.94 (78.24–127.7)	25.1 (20.01–30.73)	2.61 (2.2–3.02)	12.26 (11.24–13.44)	1.02 (0.95–1.09)
Zimbabwe	1417.73 (1112.13–1754.91)	97.82 (76.16–125.11)	16.48 (13.23–19.69)	1.84 (1.61–2.08)	13.28 (10.51–16.49)	1.2 (1.03–1.38)
Western Sub-Saharan Africa	1148.61 (895.18–1426.16)	78.59 (61.43–98.68)	11.08 (8.99–13.41)	1.16 (1.01–1.32)	13.14 (11.34–15.33)	1.22 (1.11–1.35)
Eswatini	1405.13 (1097.7–1766.01)	95.05 (73.58–120.75)	20.98 (16.56–25.65)	2.17 (1.87–2.52)	13.85 (11.03–17.23)	1.23 (1.07–1.41)
Benin	1096.13 (861.05–1352.64)	76.26 (59.16–95.75)	11.2 (9.01–13.63)	1.16 (1–1.32)	12.87 (10.3–15.95)	1.22 (1.04–1.41)
Burkina Faso	1046.9 (806.85–1322.75)	75.16 (57.37–95.38)	10.58 (8.52–12.81)	1.18 (1.03–1.32)	13.12 (10.38–16.51)	1.3 (1.11–1.5)
Cameroon	1092.37 (850.65–1366.77)	76.34 (59.49–96.57)	13.99 (11.35–17.11)	1.43 (1.26–1.65)	14.55 (11.55–18.11)	1.38 (1.2–1.61)
Cabo Verde	1159.04 (899.48–1434.86)	71.5 (55.75–89.97)	16.86 (13.83–20.28)	1.6 (1.4–1.81)	15.84 (12.64–19.97)	1.42 (1.22–1.65)
Chad	1054.07 (814.92–1325.18)	76.02 (59.45–98.74)	8.87 (7.17–10.82)	1 (0.88–1.13)	13.31 (10.57–16.61)	1.27 (1.1–1.47)
Côte d'Ivoire	1102.19 (854.39–1379.24)	79.2 (61.95–101.23)	12.16 (9.76–14.81)	1.23 (1.08–1.4)	14.15 (11.17–17.72)	1.24 (1.07–1.43)
Gambia	1136.3 (883.92–1432.16)	73.34 (57.62–92.75)	11.82 (9.68–14.43)	1.35 (1.18–1.53)	12.82 (10.15–16.05)	1.34 (1.15–1.56)
Ghana	1076.01 (841.63–1349.56)	65.8 (51.33–82.6)	13.18 (10.63–16.22)	1.14 (1–1.29)	14.24 (11.35–18.12)	1.37 (1.18–1.57)
Guinea	904.3 (703.16–1121.8)	80.57 (62.94–102.75)	10.41 (8.38–12.7)	1.16 (1.01–1.3)	14.22 (11.39–17.47)	1.38 (1.21–1.57)
Guinea-Bissau	1094.82 (848.42–1384.06)	80.29 (62.63–100.39)	9.69 (7.74–11.82)	1.17 (1.02–1.33)	13.31 (10.68–16.53)	1.1 (0.94–1.28)
Liberia	1117.1 (880.71–1387)	84.65 (66.13–106.77)	11.84 (9.5–14.57)	0.93 (0.81–1.06)	11.31 (8.99–14.44)	1.1 (0.92–1.29)
Mali	1194 (926.99–1483.51)	72.97 (56.94–91.26)	8.94 (6.98–10.93)	1.26 (1.08–1.44)	11.81 (9.24–14.93)	1.2 (1.02–1.4)
Mauritania	1105.54 (861.58–1364.74)	79.02 (60.62–100.01)	13.66 (10.81–16.54)	0.95 (0.82–1.08)	13.65 (10.83–16.9)	1.1 (0.95–1.28)
Niger	1090.18 (842.39–1366.57)	80.69 (62.81–101.77)	8.64 (6.96–10.6)	1.12 (0.96–1.29)	11.29 (8.94–14.3)	1.18 (1.1–1.26)
Nigeria	1214.14 (944.1–1516.06)	76.35 (59.51–96.71)	10.82 (8.71–13.26)	1.28 (1.11–1.49)	13.03 (11.95–14.12)	1.2 (1.02–1.39)
Sao Tome and Principe	1192.46 (938.04–1475.95)	77.42 (60.18–97.2)	13.77 (11.13–17.04)	1.06 (0.93–1.21)	13.37 (10.69–16.85)	1.14 (0.97–1.33)
Senegal	1136.08 (878.03–1425.25)	81.52 (63.15–103.57)	10.47 (8.42–12.73)	1.06 (0.92–1.19)	12.4 (9.77–15.7)	1.14 (0.97–1.33)
Sierra Leone	1132.58 (878.92–1422.96)	77.95 (61.17–97.3)	9.89 (7.85–11.93)	1.2 (1.04–1.35)	11.76 (9.24–14.86)	1.22 (1.05–1.41)
Togo	1096.84 (868.9–1364.79)	76.19 (59.3–96.36)	11.09 (8.95–13.36)	1.26 (1.11–1.43)	12.25 (9.87–15.36)	1.33 (1.14–1.54)

CAVD indicates nonrheumatic calcific aortic valve disease; DMVD, nonrheumatic degenerative mitral valve disease; RHD, rheumatic heart disease; SDI, Socio-Demographic Index; UI, uncertainty index; and VHD, valvular heart disease.

Table 3. Age-Standardized Death and DALYs of VHD by Location in 2021

	RHD		CAVD		DMVD	
	Age-standardized death (cases per 100 000 people) (95% UI)	Age-standardized DALYs (cases per 100 000 people) (95% UI)	Age-standardized death (cases per 100 000 people) (95% UI)	Age-standardized DALYs (cases per 100 000 people) (95% UI)	Age-standardized death (cases per 100 000 people) (95% UI)	Age-standardized DALYs (cases per 100 000 people) (95% UI)
Global	4.47 (3.89–5.31)	162.12 (139.06–190.52)	1.83 (1.54–2)	27.74 (24.67–30.48)	0.46 (0.39–0.51)	11.36 (9.87–13.61)
Sex						
Female	4.72 (4.01–5.82)	173.99 (148.21–211.13)	1.73 (1.4–1.95)	24.41 (20.72–27.45)	0.49 (0.4–0.57)	11.28 (9.16–13.64)
Male	4.22 (3.54–6.19)	150.11 (125.15–204.97)	1.89 (1.66–2.02)	31.09 (28.38–33.93)	0.41 (0.36–0.46)	11.57 (9.66–14.07)
SDI quintile						
Low SDI	9.54 (7.29–12.88)	311.11 (250.77–402.6)	0.98 (0.64–1.31)	19.33 (13.08–24.89)	0.51 (0.34–0.73)	12.8 (9–17.54)
Low-middle SDI	10.68 (8.79–14.85)	342.79 (287.9–445.93)	0.84 (0.67–1.01)	17.2 (13.85–20.5)	0.4 (0.31–0.53)	10.62 (8.41–13.21)
Middle SDI	4.22 (3.47–5.19)	139.86 (118.87–165.24)	0.49 (0.43–0.57)	10.76 (9.48–12.35)	0.23 (0.19–0.29)	6.76 (5.85–8.19)
High-middle SDI	2.11 (1.77–2.5)	61.45 (52.63–71.91)	1.27 (1.08–1.39)	21 (18.75–23.06)	0.37 (0.32–0.41)	9.77 (8.33–12.01)
High SDI	1.1 (0.93–1.2)	24.68 (22.15–27.04)	3.43 (2.81–3.76)	50.38 (44.16–54.83)	0.65 (0.55–0.7)	15.01 (13.02–17.98)
Central Europe, Eastern Europe, and Central Asia	1.52 (1.4–1.65)	58.81 (51.92–67.14)	1.35 (1.23–1.44)	28.1 (25.83–31.1)	0.53 (0.48–0.57)	14.87 (13.15–17.71)
Central Asia	3.2 (2.79–3.66)	142.06 (120.7–167.98)	0.3 (0.26–0.34)	7.85 (6.66–9.47)	0.29 (0.26–0.33)	14.09 (10.69–18.95)
Armenia	1.89 (1.36–2.32)	104.18 (77–135.03)	0.31 (0.26–0.35)	8.07 (6.56–10.03)	0.25 (0.21–0.29)	10.59 (7.97–14.26)
Azerbaijan	1.38 (0.83–1.99)	93.75 (68.44–125.14)	0.06 (0.04–0.09)	3.21 (2.25–4.6)	0.03 (0.02–0.05)	7.21 (4.26–11.72)
Georgia	4.32 (3.69–5.07)	169.28 (142.89–201.81)	1.19 (0.98–1.4)	26.09 (21.65–30.8)	1.31 (1.13–1.51)	45.59 (37.78–56.22)
Kazakhstan	1.9 (1.46–2.35)	58.05 (44.39–70.86)	0.24 (0.2–0.29)	6.67 (5.41–8.5)	0.28 (0.23–0.34)	12.26 (9.18–16.29)
Kyrgyzstan	2.89 (2.35–3.59)	143 (117.19–175.22)	0.11 (0.09–0.14)	3.99 (3.12–5.17)	0.13 (0.1–0.16)	8.78 (6.14–12.79)
Mongolia	3.45 (2.86–4.1)	159.11 (128.89–196.63)	0.29 (0.2–0.4)	7.82 (5.66–10.45)	0.41 (0.3–0.54)	19.09 (13.91–26.14)
Tajikistan	1.85 (1.38–2.48)	116.61 (88.66–154.84)	0.01 (0–0.01)	1.36 (0.78–2.24)	0.01 (0–0.01)	6.26 (3.4–10.82)
Turkmenistan	2.93 (2.18–3.9)	157.14 (125.33–196.97)	0.13 (0.1–0.16)	4.87 (3.66–6.44)	0.13 (0.1–0.18)	9.8 (6.7–14.39)
Uzbekistan	4.82 (3.93–5.74)	206.67 (168.72–246.57)	0.27 (0.22–0.31)	7.93 (6.48–9.57)	0.22 (0.18–0.27)	13.33 (9.5–18.77)
Central Europe	1.38 (1.2–1.51)	34.96 (30.98–38.82)	2.68 (2.4–2.91)	50.1 (45.8–54.99)	1.05 (0.93–1.14)	24.51 (21.98–27.78)
Albania	1.39 (0.87–1.96)	85.01 (63.08–115.06)	1.01 (0.68–1.44)	19.39 (14.01–26.3)	0.74 (0.43–1.16)	17.33 (11.83–24.89)
Bosnia and Herzegovina	0.7 (0.52–0.92)	18.63 (14.3–24.2)	1.42 (0.91–2.04)	28.22 (19.38–39.2)	1.32 (0.9–1.9)	31.62 (22.8–43.2)
Bulgaria	2.01 (1.57–2.49)	60.77 (47.16–74.8)	1.02 (0.87–1.2)	21.67 (18.39–25.45)	0.61 (0.51–0.72)	16.6 (13.79–19.78)
Croatia	1.27 (1.08–1.48)	27.86 (23.73–32.16)	3.64 (3.14–4.13)	64.76 (55.83–73.89)	1.08 (0.93–1.24)	25.2 (21.48–30.06)
Czechia	1.32 (1.13–1.52)	29.39 (25.54–33.45)	2.99 (2.6–3.33)	55.45 (48.55–62.76)	1.03 (0.89–1.15)	24.84 (21.45–29.45)
Hungary	1.17 (1.01–1.34)	28.52 (24.65–32.38)	4.72 (4.17–5.25)	91.85 (81.93–101.92)	1.6 (1.42–1.77)	38.23 (33.9–42.72)
North Macedonia	1.69 (1.21–2.18)	39.8 (29.25–50.37)	1.3 (0.84–1.72)	22.99 (16.74–29.48)	0.67 (0.33–0.96)	14.88 (9.07–20.43)
Montenegro	1.47 (1.12–1.87)	38.4 (29.89–47.84)	0.89 (0.67–1.17)	17.71 (14.07–22.23)	0.56 (0.34–0.76)	13.52 (9.55–17.54)
Poland	1.39 (1.2–1.53)	32.16 (28.26–35.31)	2.94 (2.63–3.18)	53.19 (48.65–57.21)	1 (0.9–1.09)	22.31 (20.25–24.55)
Romania	1.45 (1.21–1.68)	37.45 (31.16–43.33)	0.97 (0.83–1.11)	27.38 (22.49–33.93)	0.51 (0.44–0.59)	14.66 (12.45–17.42)
Serbia	1.14 (0.85–1.41)	28.25 (21.61–34.7)	2.98 (2.18–3.87)	53.62 (40.96–67.88)	2.58 (1.68–3.31)	54.55 (39.32–68.46)
Slovakia	1.06 (0.87–1.28)	31 (25.71–37.09)	1.3 (0.94–1.63)	27.01 (21.28–33.17)	0.48 (0.26–0.65)	12.55 (7.66–16.5)
Slovenia	2.16 (1.77–2.51)	39.79 (33.5–45.99)	10.25 (8.59–11.59)	154.36 (133.1–173.95)	1.3 (1.06–1.56)	27.85 (23.17–33.72)
Eastern Europe	1.04 (0.95–1.15)	34.54 (31.06–38.67)	0.64 (0.59–0.69)	18.23 (16.32–20.87)	0.22 (0.21–0.24)	9.2 (7.59–11.47)
Belarus	1.25 (1.02–1.52)	44.19 (36.09–53.78)	0.15 (0.12–0.18)	6.24 (4.83–8.6)	0.04 (0.03–0.05)	3.77 (2.49–6.04)
Estonia	0.63 (0.54–0.73)	23.96 (20.33–28.3)	3.2 (2.76–3.61)	67.73 (59.72–77.2)	0.63 (0.53–0.74)	17.79 (14.95–21.75)
Latvia	1.03 (0.89–1.18)	37.27 (32.5–43.27)	1.8 (1.57–2.03)	42.79 (37.34–48.93)	0.26 (0.22–0.29)	9.63 (7.93–12.16)
Lithuania	0.92 (0.75–1.07)	34.41 (29.17–40.56)	1.25 (1.08–1.42)	30.89 (26.62–35.57)	0.25 (0.21–0.3)	10.26 (8.19–13.58)
Republic of Moldova	1.14 (0.97–1.32)	40.41 (34.76–46.76)	0.16 (0.15–0.18)	6.82 (5.27–8.9)	0.22 (0.2–0.25)	8.91 (7.3–11.13)
Russian Federation	1.07 (0.97–1.16)	33.37 (30.03–37.41)	0.73 (0.67–0.79)	20.8 (18.59–23.78)	0.27 (0.24–0.29)	10.46 (8.79–12.86)
Ukraine	0.98 (0.71–1.27)	36.55 (27.77–46.56)	0.29 (0.22–0.36)	9.59 (7.38–12.09)	0.11 (0.09–0.14)	6.02 (4.44–8.21)

(Continued)

Table 3. Continued

	RHD		CAVD		DMVD	
	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)
High-income	1.14 (0.96–1.25)	25.77 (23.02–28.6)	3.6 (2.95–3.94)	53.11 (46.56–57.88)	0.66 (0.56–0.72)	15.31 (13.21–18.43)
Australasia	1.1 (0.94–1.22)	26.93 (24.5–29.26)	3.09 (2.59–3.42)	45.22 (39.49–49.74)	0.59 (0.5–0.66)	11.82 (10.38–13.45)
Australia	0.99 (0.84–1.1)	23.5 (21.16–25.57)	2.76 (2.32–3.08)	40.67 (35.33–44.96)	0.53 (0.44–0.59)	10.53 (9.23–12.09)
New Zealand	1.65 (1.44–1.82)	44.46 (40.43–48.37)	4.92 (4.16–5.39)	70.42 (61.76–76.94)	0.91 (0.78–1.02)	18.77 (16.4–21.66)
High-income Asia Pacific	0.75 (0.59–0.85)	13.04 (11.25–14.37)	2.46 (1.84–2.8)	32.75 (27.02–37.01)	0.54 (0.42–0.61)	11.93 (9.77–15.13)
Brunei Darussalam	2.1 (1.74–2.48)	44.13 (37.57–51.38)	2.64 (1.84–3.38)	42.08 (31.54–51.28)	1.06 (0.56–1.49)	22.74 (14.67–30.22)
Japan	0.79 (0.62–0.89)	13.86 (12–15.19)	2.67 (2.01–3.04)	36 (29.61–40.51)	0.59 (0.46–0.66)	13.22 (10.9–16.44)
Republic of Korea	0.49 (0.38–0.59)	9.35 (7.88–10.77)	1.19 (0.8–1.55)	17.61 (13.2–21.86)	0.26 (0.13–0.37)	6.67 (4.47–9.37)
Singapore	0.56 (0.47–0.63)	11.5 (10.28–12.67)	0.57 (0.48–0.63)	10.49 (9.09–12.26)	0.24 (0.21–0.27)	7.25 (5.73–9.65)
High-income North America	0.85 (0.71–0.93)	22.72 (19.91–25.14)	3.6 (2.97–3.93)	54.41 (48.14–59.3)	0.59 (0.51–0.64)	17.33 (14.31–22.01)
Canada	0.99 (0.83–1.08)	23.88 (21.27–26.76)	3.35 (2.81–3.69)	47.32 (41.83–51.68)	0.4 (0.34–0.44)	11.32 (9.19–14.62)
United States	0.83 (0.68–0.91)	22.56 (19.64–25.08)	3.63 (2.99–3.96)	55.28 (48.86–60.41)	0.61 (0.53–0.66)	18.07 (14.93–22.94)
Greenland	1.02 (0.78–1.26)	27.38 (22.59–32.33)	4.42 (3.17–6.58)	73.05 (54.08–104.24)	0.88 (0.5–1.43)	26.58 (18.67–38.17)
Southern Latin America	1.18 (1.03–1.3)	55.94 (42.77–73.71)	3.01 (2.67–3.27)	52.09 (47.68–56.73)	0.37 (0.33–0.4)	9.6 (8.58–11.1)
Argentina	1.46 (1.27–1.62)	74.73 (56.38–100.46)	3.44 (3.04–3.77)	59.42 (54.41–65.04)	0.33 (0.29–0.36)	8.7 (7.69–10.2)
Chile	0.71 (0.61–0.79)	18.23 (16.04–20.48)	1.23 (1.09–1.33)	24.7 (22.34–27.48)	0.41 (0.36–0.44)	10.4 (9.25–11.97)
Uruguay	0.63 (0.54–0.7)	16.1 (14.25–17.99)	6.11 (5.34–6.67)	98.97 (89.6–107.82)	0.61 (0.54–0.67)	15.42 (13.87–17.45)
Western Europe	1.51 (1.27–1.65)	28.17 (25.48–30.3)	4.23 (3.53–4.6)	62.44 (54.95–67.78)	0.78 (0.66–0.85)	15.99 (14.07–18.41)
Andorra	0.57 (0.4–0.75)	12.68 (9.3–16.52)	1.96 (1.33–2.74)	30.99 (22.14–42.35)	0.35 (0.2–0.61)	7.35 (4.9–11.67)
Austria	1.74 (1.47–1.92)	31.38 (27.9–34.11)	4.37 (3.61–4.8)	66.35 (57.42–75.12)	0.93 (0.77–1.04)	19.6 (16.68–24.06)
Belgium	1.49 (1.24–1.67)	27.43 (24.1–30.22)	5.26 (4.16–5.88)	74.53 (63.54–82.06)	0.69 (0.57–0.76)	12.55 (11.14–13.84)
Cyprus	2.65 (2.13–3.14)	44.06 (36.74–51.44)	8.19 (6.06–10.38)	108.22 (85.35–134.21)	1.08 (0.65–1.69)	16.29 (10.81–24.21)
Denmark	1.11 (0.95–1.22)	20.85 (18.98–22.48)	4.15 (3.48–4.59)	62.1 (55.05–67.84)	0.75 (0.65–0.83)	14.03 (12.69–15.47)
Finland	0.71 (0.61–0.78)	16.34 (14.88–17.78)	4.81 (3.93–5.35)	73.02 (63.73–80.28)	1.02 (0.85–1.12)	20.76 (18.34–23.65)
France	1.23 (1.02–1.39)	23.75 (20.9–26.41)	4.13 (3.4–4.57)	58.06 (50.35–63.79)	0.3 (0.26–0.34)	6.12 (5.41–7.18)
Germany	2.46 (2.06–2.73)	41.81 (36.93–45.51)	5.6 (4.58–6.18)	82 (71.02–90.16)	1.22 (1.02–1.36)	20.46 (18.05–22.66)
Greece	0.68 (0.6–0.75)	13.91 (12.43–15.18)	3.68 (3.12–4.02)	56.39 (49.93–61.4)	0.67 (0.58–0.74)	12.87 (11.38–14.35)
Iceland	0.65 (0.54–0.74)	13.84 (12.13–15.51)	4.7 (3.86–5.29)	72.74 (62.55–81.24)	0.48 (0.4–0.53)	9.14 (8.01–10.27)
Ireland	0.75 (0.63–0.86)	15.69 (13.43–17.63)	2.58 (2.13–2.88)	40.52 (35.05–44.62)	0.44 (0.37–0.49)	9.08 (7.85–10.48)
Israel	1.47 (1.28–1.63)	29.34 (26.56–31.95)	3.82 (3.16–4.24)	54.22 (47.1–59.28)	0.76 (0.65–0.85)	14.57 (12.88–16.5)
Italy	1.6 (1.36–1.77)	33.18 (29.99–35.97)	2.71 (2.21–2.98)	44.52 (38.69–48.9)	0.72 (0.61–0.78)	22.96 (18.2–30.49)
Luxembourg	1.1 (0.95–1.22)	21.76 (19.48–24.09)	5.73 (4.9–6.34)	84.35 (74.92–92.81)	0.8 (0.67–0.9)	16.09 (13.84–18.91)
Malta	0.92 (0.77–1.06)	19.83 (17.35–22.43)	2.21 (1.83–2.49)	36.17 (31.65–40.18)	0.51 (0.44–0.59)	9.93 (8.79–11.33)
Netherlands	0.87 (0.74–0.97)	14.88 (13.23–16.4)	6.09 (5.04–6.7)	77.49 (66.54–84.3)	1.86 (1.55–2.07)	30.03 (26.58–33.12)
Norway	0.79 (0.68–0.87)	12.96 (11.62–14.03)	6.2 (5.09–6.82)	80.67 (69.75–88.19)	0.6 (0.51–0.66)	18.33 (13.69–25.63)
Portugal	1.23 (1.06–1.36)	25.93 (23.63–28.33)	3.73 (3.11–4.07)	55.68 (48.88–60.07)	0.58 (0.49–0.65)	10.66 (9.56–11.69)
Spain	1.92 (1.58–2.17)	36.82 (32.08–40.64)	4.09 (3.36–4.56)	61.41 (53.48–67.09)	0.86 (0.71–0.96)	14.99 (13.01–16.65)
Sweden	0.64 (0.54–0.72)	10.6 (9.35–11.85)	4.1 (3.36–4.6)	56.34 (48.15–63.46)	0.51 (0.42–0.57)	10.42 (8.55–12.72)
Switzerland	0.75 (0.64–0.83)	15.87 (14.45–17.4)	2.98 (2.39–3.34)	44.34 (37.98–49.63)	0.62 (0.51–0.7)	12.62 (10.79–15.02)
United Kingdom	0.76 (0.67–0.81)	16.06 (14.8–17.3)	3.86 (3.32–4.12)	59 (53.24–63.42)	0.57 (0.5–0.61)	13.05 (11.47–15.52)
Monaco	0.58 (0.43–0.77)	13.21 (10.14–17.25)	1.3 (0.9–1.76)	22.08 (16.04–28.98)	0.44 (0.26–0.66)	8.89 (5.76–12.46)

(Continued)

Table 3. Continued

	RHD		CAVD		DMVD	
	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)
Latin America and Caribbean	0.87 (0.76–0.94)	71.49 (54.99–95.33)	1.16 (1.05–1.25)	26.69 (24.76–28.93)	0.51 (0.46–0.55)	13.28 (12.43–14.31)
Andean Latin America	0.76 (0.6–0.93)	74.89 (53.81–106.06)	0.61 (0.5–0.74)	16.44 (13.57–19.98)	0.2 (0.15–0.25)	5.87 (4.45–7.23)
Bolivia (Plurinational State of)	1.7 (1.26–2.35)	98.78 (72.78–134.15)	0.9 (0.64–1.22)	22.42 (16.55–30.12)	0.3 (0.14–0.46)	8.24 (4.21–12.42)
Ecuador	0.64 (0.45–0.81)	69.73 (47.91–98.72)	0.74 (0.6–0.91)	19.65 (15.83–24.32)	0.37 (0.3–0.46)	10.41 (8.29–12.96)
Peru	0.58 (0.41–0.79)	70.64 (49.58–101.14)	0.48 (0.36–0.65)	13.28 (10.12–17.73)	0.1 (0.05–0.14)	3.04 (1.79–4.18)
Caribbean	1.91 (1.49–2.49)	141.67 (110.04–182.02)	1.01 (0.88–1.14)	24.98 (21.44–28.74)	0.46 (0.38–0.54)	14.46 (11.76–17.45)
Antigua and Barbuda	0.69 (0.63–0.75)	82.07 (59.36–113.32)	0.77 (0.7–0.85)	16.66 (15.21–18.64)	0.48 (0.45–0.52)	13.1 (12.12–14.18)
Bahamas	0.63 (0.49–0.8)	81.46 (58.51–111.35)	0.79 (0.66–0.96)	20.12 (16.37–24.52)	0.38 (0.31–0.47)	12.45 (10.05–15.51)
Barbados	0.59 (0.45–0.77)	79.56 (56.56–109.51)	1.15 (0.94–1.38)	26.47 (21.57–32.52)	0.17 (0.14–0.21)	5.35 (4.28–6.74)
Belize	0.69 (0.6–0.79)	83.17 (62.26–111.81)	0.33 (0.29–0.38)	8.7 (7.48–10.32)	0.48 (0.43–0.55)	14.16 (12.52–15.94)
Cuba	1.07 (0.93–1.22)	95.03 (72.32–126.59)	1.08 (0.94–1.22)	26.07 (22.63–29.4)	0.54 (0.47–0.62)	15.72 (13.74–17.92)
Dominica	1.34 (1.06–1.66)	107.34 (81.11–140.68)	0.85 (0.67–1.08)	21.68 (16.79–27.51)	0.31 (0.19–0.44)	9.82 (6.14–13.47)
Dominican Republic	0.99 (0.71–1.49)	98.42 (72.73–131.05)	0.64 (0.51–0.82)	17.77 (14.17–22)	0.24 (0.14–0.32)	8.33 (5.31–10.97)
Grenada	2.18 (1.87–2.5)	137.86 (112.32–173.46)	1.31 (1.13–1.5)	33.14 (28.2–38.27)	1.11 (0.96–1.26)	32.71 (27.72–37.32)
Guyana	1.37 (1.01–1.83)	112.06 (87.31–145.63)	1.73 (1.35–2.19)	45.47 (35.34–57.98)	0.8 (0.62–1.04)	26.2 (20.07–34.08)
Haiti	5.01 (2.93–7.93)	279.83 (179.47–408.93)	1.26 (0.79–1.83)	29.92 (18.29–44.71)	0.69 (0.4–1.08)	22.07 (12.48–34.15)
Jamaica	1.09 (0.81–1.44)	100.52 (76.45–132.84)	0.27 (0.21–0.34)	6.93 (5.39–8.86)	0.29 (0.23–0.37)	8.43 (6.58–10.82)
Saint Lucia	1.25 (1.01–1.54)	105.53 (82.47–138)	0.87 (0.73–1.03)	20 (16.8–23.76)	0.21 (0.17–0.25)	6.06 (5.02–7.4)
Saint Vincent and the Grenadines	1.56 (1.34–1.83)	120.31 (96.3–151.7)	1.08 (0.96–1.23)	25.72 (22.58–29.22)	0.6 (0.52–0.68)	18.34 (15.98–21.02)
Suriname	0.95 (0.75–1.19)	94.47 (72.09–124.13)	0.72 (0.5–0.95)	18.42 (13.39–23.95)	0.55 (0.34–0.73)	17.8 (11.87–23.03)
Trinidad and Tobago	1.03 (0.75–1.37)	99.87 (76.04–131.78)	0.63 (0.49–0.79)	16.04 (12.54–19.88)	0.42 (0.32–0.53)	13.82 (10.8–17.53)
Bermuda	0.39 (0.32–0.49)	16.27 (13.7–19.58)	3.91 (3.33–4.72)	83.75 (71.96–101.12)	0.42 (0.35–0.5)	11.73 (9.86–14.23)
Puerto Rico	0.4 (0.33–0.48)	17.95 (15.18–21.41)	1.42 (1.16–1.65)	35.97 (30–42.11)	0.26 (0.21–0.31)	8.34 (6.93–9.87)
Saint Kitts and Nevis	0.57 (0.47–0.7)	22.81 (18.81–27.74)	0.99 (0.84–1.13)	21 (17.79–24.76)	0.53 (0.44–0.61)	13.21 (10.89–15.7)
United States Virgin Islands	0.56 (0.42–0.72)	27.71 (21.63–35)	1.02 (0.75–1.4)	27.23 (20.24–38.09)	0.52 (0.35–0.72)	17.55 (12.29–24.77)
Central Latin America	0.48 (0.34–0.56)	36.16 (26.76–48.41)	0.91 (0.82–1.02)	23.08 (20.68–26.05)	0.42 (0.37–0.48)	10.4 (9.1–11.92)
Colombia	0.2 (0.15–0.25)	8.31 (6.65–10.03)	1.29 (1.07–1.52)	31.85 (26.72–37.55)	0.97 (0.81–1.14)	23.36 (19.64–27.29)
Costa Rica	0.58 (0.5–0.66)	78.56 (54.6–110.83)	1.43 (1.24–1.6)	35.16 (30.76–39.5)	0.33 (0.29–0.37)	8.34 (7.29–9.39)
El Salvador	0.3 (0.23–0.4)	65.06 (44.18–94.86)	0.25 (0.19–0.32)	7.94 (6.16–10.1)	0.04 (0.02–0.06)	1.42 (0.82–2.02)
Guatemala	0.16 (0.13–0.19)	59.75 (38.88–88.33)	0.4 (0.34–0.46)	10.8 (9.15–12.75)	0.16 (0.14–0.19)	4.47 (3.83–5.18)
Honduras	0.71 (0.41–1.08)	75.76 (51.65–105.5)	1.14 (0.79–1.47)	25.92 (18.65–33.59)	0.4 (0.21–0.56)	9.35 (5.27–13.43)
Mexico	0.63 (0.42–0.74)	38.99 (28.9–51.42)	0.8 (0.71–0.89)	20.68 (18.42–23.8)	0.2 (0.18–0.22)	5.14 (4.59–5.8)
Nicaragua	0.48 (0.39–0.62)	73.36 (50.29–105.72)	0.3 (0.23–0.37)	8.62 (6.8–10.6)	0.1 (0.05–0.14)	2.99 (1.67–3.96)
Panama	0.53 (0.41–0.64)	71.81 (50.76–100.82)	0.78 (0.62–0.95)	19.8 (15.78–23.93)	0.42 (0.33–0.51)	10.7 (8.57–12.94)
Venezuela (Bolivarian Republic of)	0.44 (0.33–0.58)	16.09 (12.28–20.82)	1.01 (0.79–1.31)	25.98 (20.12–33.3)	0.59 (0.45–0.75)	15.5 (11.76–19.97)
Tropical Latin America	1.09 (0.94–1.17)	94.88 (71.08–126.96)	1.55 (1.39–1.66)	33 (30.52–35.02)	0.67 (0.62–0.72)	17.82 (16.8–18.63)
Brazil	1.09 (0.95–1.18)	95.14 (71.26–127.27)	1.54 (1.37–1.64)	32.61 (30.29–34.56)	0.68 (0.62–0.72)	17.89 (16.88–18.71)

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Table 3. Continued

	RHD		CAVD		DMVD	
	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)
Paraguay	0.85 (0.64–1.1)	85.38 (62.83–117.03)	2.25 (1.7–2.94)	49.07 (37.25–63.87)	0.56 (0.33–0.77)	14.8 (9.41–20.14)
Algeria	1.4 (1.09–1.78)	65.25 (50.29–83.85)	0.66 (0.28–0.96)	14.59 (5.76–21.22)	0.84 (0.5–1.51)	19.96 (12.69–35.78)
Bahrain	0.75 (0.6–0.94)	20.58 (16.49–25.44)	1.21 (0.93–1.59)	23.34 (18.31–30.14)	0.36 (0.22–0.48)	8.86 (5.9–11.54)
Egypt	4.37 (3.59–5.3)	172.85 (143.5–206.22)	0.6 (0.44–0.81)	18.55 (14.05–23.93)	0.67 (0.5–0.92)	20.34 (14.53–25.82)
Iran (Islamic Republic of)	1.38 (1.12–1.59)	69.8 (55.69–88.53)	0.61 (0.49–0.91)	14.41 (12.02–20.28)	0.53 (0.34–0.65)	13.73 (10.44–16.84)
Iraq	1.87 (1.4–2.39)	88.37 (69.29–110.57)	0.75 (0.44–1)	19.44 (10.93–27.04)	0.25 (0.12–0.58)	6.69 (3.23–15.66)
Jordan	0.47 (0.35–0.59)	16.74 (13.21–20.59)	0.44 (0.34–0.59)	10.42 (8.13–13.82)	0.21 (0.13–0.28)	5.93 (4.01–7.75)
Kuwait	0.39 (0.29–0.48)	15.32 (12.4–18.44)	0.63 (0.52–0.75)	14.38 (12.27–16.96)	0.18 (0.15–0.22)	5.06 (4.19–6.13)
Lebanon	1.07 (0.89–1.3)	32.6 (27.62–39.04)	1.66 (1.32–2.06)	35.4 (28.55–43.96)	0.35 (0.22–0.5)	9.46 (6.59–13.47)
Libya	1.36 (0.88–1.98)	87.84 (61.21–117.76)	0.75 (0.21–1.56)	20.81 (6.07–40.94)	0.86 (0.4–1.95)	24.84 (12.48–52.95)
Morocco	1.94 (1.42–2.6)	93.23 (70.88–122.17)	0.68 (0.29–1)	16.43 (6.75–24.86)	0.96 (0.61–1.69)	24.68 (15.83–45.35)
Palestine	1.3 (1.07–1.53)	71.23 (56.38–91.15)	0.37 (0.29–0.48)	8.48 (6.77–10.82)	0.22 (0.15–0.3)	5.86 (4.15–7.55)
Oman	1.07 (0.59–1.44)	30.95 (20.33–39.75)	0.25 (0.18–0.34)	6.36 (4.65–8.22)	0.3 (0.19–0.38)	7.5 (5.15–9.35)
Qatar	0.89 (0.66–1.14)	24.87 (19.5–31.43)	0.9 (0.66–1.2)	18.13 (13.44–23.91)	0.38 (0.24–0.54)	8.99 (5.89–12.33)
Saudi Arabia	0.73 (0.5–0.96)	26.11 (18.52–34.34)	0.54 (0.4–0.76)	13.94 (10.27–19.1)	0.58 (0.4–0.77)	17.16 (11.69–23.02)
Syrian Arab Republic	1.94 (1.35–2.69)	91.75 (67.6–121.31)	1.99 (1.23–2.71)	43.91 (27.22–59.98)	1.3 (0.84–2.5)	30.64 (19.02–60.59)
Tunisia	1.3 (0.88–2.03)	37.42 (24.71–57.34)	0.59 (0.23–0.99)	14.25 (5.37–23.75)	0.69 (0.39–1.37)	17.01 (9.66–33.56)
Turkey	0.88 (0.72–1.05)	25.36 (21.1–30.2)	1.09 (0.82–1.43)	22.91 (17.35–30.13)	0.95 (0.7–1.34)	23.57 (18.12–32.38)
United Arab Emirates	1.87 (1.14–2.62)	81.31 (60.51–106.03)	2.75 (2.11–3.49)	54.57 (42.71–69.14)	0.24 (0.14–0.36)	6.4 (4.38–9.34)
Yemen	3.17 (2.08–4.97)	138.68 (99.52–194.77)	0.66 (0.21–1.14)	16.05 (5.02–27.87)	1.07 (0.64–1.82)	27.59 (16.22–45.24)
Afghanistan	4.18 (2.49–6.58)	174.77 (116.97–247.14)	0.6 (0.21–1.07)	15.77 (5.58–29)	1.11 (0.56–1.87)	31.18 (14.61–54.72)
Sudan	2.57 (1.58–4.15)	120.91 (82.77–179.3)	0.63 (0.23–1.02)	16.42 (5.99–26.93)	0.84 (0.5–1.54)	23.46 (13.46–44.64)
North Africa and Middle East	1.9 (1.62–2.23)	86.78 (71.3–104.16)	0.81 (0.61–0.99)	19.01 (14.14–23.21)	0.75 (0.59–1.08)	19.51 (15.72–27.22)
Bangladesh	16.31 (11.15–27.91)	457.57 (324.99–745.57)	1.05 (0.7–1.52)	18.19 (12.17–26.17)	0.37 (0.23–0.57)	8.35 (5.29–12.06)
Bhutan	14.26 (8.04–27.41)	401.91 (251.17–725.13)	0.97 (0.7–1.32)	17.84 (12.9–24.78)	0.32 (0.19–0.48)	7.45 (4.76–11.21)
India	14.28 (11.79–19)	431.47 (361.64–548.57)	0.89 (0.68–1.09)	17.32 (13.42–21.21)	0.35 (0.24–0.47)	8.81 (6.16–11.17)
Nepal	16.97 (11.54–26.79)	489.93 (343.92–726.51)	0.96 (0.66–1.32)	17.77 (12.2–24.2)	0.33 (0.19–0.5)	7.82 (4.79–11.37)
Pakistan	17.85 (13.13–25.81)	584.99 (443.3–816.86)	1.05 (0.77–1.47)	20.4 (14.98–28.94)	0.4 (0.24–0.57)	10.23 (6.44–14.39)
South Asia	14.88 (12.23–20.01)	453.58 (380.1–580.89)	0.92 (0.7–1.13)	17.69 (13.81–21.73)	0.36 (0.24–0.47)	8.9 (6.23–11.33)
Southeast Asia, East Asia, and Oceania	3.61 (2.94–4.48)	106.19 (89.37–125.79)	0.13 (0.11–0.18)	2.89 (2.42–3.85)	0.07 (0.05–0.11)	3.14 (2.34–4.51)
East Asia	4.15 (3.27–5.26)	110.83 (90.18–135.12)	0.1 (0.08–0.12)	2.25 (1.83–2.82)	0.06 (0.04–0.08)	2.94 (2.16–4.26)
China	4.21 (3.3–5.37)	111.69 (90.42–136.81)	0.07 (0.06–0.1)	1.92 (1.49–2.48)	0.05 (0.03–0.07)	2.79 (2.01–4.08)
Democratic People's Republic of Korea	5.89 (3.4–11.2)	169.1 (108.61–289.76)	0.1 (0.04–0.24)	2.64 (1.48–5.45)	0.1 (0.04–0.33)	3.61 (1.98–8.52)
Taiwan (Province of China)	0.6 (0.51–0.67)	19.03 (16.02–22.3)	0.88 (0.76–0.97)	15.41 (13.77–16.67)	0.34 (0.3–0.37)	9.63 (8.44–11.32)
Oceania	11.71 (7.03–20.8)	525.51 (342.95–854.77)	0.84 (0.64–1.2)	20.77 (15.34–29.45)	0.04 (0.03–0.08)	3.44 (2.29–5.51)
Viet Nam	0.86 (0.61–1.18)	37.37 (27.74–48.89)	0.13 (0.07–0.38)	2.61 (1.44–6.03)	0.07 (0.02–0.31)	2.55 (1.34–6.55)
Fiji	8.83 (6.79–11.33)	371.12 (287.18–474.31)	0.42 (0.32–0.54)	9.23 (7.07–11.89)	0.06 (0.03–0.08)	3.29 (2.27–4.59)
Kiribati	11.59 (8.58–15.86)	502.36 (378.27–678.55)	3.33 (2.36–4.54)	75.24 (51.57–100.16)	0.24 (0.15–0.46)	13.12 (8.24–22.64)
Marshall Islands	11.08 (7.52–16.24)	481.48 (338.84–679.42)	1.43 (0.98–2.09)	33.94 (21.69–50.81)	0.06 (0.03–0.13)	4.54 (2.71–7.59)

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Table 3. Continued

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	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)
Micronesia (Federated States of)	9.59 (6.56–14.08)	410.26 (293.91–590.35)	1.41 (1.03–2.14)	32.92 (23.26–47.98)	0.05 (0.03–0.09)	3.68 (2.38–5.98)
Papua New Guinea	13.12 (6.79–25.41)	576.41 (345.5–1003.24)	0.79 (0.53–1.23)	20.1 (13.1–30.33)	0.04 (0.02–0.08)	3.41 (2.09–5.57)
Samoa	6.64 (4.82–9.56)	298.49 (220.94–422.66)	1.21 (0.93–1.8)	26.84 (20.6–38.41)	0.04 (0.02–0.08)	3.06 (1.94–5.04)
Solomon Islands	10.02 (5.4–17.03)	403.11 (244.29–646.18)	0.82 (0.56–1.2)	17.82 (12.1–26.35)	0.03 (0.02–0.05)	2.39 (1.51–3.68)
Tonga	2.86 (2.13–3.76)	171.09 (133.08–221.41)	0.87 (0.63–1.41)	18.76 (13.81–28.6)	0.02 (0.01–0.04)	2 (1.21–3.21)
Vanuatu	12.52 (8.13–19.91)	532.6 (367.82–819.53)	1.11 (0.82–1.65)	25.92 (18.45–38.21)	0.04 (0.02–0.09)	3.21 (1.96–5.56)
American Samoa	5.27 (4.1–6.61)	245.53 (196.64–298.82)	1.66 (1.27–2.05)	35.73 (27.6–44.31)	0.15 (0.11–0.22)	7.9 (5.78–10.99)
Cook Islands	1.66 (1.28–2.07)	67.84 (52.62–85.05)	0.58 (0.39–1.08)	12.92 (8.69–23.67)	0.02 (0.01–0.05)	1.94 (1.1–3.65)
Guam	1.77 (1.52–2.05)	127.78 (104.65–158.77)	1.15 (0.95–1.36)	34.85 (29.57–40.98)	0.01 (0–0.02)	1.72 (0.99–2.84)
Nauru	10.35 (7.55–13.43)	435.45 (320.66–570.39)	1.68 (1.06–2.71)	43.07 (27.93–67.66)	0.07 (0.04–0.16)	5.22 (3.15–9.72)
Niue	6.59 (5.45–8.04)	309.67 (258.55–372.66)	1.36 (1.03–2.14)	32.46 (25.78–49.57)	0.06 (0.03–0.13)	4.29 (2.48–8.37)
Northern Mariana Islands	3.17 (2.61–3.69)	158.02 (128.37–193.8)	2.72 (2.11–3.26)	55.7 (43.57–64.89)	0 (0–0.01)	1.43 (0.83–2.42)
Palau	7.75 (6.2–9.63)	319.25 (253.41–397.5)	1.14 (0.84–1.81)	27.63 (20.13–40.48)	0.06 (0.03–0.12)	4.81 (2.81–8.17)
San Marino	1.02 (0.66–1.45)	22.33 (15.21–30.92)	1.2 (0.74–1.76)	20.19 (13.93–28.08)	0.24 (0.14–0.38)	5.86 (3.82–8.41)
Tokelau	7.52 (6.06–9.61)	355.42 (291.67–454.78)	1.23 (0.94–1.9)	32.05 (25.18–48)	0.06 (0.03–0.13)	4.72 (2.9–8.95)
Tuvalu	8.61 (6.24–12.02)	331.58 (243.95–458.41)	1.34 (1.01–2.02)	30.64 (23.28–44.9)	0.05 (0.03–0.09)	3.4 (2.15–5.68)
Southeast Asia	1.08 (0.86–1.39)	65.95 (53.38–82.03)	0.25 (0.19–0.39)	4.73 (3.64–7.14)	0.1 (0.07–0.23)	3.57 (2.57–6)
Cambodia	1.56 (1.04–2.14)	94.91 (67.98–127.01)	0.11 (0.05–0.3)	2.15 (1.07–5.27)	0.06 (0.03–0.24)	2.51 (1.38–6.15)
Indonesia	1.31 (0.94–1.94)	62.46 (47.39–86.27)	0.15 (0.06–0.39)	2.87 (1.4–6.78)	0.08 (0.03–0.32)	3.01 (1.65–7.45)
Lao People's Democratic Republic	2.32 (1.45–3.79)	147.88 (104.04–220.2)	0.12 (0.05–0.33)	2.56 (1.16–6.06)	0.07 (0.03–0.28)	3 (1.67–7.43)
Malaysia	0.81 (0.64–0.96)	69.91 (54.33–90)	0.48 (0.4–0.64)	9.82 (8.31–12.66)	0.12 (0.08–0.16)	4.48 (3.34–5.88)
Maldives	0.48 (0.39–0.57)	55.86 (41.25–76.62)	0.57 (0.43–0.72)	10.06 (7.87–12.85)	0.21 (0.12–0.29)	5.79 (4.02–7.83)
Myanmar	1.87 (1.37–2.63)	125.32 (95.5–165.57)	0.13 (0.06–0.35)	2.76 (1.37–6.69)	0.07 (0.03–0.27)	2.95 (1.64–7.32)
Philippines	1.03 (0.68–1.51)	77.52 (55.74–104.43)	0.16 (0.12–0.21)	3.5 (2.83–4.45)	0.05 (0.02–0.07)	2.42 (1.45–3.42)
Sri Lanka	0.53 (0.35–0.75)	24.98 (17.94–33.63)	0.38 (0.25–0.56)	8.04 (5.45–11.65)	0.03 (0.02–0.05)	2.65 (1.79–3.98)
Thailand	0.36 (0.29–0.46)	50.6 (37.22–70.15)	0.48 (0.34–0.66)	9.98 (7.28–13.46)	0.23 (0.12–0.35)	7.43 (4.57–10.33)
Timor-Leste	2.35 (1.27–4.17)	139.34 (87.6–232.56)	0.11 (0.05–0.29)	2.32 (1.03–5.46)	0.07 (0.02–0.26)	2.75 (1.46–6.8)
Mauritius	0.62 (0.57–0.66)	64.98 (50.14–84.71)	1.45 (1.32–1.54)	30.37 (27.88–32.05)	0.49 (0.45–0.52)	13.94 (12.81–15.06)
Seychelles	0.47 (0.39–0.55)	56.28 (41.2–76.44)	0.51 (0.28–0.66)	9.88 (5.32–12.74)	0.21 (0.12–0.46)	6.74 (4.34–11.71)
Sub-Saharan Africa	2.85 (2.47–3.46)	145.3 (114.29–186.8)	1.11 (0.75–1.55)	20.78 (14.06–28.52)	0.54 (0.34–0.8)	13.1 (8.57–18.82)
Central Sub-Saharan Africa	4.11 (2.51–6.89)	191.41 (135.53–293.59)	1.45 (0.88–2.27)	27.84 (17.2–41.81)	0.73 (0.44–1.21)	17.03 (10.15–26.5)
Angola	4.25 (2.85–6.44)	195.96 (139.28–268.89)	1.54 (0.97–2.29)	29.59 (19.07–43.38)	0.8 (0.49–1.32)	18.79 (11.46–29.46)
Central African Republic	6.87 (3.58–12.3)	278.72 (176.39–450.58)	1.42 (0.8–2.07)	28.38 (16.64–42.39)	0.84 (0.46–1.39)	20.3 (11.22–31.45)
Congo	3.7 (2.57–5.17)	180.72 (131.24–238.93)	1.68 (1.12–2.37)	32.57 (22.31–45.18)	0.82 (0.5–1.2)	19.7 (11.83–27.69)
Democratic Republic of the Congo	4.02 (2.12–7.75)	187.64 (125.43–311.41)	1.4 (0.8–2.37)	26.78 (15.86–42.16)	0.7 (0.39–1.2)	16.12 (9.14–26.22)
Equatorial Guinea	1.94 (1.22–2.99)	129.5 (89.7–181.17)	1.45 (0.89–2.28)	27.64 (16.71–43.15)	0.63 (0.37–1.04)	14.56 (8.3–23.84)
Gabon	2.46 (1.8–3.33)	140.81 (105.74–189.6)	1.67 (1.16–2.32)	31.39 (22.27–44.18)	0.73 (0.42–1.07)	16.6 (9.71–24.05)
Eastern Sub-Saharan Africa	3.48 (2.79–4.19)	161.76 (129.27–205.09)	1.02 (0.66–1.44)	20.2 (13.21–27.55)	0.5 (0.31–0.79)	12.7 (8.31–18.38)
Burundi	3.98 (2.8–5.71)	176.12 (128.35–235.33)	0.93 (0.52–1.51)	18.37 (10.87–27.7)	0.48 (0.27–0.86)	12.25 (7.16–19.82)

(Continued)

Table 3. Continued

	RHD		CAVD		DMVD	
	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)	Age-standardized death (cases per 100000 people) (95% UI)	Age-standardized DALYs (cases per 100000 people) (95% UI)
Comoros	2.96 (2.13–3.89)	148.41 (109.71–194.05)	1.05 (0.61–1.72)	20.38 (12.11–32.54)	0.5 (0.28–0.85)	12.54 (7.19–20.23)
Djibouti	2.79 (1.8–4.08)	142.44 (103.83–194.43)	1.11 (0.69–1.76)	21.25 (13.25–33.12)	0.54 (0.32–0.88)	12.79 (7.7–20.34)
Eritrea	5.16 (3.72–6.64)	215.11 (161.77–271.17)	1.16 (0.71–1.68)	22.77 (14.44–32.61)	0.71 (0.45–1.15)	17.65 (11.48–26.33)
Ethiopia	2.92 (2.05–4.26)	144.92 (109.37–193.7)	0.67 (0.41–0.96)	13.09 (8.04–18.52)	0.35 (0.23–0.56)	8.89 (6.08–13.71)
Kenya	2.26 (1.45–3.31)	121.02 (88.66–160.92)	0.99 (0.68–1.39)	18.22 (13.12–24.98)	0.45 (0.29–0.7)	10.47 (7.22–15.14)
Madagascar	7.17 (4.24–10.26)	269.57 (185.51–368.9)	1.61 (0.98–2.35)	34.11 (21.4–47.65)	0.94 (0.58–1.47)	26.31 (16.75–37.8)
Malawi	3.07 (2.19–4.26)	155.07 (114.59–205.14)	1.11 (0.66–1.7)	22.94 (13.8–33.37)	0.48 (0.28–0.85)	12.44 (7.65–20.31)
Mozambique	5.63 (4–7.68)	213.78 (161.84–279.57)	1.58 (0.88–2.53)	31.73 (17.86–47.09)	0.73 (0.37–1.41)	18.14 (9.48–31.77)
Rwanda	2.94 (1.82–4.15)	144 (102.11–198.54)	1.12 (0.64–1.87)	21.05 (12.28–34.11)	0.54 (0.31–0.91)	13 (8.24–20.77)
Somalia	5.83 (3.49–10.99)	224.34 (153.39–357.23)	0.77 (0.3–1.3)	15.55 (6.4–24.87)	0.47 (0.22–0.95)	12.21 (5.67–21.64)
United Republic of Tanzania	3.23 (2.25–4.32)	154.76 (112.45–201.75)	1.24 (0.75–2.05)	23.47 (14.19–37.42)	0.52 (0.3–0.95)	12.43 (7.34–20.86)
Uganda	2.38 (1.63–3.21)	130.71 (95.12–174.49)	0.93 (0.53–1.49)	18.14 (10.71–28.16)	0.45 (0.27–0.78)	10.93 (6.74–18.12)
Zambia	3.42 (1.87–5.17)	156.24 (106.83–217.94)	1.43 (0.93–2.08)	27.72 (18.5–38.66)	0.73 (0.46–1.12)	17.79 (11.63–26.87)
South Sudan	4.47 (3.19–6.08)	194.81 (149.65–257.8)	0.89 (0.47–1.35)	17.89 (9.91–27.43)	0.46 (0.25–0.81)	12.02 (6.28–19.65)
Southern Sub-Saharan Africa	2.49 (2.08–2.95)	165.06 (132.26–208.39)	1.23 (0.98–1.45)	21.98 (17.85–26.4)	0.4 (0.28–0.52)	12.08 (8.71–15.01)
Botswana	1.59 (1.11–2.23)	120.35 (87.81–164.92)	0.88 (0.67–1.18)	15.32 (11.37–20.29)	0.35 (0.23–0.5)	9.55 (6.35–13.5)
Lesotho	3.74 (2.42–5.65)	195.31 (139.96–271.52)	1.12 (0.78–1.55)	21.68 (14.98–30.17)	0.6 (0.34–0.87)	17.71 (10.89–25.6)
Namibia	2.26 (1.55–3.14)	140.42 (106.71–185.8)	1.15 (0.82–1.56)	20.08 (14.34–27.42)	0.47 (0.31–0.71)	12.87 (8.45–19.7)
South Africa	1.62 (1.45–1.85)	127.1 (98.4–167.57)	1.23 (0.97–1.45)	21.75 (17.86–26.04)	0.36 (0.26–0.48)	10.62 (7.9–13.81)
Zimbabwe	7.34 (4.97–10.02)	338.98 (246.7–443.34)	1.24 (0.93–1.62)	23.87 (17.22–31.56)	0.6 (0.36–0.85)	18.66 (11.26–26.3)
Western Sub-Saharan Africa	2.17 (1.8–2.69)	116.95 (89.91–149.81)	1.04 (0.65–1.63)	19.11 (11.83–29.47)	0.56 (0.35–0.88)	12.94 (7.95–19.61)
Eswatini	2.79 (1.9–3.93)	163.85 (119.2–216.88)	1.08 (0.75–1.51)	21.62 (14.57–31.03)	0.53 (0.3–0.78)	15.9 (9.6–23.55)
Benin	2.02 (1.44–2.71)	109 (81.72–143.63)	0.8 (0.44–1.26)	14.98 (8.63–23.52)	0.44 (0.26–0.72)	10.28 (6.03–15.96)
Burkina Faso	4.09 (2.78–5.98)	158.45 (115.46–218.19)	1.19 (0.65–1.89)	21.44 (11.56–33.03)	0.73 (0.44–1.27)	16.36 (9.6–26.59)
Cameroon	2.21 (1.57–3.16)	113.58 (82.93–152.08)	1.23 (0.73–1.93)	23.35 (14.15–35.5)	0.67 (0.4–1.1)	16.07 (9.34–25.46)
Cabo Verde	1.26 (0.95–1.65)	88.88 (66.37–118.49)	1.09 (0.69–1.92)	19.68 (12.61–34.06)	0.49 (0.3–0.74)	10.97 (7.09–16.2)
Chad	3.99 (2.74–5.39)	167.06 (122.5–215.76)	0.9 (0.44–1.46)	17.14 (8.87–26.91)	0.62 (0.38–1.01)	14.86 (8.97–22.6)
Côte d'Ivoire	2.24 (1.7–2.96)	116.39 (87.34–152.77)	1.11 (0.65–1.89)	21.21 (12.38–34.84)	0.6 (0.35–0.99)	14.27 (8.23–22.9)
Gambia	2.54 (1.91–3.53)	126.09 (95.78–170.2)	1.23 (0.73–1.93)	23.45 (13.88–35.93)	0.67 (0.4–1.03)	15.92 (9.39–23.39)
Ghana	1.36 (1.03–1.77)	88.14 (65.91–117.25)	1.28 (0.8–2.02)	24.08 (15.63–35.34)	0.66 (0.37–1.02)	15.51 (9.03–23.19)
Guinea	3.07 (2.11–4.36)	132.91 (97.52–177.88)	0.99 (0.51–1.61)	18.86 (10.1–30.02)	0.61 (0.35–1)	14.74 (8.85–23.05)
Guinea-Bissau	4.11 (2.92–5.71)	173.49 (132.44–231.14)	1.33 (0.79–1.98)	26.16 (15.57–38.17)	0.84 (0.49–1.26)	21.23 (12.17–30.09)
Liberia	2.57 (1.8–4.08)	125.97 (93.73–182.33)	1.06 (0.59–1.77)	20.2 (11.27–32.71)	0.54 (0.29–0.94)	13.15 (7.11–22.46)
Mali	2.51 (1.74–3.29)	131.59 (97.94–172.91)	0.73 (0.35–1.21)	14.01 (7.22–22.16)	0.47 (0.27–0.77)	11.95 (6.72–17.94)
Mauritania	1.98 (1.34–2.62)	104.08 (78.02–136.67)	1.13 (0.75–1.79)	20.47 (13.66–32.37)	0.57 (0.33–0.91)	12.8 (7.57–19.33)
Niger	3.63 (2.3–5.61)	152.78 (105.3–218.98)	0.79 (0.32–1.36)	14.31 (5.89–23.78)	0.52 (0.28–0.95)	11.75 (6.07–20.88)
Nigeria	1.69 (1.31–2.27)	107.58 (78.85–140.88)	1.01 (0.64–1.65)	17.89 (11.16–30.07)	0.51 (0.29–0.82)	11.28 (6.38–18.36)
Sao Tome and Principe	3.88 (2.57–6)	157.43 (110.42–223.18)	1.07 (0.7–1.81)	20.16 (13.04–34.32)	0.5 (0.32–0.81)	11.94 (7.68–18.79)
Senegal	2.28 (1.6–3.18)	116.9 (84.16–156.97)	1.12 (0.63–1.92)	20.72 (11.74–33.76)	0.62 (0.38–1.04)	14.32 (9.15–23.12)
Sierra Leone	2.81 (2–3.9)	137.22 (101.39–185.49)	1 (0.56–1.73)	19.22 (10.72–34.19)	0.55 (0.32–0.92)	13.46 (7.54–21.93)
Togo	2.64 (1.86–3.76)	125.71 (94.31–167.54)	1.22 (0.72–2)	22.92 (13.96–36.15)	0.65 (0.37–1.11)	15.54 (9.19–24.3)

CAVD indicates nonrheumatic calcific aortic valve disease; DALYs, disability-adjusted life-years; DMVD, nonrheumatic degenerative mitral valve disease; RHD, rheumatic heart disease; SDI, Socio-Demographic Index; UI, uncertainty index; and VHD, valvular heart disease.

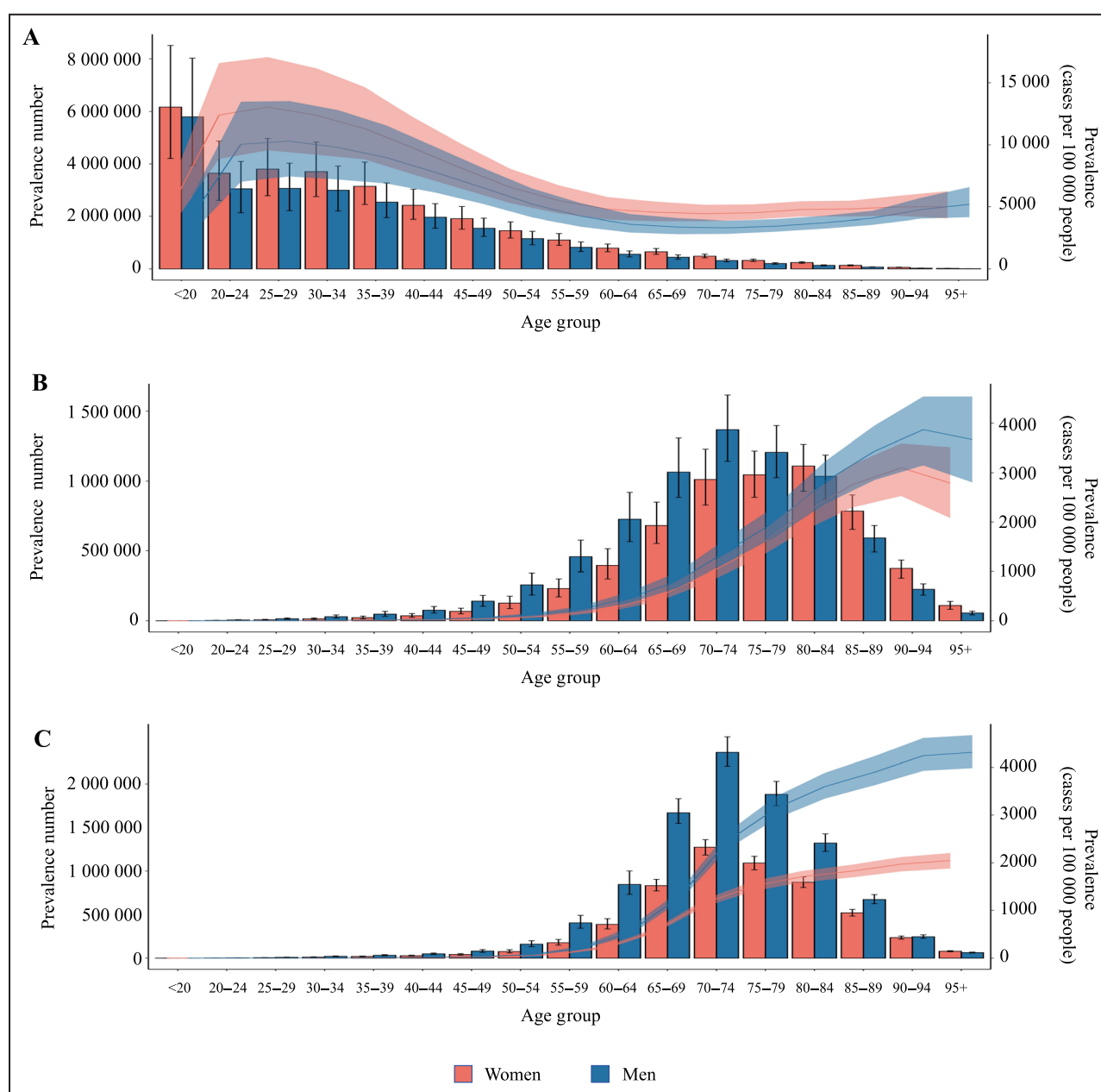


Figure 2. Global burden of age-standardized prevalence (cases per 100 000 people) of VHD by age and sex in 2021.

A, RHD; **B**, CAVD; **C**, DMVD. Median estimate and 95% uncertainty intervals are shown. CAVD indicates nonrheumatic calcific aortic valve disease; DMVD, nonrheumatic degenerative mitral valve disease; RHD, rheumatic heart disease; and VHD, valvular heart disease.

respectively. A similar pattern was observed in middle SDI and low-middle SDI regions for DMVD. Also, middle SDI and low-middle SDI regions had the highest age-standardized DALYs of RHD, whereas high SDI and high-middle SDI regions showed the highest age-standardized DALYs of CAVD and DMVD (Figure S5). Between 1990 and 2021, high SDI and high middle SDI regions experienced a notable decline in DALYs for RHD. In contrast, these regions observed a significant increase in age-standardized DALYs for CAVD. Notably, among all regions, only those with

high SDI demonstrated a significant decrease in age-standardized DALYs for DMVD.

Relationship Between the Burden of VHD, EAPC, and SDI

Further analysis revealed that age-standardized prevalences of VHD were correlated across different sociodemographic levels in 204 countries and territories. (Figure 5). In 2021, there was a positive association between age-standardized prevalences of RHD and

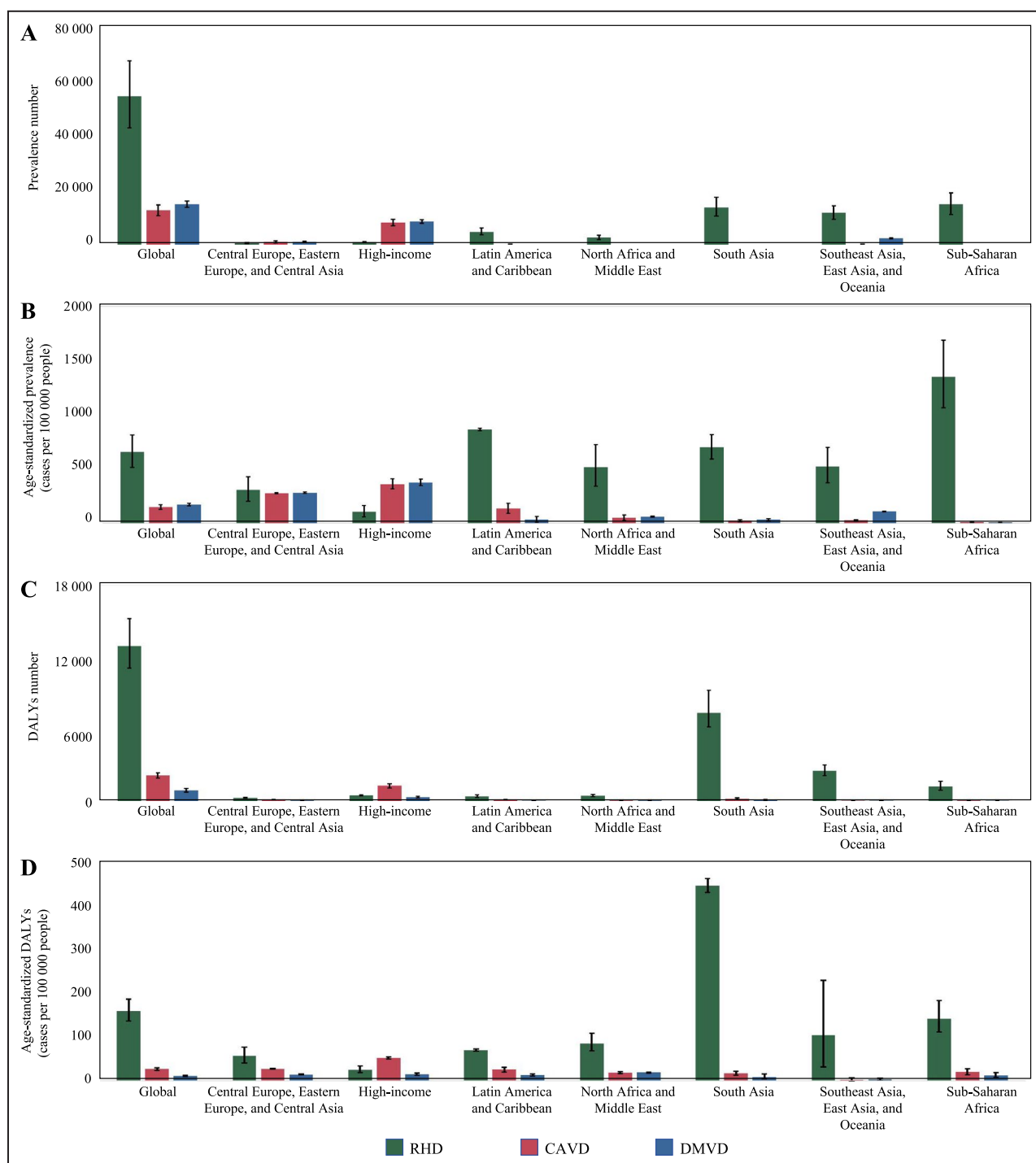


Figure 3. Global burden of VHD across GBD regions in 2021.

A, Prevalence number; **B**, Age-standardized prevalence (cases per 100 000 people); **C**, DALY number; **D**, Age-standardized DALY (cases per 100 000 people). Median estimate and 95% uncertainty intervals are shown. CAVD indicates nonrheumatic calcific aortic valve disease; DALYs, disability-adjusted life-years; DMVD, nonrheumatic degenerative mitral valve disease; GBD, Global Burden of Disease; RHD, rheumatic heart disease; and VHD, valvular heart disease.

SDI ($R=0.75$, $P<0.001$). Conversely, age-standardized prevalences of CAVD negatively correlated with SDI ($R=0.89$, $P<0.001$). Similarly, age-standardized prevalences of DMVD also exhibited a negative correlation with SDI ($R=0.90$, $P<0.001$).

EAPCs in the age-standardized prevalences of RHD, CAVD, and DMVD were shown in Figure S6. Scatterplot of the relationship between SDI values and EAPCs in the age-standardized prevalences is shown in Figure S7. According to Pearson's correlation

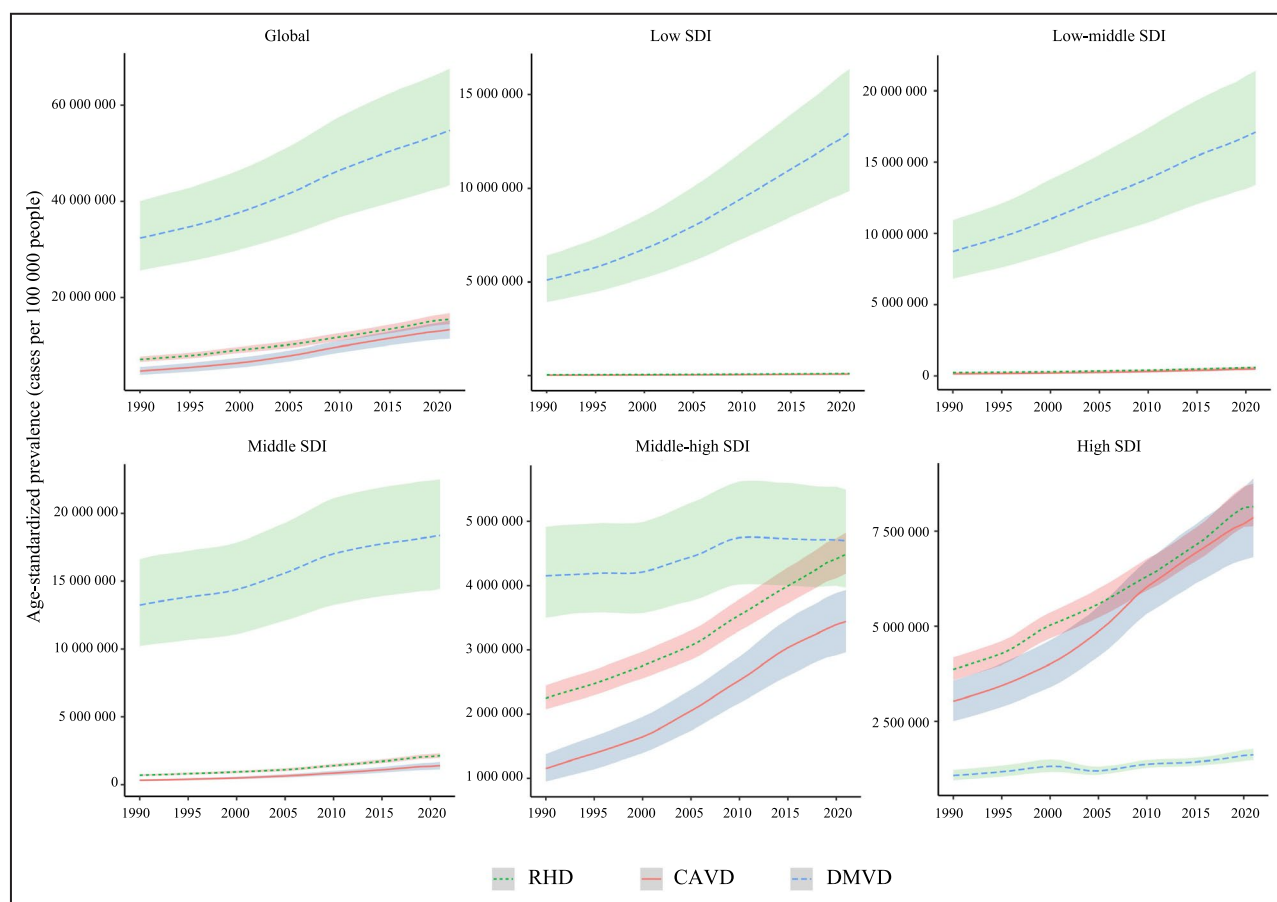


Figure 4. Temporal trends of age-standardized prevalence (cases per 100,000 people) of VHD by SDI regions from 1990 to 2021.

Median estimate and 95% uncertainty intervals are shown. CAVD indicates nonrheumatic calcific aortic valve disease; DMVD, nonrheumatic degenerative mitral valve disease; RHD, rheumatic heart disease; SDI, Socio-Demographic Index; and VHD, valvular heart disease.

analysis, the EAPCs in the age-standardized prevalences of RHD were negatively correlated with the SDI value ($R=-0.56$, $P<0.001$). Moreover, a strong positive correlation was detected in 2021 between SDI and EAPC with age-standardized prevalences of CAVD and DMVD ($R=0.53$, $P<0.001$ and $R=0.24$, $P<0.001$, respectively).

DISCUSSION

VHD has garnered increasing attention over the past 3 decades, particularly in light of ongoing demographic aging. This study leverages the most recent GBD data to deliver a comprehensive and updated assessment of VHD on global, regional, and national scales. Building on the updated cardiovascular data from recent GBD proceedings, our study focuses specifically on VHD within the latest data set, offering a detailed analysis of recent trends and regional disparities. This focus on the newest data allows us to extend prior analyses, highlighting specific areas of progress and

ongoing disparity. By incorporating up-to-date SDI variations, we reveal how advancements in medical care and economic development have differentially affected VHD burdens across regions. Our study identifies both positive impacts from these advancements in some regions and the remaining burden of disease in others, offering a more comprehensive picture of VHD burden shifts. Our findings indicate that, although some regions have seen reductions in VHD due to improved health care infrastructure, significant challenges persist in low-SDI regions where RHD remains a major issue, largely due to limited health care access and untreated infections. Conversely, high-SDI regions face an increasing burden of CAVD and DMVD, driven by aging populations and lifestyle factors. This up-to-date and nuanced analysis underscores the need for targeted public health strategies to address these evolving disparities. Addressing RHD in low-SDI areas demands improved access to care and preventative strategies, whereas high-SDI settings require a focus on managing the rising CAVD and DMVD burden. Understanding and addressing these regional

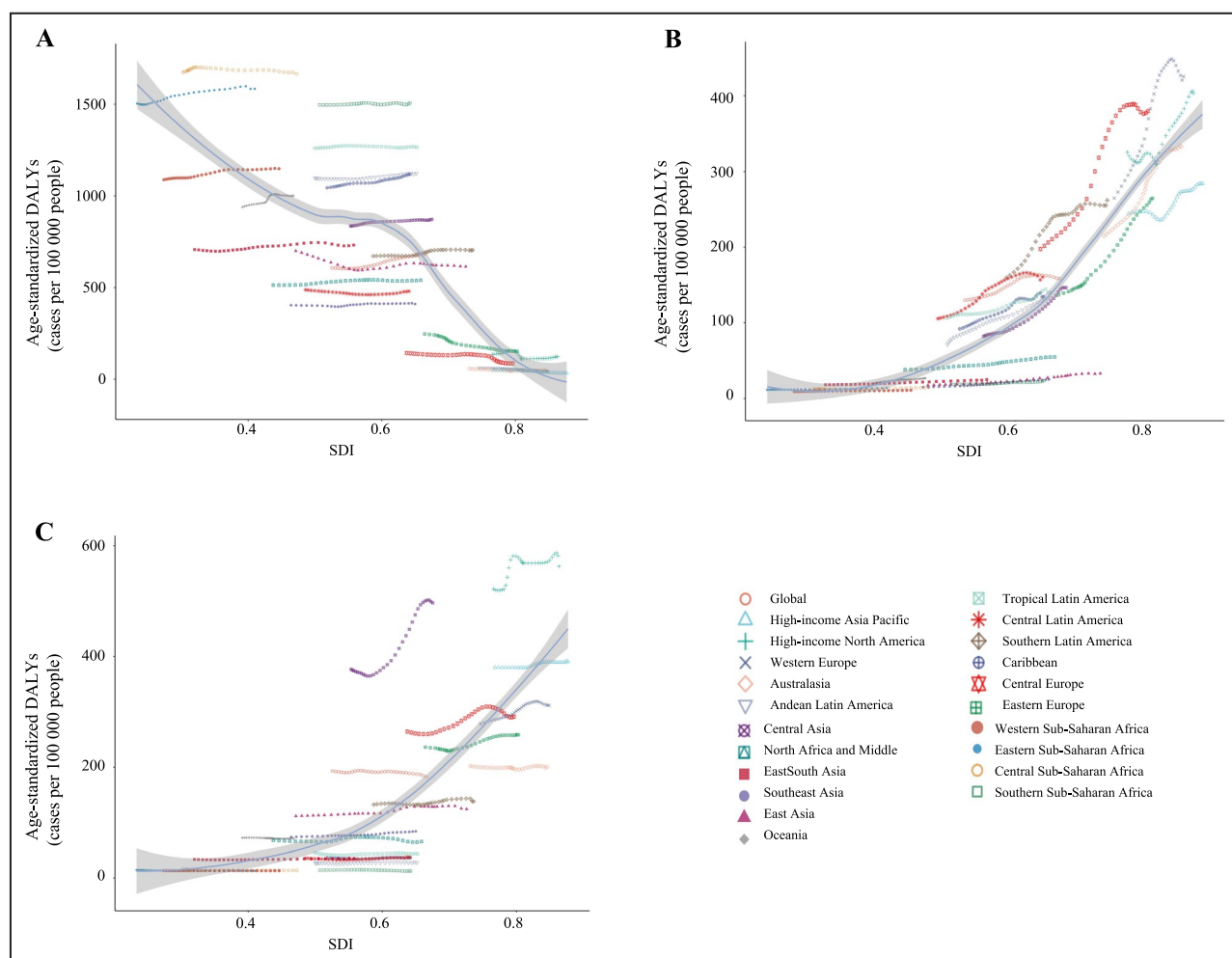


Figure 5. Relationship between age-standardized prevalence (cases per 100 000 people) of VHD and SDI across regions from 1990 to 2021.

A, RHD; B, CAVD; C, DMVD. CAVD indicates nonrheumatic calcific aortic valve disease; DMVD, nonrheumatic degenerative mitral valve disease; RHD, rheumatic heart disease; SDI, Socio-Demographic Index; and VHD, valvular heart disease.

dynamics is crucial for reducing the overall burden of VHD on global health outcomes.

RHD remains the leading cause of mortality related to VHD, and its prevalence is increasing.¹² The persistence of RHD is very closely aligned with conditions such as poverty, inequality, and overcrowding.¹³ The relationship of the persistence of RHD with poverty, inequality, and overcrowding continues to explain why overall worldwide rates of RHD prevalence over the past 4 or 5 decades have yet to show any changes or decline.¹⁴ Although extreme poverty rates have decreased, RHD prevalence remains high due to health care access challenges, particularly in low-resource settings. First, RHD is a complication of untreated streptococcal throat infections, especially during childhood, which are common in low-resource environments where health care access is limited. These infections frequently occur during childhood in settings where many children are unable to receive

timely medical care.¹⁵ As a result, early infections that are left untreated can lead to RHD in adulthood, despite overall advancements in poverty reduction. Second, income-related inequalities have persisted both within and between countries. Afflicted regions with high RHD prevalence continue to correlate with health infrastructural challenges, poor availabilities of antibiotics curative for streptococcal infections, and access to specialty care. Disparities in access to cardiac surgical care further perpetuate the RHD burden in endemic regions.¹⁶ Many of these areas lack specialized care facilities and trained personnel, leading to inadequate treatment options and a cycle of increasing RHD prevalence.¹⁶ Third, RHD is closely related to social health determinants, especially education and living with proper housing, clean water, and good sanitation.^{17,18} Overcrowded living conditions and poor sanitation further exacerbate the risk of streptococcal infections.^{19,20} Four, this is despite

RHD being preventable but rarely getting prioritized in the way other global concerns do.^{19,21} Inadequate funding without essential prioritization equals a vicious cycle of RHD prevalence due to the inadequacy of programs preventing, detecting, or treating this condition.^{22,23} In all, even as the world seems poised to record a decrease in the DALYs of RHD from this study findings, the concurrent persistence and increased burden of RHD point to the necessity for sustained targeted efforts at improvements in health care access, health care system strengthening, and addressing underlying social determinants of health to effectively combat this preventable disease. The World Health Organization has launched global strategies to combat rheumatic fever and RHD through improved access to antibiotics and enhanced early detection programs, particularly in low- and middle-income countries, which are crucial steps toward addressing the RHD burden.²⁴

The global prevalence and age-standardized rates of CAVD have been increasing over the past three decades, particularly in high-middle and high regions.^{8,25} As the world's population ages, the impact of CAVD on the burden of illness and associated mortality is becoming more significant for several reasons. First, with the increase in life expectancy and the aging of world populations, the incidence of conditions such as CAVD related to age will be higher.²⁶ The prevalence of CAVD increases with age, especially after 65 years, and thus, the disease is more prevalent in different populations of older age groups.⁸ Second, at the same time, there is an increased prevalence of risk factors for atherosclerosis, including more pronounced effects from urbanization, smoking, alcohol consumption, dietary changes, and increasing rates of hypertension, obesity, and diabetes.^{27–29} Third, advanced surgical treatments such as aortic valve replacement are not always accessible in lower-resource regions, leading to a higher burden of severe, untreated cases.³⁰ Disparities in health care access also result in significant variations in reported prevalence, including underreporting and delayed diagnoses in some areas. Fourth, the development of medical imaging and diagnosis methods advanced the ability to detect and diagnose the presence of CAVD.^{31,32} Further, higher awareness among medical practitioners and more access to medical care elevate the prevalence reported.³³ It is important to note that the low prevalence of CAVD in other regions does not mean that the issue can be ignored. Differences in health care access and treatment availability have led to variations in reported prevalence, including underreporting in some areas and delayed diagnosis of the disease. Our findings show that the most significant increases in age-standardized prevalence of CAVD from 1990 to 2021 have occurred in regions

with middle and low-middle SDI. There is a pressing need for investment in health care infrastructure, particularly in regions experiencing significant population aging. National cardiology societies, such as those in the United States and Europe, have established guidelines for managing aortic stenosis.^{34–36} Concurrently, international organizations are advocating for research and development to enhance early diagnosis and treatment options for CAVD.

DMVD is the root of chronic mitral regurgitation, atrial fibrillation, and heart failure.^{37–39} Uncontrolled, these diseases are a significant burden on health and everyday life.⁴⁰ The trends for age-standardized prevalence of DMVD have been continuously decreasing over the years. Nonetheless, the increase in the overall burden of DMVD worldwide is still exponentially driven by population growth and aging.³⁹ DMVD is the root of chronic mitral regurgitation, atrial fibrillation, and heart failure.^{31–33} Uncontrolled, these diseases are a significant burden on health and everyday life.³⁴ The trends for age-standardized prevalences of DMVD have been continuously decreasing over the years. Nonetheless, the increase in the overall burden of DMVD worldwide is still exponentially driven by population growth and aging.³³ DMVD often requires specialized care, including surgical repair or replacement of the mitral valve. However, disparities in access to such advanced treatments are prevalent worldwide.^{30,41} Many regions lack the necessary infrastructure and expertise to provide timely and effective care for DMVD, exacerbating the global health burden. Research has also highlighted a sex bias in the prevalence and management of DMVD.^{35,36} Men exhibited higher rates of unhealthy habits such as poor diet, smoking, and exposure to unfavorable environmental factors, which may account for some of the variance in DMVD incidence.³⁷ Conversely, women might be less likely to seek medical attention or undergo diagnosis until symptoms progress to a more severe stage. Women were less likely to undergo multidisciplinary evaluation and intervention than men.³⁸ Addressing these disparities is crucial for improving health outcomes. The United States and some countries in Europe have established specific guidelines for managing mitral valve disorders, and international efforts are underway to harmonize treatment protocols and advance research.^{34–36} These initiatives aim to enhance patient care globally and reduce the disparities in DMVD management.

Our study has several inherent limitations. First, data availability varies widely across countries. Generally, the ones with a low SDI might probably have less accuracy in estimating the burden of VHD due to incomplete or unavailable data because of the delayed development of public health services. Second, geographical variability is brought into the

identification and measurement of cases of VHD and probable bias because of heterogeneous measurement practice across studies. Third, echocardiography and computed tomography scans have increasingly been used to detect asymptomatic VHD from 1990 to 2019, which may inflate the diagnosis of these diseases in the recent period compared with the earlier period. Lastly, RHD, CAVD, and DMVD are still not clearly differentiated, especially in areas with a high prevalence of RHD, hence probably resulting in misclassifications in our analysis. These limitations call for careful interpretation of our results and provide an impetus to improve data quality and consistency in future epidemiological research on VHD.

CONCLUSIONS

VHD thus becomes an increasingly important public health concern, with large differences in prevalence by sex, age, and socioeconomic levels. Fully interpreting those differences between high-income and middle-to low-income countries would be very important. It can help target research efforts and effective public health strategies aimed at countering the challenges posed by VHD across diverse global contexts.

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Received September 13, 2024; accepted November 6, 2024.

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Acknowledgments

Author contributions: All authors approve the final version of the article, including the authorship list and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors have read and approved the final version of the article for submission. Conceptualization: X.-D. Zhou and Y.D. Peng; Data curation and formal analysis: X.-D. Zhou, Q.-F. Chen and S.Z. Shi; Writing, review, and editing: Q.F. Chen, S.Z. Shi, Y.F. Wang, J.J. Shi, C.Y. Liu, T.C. Xu, C. Ni, X. Zhou, H.T. Liao, W.H. Lin, Y.D. Peng, X.-D. Zhou.

Sources of Funding

This study was supported by the Wenzhou Science Technology Bureau Foundation (2022Y0726, Y20240081).

Disclosures

None.

Supplemental Material

Tables S1–S2

Figures S1–S7

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