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Note	

Global Burden of Cardiovascular Diseases and Risks, 1990-2022

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Twitter Handles and Hashtags: #GBDstudy @IHME_UW @NHLBI_Translate

Word Count: 1,717 for summary of methods, excluding references and tables

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Cardiovascular Disease in all Regions
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates by region ranged from 73.6 per 100,000 in High-income Asia Pacific to 432.3 per 100,000 in Eastern Europe in 2022. Global CVD mortality decreased by 34.9% from 1990 to 2022. Ischemic heart disease had the highest global age-standardized DALYs of all diseases at 2,275.9 per 100,000. Intracerebral hemorrhage and ischemic stroke were the next highest CVD causes for age-standardized DALYs. Age-standardized CVD prevalence ranged from 5,881.0 per 100,000 in South Asia to 11,342.6 per 100,000 in Central Asia. High systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 2,564.9 per 100,000 globally. Of all risks, household air pollution from solid fuels had the largest change in attributable age-standardized DALYs from 1990 to 2022 with a 65.1% decrease.
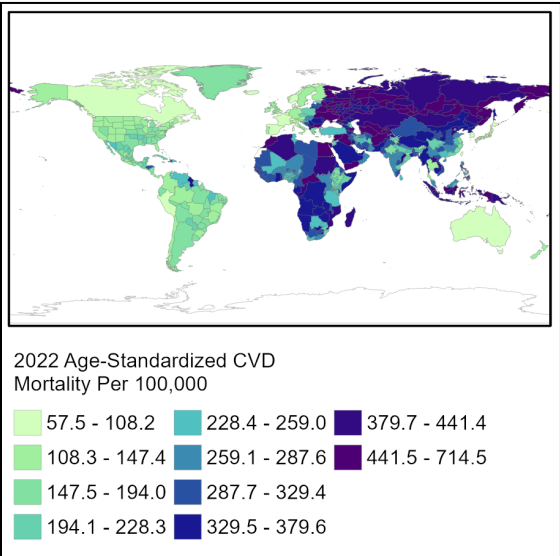
2022 Age-Standardized CVD Mortality Per 100,000

57.5 - 108.2	228.4 - 259.0	379.7 - 441.4
108.3 - 147.4	259.1 - 287.6	441.5 - 714.5
147.5 - 194.0	287.7 - 329.4	
194.1 - 228.3	329.5 - 379.6	

Figure 1. Global map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

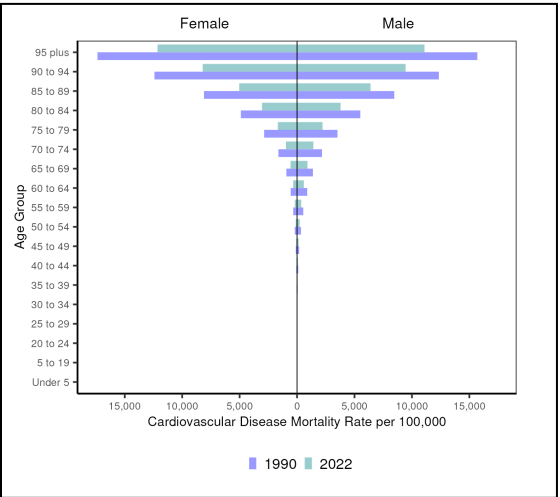| Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	46,358,651	386,947	575.5	4.5	162.5
Ischemic heart disease	315,390,626	9,239,181	3,610.2	108.8	2,275.9
Ischemic stroke	86,661,746	3,542,299	994.5	42.3	819.5
Intracerebral hemorrhage	20,509,587	3,428,876	237.9	39.4	923.8
Subarachnoid hemorrhage	9,281,913	344,872	107.2	4.0	120.7
Hypertensive heart disease	13,052,641	1,353,074	150.9	16.1	292.7
Non-rheumatic calcific aortic valve disease	13,551,699	146,199	156.6	1.8	26.8
Non-rheumatic degenerative mitral valve disease	15,592,046	37,843	177.9	0.5	11.1
Other non-rheumatic valve diseases	12,130	2,033	0.1	<0.1	0.6
Myocarditis	625,129	26,702	7.8	0.3	11.8
Alcoholic cardiomyopathy	554,214	62,661	6.3	0.7	24.6
Other cardiomyopathy	4,715,332	295,751	58.7	3.5	99.3
Pulmonary arterial hypertension	193,710	20,561	2.3	0.2	7.4
Atrial fibrillation and flutter	55,414,434	362,381	637.5	4.5	102.9
Aortic aneurysm	Not estimated	153,118	Not estimated	1.8	34.6
Lower extremity peripheral arterial disease	105,980,247	73,928	1,213.3	0.9	19.6
Endocarditis	438,374	82,402	5.4	1.0	25.8
Other cardiovascular and circulatory diseases	86,722,785	221,797	1,006.1	2.6	118.8

Table 1. Global cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.

Figure 2. Global cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
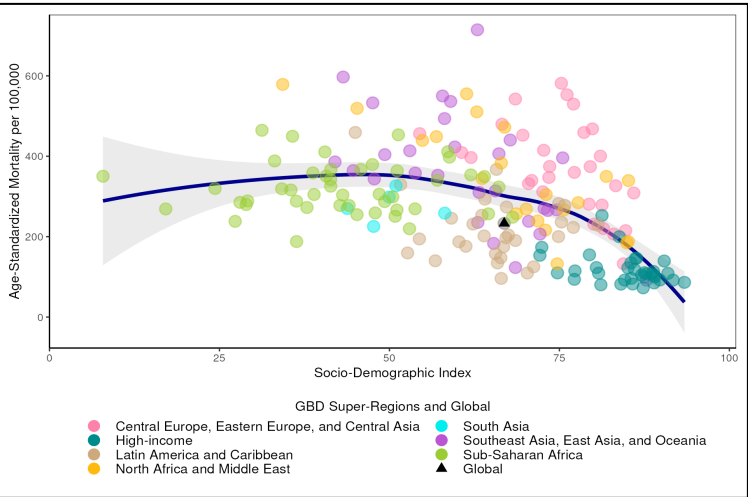

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Global estimate indicated by a triangle, loess line in blue with shaded 95% uncertainty interval.
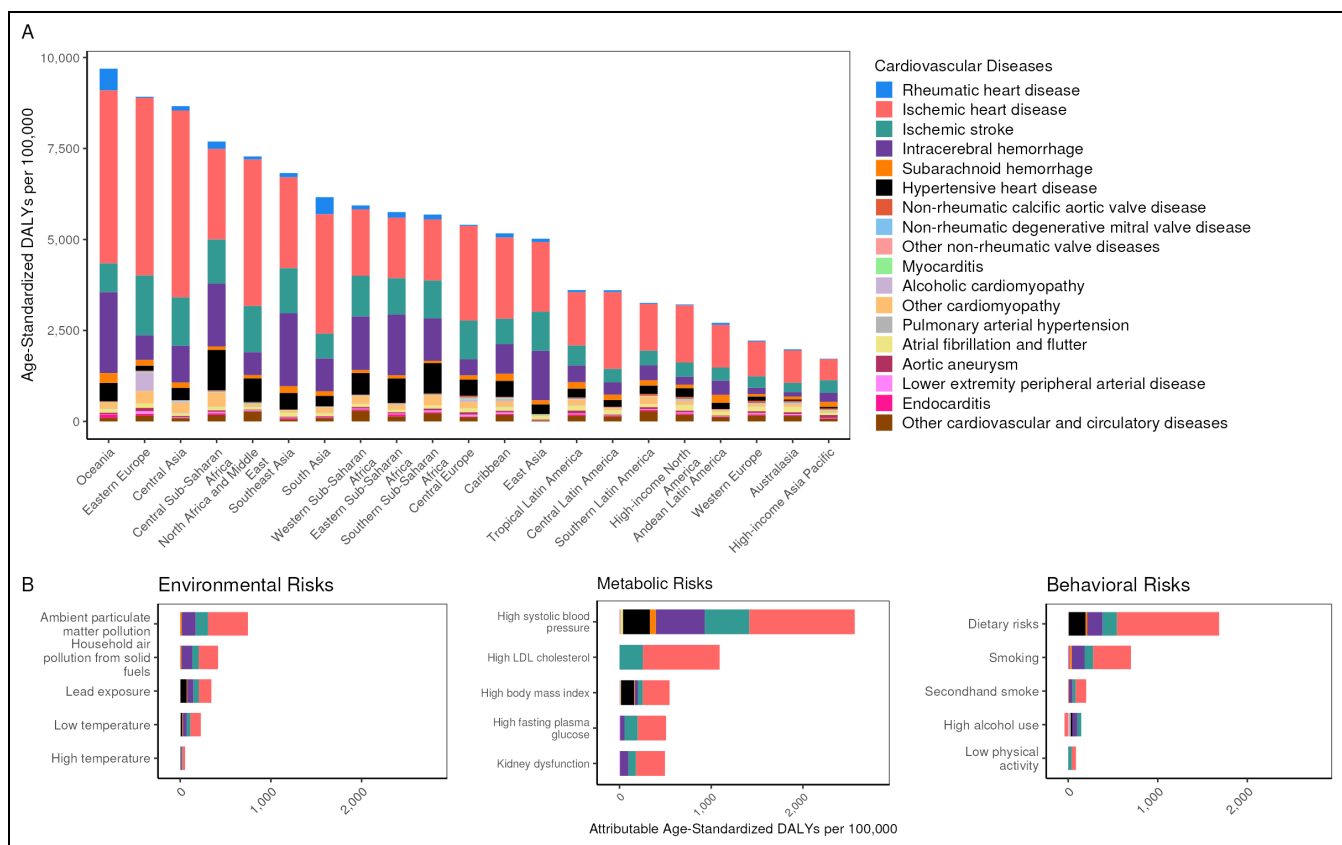
A

B

Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by region and (B) burden attributable to selected risk factors, globally, compared to the theoretical minimum risk exposure level
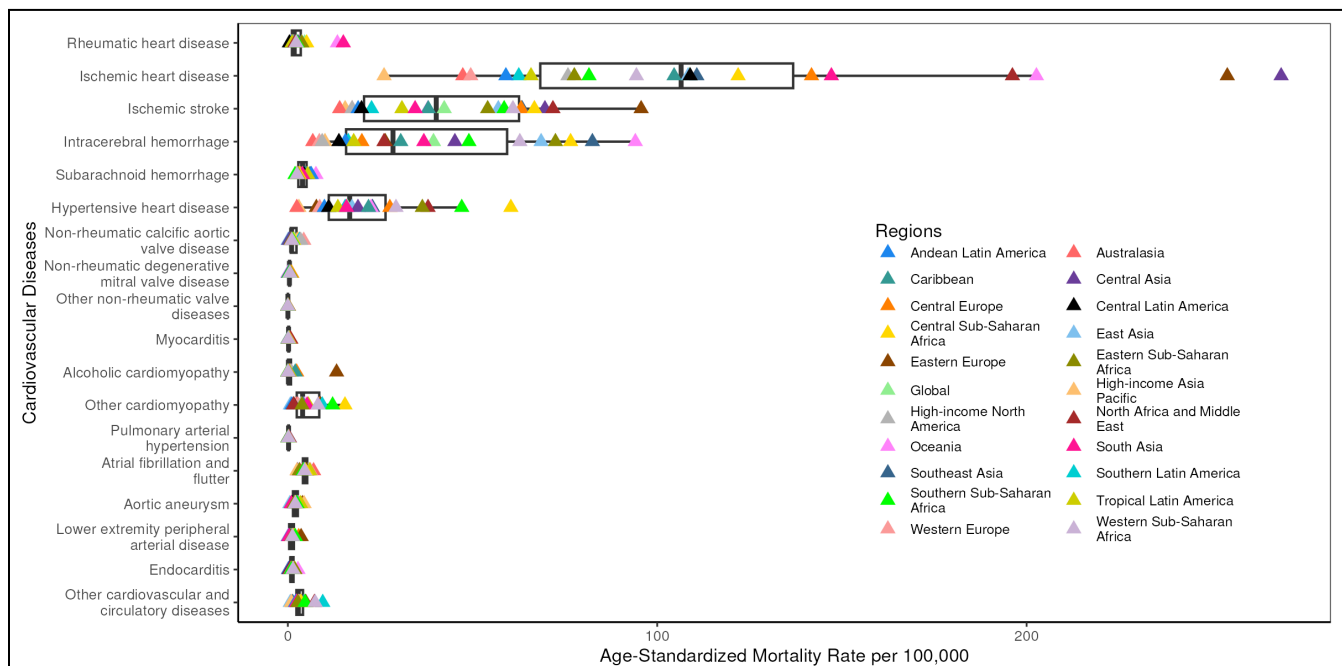

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and region. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Central Asia
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Central Asia ranged from 331.8 to 542.3 per 100,000 in 2022. CVD mortality decreased by 16.5% from 1990 to 2022. Of the 21 regions, Central Asia ranked 4th in 1990 and 2nd in 2022 for age-standardized CVD mortality, and 1st in CVD age-standardized prevalence in 2022. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 337.4 per 100,000. High systolic blood pressure had the largest number of attributable age-standardized CVD DALYs at 4,875.3 per 100,000.
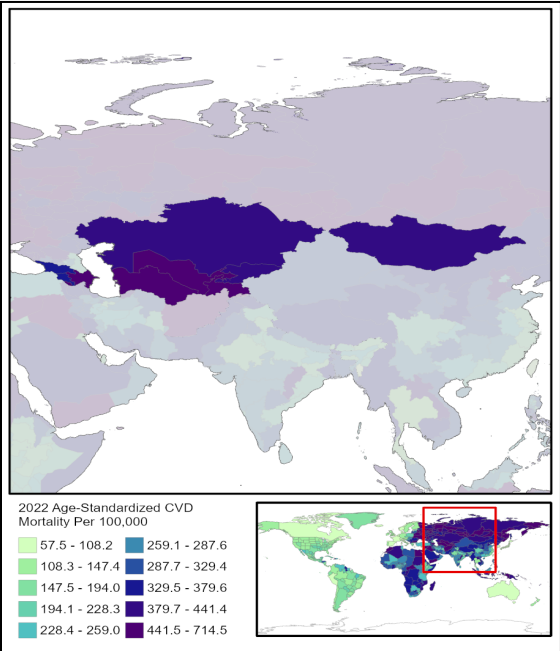
Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

2022 Age-Standardized CVD Mortality Per 100,000

- 57.5 – 108.2
- 108.3 – 147.4
- 147.5 – 194.0
- 194.1 – 228.3
- 228.4 – 259.0
- 259.1 – 287.6
- 287.7 – 329.4
- 329.5 – 379.6
- 379.7 – 441.4
- 441.5 – 714.5

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	618,471	2,480	624.3	2.8	119.3
Ischemic heart disease	7,125,865	182,604	8,573.3	268.9	5,135.8
Ischemic stroke	951,108	45,226	1,091.5	69.6	1,330.9
Intracerebral hemorrhage	184,547	34,154	194.0	45.2	1,008.4
Subarachnoid hemorrhage	102,912	4,109	109.7	5.2	147.4
Hypertensive heart disease	71,919	12,724	96.4	19.0	337.4
Non-rheumatic calcific aortic valve disease	117,564	236	147.0	0.3	8.5
Non-rheumatic degenerative mitral valve disease	375,266	246	500.0	0.3	14.7
Other non-rheumatic valve diseases	220	54	0.3	0.1	1.8
Myocarditis	6,279	303	6.8	0.3	12.0
Alcoholic cardiomyopathy	5,279	861	5.5	0.9	32.5
Other cardiomyopathy	54,216	7,598	60.3	8.7	272.5
Pulmonary arterial hypertension	2,208	330	2.3	0.4	13.1
Atrial fibrillation and flutter	424,061	1,571	565.6	2.6	79.6
Aortic aneurysm	Not estimated	1,326	Not estimated	1.8	37.9
Lower extremity peripheral arterial disease	612,533	349	835.5	0.5	13.2
Endocarditis	854	177	0.9	0.2	7.5
Other cardiovascular and circulatory diseases	427,924	2,008	497.1	2.6	90.7

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
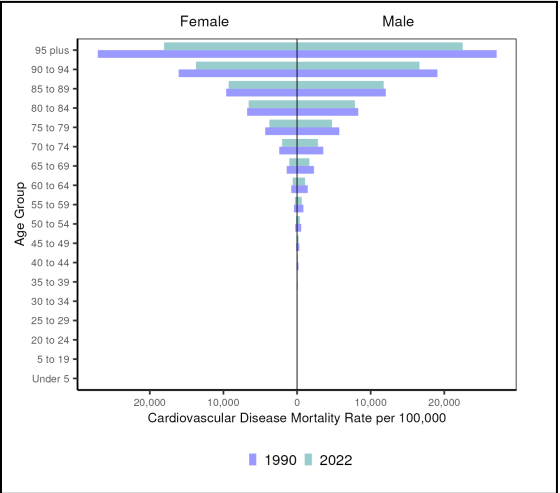

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
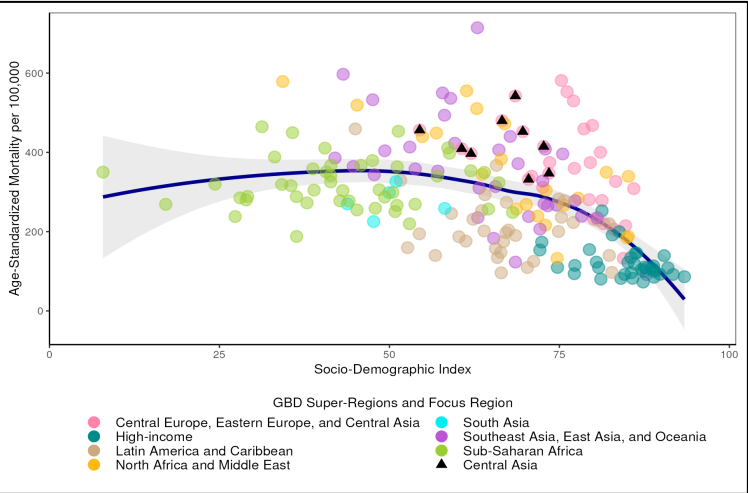

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
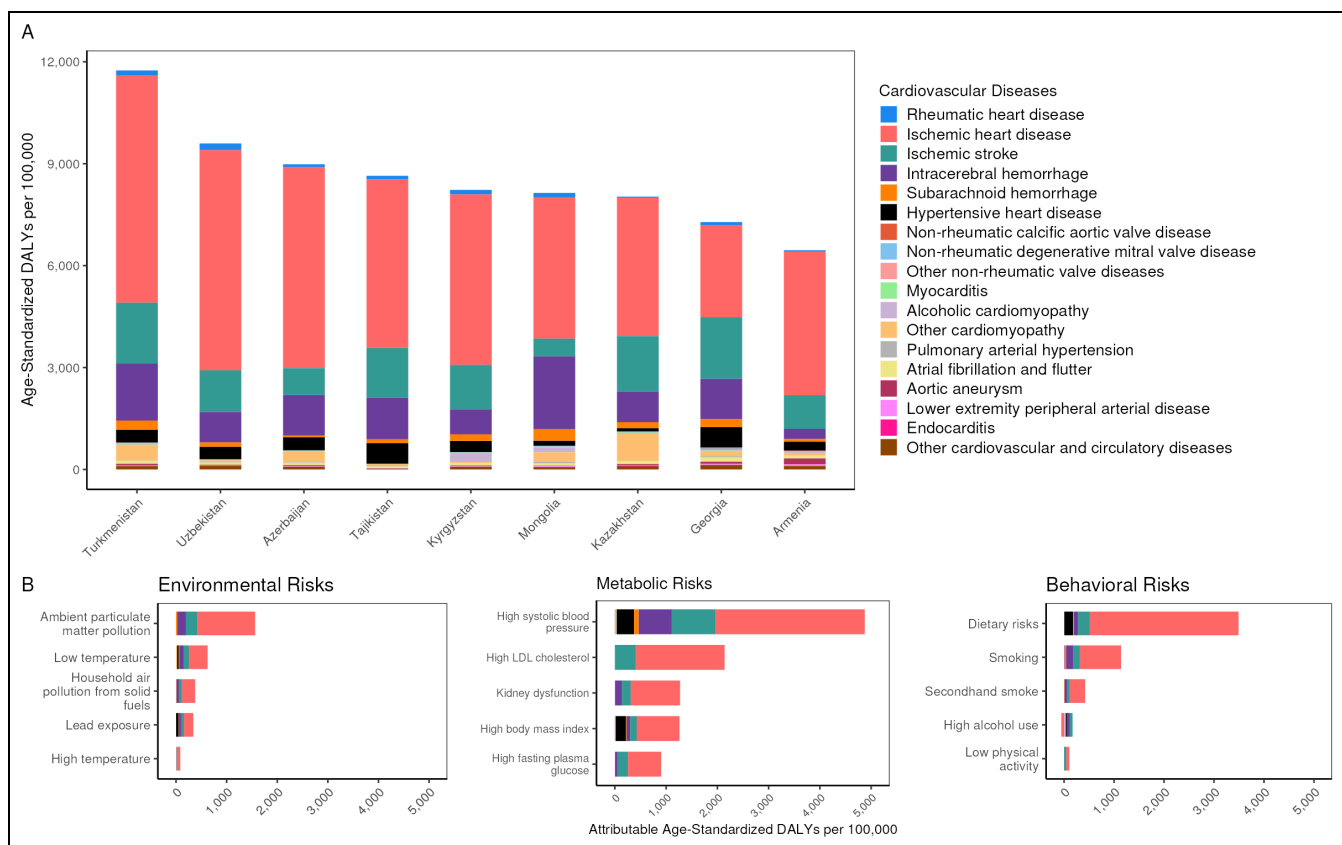
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
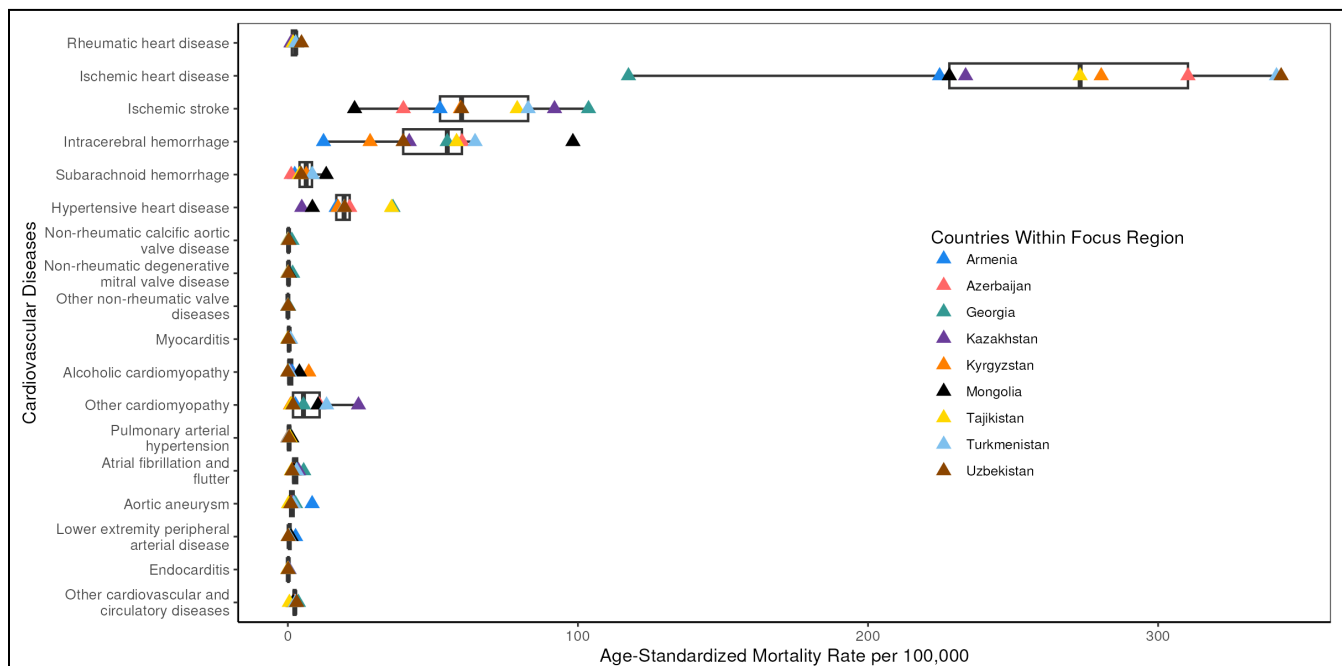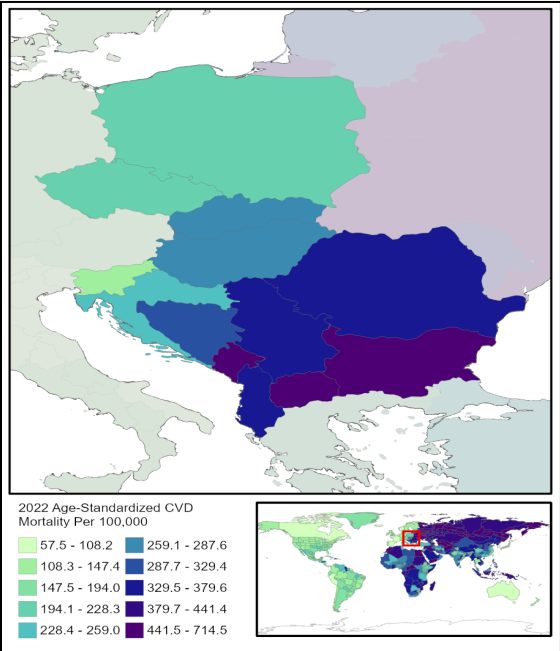

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Institute for Health Metrics and Evaluation - National Heart, Lung, and Blood Institute - American College of Cardiology Foundation

Global Burden of Cardiovascular Diseases and Risks Collaboration

Data from Global Burden of Disease Study, Institute for Health Metrics and Evaluation, University of Washington

www.healthdata.org/gbd

Cardiovascular Disease in Central Europe
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Central Europe ranged from 132.6 to 581.4 per 100,000 in 2022; a 4.4 fold difference. CVD mortality decreased by 47.0% from 1990 to 2022. Out of the 21 regions, Central Europe was ranked 2nd in 1990 and 7th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 444.3 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 2,963.3 per 100,000.

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

2022 Age-Standardized CVD Mortality Per 100,000

- 57.5 - 108.2
- 108.3 - 147.4
- 147.5 - 194.0
- 194.1 - 228.3
- 228.4 - 259.0
- 259.1 - 287.6
- 287.7 - 329.4
- 329.5 - 379.6
- 379.7 - 441.4
- 441.5 - 714.5

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	63,222	2,976	30.7	1.3	30.7
Ischemic heart disease	12,141,290	338,314	5,430.8	141.8	2,601.9
Ischemic stroke	1,841,834	155,795	853.9	63.1	1,063.1
Intracerebral hemorrhage	193,385	46,002	121.7	20.0	443.8
Subarachnoid hemorrhage	177,955	7,020	108.0	3.4	114.2
Hypertensive heart disease	356,261	66,782	151.7	27.6	444.3
Non-rheumatic calcific aortic valve disease	869,200	6,517	377.5	2.7	49.2
Non-rheumatic degenerative mitral valve disease	677,172	2,486	288.1	1.1	24.2
Other non-rheumatic valve diseases	1,303	347	0.8	0.2	3.1
Myocarditis	12,887	1,594	11.1	0.8	19.7
Alcoholic cardiomyopathy	42,646	4,804	25.2	2.4	71.9
Other cardiomyopathy	160,289	20,028	95.7	8.6	169.5
Pulmonary arterial hypertension	3,515	445	2.3	0.2	6.1
Atrial fibrillation and flutter	1,412,498	12,606	604.9	5.1	111.8
Aortic aneurysm	Not estimated	6,482	Not estimated	2.8	61.7
Lower extremity peripheral arterial disease	2,227,532	7,116	942.2	2.9	50.4
Endocarditis	6,884	1,351	5.9	0.7	20.5
Other cardiovascular and circulatory diseases	1,879,255	6,875	951.1	3.1	118.1

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
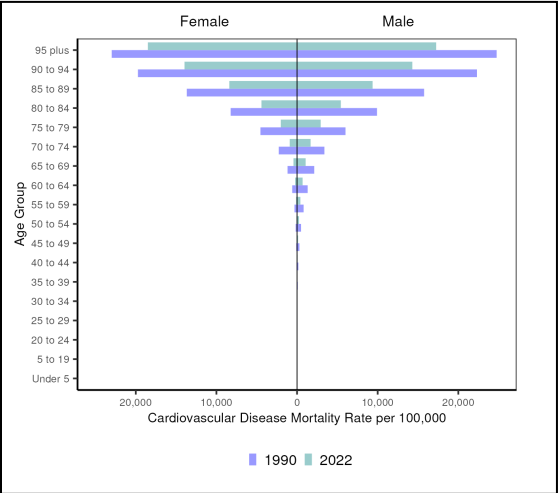

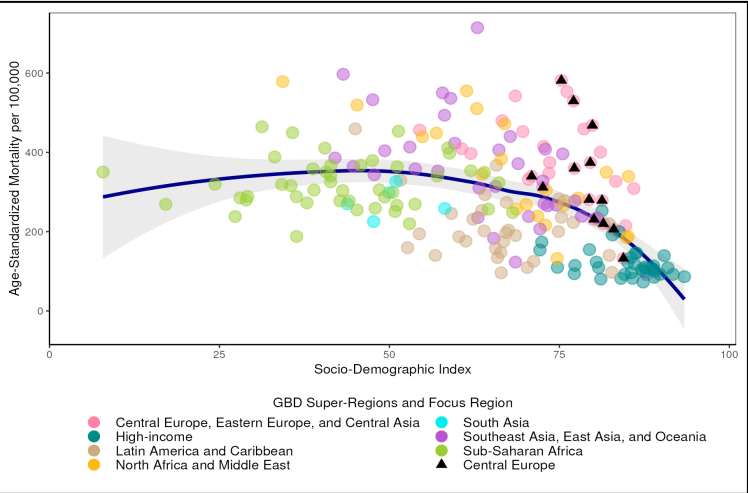Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
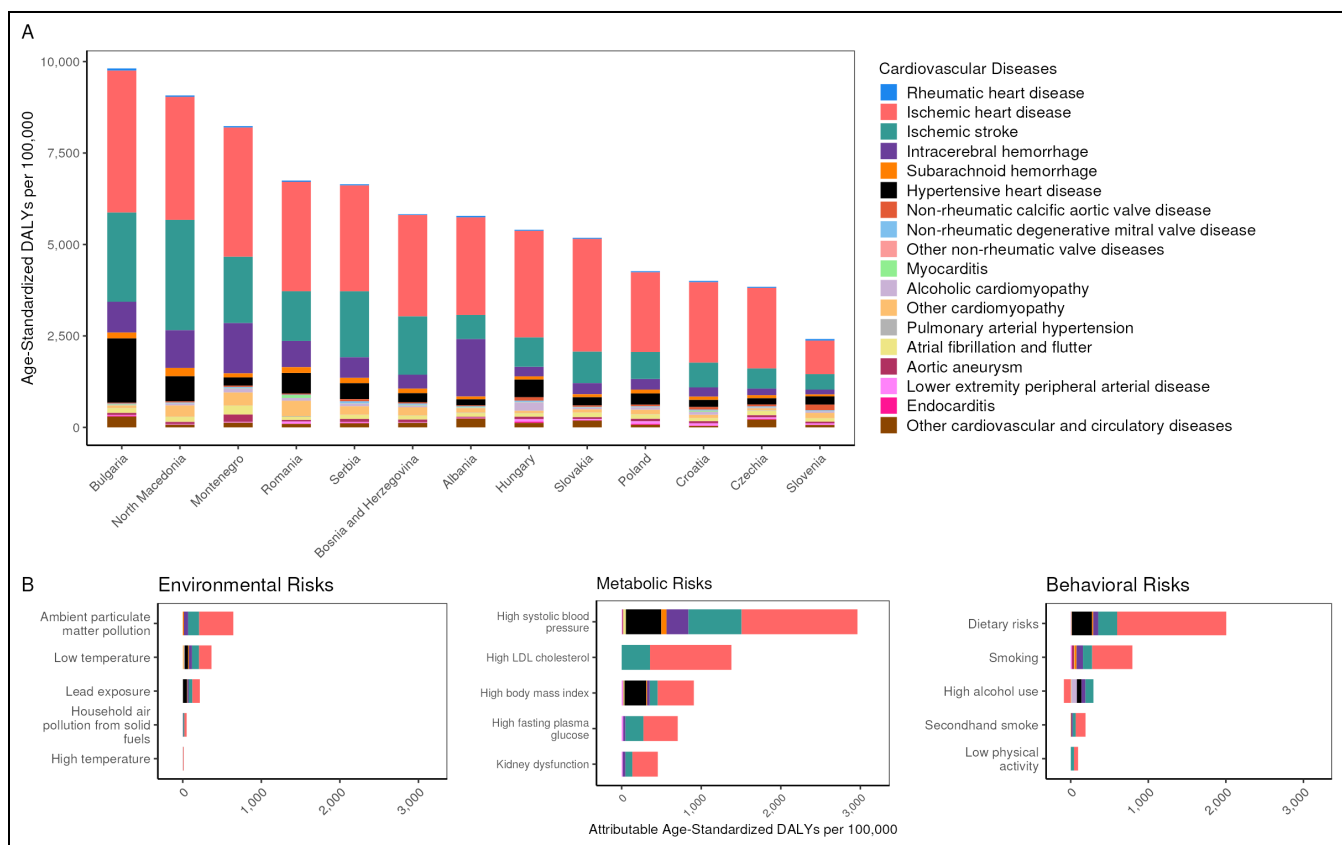
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
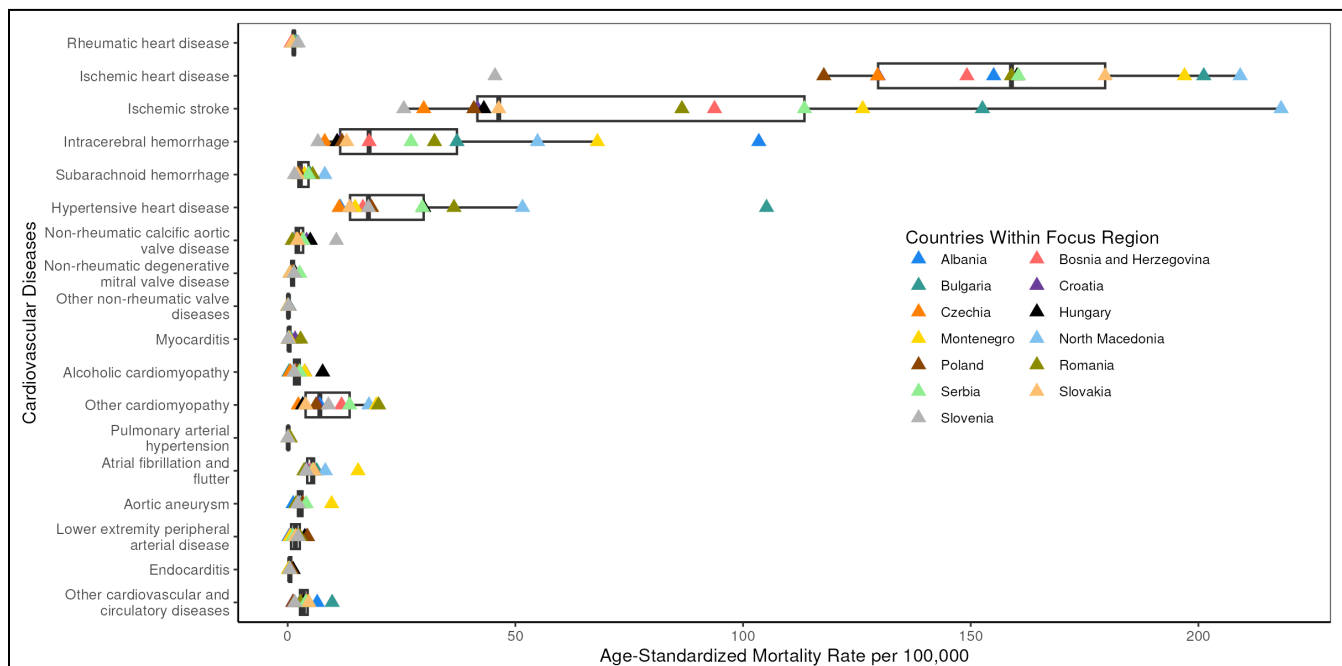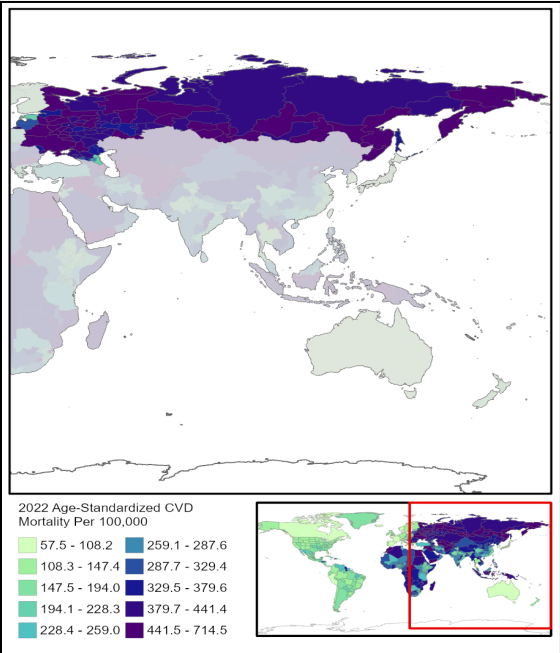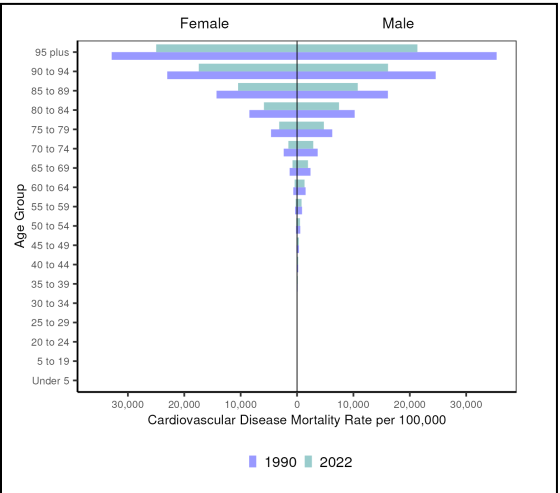

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Eastern Europe
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Eastern Europe ranged from 215.0 to 553.0 per 100,000 in 2022; a 2.6 fold difference. CVD mortality decreased by 24.3% from 1990 to 2022. Out of the 21 regions, Eastern Europe was ranked 1st in both 1990 and 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, alcoholic cardiomyopathy had the highest age-standardized DALYs in 2022 at 521.2 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 4,619.4 per 100,000.

2022 Age-Standardized CVD Mortality Per 100,000

- 57.5 - 108.2
- 108.3 - 147.4
- 147.5 - 194.0
- 194.1 - 228.3
- 228.4 - 259.0
- 259.1 - 287.6
- 287.7 - 329.4
- 329.5 - 379.6
- 379.7 - 441.4
- 441.5 - 714.5

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	241,126	3,324	73.9	1.0	28.6
Ischemic heart disease	25,389,496	914,066	7,243.7	254.3	4,882.7
Ischemic stroke	3,074,246	348,195	924.7	95.7	1,642.8
Intracerebral hemorrhage	467,843	90,934	159.3	26.4	680.1
Subarachnoid hemorrhage	317,276	16,751	108.9	5.0	154.7
Hypertensive heart disease	171,771	27,760	46.8	7.7	138.5
Non-rheumatic calcific aortic valve disease	963,872	2,470	266.4	0.7	19.2
Non-rheumatic degenerative mitral valve disease	949,952	832	259.7	0.2	9.6
Other non-rheumatic valve diseases	395	131	0.2	<0.1	1.3
Myocarditis	17,479	743	7.7	0.2	8.6
Alcoholic cardiomyopathy	177,153	38,801	63.6	13.2	521.2
Other cardiomyopathy	157,875	25,924	76.2	8.9	339.9
Pulmonary arterial hypertension	7,722	117	2.8	<0.1	1.7
Atrial fibrillation and flutter	2,384,327	19,282	663.1	5.3	119.9
Aortic aneurysm	Not estimated	13,936	Not estimated	4.0	93.8
Lower extremity peripheral arterial disease	4,018,233	13,208	1,099.9	3.6	66.3
Endocarditis	9,142	3,058	4.8	1.1	48.1
Other cardiovascular and circulatory diseases	2,914,750	16,721	863.9	4.9	164.1

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.

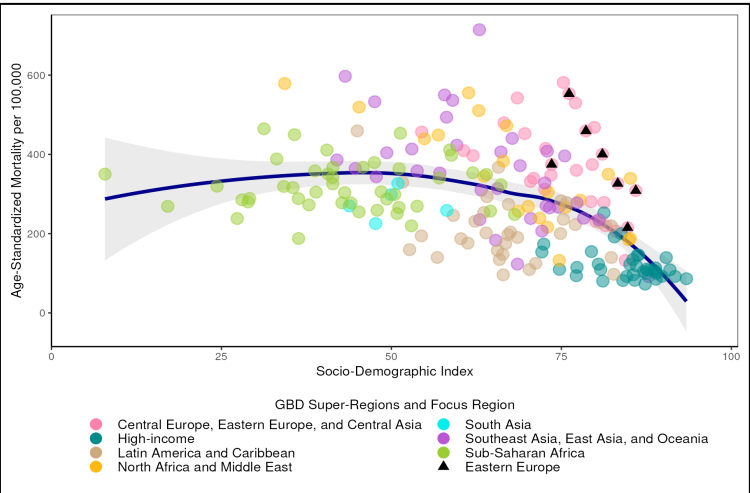Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
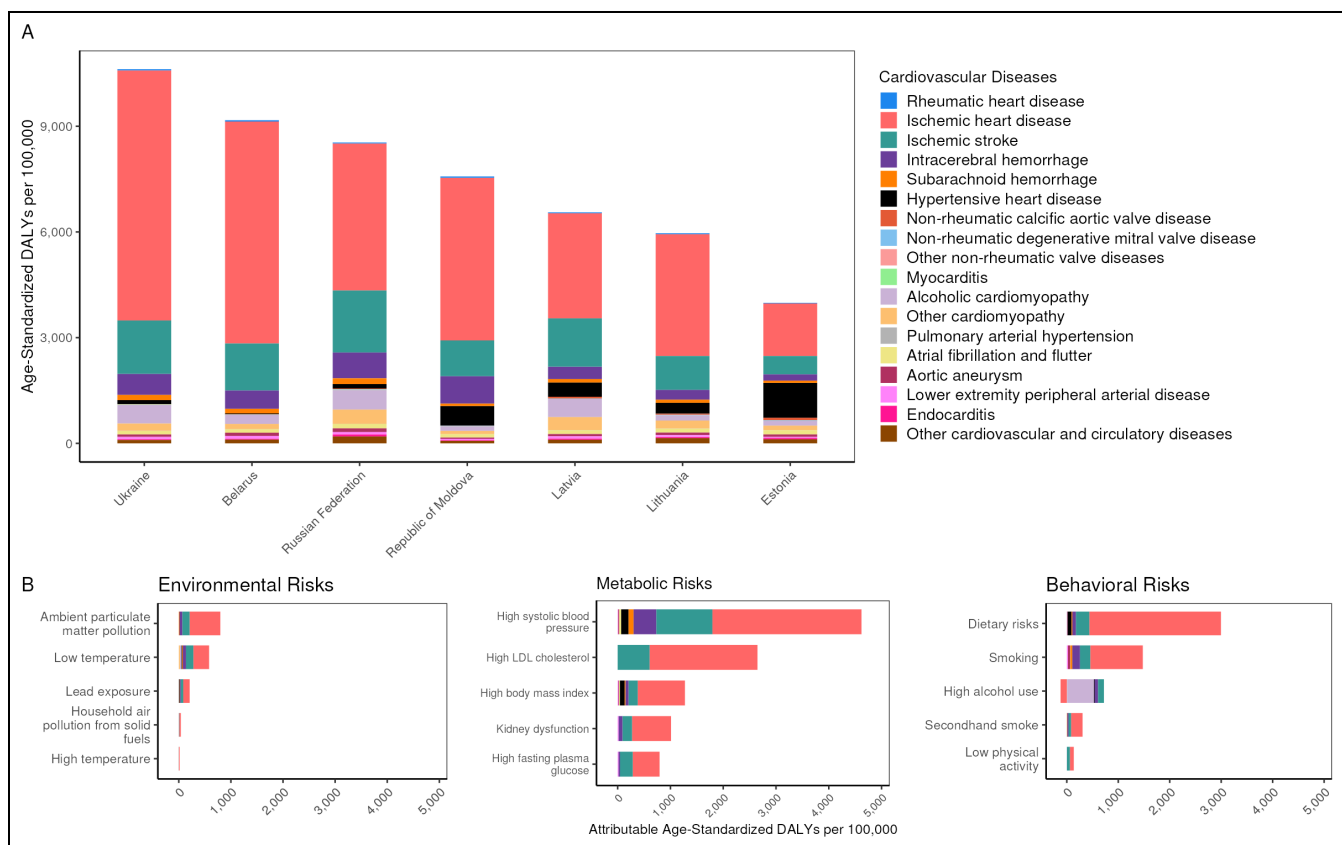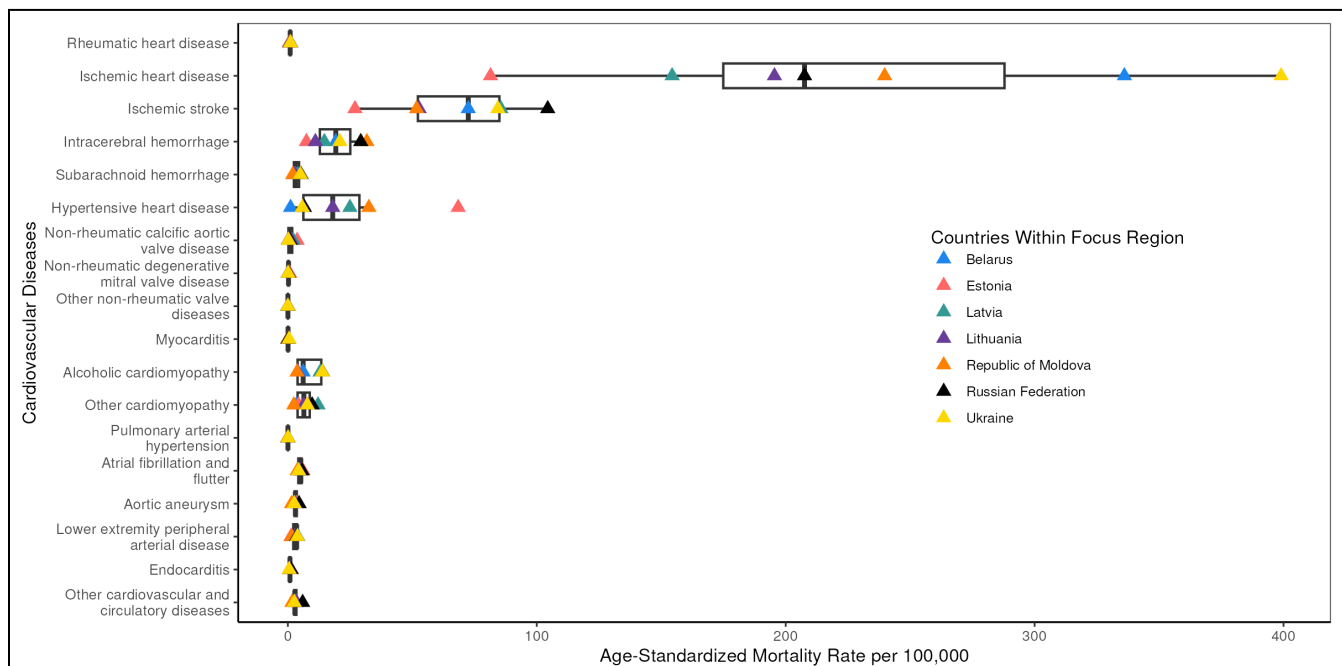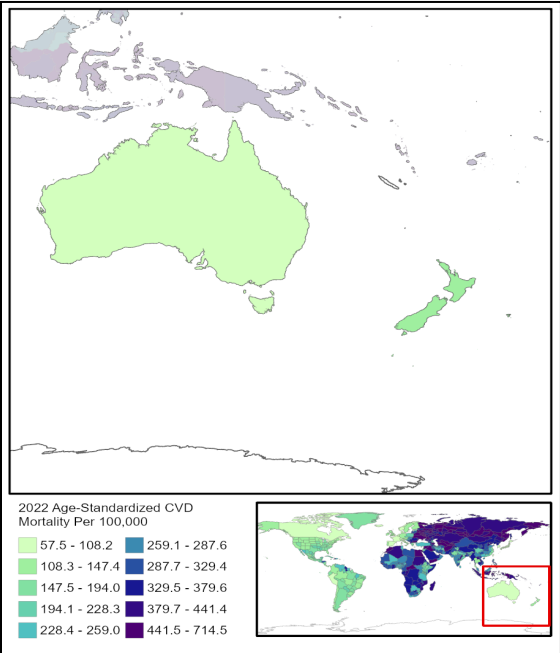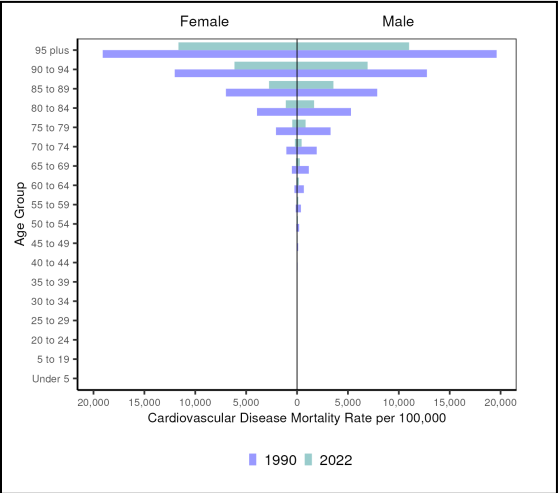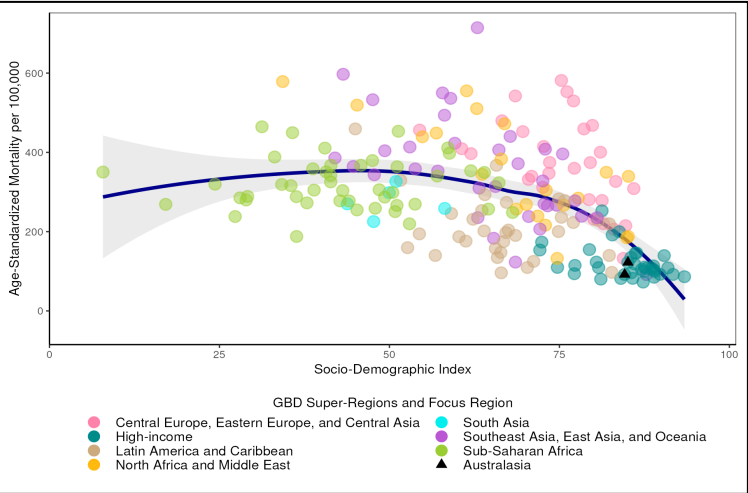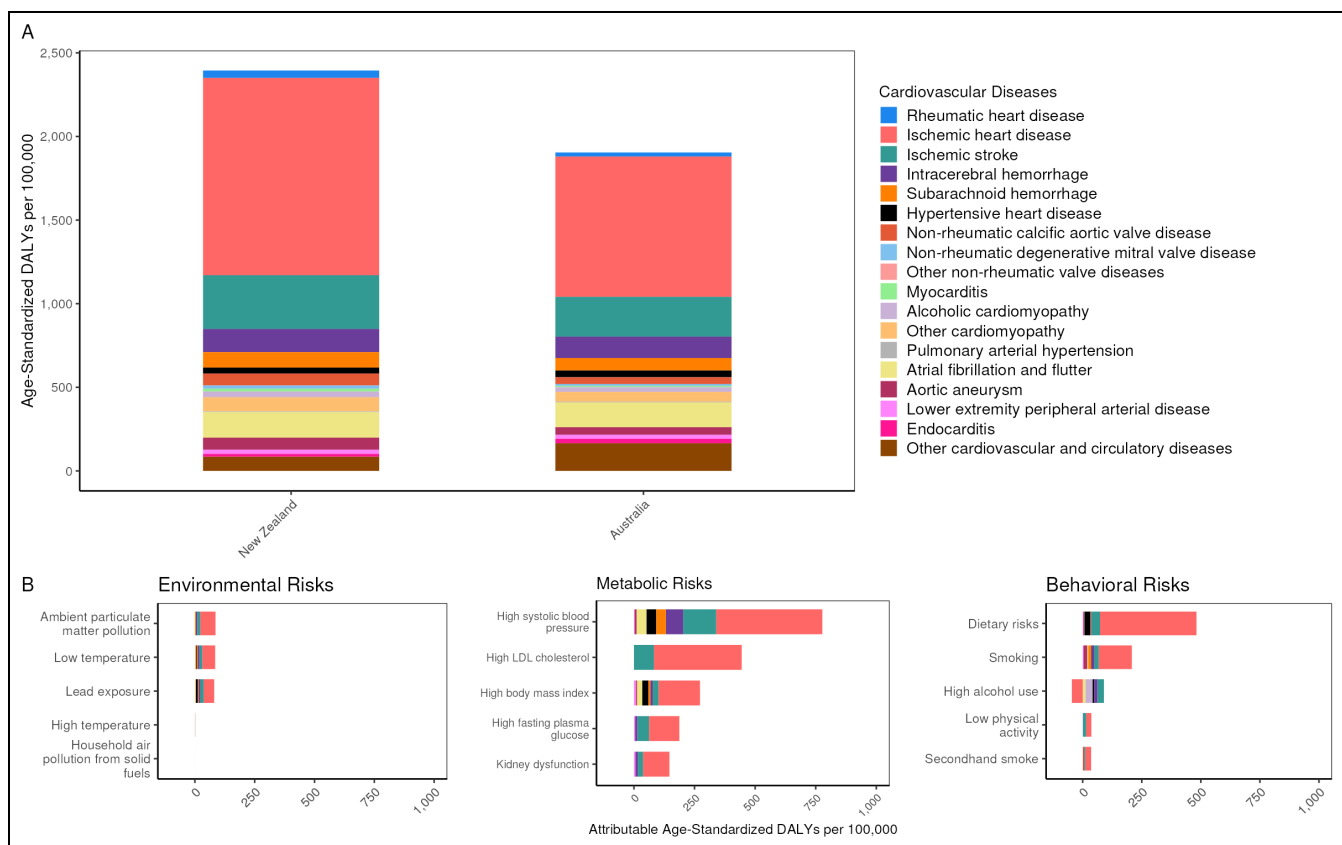
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
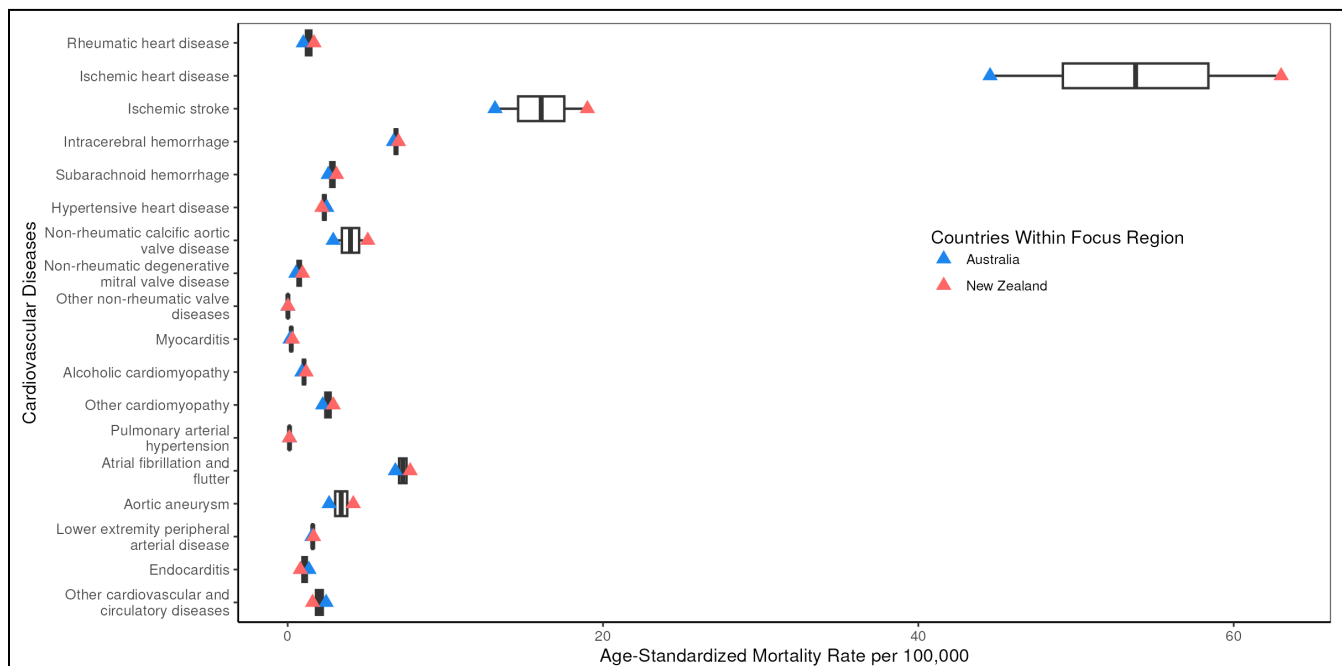

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Australasia
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Australasia ranged from 92.0 to 122.5 per 100,000 in 2022; a 1.3 fold difference. CVD mortality decreased by 65.5% from 1990 to 2022. Of the 21 regions, Australasia ranked 16th in 1990 and 20th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, other cardiovascular and circulatory diseases had the highest age-standardized DALYs in 2022 at 152.2 per 100,000. High systolic blood pressure had the largest number of attributable age-standardized CVD DALYs at 777.3 per 100,000.
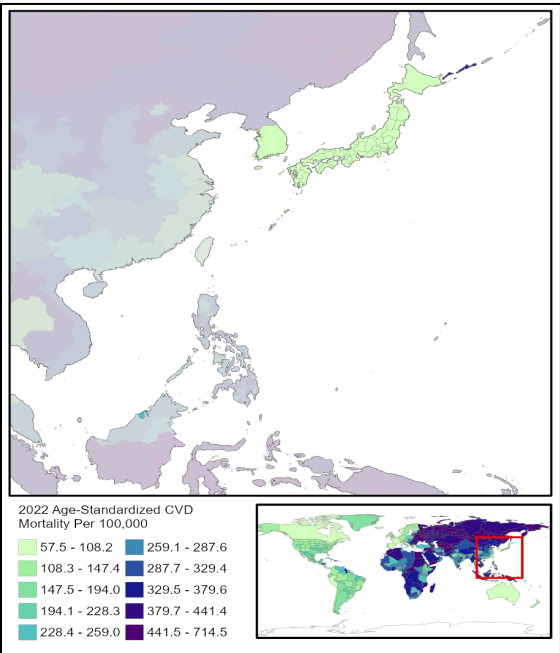
Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	22,224	638	52.9	1.1	27.1
Ischemic heart disease	1,282,122	29,819	2,380.2	47.4	893.0
Ischemic stroke	322,348	9,651	625.8	14.0	250.4
Intracerebral hemorrhage	41,072	4,199	95.2	6.8	130.1
Subarachnoid hemorrhage	34,529	1,457	80.0	2.7	76.8
Hypertensive heart disease	33,550	1,606	56.5	2.4	39.8
Non-rheumatic calcific aortic valve disease	198,197	2,162	331.3	3.2	45.5
Non-rheumatic degenerative mitral valve disease	118,556	373	199.4	0.6	11.7
Other non-rheumatic valve diseases	55	7	0.1	<0.1	0.2
Myocarditis	4,306	73	14.6	0.2	9.0
Alcoholic cardiomyopathy	12,654	470	27.6	0.9	29.8
Other cardiomyopathy	39,079	1,331	107.7	2.3	62.7
Pulmonary arterial hypertension	1,192	62	2.8	0.1	3.8
Atrial fibrillation and flutter	533,587	4,748	918.4	7.0	149.8
Aortic aneurysm	Not estimated	1,764	Not estimated	2.9	49.6
Lower extremity peripheral arterial disease	515,310	1,056	878.6	1.6	23.3
Endocarditis	4,542	755	9.7	1.3	26.1
Other cardiovascular and circulatory diseases	1,018,013	1,335	2,019.0	2.3	152.2

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
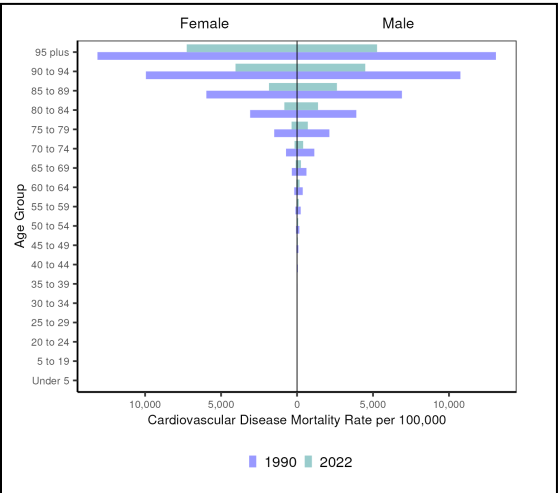

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
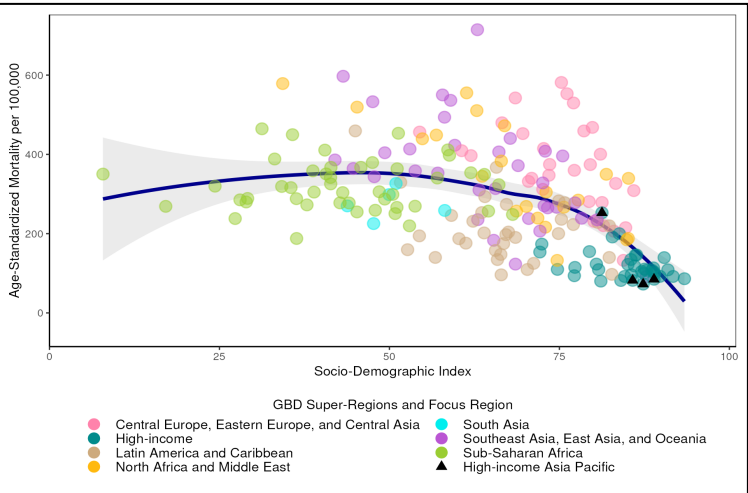

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
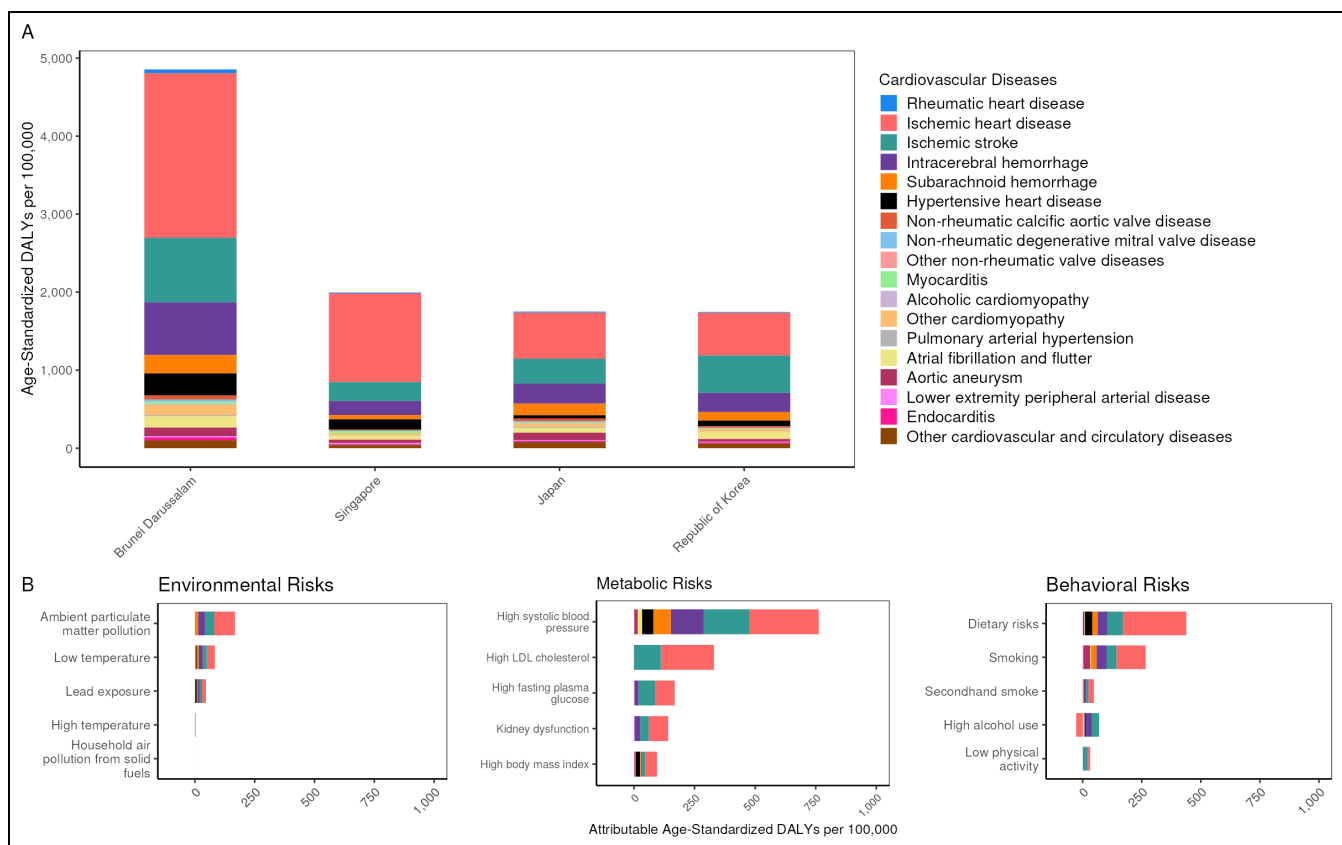
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
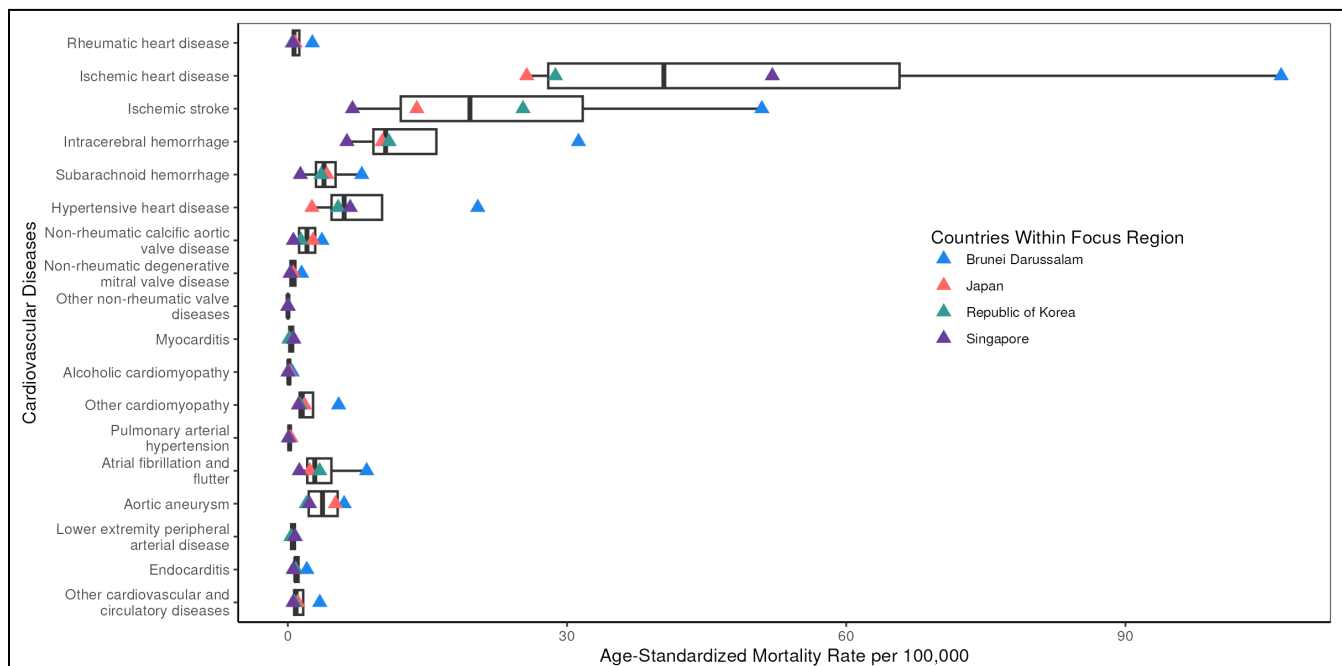

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in High-Income Asia Pacific
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in High-income Asia Pacific ranged from 72.7 to 252.6 per 100,000 in 2022; a 3.5 fold difference. CVD mortality decreased by 64.2% from 1990 to 2022. Out of the 21 regions, High-income Asia Pacific was ranked 20th in 1990 and 21st in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, aortic aneurysm had the highest age-standardized DALYs in 2022 at 79.6 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 762.7 per 100,000.

2022 Age-Standardized CVD Mortality Per 100,000

|	
57.5 - 108.2	259.1 - 287.6
108.3 - 147.4	287.7 - 329.4
147.5 - 194.0	329.5 - 379.6
194.1 - 228.3	379.7 - 441.4
228.4 - 259.0	441.5 - 714.5

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	51,813	5,344	15.8	0.7	11.6
Ischemic heart disease	12,020,073	160,226	2,586.8	26.0	581.2
Ischemic stroke	3,765,022	115,125	900.3	15.5	347.4
Intracerebral hemorrhage	826,618	55,686	238.1	10.1	249.5
Subarachnoid hemorrhage	685,207	18,210	186.2	3.9	133.5
Hypertensive heart disease	310,906	22,366	58.4	3.0	46.7
Non-rheumatic calcific aortic valve disease	1,479,296	20,761	285.1	2.5	32.5
Non-rheumatic degenerative mitral valve disease	1,970,448	4,122	390.3	0.5	11.8
Other non-rheumatic valve diseases	326	31	0.1	<0.1	0.2
Myocarditis	27,538	559	15.7	0.2	8.9
Alcoholic cardiomyopathy	13,218	479	5.0	0.1	4.4
Other cardiomyopathy	201,378	9,689	81.9	1.7	44.0
Pulmonary arterial hypertension	9,259	1,137	3.0	0.2	8.8
Atrial fibrillation and flutter	2,188,998	18,040	461.2	2.5	68.1
Aortic aneurysm	Not estimated	26,762	Not estimated	4.4	79.6
Lower extremity peripheral arterial disease	5,112,414	2,692	951.9	0.4	9.5
Endocarditis	24,892	5,825	6.8	0.8	14.9
Other cardiovascular and circulatory diseases	3,392,925	5,480	962.4	1.0	71.0

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
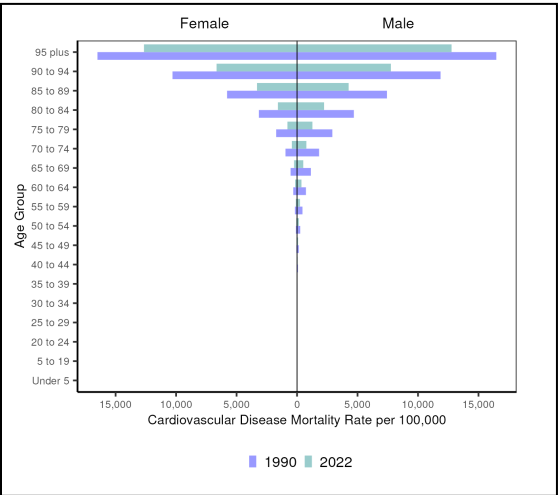

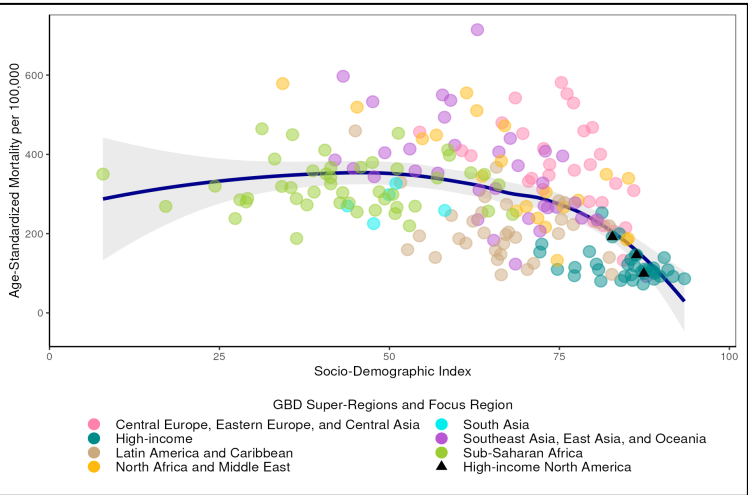Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
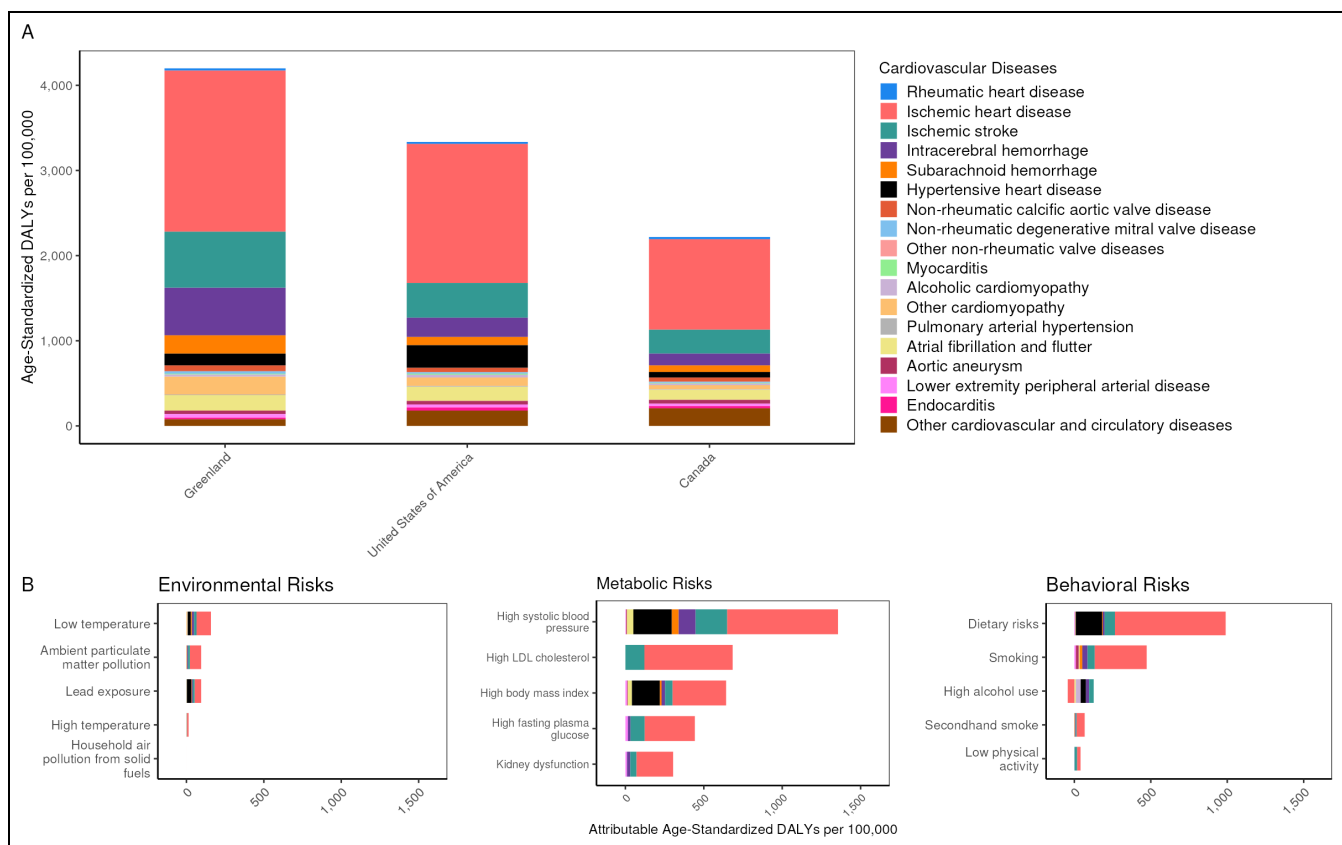
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
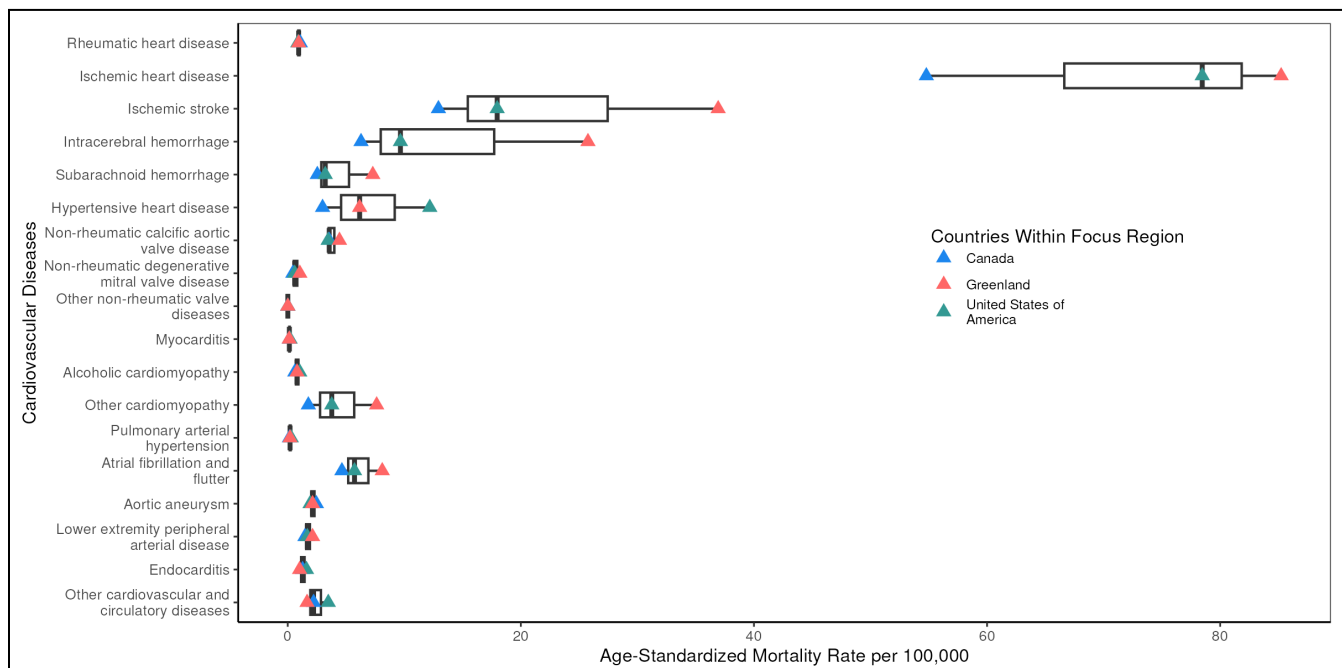

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in High-Income North America
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in High-income North America ranged from 99.4 to 191.6 per 100,000 in 2022; a 1.9 fold difference. CVD mortality decreased by 45.9% from 1990 to 2022. High-income North America was ranked 17th in both 1990 and in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 245.2 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 1,355.7 per 100,000.
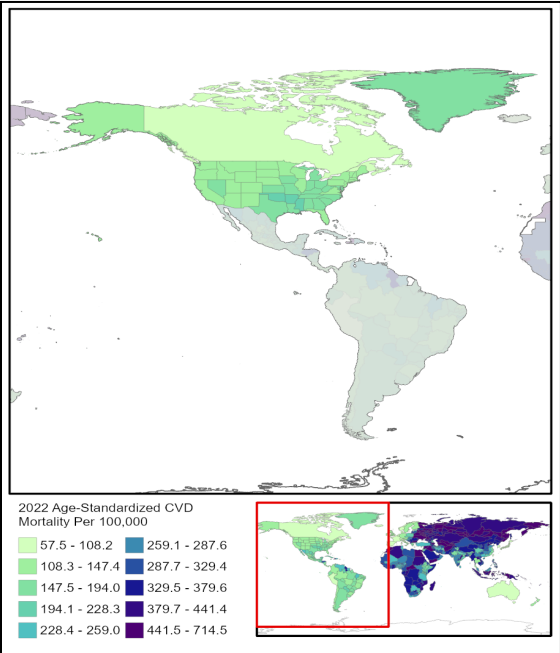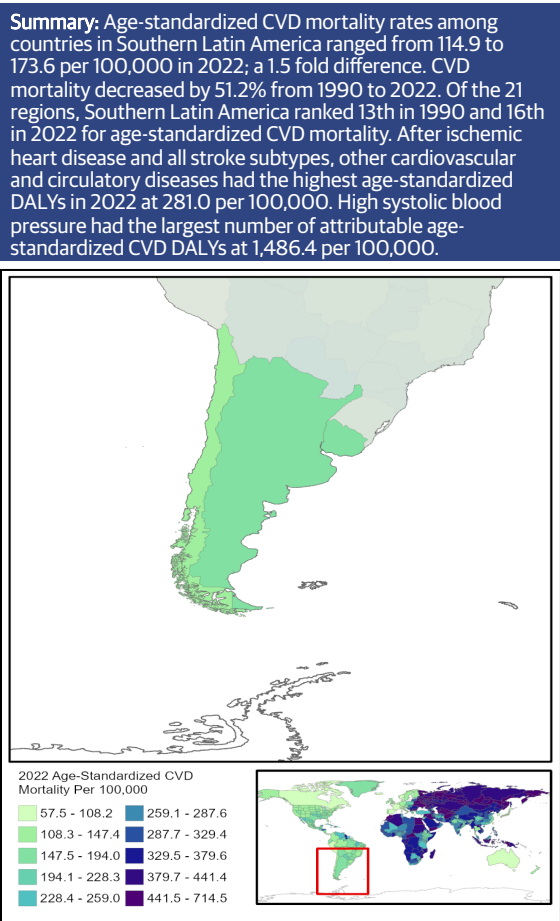
Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	667,615	6,262	104.0	0.9	22.5
Ischemic heart disease	29,774,092	545,993	4,512.7	75.8	1,572.4
Ischemic stroke	7,310,116	133,791	1,243.8	17.4	392.9
Intracerebral hemorrhage	811,487	64,618	161.1	9.3	217.9
Subarachnoid hemorrhage	424,733	20,234	84.2	3.1	93.3
Hypertensive heart disease	1,030,771	77,701	159.5	11.2	245.2
Non-rheumatic calcific aortic valve disease	2,822,210	26,859	399.9	3.5	51.3
Non-rheumatic degenerative mitral valve disease	3,765,229	4,250	531.1	0.6	16.3
Other non-rheumatic valve diseases	712	78	0.2	<0.1	0.4
Myocarditis	55,489	809	17.3	0.2	11.3
Alcoholic cardiomyopathy	94,817	5,917	18.1	1.0	31.7
Other cardiomyopathy	525,115	23,631	124.8	3.6	95.4
Pulmonary arterial hypertension	8,771	1,888	1.7	0.3	7.5
Atrial fibrillation and flutter	8,517,878	43,337	1,209.9	5.6	161.4
Aortic aneurysm	Not estimated	13,625	Not estimated	2.0	42.2
Lower extremity peripheral arterial disease	12,665,608	12,402	1,784.6	1.7	33.7
Endocarditis	51,368	10,617	10.2	1.6	36.4
Other cardiovascular and circulatory diseases	10,519,632	21,465	1,884.4	3.3	182.8

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
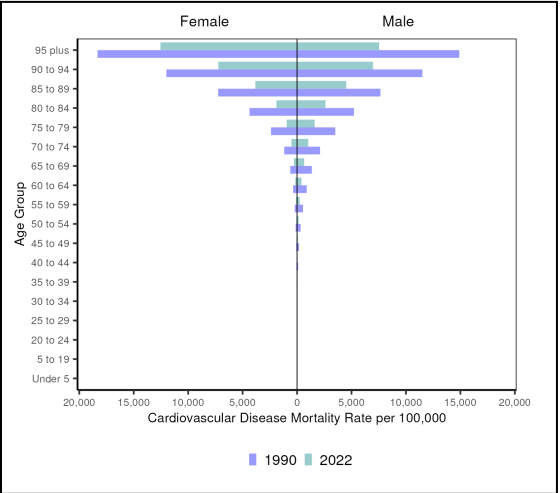

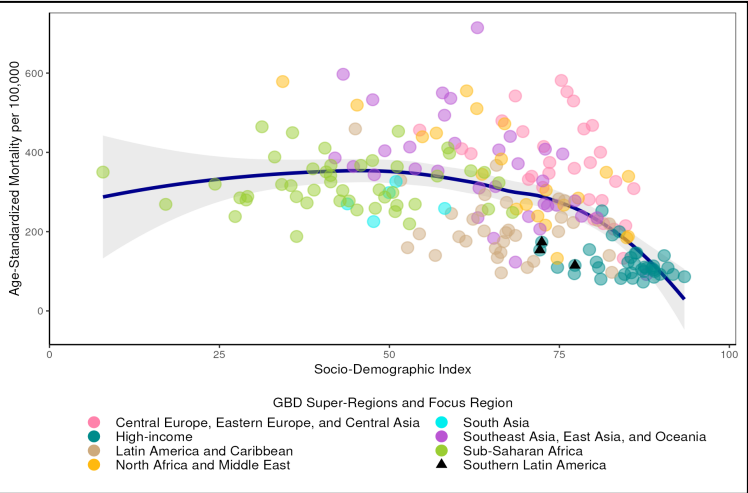Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
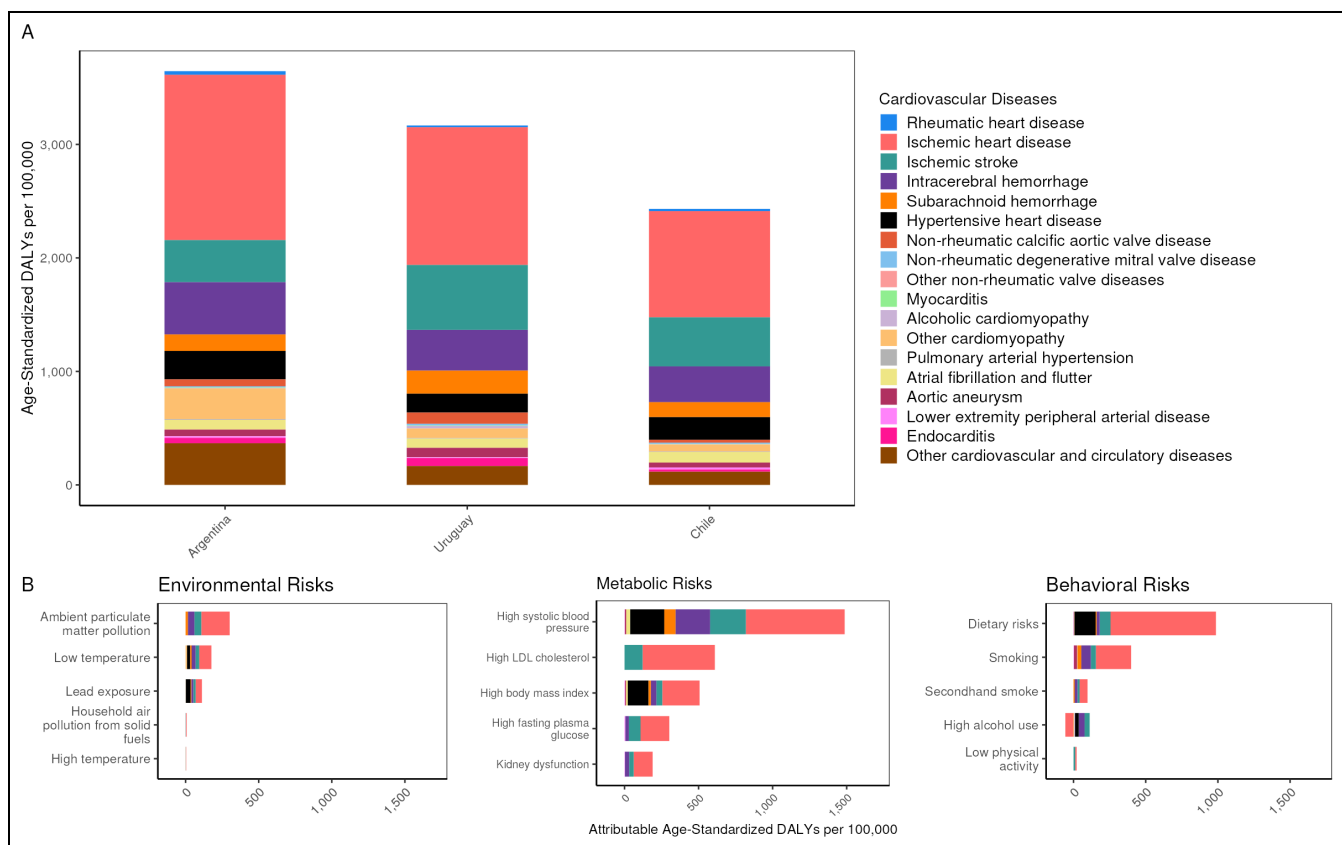
A

B

Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
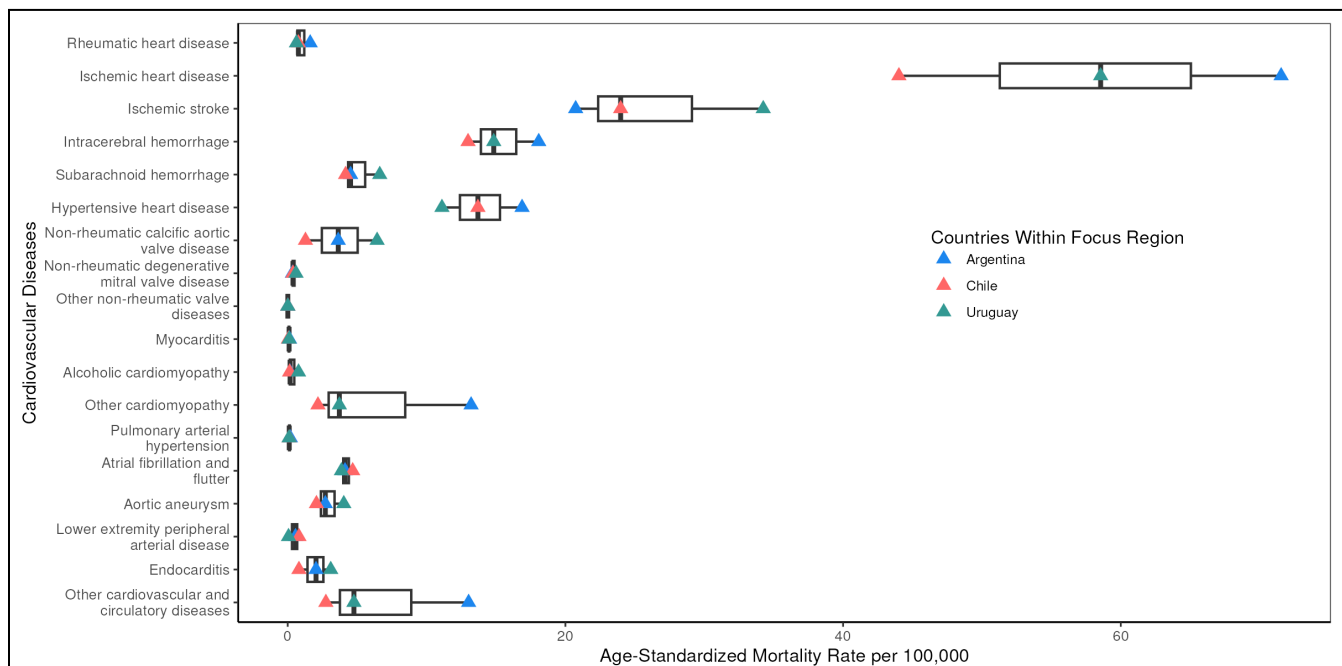

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Southern Latin America
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Southern Latin America ranged from 114.9 to 173.6 per 100,000 in 2022; a 1.5 fold difference. CVD mortality decreased by 51.2% from 1990 to 2022. Of the 21 regions, Southern Latin America ranked 13th in 1990 and 16th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, other cardiovascular and circulatory diseases had the highest age-standardized DALYs in 2022 at 281.0 per 100,000. High systolic blood pressure had the largest number of attributable age-standardized CVD DALYs at 1,486.4 per 100,000.

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	52,634	1,201	61.0	1.3	26.7
Ischemic heart disease	2,609,524	57,655	2,920.1	62.5	1,287.1
Ischemic stroke	528,575	21,539	615.0	22.7	401.3
Intracerebral hemorrhage	204,460	14,720	253.2	16.4	412.0
Subarachnoid hemorrhage	102,243	3,945	125.9	4.5	144.0
Hypertensive heart disease	98,942	14,678	107.9	15.5	230.0
Non-rheumatic calcific aortic valve disease	244,711	2,972	267.5	3.2	53.0
Non-rheumatic degenerative mitral valve disease	128,886	336	141.0	0.4	9.5
Other non-rheumatic valve diseases	23	7	<0.1	<0.1	0.2
Myocarditis	3,935	87	5.4	0.1	3.7
Alcoholic cardiomyopathy	2,095	172	2.6	0.2	5.9
Other cardiomyopathy	71,655	8,491	97.2	9.3	198.6
Pulmonary arterial hypertension	2,260	132	2.8	0.2	5.7
Atrial fibrillation and flutter	419,791	4,074	459.7	4.3	87.2
Aortic aneurysm	Not estimated	2,380	Not estimated	2.6	55.4
Lower extremity peripheral arterial disease	983,138	567	1,071.6	0.6	14.1
Endocarditis	4,242	1,566	5.6	1.7	41.4
Other cardiovascular and circulatory diseases	1,700,581	8,696	1,970.7	9.5	281.0

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
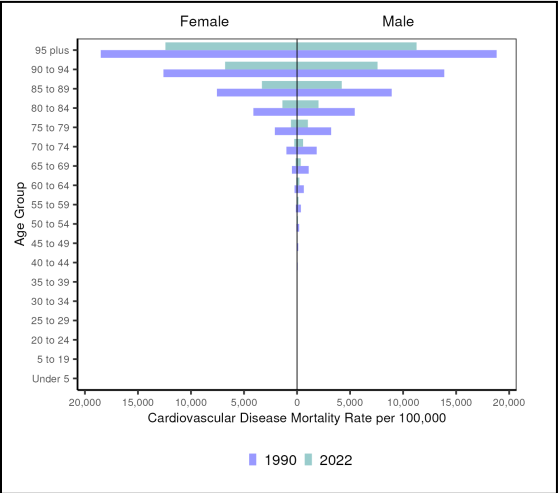

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
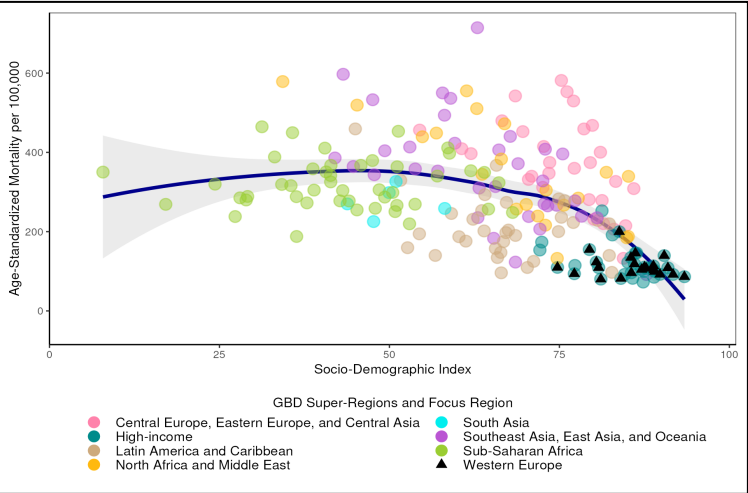

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
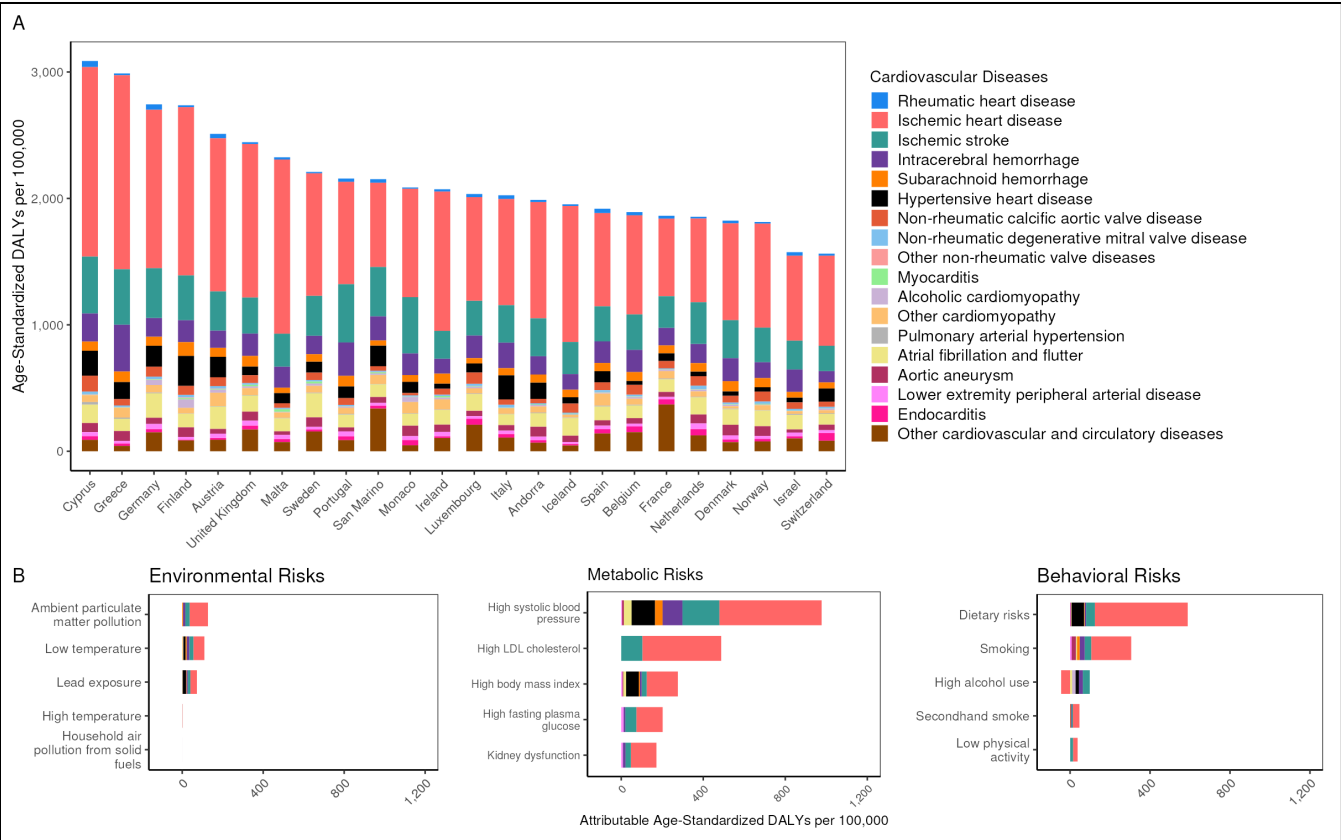
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
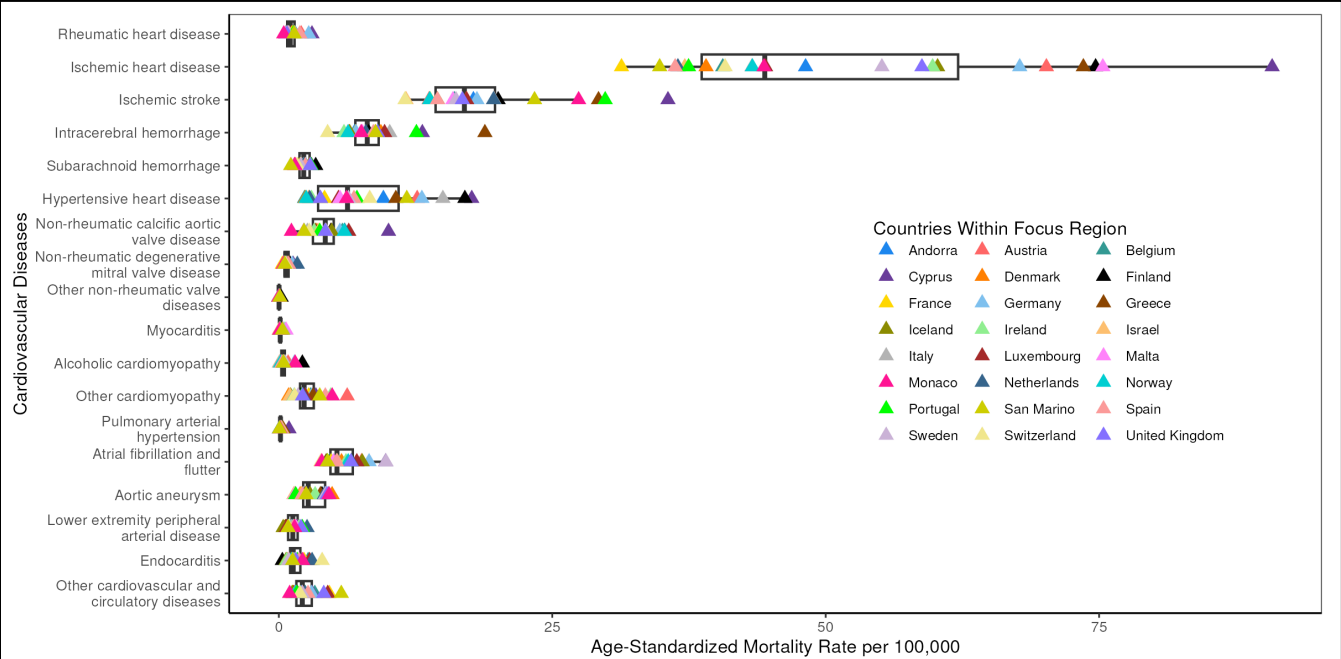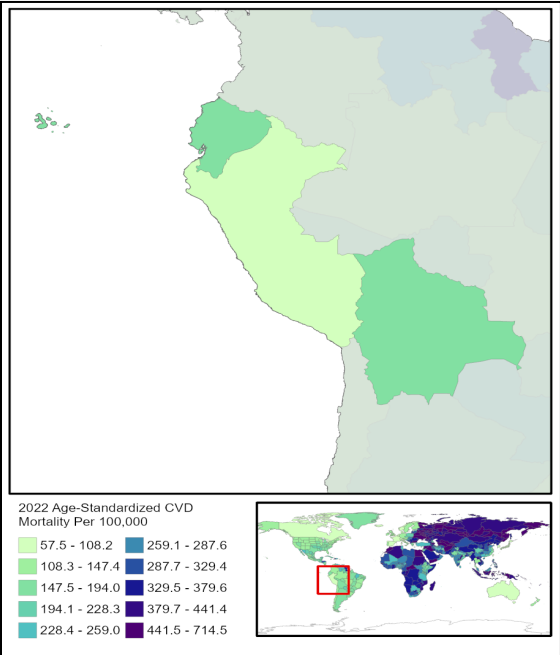

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Western Europe
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Western Europe ranged from 80.2 to 199.9 per 100,000 in 2022; a 2.5 fold difference. CVD mortality decreased by 60.2% from 1990 to 2022. Of the 21 regions, Western Europe ranked 15th in 1990 and 19th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, other cardiovascular and circulatory diseases had the highest age-standardized DALYs in 2022 at 166.7 per 100,000. High systolic blood pressure had the largest number of attributable age-standardized CVD DALYs at 977.2 per 100,000.
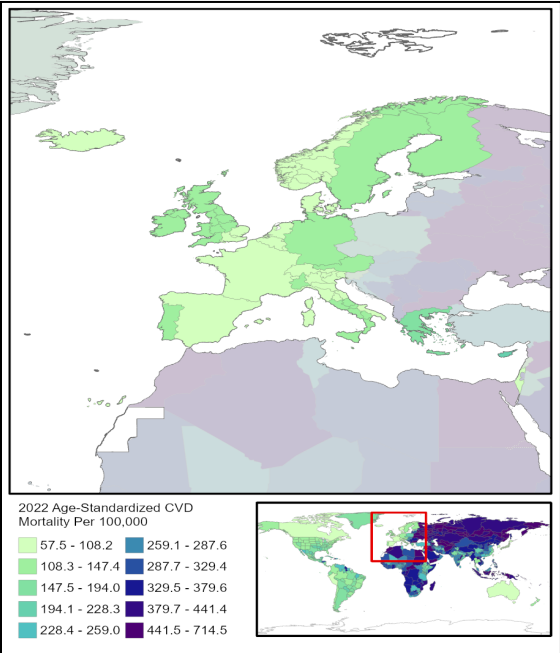
Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

2022 Age-Standardized CVD Mortality Per 100,000

- 57.5 – 108.2
- 108.3 – 147.4
- 147.5 – 194.0
- 194.1 – 228.3
- 228.4 – 259.0
- 259.1 – 287.6
- 287.7 – 329.4
- 329.5 – 379.6
- 379.7 – 441.4
- 441.5 – 714.5

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	115,044	18,447	14.9	1.6	26.5
Ischemic heart disease	27,188,008	576,481	2,928.5	49.5	957.8
Ischemic stroke	6,280,537	228,785	702.4	17.4	312.8
Intracerebral hemorrhage	795,635	95,176	112.6	8.5	170.5
Subarachnoid hemorrhage	570,991	22,622	84.6	2.3	68.3
Hypertensive heart disease	1,211,065	115,009	108.9	8.6	114.2
Non-rheumatic calcific aortic valve disease	4,297,106	55,830	419.1	4.3	61.9
Non-rheumatic degenerative mitral valve disease	3,167,713	9,420	308.5	0.8	15.4
Other non-rheumatic valve diseases	1,693	298	0.2	<0.1	0.5
Myocarditis	45,972	1,523	9.6	0.2	5.2
Alcoholic cardiomyopathy	95,734	4,892	14.4	0.6	17.2
Other cardiomyopathy	530,824	31,479	86.2	2.7	58.5
Pulmonary arterial hypertension	23,892	1,756	3.6	0.2	4.8
Atrial fibrillation and flutter	7,681,289	81,522	749.7	6.1	128.1
Aortic aneurysm	Not estimated	29,615	Not estimated	2.7	51.0
Lower extremity peripheral arterial disease	20,564,688	17,682	2,099.2	1.4	30.4
Endocarditis	94,539	19,801	12.7	1.7	31.4
Other cardiovascular and circulatory diseases	17,808,574	32,595	2,140.9	3.0	166.7

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
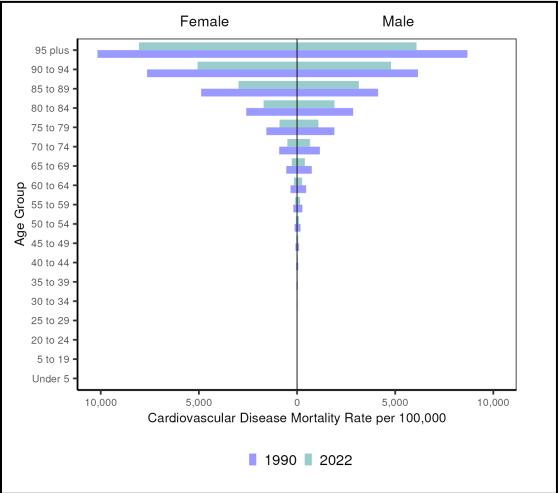

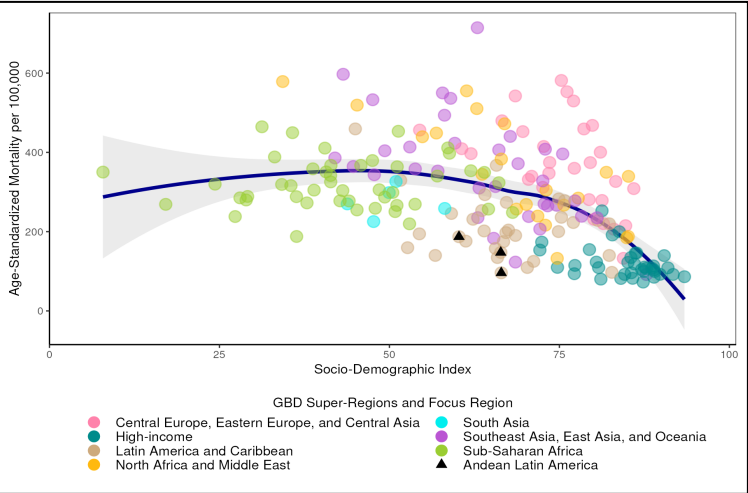Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
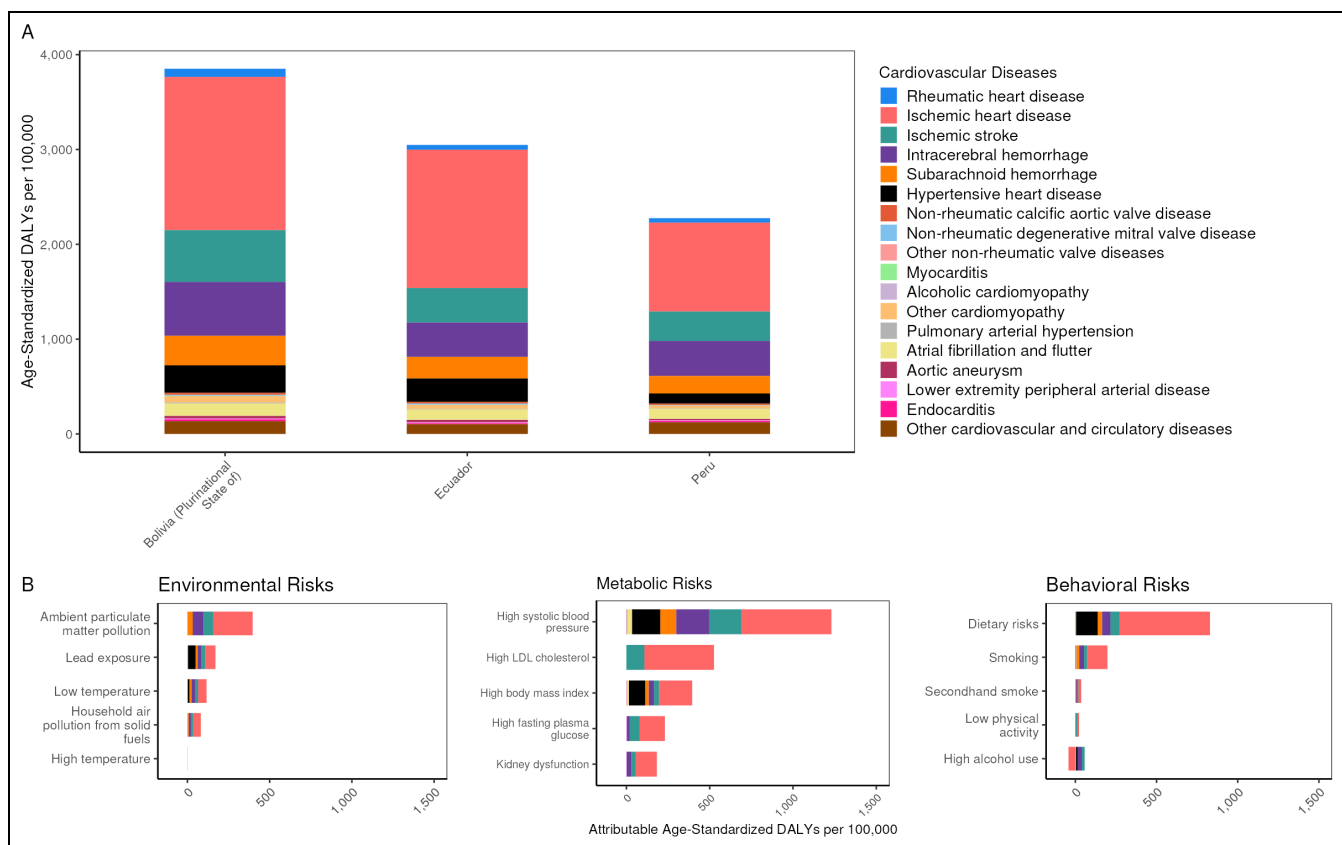
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
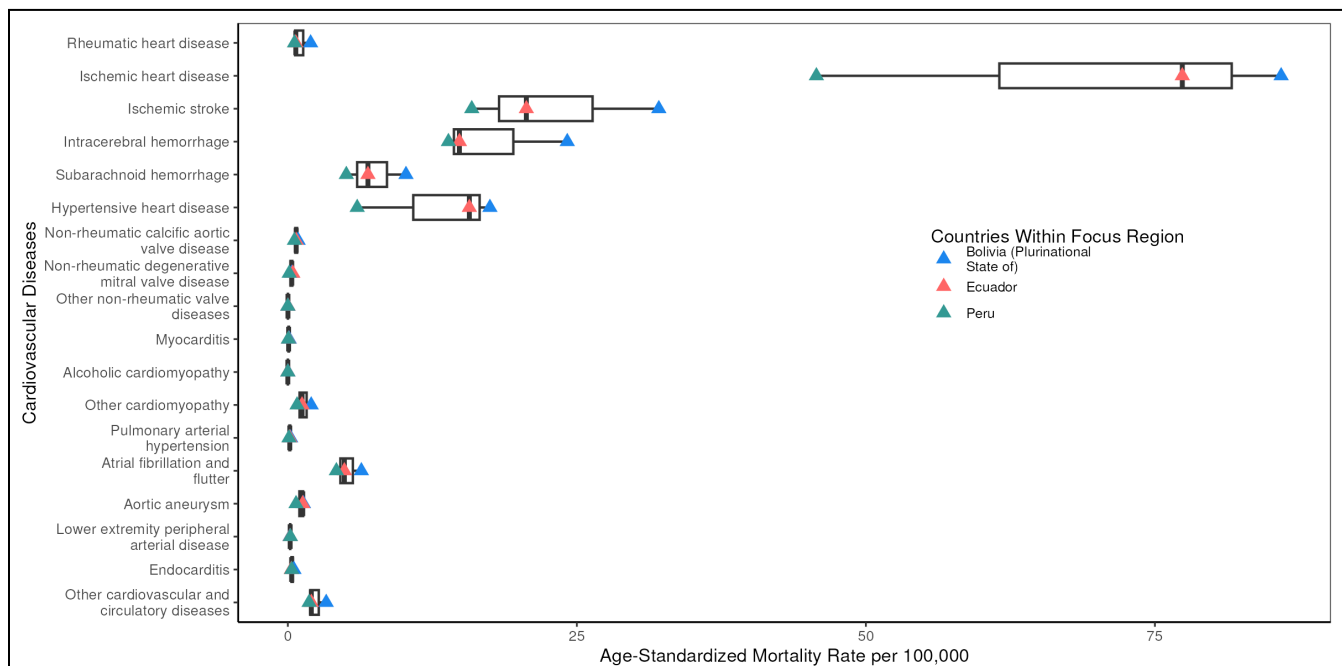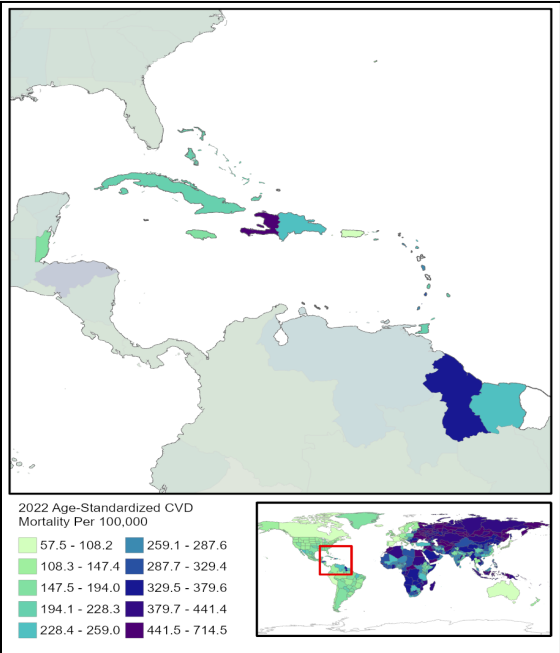

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Andean Latin America
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Andean Latin America ranged from 96.1 to 187.2. per 100,000 in 2022; a 1.9 fold difference. CVD mortality decreased by 39.9% from 1990 to 2022. Out of the 21 regions, Andean Latin America was ranked 21st in 1990 and 18th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 169.3 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 1,230.6 per 100,000.

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	457,455	494	656.7	0.8	53.7
Ischemic heart disease	1,070,915	34,037	1,721.7	59.0	1,173.5
Ischemic stroke	469,672	10,679	756.7	19.0	356.2
Intracerebral hemorrhage	99,306	9,357	150.7	15.6	397.3
Subarachnoid hemorrhage	155,742	3,937	242.6	6.3	216.0
Hypertensive heart disease	85,773	5,595	145.0	9.9	169.3
Non-rheumatic calcific aortic valve disease	80,043	391	134.1	0.7	17.1
Non-rheumatic degenerative mitral valve disease	16,939	144	28.4	0.2	6.7
Other non-rheumatic valve diseases	24	4	<0.1	<0.1	0.1
Myocarditis	3,365	39	5.2	0.1	2.4
Alcoholic cardiomyopathy	27	3	<0.1	<0.1	0.1
Other cardiomyopathy	23,166	660	35.9	1.1	39.2
Pulmonary arterial hypertension	1,809	84	2.8	0.1	5.1
Atrial fibrillation and flutter	402,429	2,532	684.4	4.6	111.4
Aortic aneurysm	Not estimated	563	Not estimated	1.0	20.3
Lower extremity peripheral arterial disease	502,546	116	858.6	0.2	7.8
Endocarditis	2,992	221	4.6	0.4	13.6
Other cardiovascular and circulatory diseases	780,772	1,237	1,247.7	2.1	118.8

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
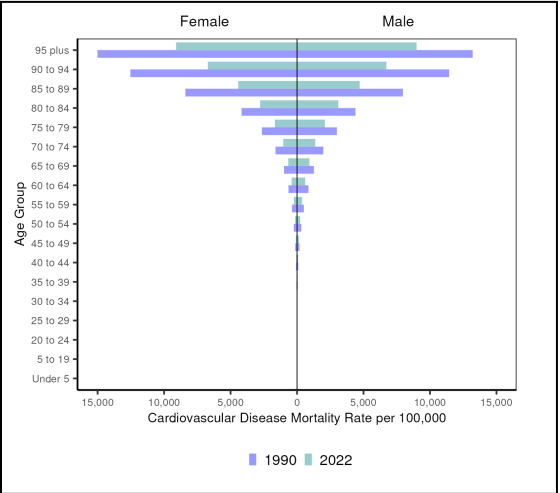

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
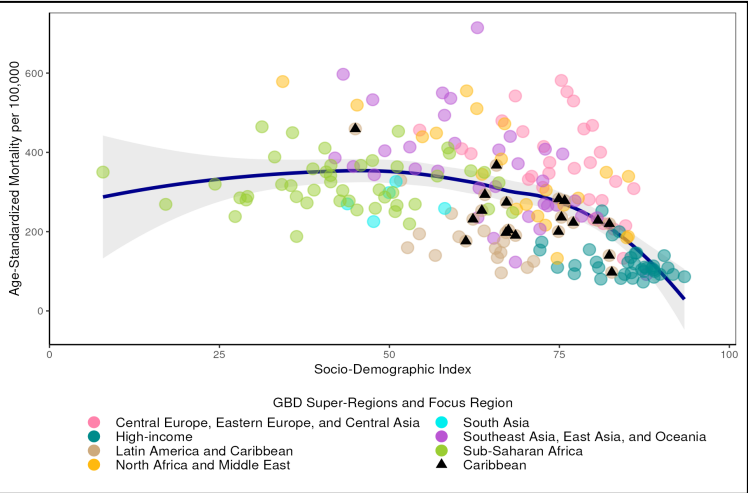

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
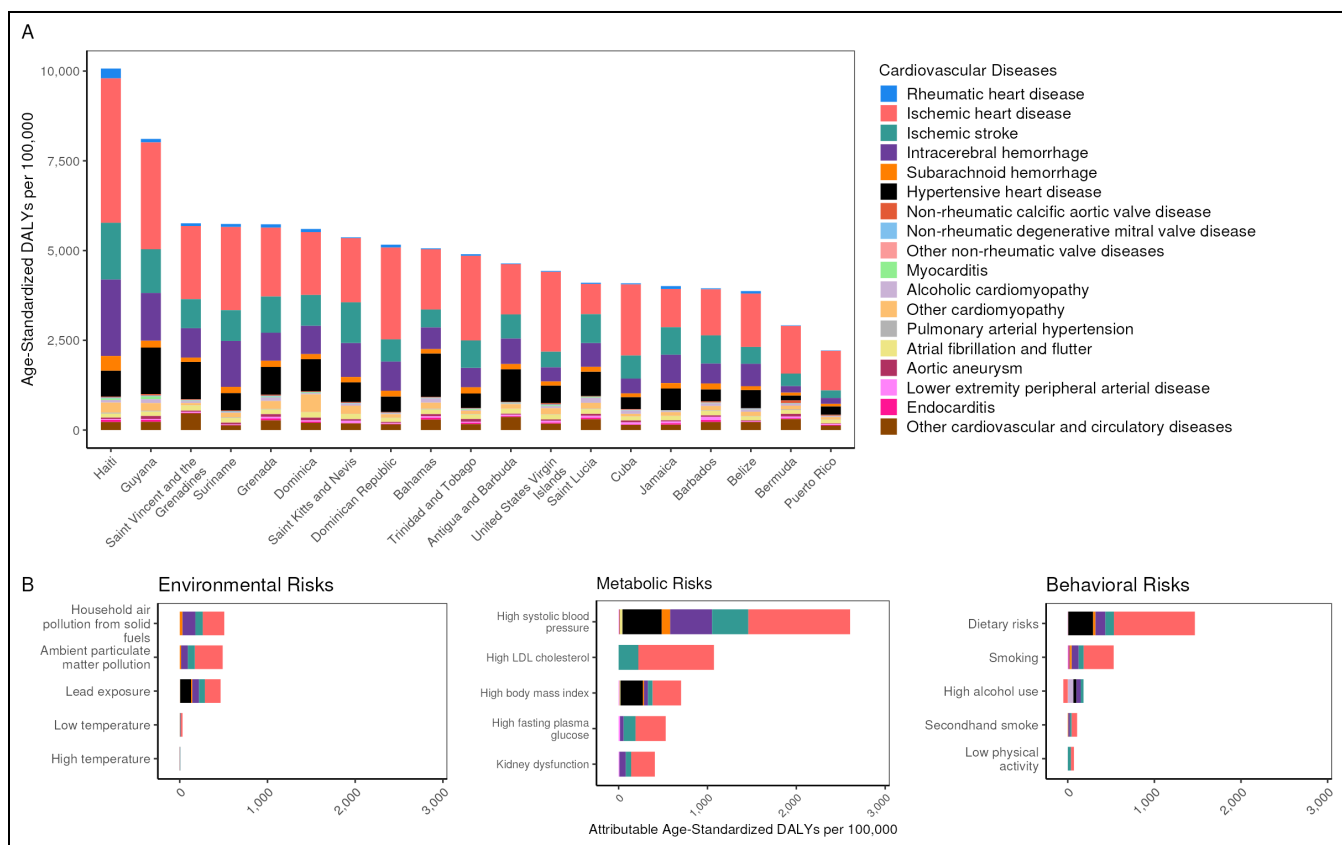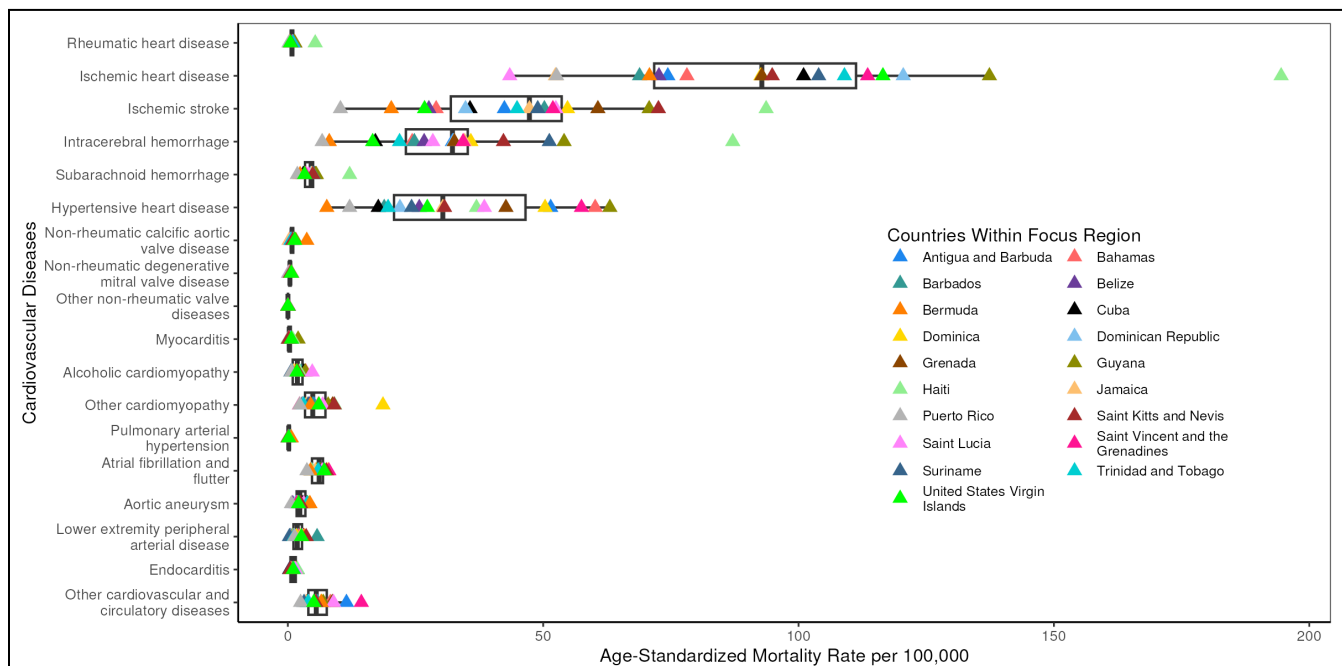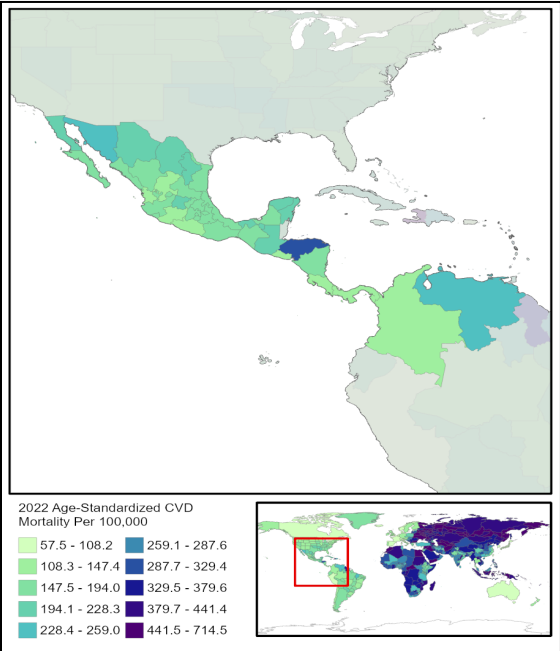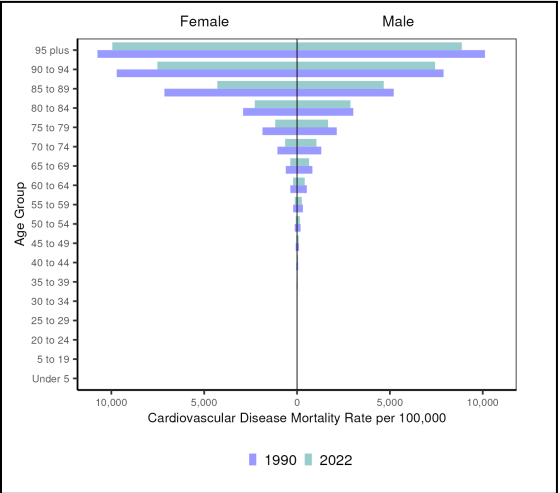
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in the Caribbean
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in the Caribbean ranged from 97.3 to 459.2 per 100,000 in 2022; a 4.7 fold difference. CVD mortality decreased by 34.7% from 1990 to 2022. Out of the 21 regions, the Caribbean was ranked 11th in 1990 and 13th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 441.6 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 2,605.3 per 100,000.

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	261,123	921	540.7	1.8	110.6
Ischemic heart disease	1,659,127	58,168	3,058.2	104.6	2,235.9
Ischemic stroke	490,869	21,153	913.3	38.0	701.9
Intracerebral hemorrhage	105,537	16,704	202.2	30.6	812.9
Subarachnoid hemorrhage	107,267	2,705	203.4	5.1	192.7
Hypertensive heart disease	101,513	12,193	185.4	21.8	441.6
Non-rheumatic calcific aortic valve disease	83,167	473	151.0	0.9	21.6
Non-rheumatic degenerative mitral valve disease	20,214	214	36.9	0.4	12.6
Other non-rheumatic valve diseases	34	10	0.1	<0.1	0.5
Myocarditis	3,162	178	6.5	0.4	21.4
Alcoholic cardiomyopathy	9,102	1,096	17.2	2.0	62.3
Other cardiomyopathy	25,868	2,200	53.5	4.2	138.5
Pulmonary arterial hypertension	1,233	106	2.4	0.2	11.6
Atrial fibrillation and flutter	388,887	2,633	704.9	4.6	112.8
Aortic aneurysm	Not estimated	1,189	Not estimated	2.2	41.2
Lower extremity peripheral arterial disease	602,048	1,111	1,087.3	2.0	37.5
Endocarditis	2,215	444	4.6	0.9	33.3
Other cardiovascular and circulatory diseases	586,853	2,294	1,101.1	4.3	179.7

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.

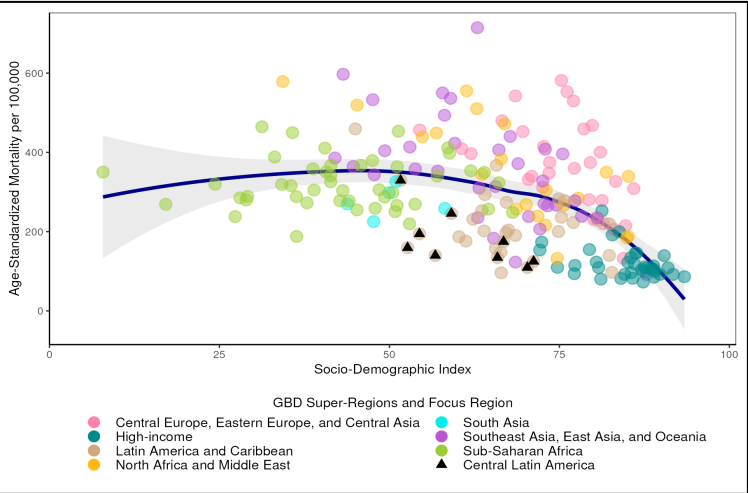Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
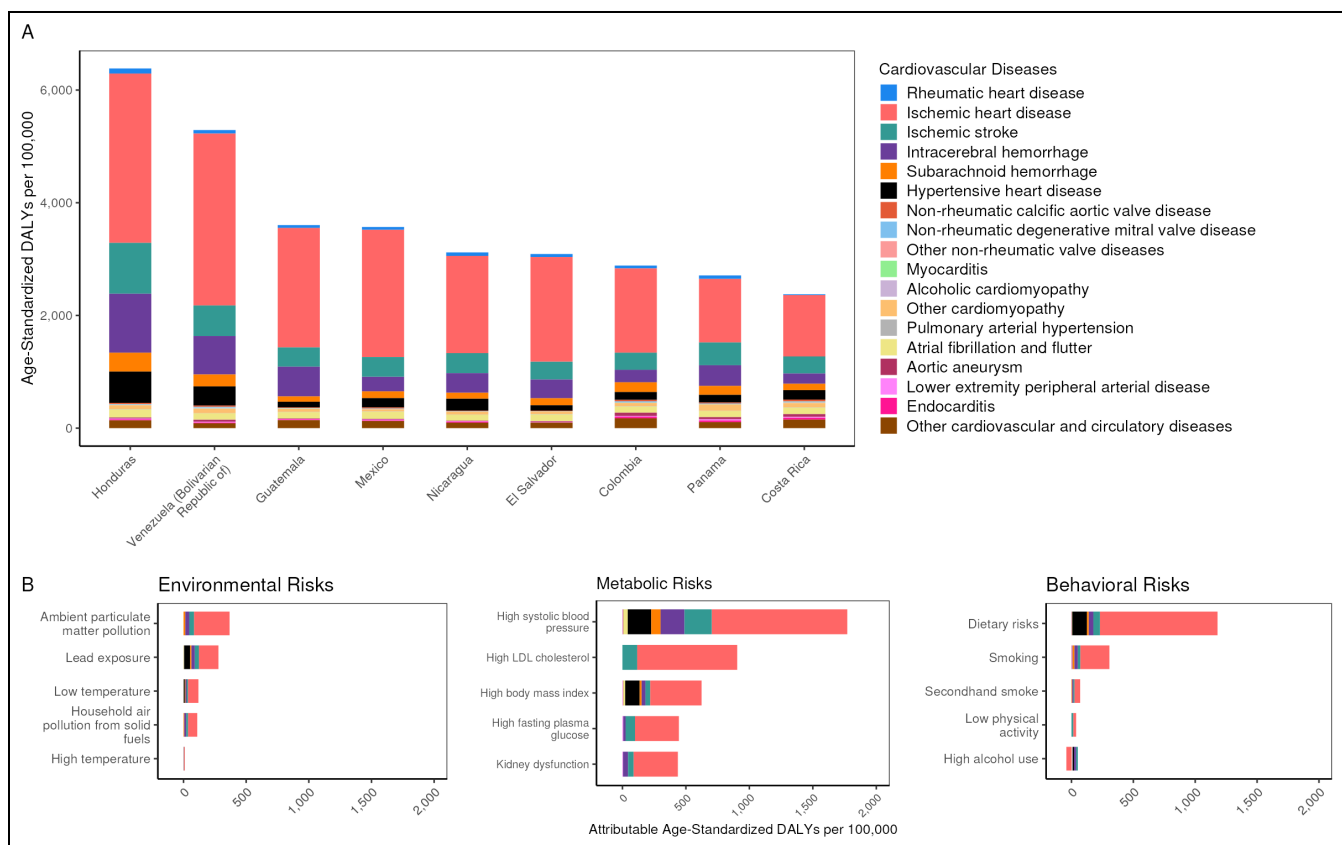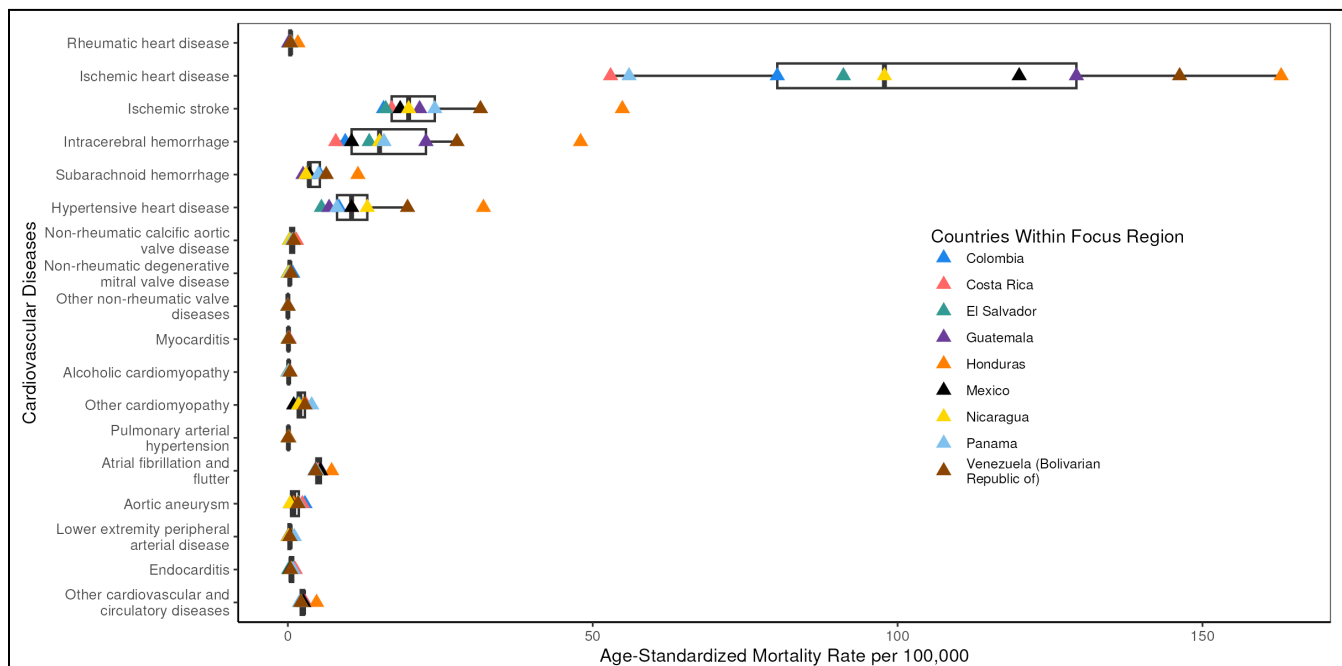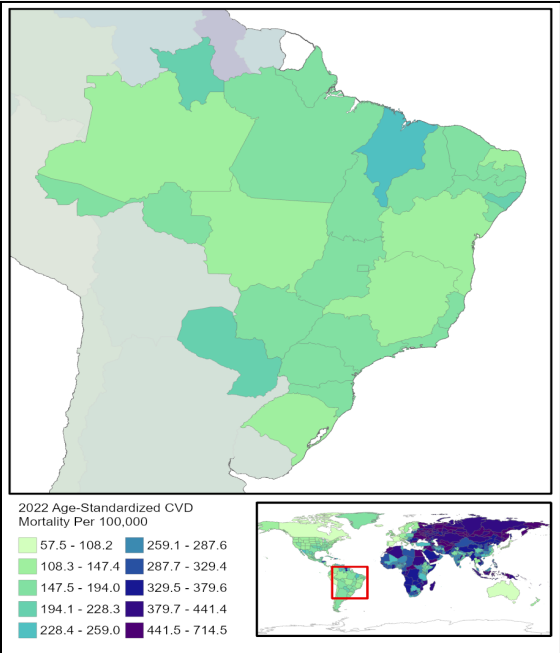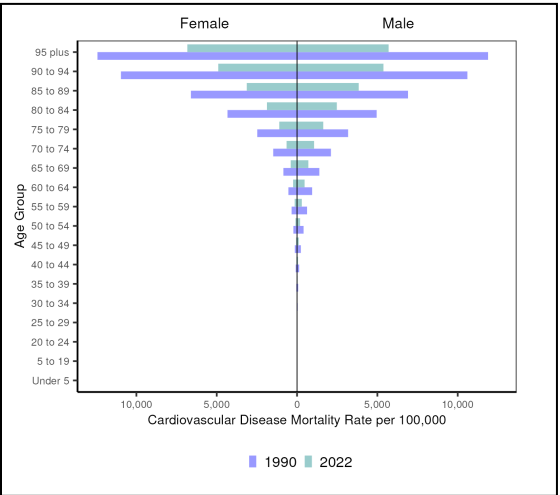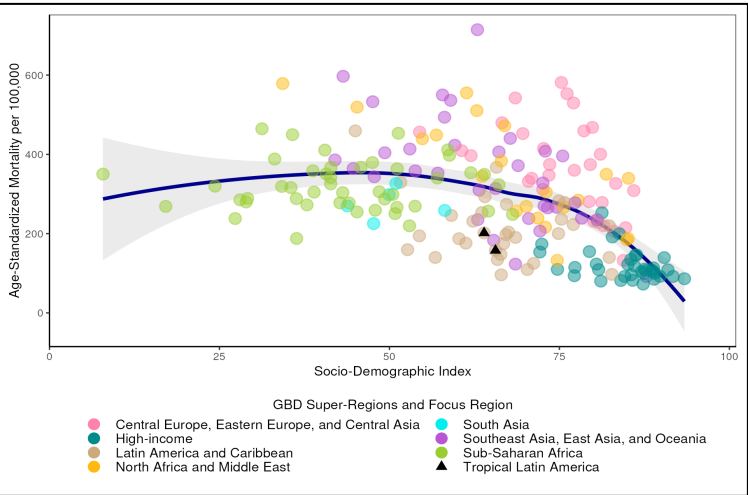
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Central Latin America
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Central Latin America ranged from 109.5 to 329.4 per 100,000 in 2022; a 3.0 fold difference. CVD mortality decreased by 25.1% from 1990 to 2022. Out of the 21 regions, Central Latin America was ranked 19th in 1990 and 14th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 185.0 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized DALYs at 1,771.4 per 100,000.

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	2,180,136	1,085	818.2	0.4	50.5
Ischemic heart disease	6,773,869	266,503	2,606.2	108.9	2,112.4
Ischemic stroke	2,013,978	47,303	782.1	19.9	369.8
Intracerebral hemorrhage	414,191	34,937	156.5	13.8	339.3
Subarachnoid hemorrhage	515,867	11,313	195.6	4.4	145.5
Hypertensive heart disease	293,297	26,580	119.2	11.1	185.0
Non-rheumatic calcific aortic valve disease	415,329	1,998	163.5	0.8	20.0
Non-rheumatic degenerative mitral valve disease	94,050	918	37.1	0.4	9.0
Other non-rheumatic valve diseases	416	53	0.2	<0.1	0.5
Myocarditis	15,823	219	6.2	0.1	4.0
Alcoholic cardiomyopathy	7,615	473	2.8	0.2	6.3
Other cardiomyopathy	98,861	3,939	40.4	1.6	50.8
Pulmonary arterial hypertension	8,503	223	3.2	0.1	3.2
Atrial fibrillation and flutter	1,830,384	11,672	731.2	5.0	121.3
Aortic aneurysm	Not estimated	3,108	Not estimated	1.3	25.9
Lower extremity peripheral arterial disease	3,237,956	906	1,293.0	0.4	13.0
Endocarditis	11,943	1,309	4.8	0.5	17.6
Other cardiovascular and circulatory diseases	3,451,669	6,319	1,330.6	2.6	131.7

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
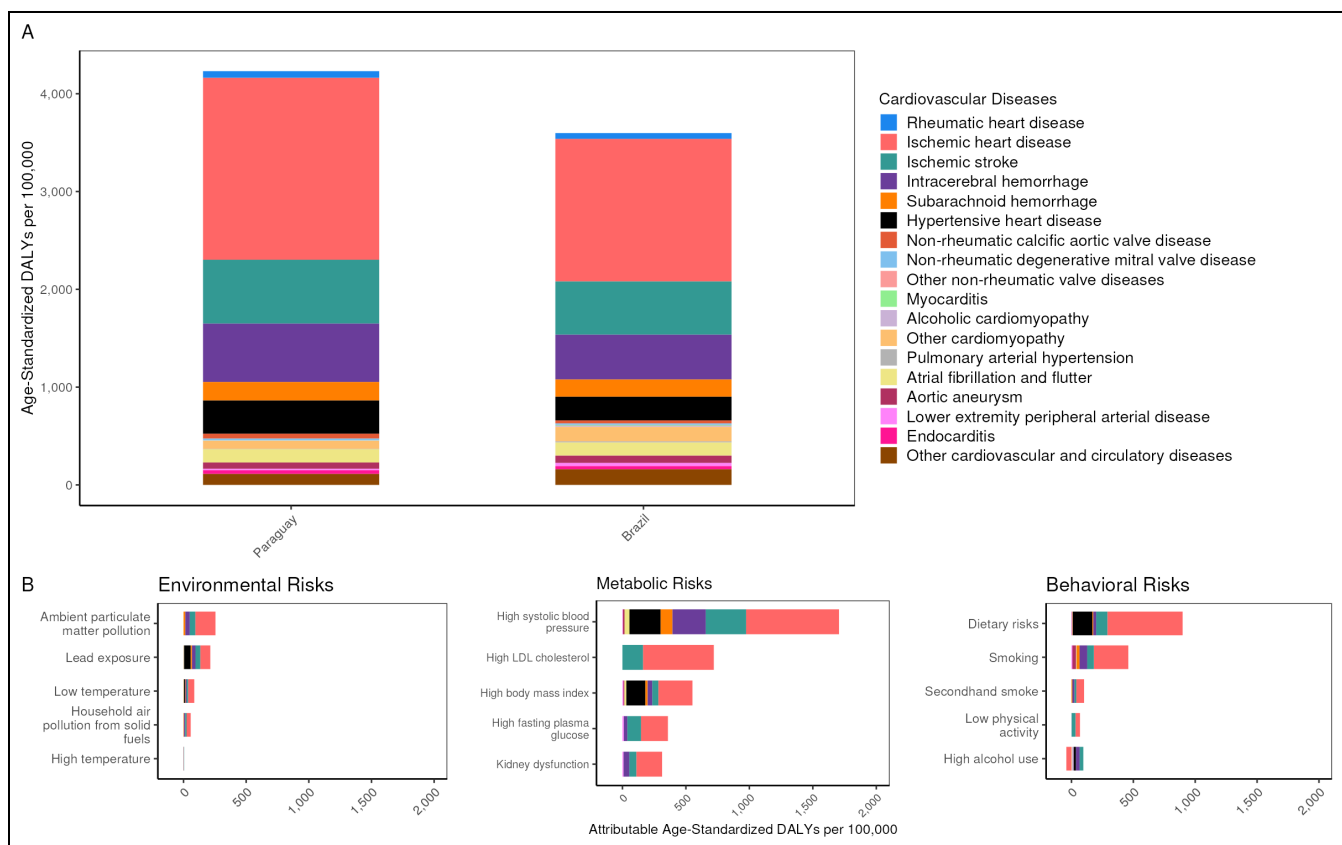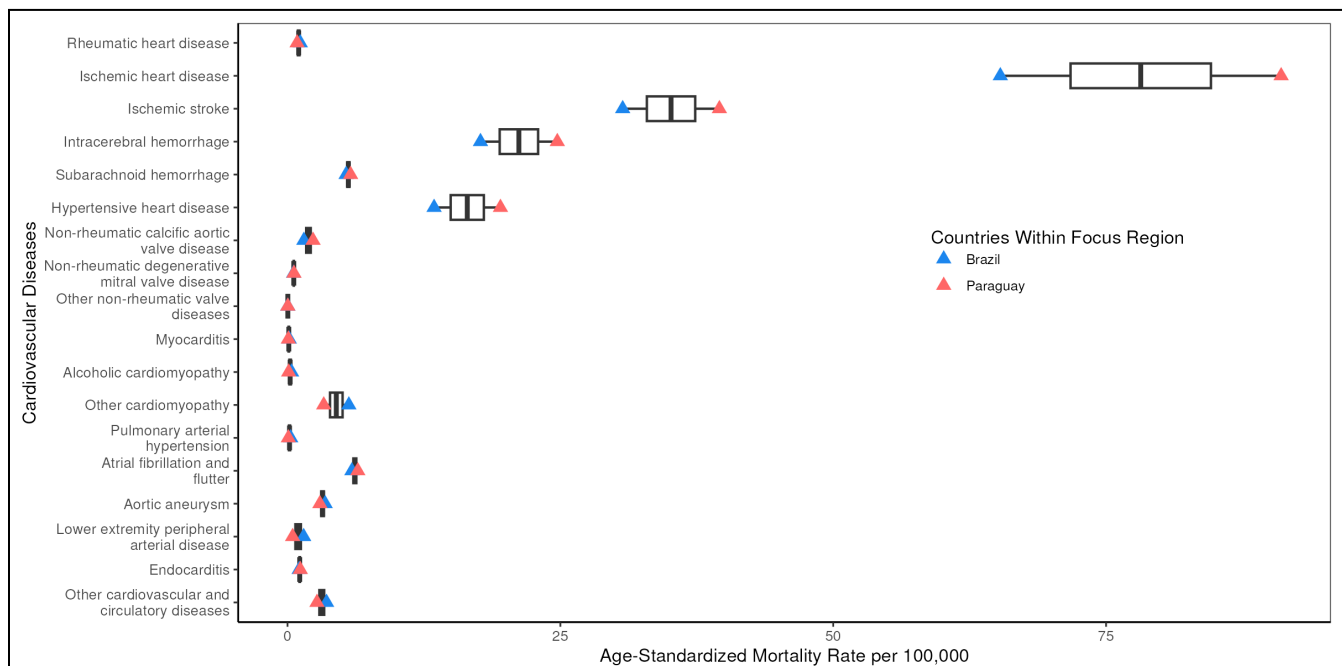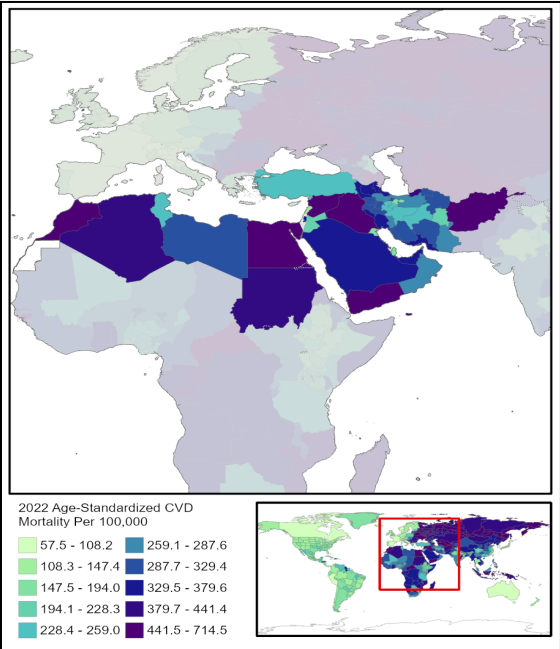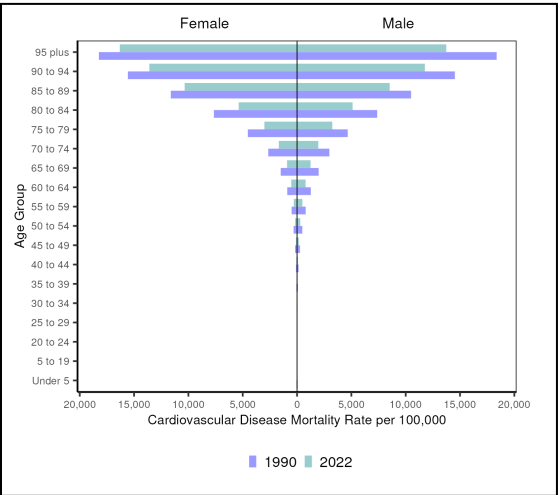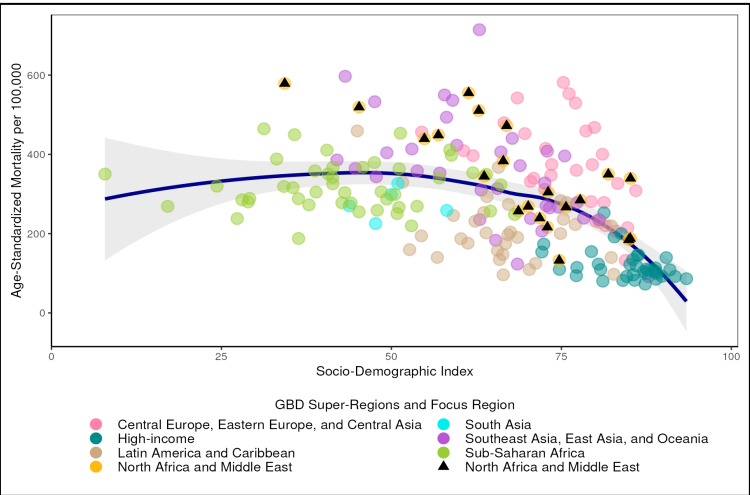
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Tropical Latin America
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Tropical Latin America ranged from 157.7 to 201.8 per 100,000 in 2022; a 1.3 fold difference. CVD mortality decreased by 52.6% from 1990 to 2022. Out of the 21 regions, Tropical Latin America was ranked 12th in 1990 and 15th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 245.4 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized DALYs at 1,706.2 per 100,000.

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	1,178,179	3,017	492.9	1.2	59.1
Ischemic heart disease	3,706,448	170,497	1,397.5	65.8	1,467.1
Ischemic stroke	2,083,023	77,319	795.6	30.9	545.1
Intracerebral hemorrhage	450,678	46,943	173.2	17.8	462.2
Subarachnoid hemorrhage	394,619	14,180	150.2	5.4	175.8
Hypertensive heart disease	424,780	34,337	166.1	13.6	245.4
Non-rheumatic calcific aortic valve disease	377,483	3,857	143.7	1.5	31.1
Non-rheumatic degenerative mitral valve disease	113,713	1,459	43.2	0.6	14.2
Other non-rheumatic valve diseases	477	73	0.2	<0.1	0.8
Myocarditis	16,568	379	7.1	0.2	6.3
Alcoholic cardiomyopathy	19,642	983	7.5	0.4	13.6
Other cardiomyopathy	276,933	14,154	118.0	5.6	147.0
Pulmonary arterial hypertension	6,328	709	2.5	0.3	9.3
Atrial fibrillation and flutter	2,055,246	14,553	787.2	5.9	136.0
Aortic aneurysm	Not estimated	8,909	Not estimated	3.4	74.5
Lower extremity peripheral arterial disease	2,903,792	3,707	1,118.7	1.5	30.9
Endocarditis	14,833	2,771	6.6	1.1	33.9
Other cardiovascular and circulatory diseases	3,621,645	9,064	1,403.2	3.6	158.2

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
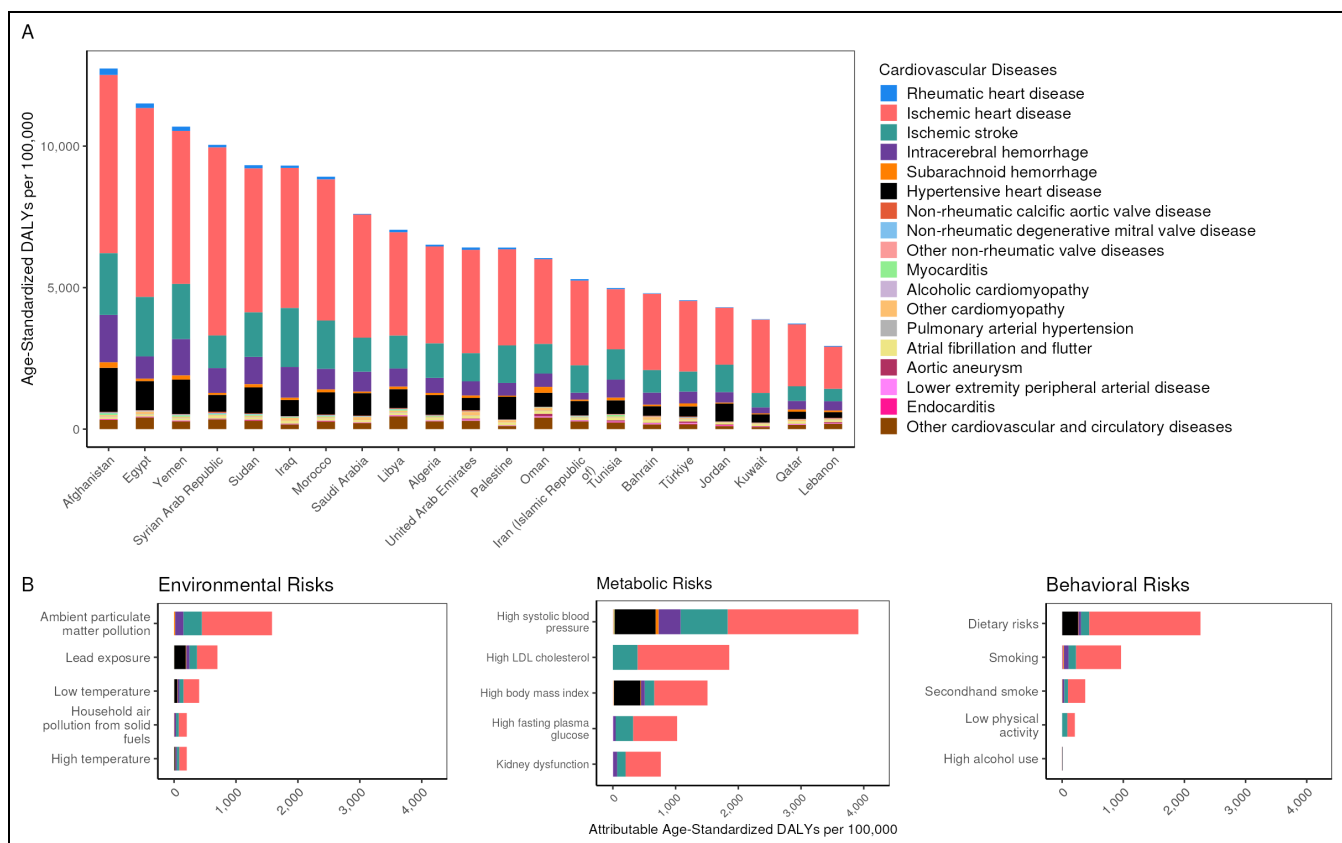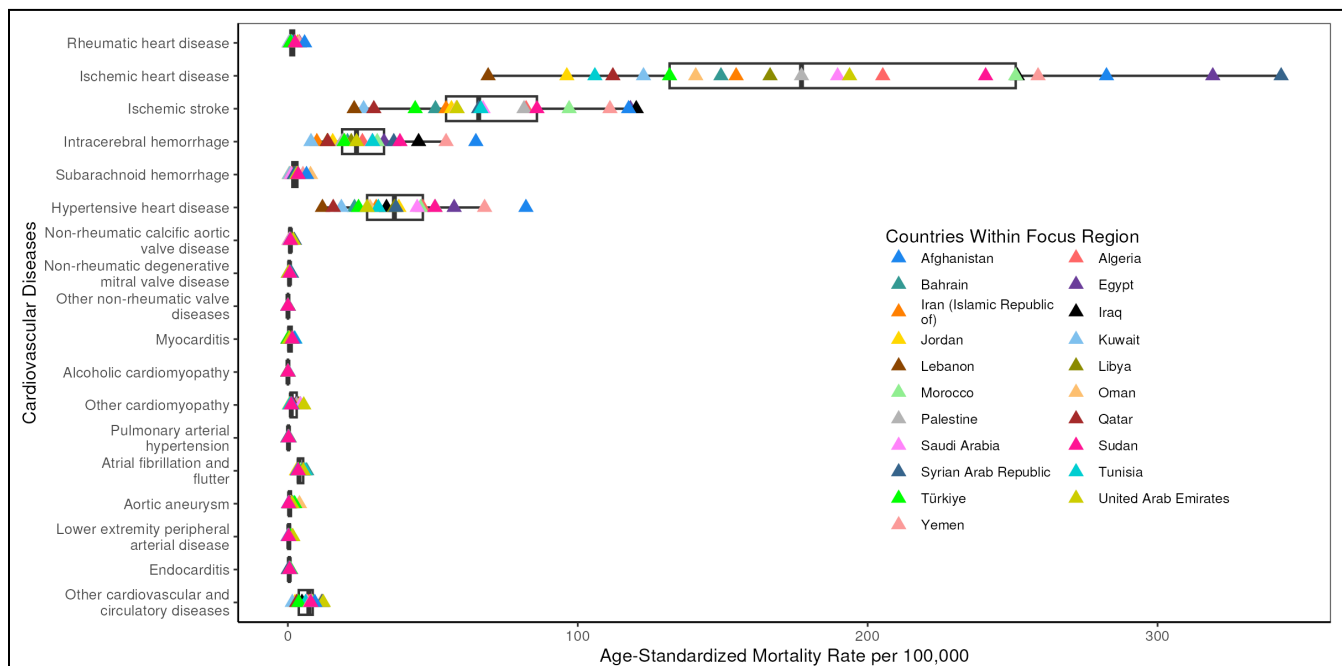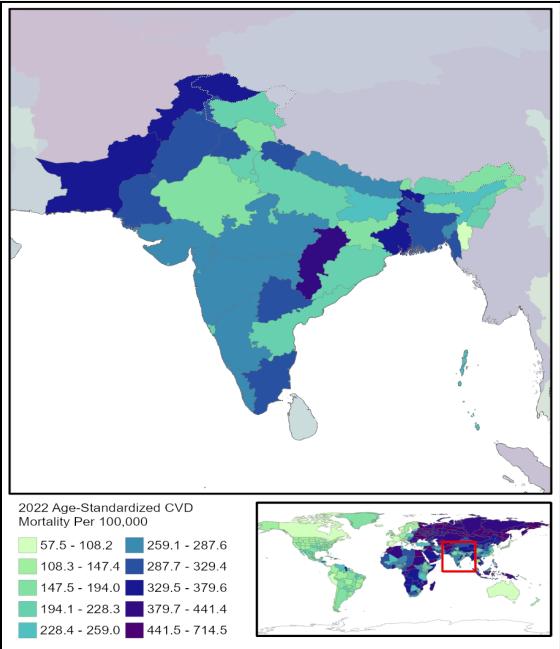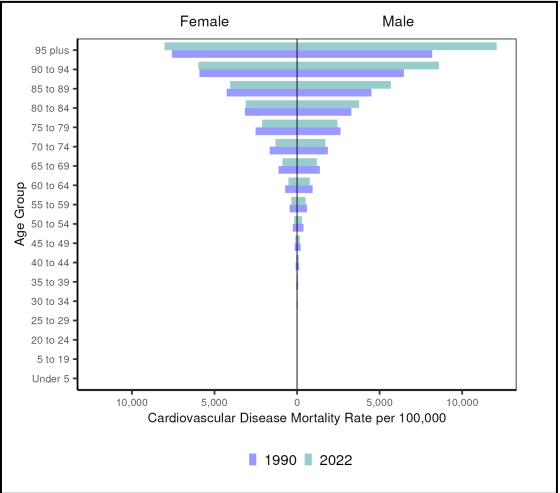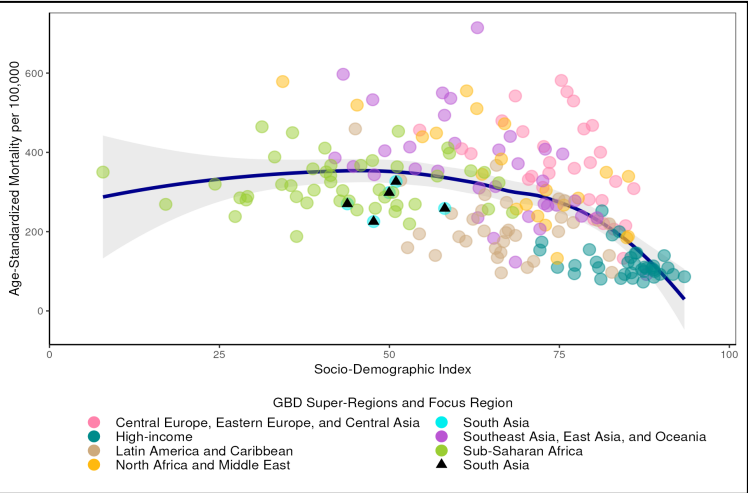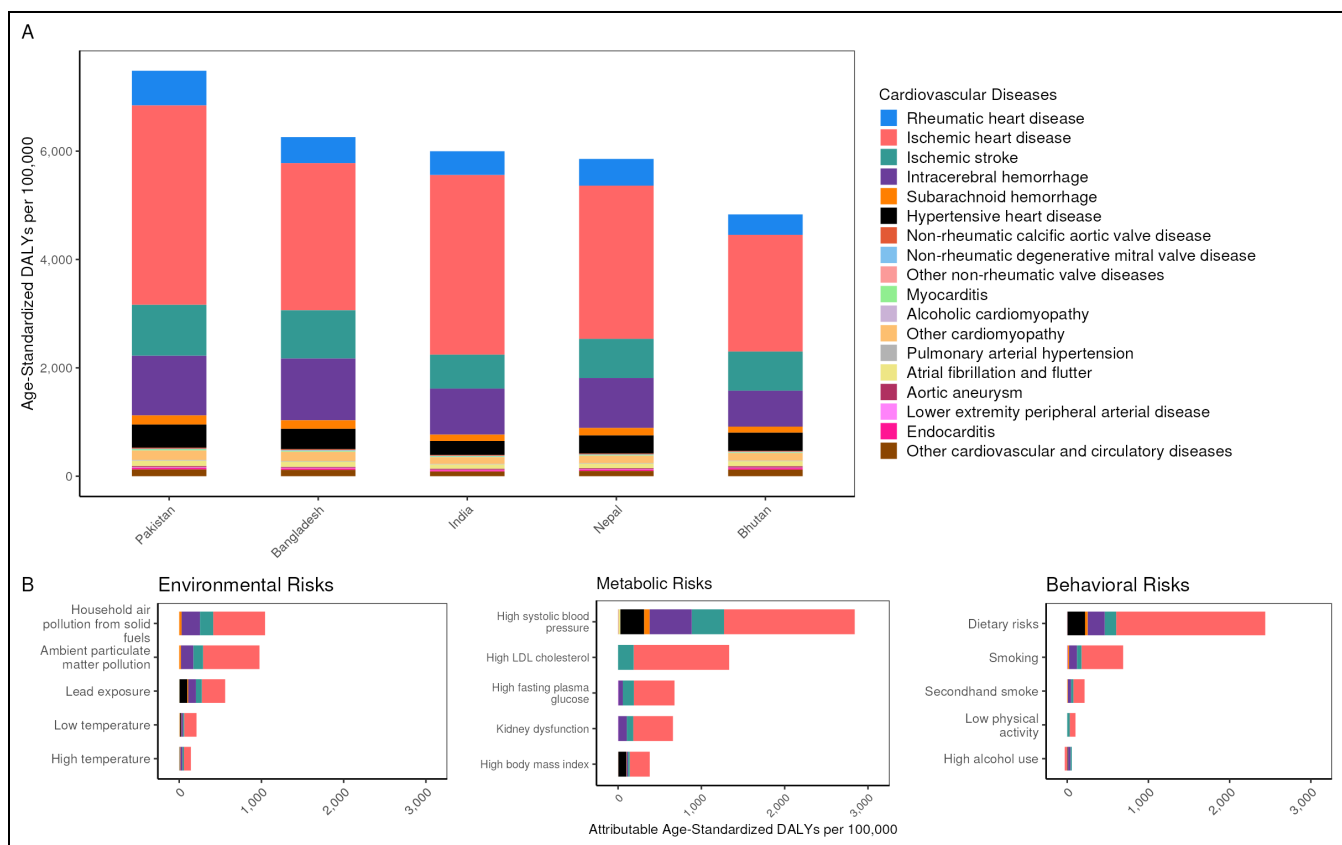
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
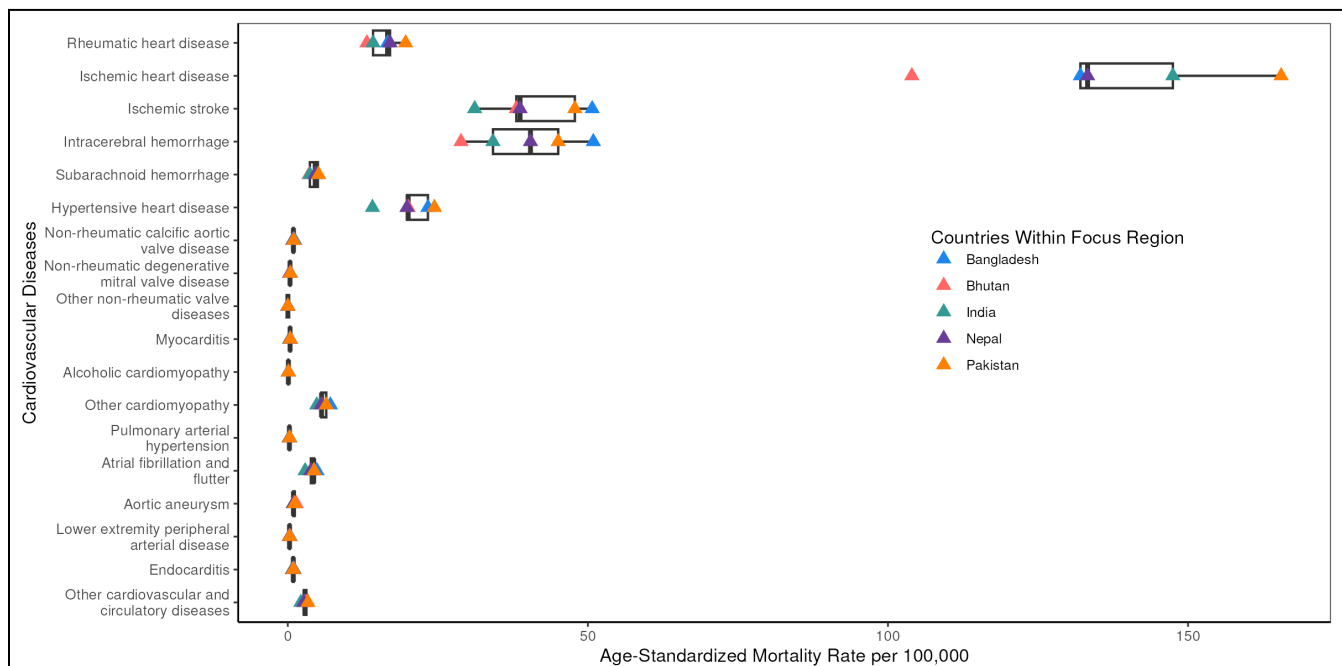

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in North Africa and Middle East
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in North Africa and Middle East ranged from 132.5 to 578.7 per 100,000 in 2022; a 4.4 fold difference. CVD mortality decreased by 31.6% from 1990 to 2022. Of the 21 regions, North Africa and Middle East ranked 3rd in 1990 and 5th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 654.8 per 100,000. High systolic blood pressure had the largest number of attributable age-standardized CVD DALYs at 3,914.0 per 100,000.
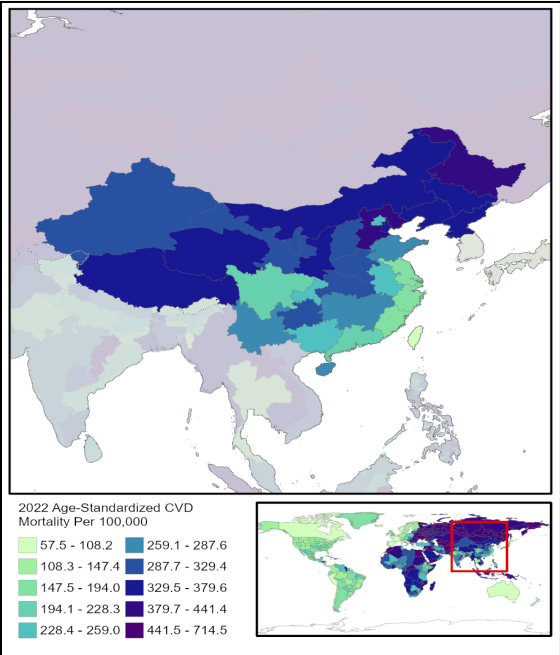
Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	2,764,881	9,411	420.5	1.9	82.2
Ischemic heart disease	29,397,709	770,738	5,780.2	196.2	4,028.1
Ischemic stroke	4,390,907	254,063	803.4	71.8	1,267.9
Intracerebral hemorrhage	1,207,552	112,756	199.2	26.0	631.2
Subarachnoid hemorrhage	660,160	12,513	115.1	2.8	86.9
Hypertensive heart disease	1,043,500	136,843	240.0	38.0	654.8
Non-rheumatic calcific aortic valve disease	260,404	3,603	56.9	0.9	20.0
Non-rheumatic degenerative mitral valve disease	271,543	3,108	63.3	0.7	18.2
Other non-rheumatic valve diseases	3,516	338	0.6	0.1	2.0
Myocarditis	33,842	3,336	5.8	0.8	22.0
Alcoholic cardiomyopathy	3,065	124	0.5	<0.1	0.8
Other cardiomyopathy	311,277	7,084	52.1	1.5	53.3
Pulmonary arterial hypertension	11,860	1,459	2.0	0.3	11.6
Atrial fibrillation and flutter	1,560,144	11,850	397.3	4.0	78.6
Aortic aneurysm	Not estimated	4,152	Not estimated	1.0	21.5
Lower extremity peripheral arterial disease	3,580,213	1,941	876.0	0.5	13.8
Endocarditis	17,388	2,628	3.0	0.6	17.4
Other cardiovascular and circulatory diseases	8,613,986	30,165	1,640.6	7.2	271.6

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
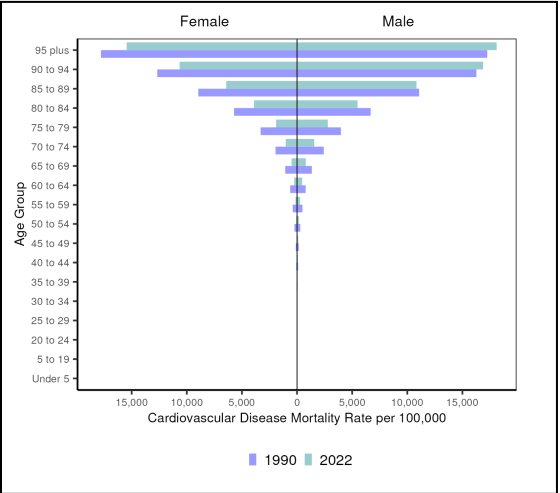

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
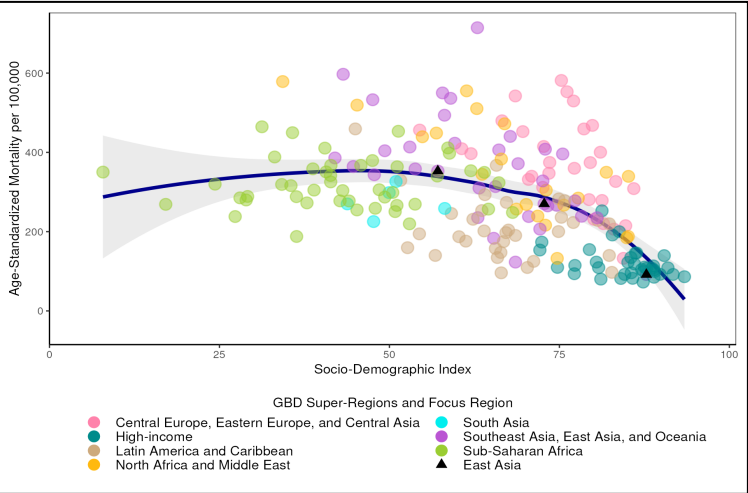

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
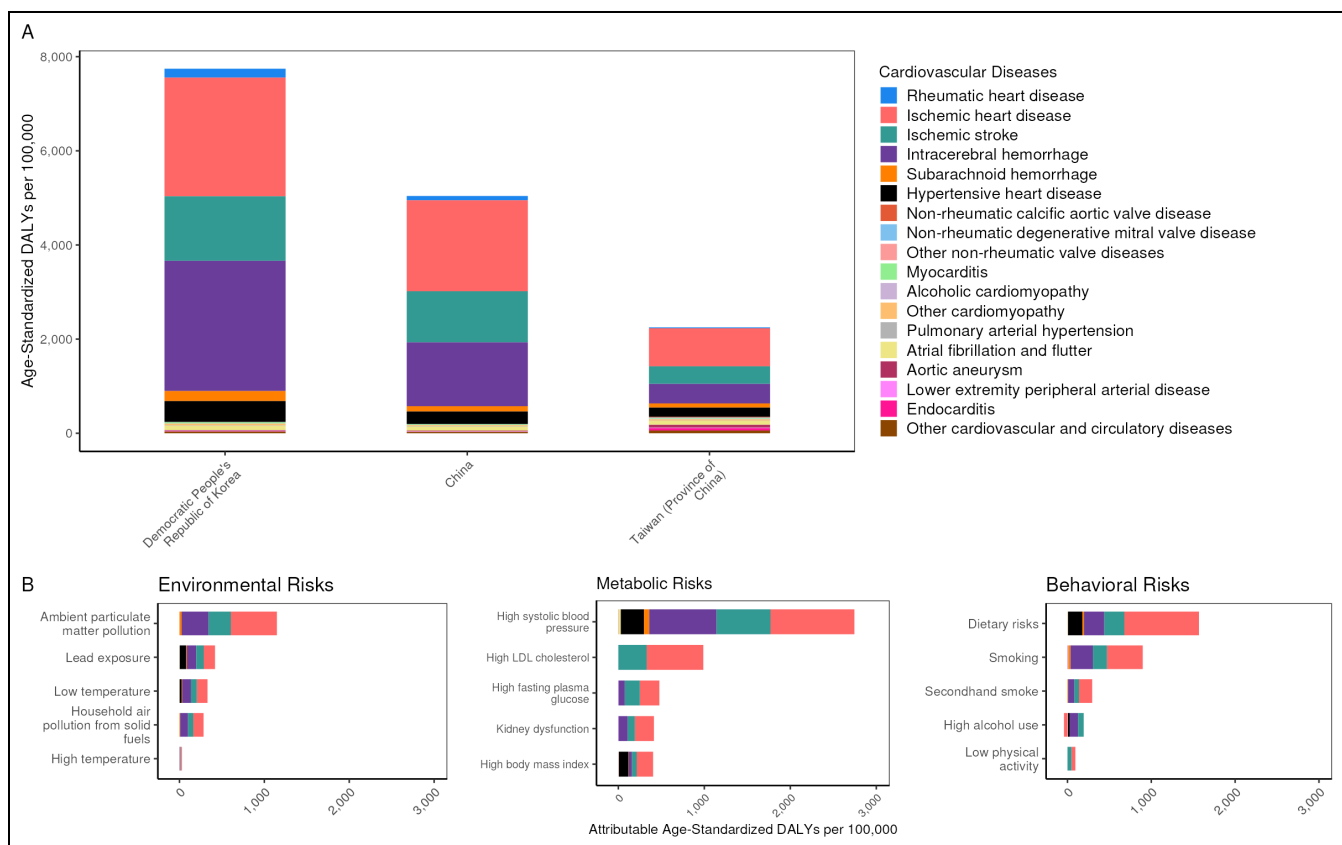
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
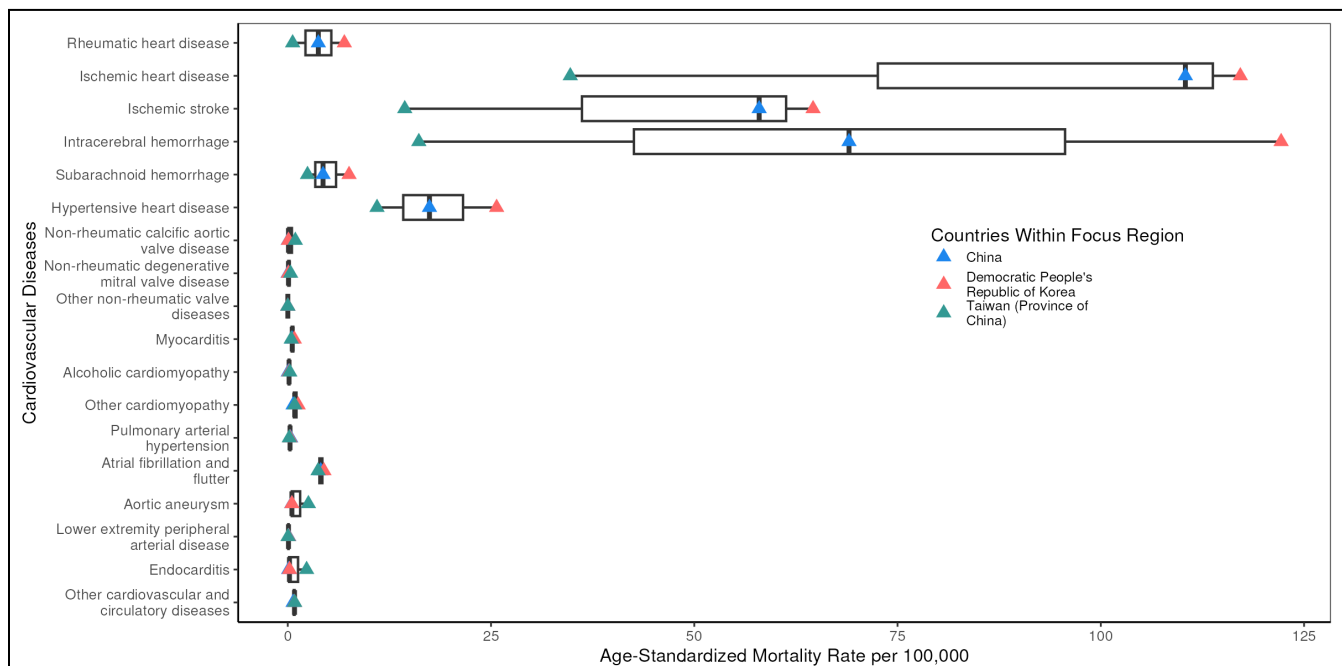

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Institute for Health Metrics and Evaluation - National Heart, Lung, and Blood Institute - American College of Cardiology Foundation

Global Burden of Cardiovascular Diseases and Risks Collaboration

Data from Global Burden of Disease Study, Institute for Health Metrics and Evaluation, University of Washington

www.healthdata.org/gbd

Cardiovascular Disease in South Asia
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in South Asia ranged from 225.4 to 326.5 per 100,000 in 2022. CVD mortality decreased by 11.3% from 1990 to 2022. Of the 21 regions, South Asia ranked 14th in 1990 and 10th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, rheumatic heart disease had the highest age-standardized DALYs in 2022 at 466.1 per 100,000. South Asia had the lowest CVD age-standardized prevalence in 2022. High systolic blood pressure had the largest number of attributable age-standardized CVD DALYs at 2,841.1 per 100,000.
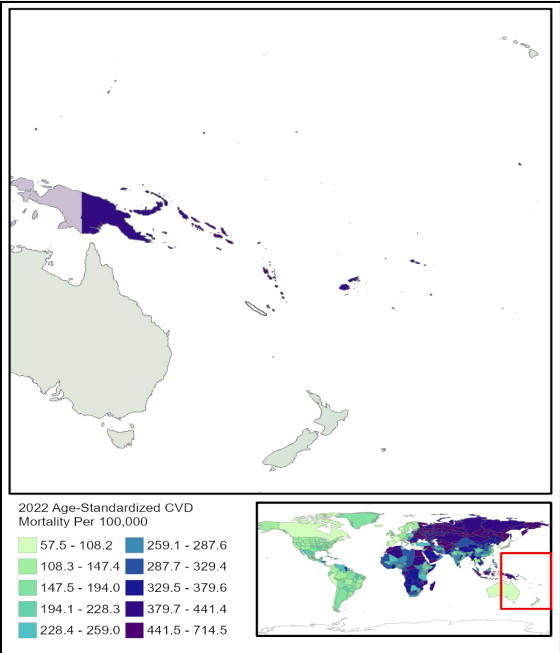
Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	13,791,295	225,729	692.5	15.0	466.1
Ischemic heart disease	36,416,292	2,021,289	2,214.6	147.1	3,285.4
Ischemic stroke	13,333,231	417,001	838.0	34.4	678.0
Intracerebral hemorrhage	4,234,810	538,372	242.9	36.8	902.9
Subarachnoid hemorrhage	1,543,909	61,635	85.1	4.0	126.8
Hypertensive heart disease	1,478,240	194,286	111.8	15.9	285.1
Non-rheumatic calcific aortic valve disease	362,863	10,800	25.1	0.9	16.0
Non-rheumatic degenerative mitral valve disease	505,344	5,230	35.6	0.4	9.1
Other non-rheumatic valve diseases	717	225	<0.1	<0.1	0.4
Myocarditis	112,625	5,127	6.5	0.3	14.2
Alcoholic cardiomyopathy	12,545	1,550	0.7	0.1	3.0
Other cardiomyopathy	797,264	72,352	48.7	5.2	136.8
Pulmonary arterial hypertension	30,055	3,646	1.7	0.3	8.3
Atrial fibrillation and flutter	7,938,649	32,239	589.6	3.2	84.7
Aortic aneurysm	Not estimated	12,746	Not estimated	1.0	19.0
Lower extremity peripheral arterial disease	10,775,328	3,447	798.3	0.3	9.3
Endocarditis	48,426	11,991	2.8	0.8	23.5
Other cardiovascular and circulatory diseases	10,705,232	32,698	707.4	2.4	94.3

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
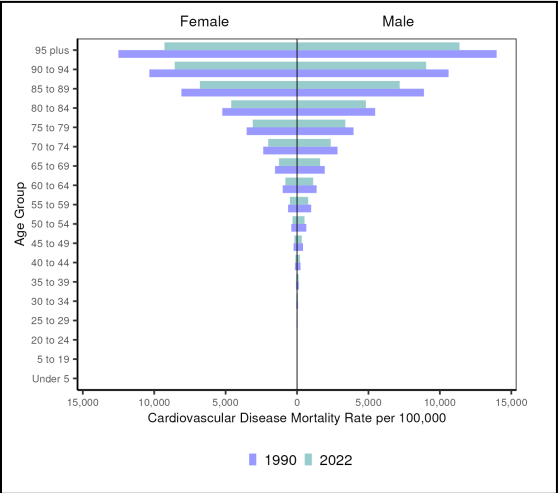

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
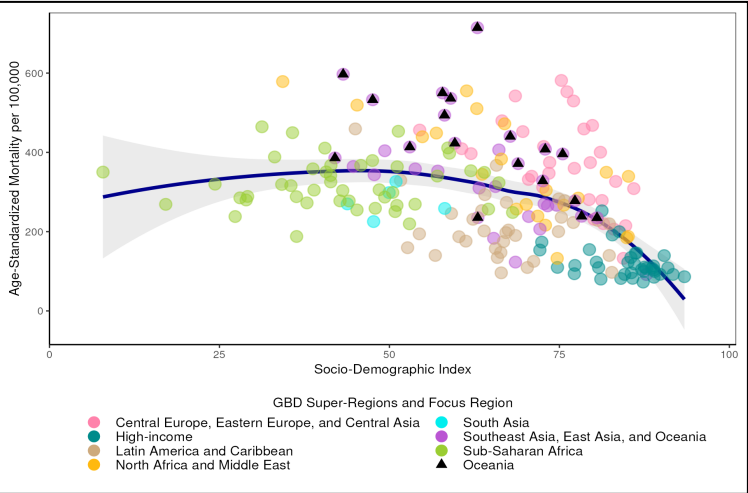

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
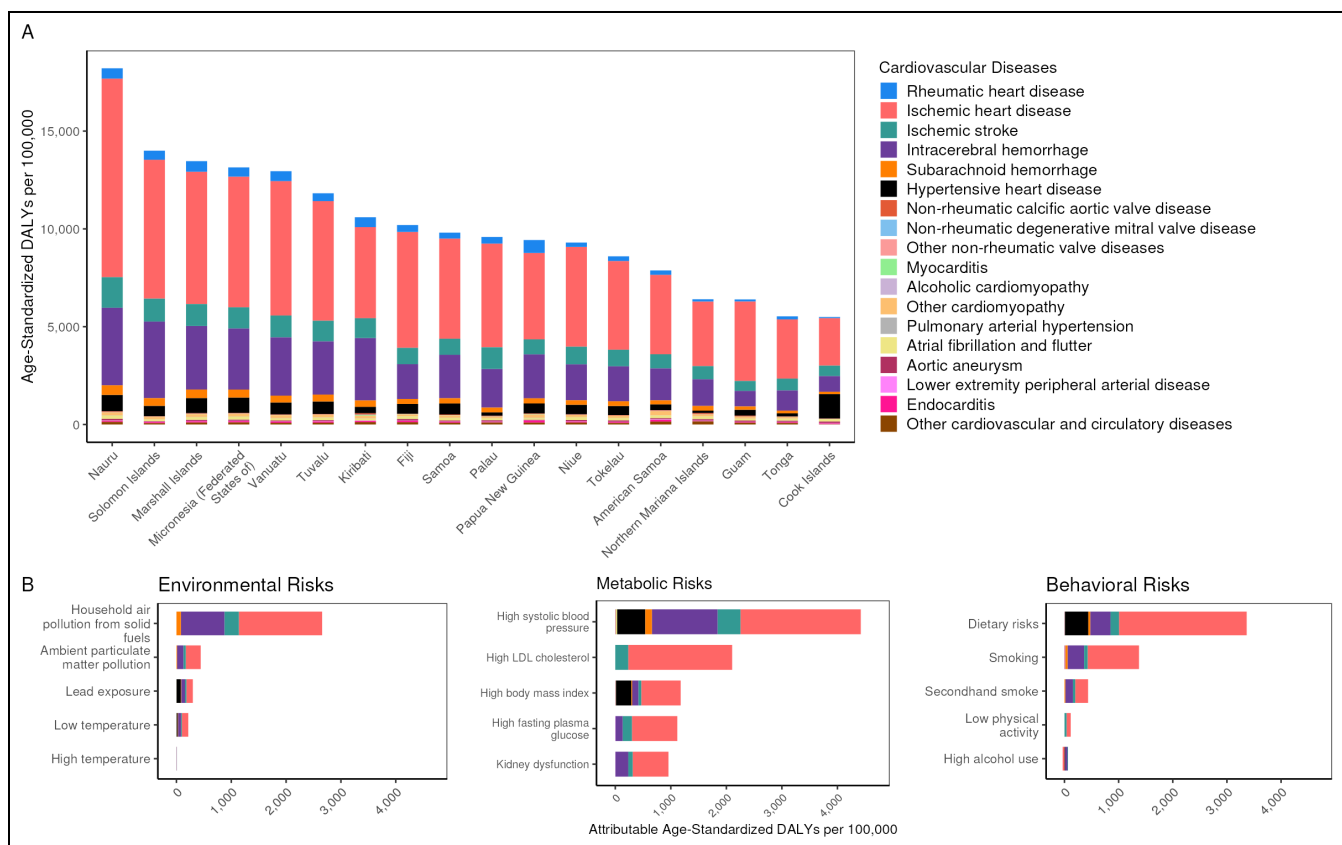
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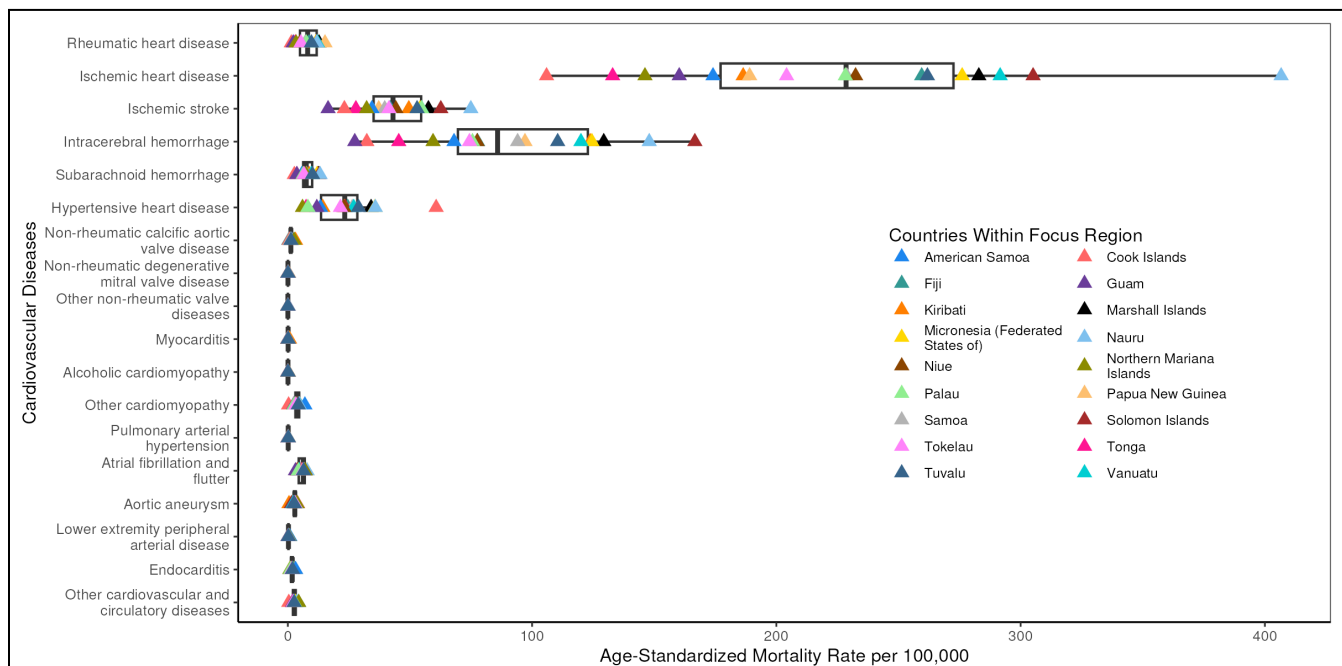

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in East Asia
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in East Asia ranged from 91.8 to 352.9 per 100,000 in 2022; a 3.8 fold difference. CVD mortality decreased by 32.4% from 1990 to 2022. Out of the 21 regions, East Asia was ranked 7th in 1990 and 11th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 269.3 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 2,745.2 per 100,000.

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	5,266,540	75,927	343.8	3.7	89.1
Ischemic heart disease	68,751,838	2,099,130	3,183.8	108.4	1,917.9
Ischemic stroke	23,266,169	1,139,094	1,064.1	57.0	1,072.0
Intracerebral hemorrhage	4,923,009	1,433,592	239.3	68.6	1,361.0
Subarachnoid hemorrhage	1,720,413	91,177	85.9	4.3	111.1
Hypertensive heart disease	4,114,002	331,523	189.0	17.4	269.3
Non-rheumatic calcific aortic valve disease	751,611	1,805	33.5	0.1	2.2
Non-rheumatic degenerative mitral valve disease	2,832,655	1,066	125.3	0.1	2.9
Other non-rheumatic valve diseases	1,382	247	0.1	<0.1	0.3
Myocarditis	165,695	9,139	11.0	0.5	17.5
Alcoholic cardiomyopathy	32,864	1,551	1.8	0.1	2.8
Other cardiomyopathy	280,309	12,430	19.1	0.7	20.0
Pulmonary arterial hypertension	42,191	6,687	2.2	0.3	7.7
Atrial fibrillation and flutter	12,179,180	67,436	551.6	4.0	88.1
Aortic aneurysm	Not estimated	11,241	Not estimated	0.5	14.3
Lower extremity peripheral arterial disease	27,223,946	2,326	1,197.4	0.1	8.3
Endocarditis	37,262	3,171	2.2	0.2	4.8
Other cardiovascular and circulatory diseases	6,009,279	12,839	290.8	0.7	31.2

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
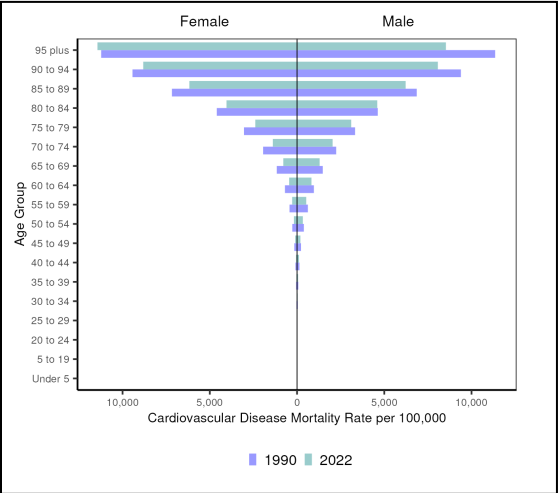

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
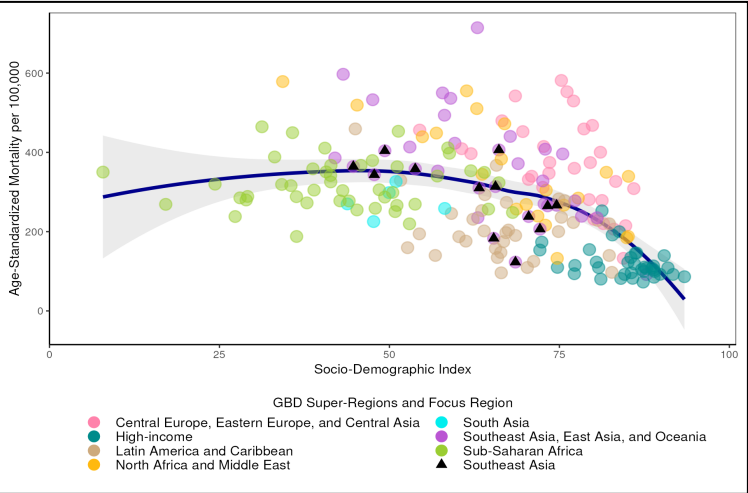

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
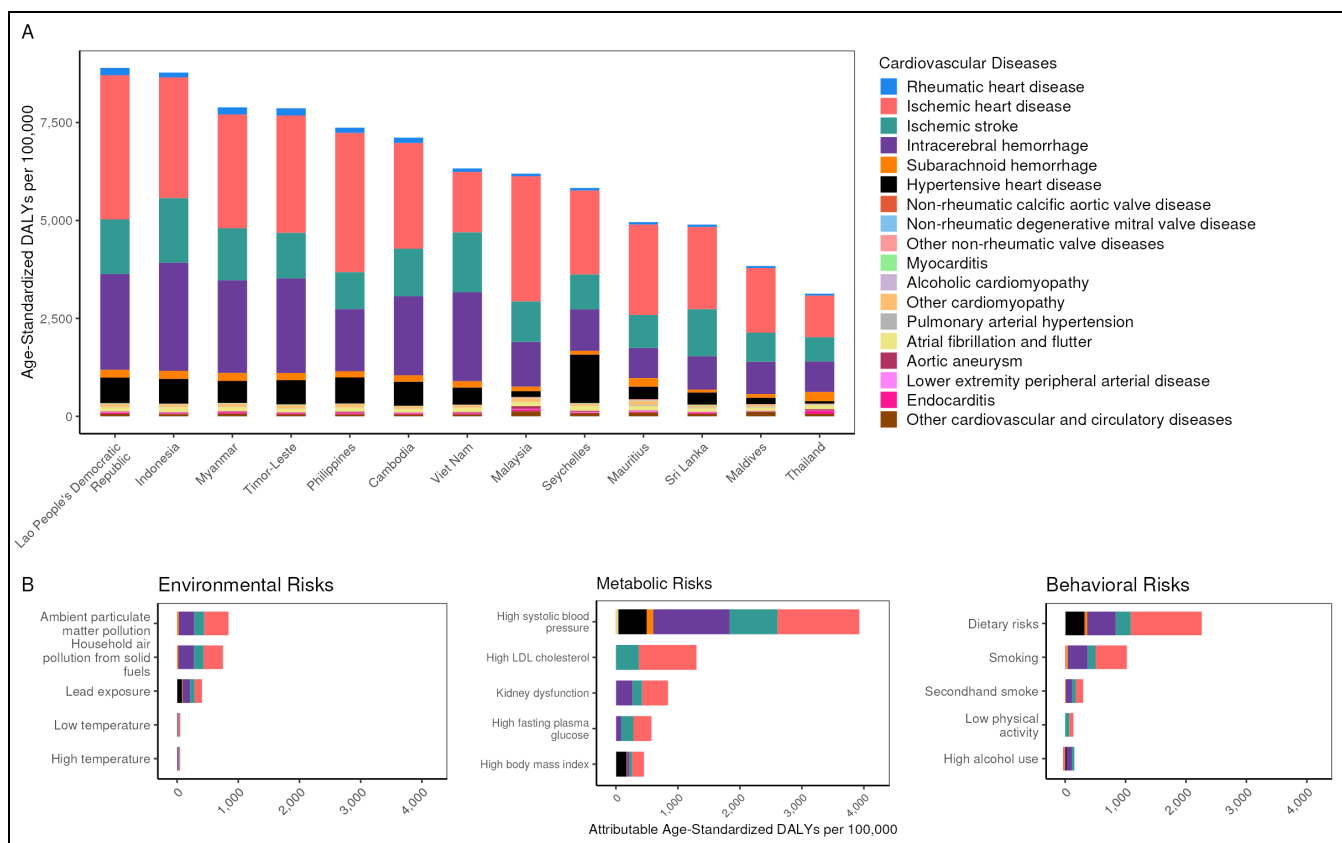
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
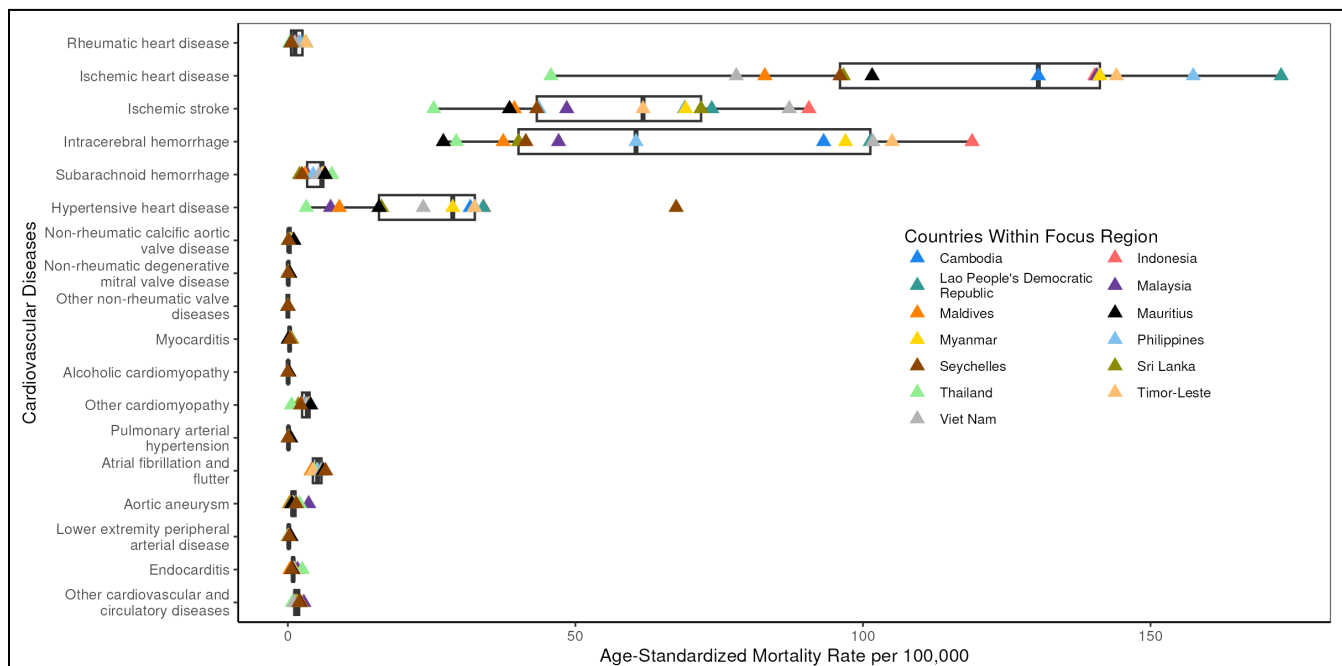

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Oceania
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Oceania ranged from 235.0 to 714.5 per 100,000 in 2022; a 3.0 fold difference. CVD mortality decreased by 16.4% from 1990 to 2022. Out of the 21 regions, Oceania was ranked 5th in 1990 and 3rd in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, rheumatic heart disease had the highest age-standardized DALYs in 2022 at 593.7 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 4,420.7 per 100,000.

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	101,882	1,468	700.3	13.4	593.7
Ischemic heart disease	448,962	13,551	5,133.3	202.7	4,755.9
Ischemic stroke	84,641	1,802	985.3	37.9	790.5
Intracerebral hemorrhage	43,925	6,451	414.8	94.1	2,226.2
Subarachnoid hemorrhage	22,127	646	205.4	7.6	267.2
Hypertensive heart disease	6,669	1,487	102.9	22.6	505.5
Non-rheumatic calcific aortic valve disease	1,718	59	27.0	0.9	22.0
Non-rheumatic degenerative mitral valve disease	4,404	7	71.2	0.1	3.8
Other non-rheumatic valve diseases	5	2	0.1	<0.1	0.6
Myocarditis	670	33	5.5	0.2	14.0
Alcoholic cardiomyopathy	20	6	0.2	0.1	2.0
Other cardiomyopathy	2,892	427	24.5	4.5	159.7
Pulmonary arterial hypertension	198	23	1.8	0.2	8.9
Atrial fibrillation and flutter	33,404	185	542.1	4.2	103.8
Aortic aneurysm	Not estimated	118	Not estimated	1.9	40.0
Lower extremity peripheral arterial disease	65,617	8	1,009.2	0.1	8.9
Endocarditis	450	252	4.2	2.7	93.4
Other cardiovascular and circulatory diseases	30,024	204	392.8	2.3	97.2

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
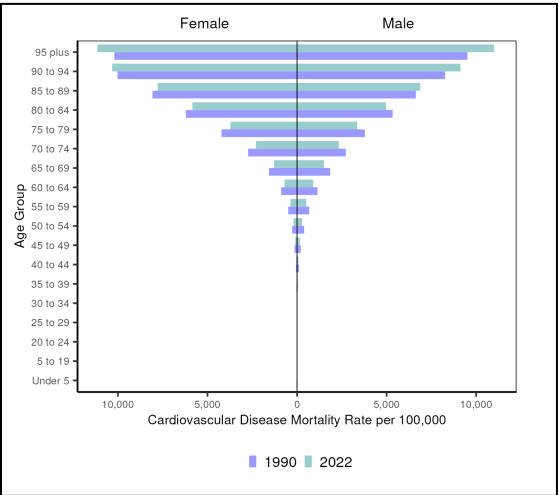

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
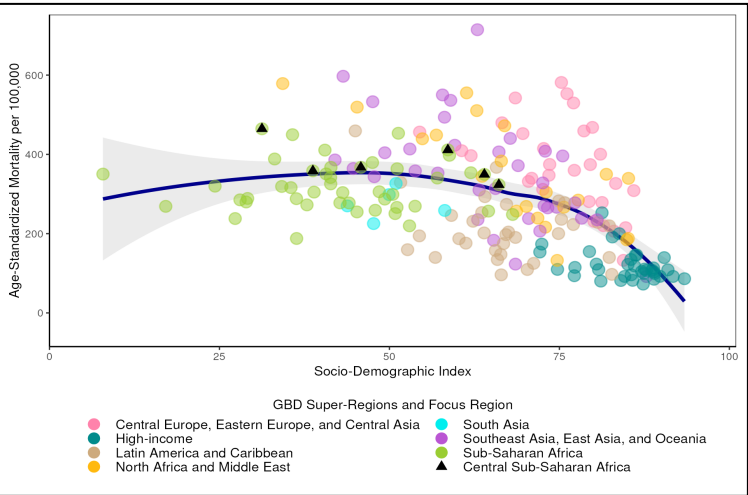

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
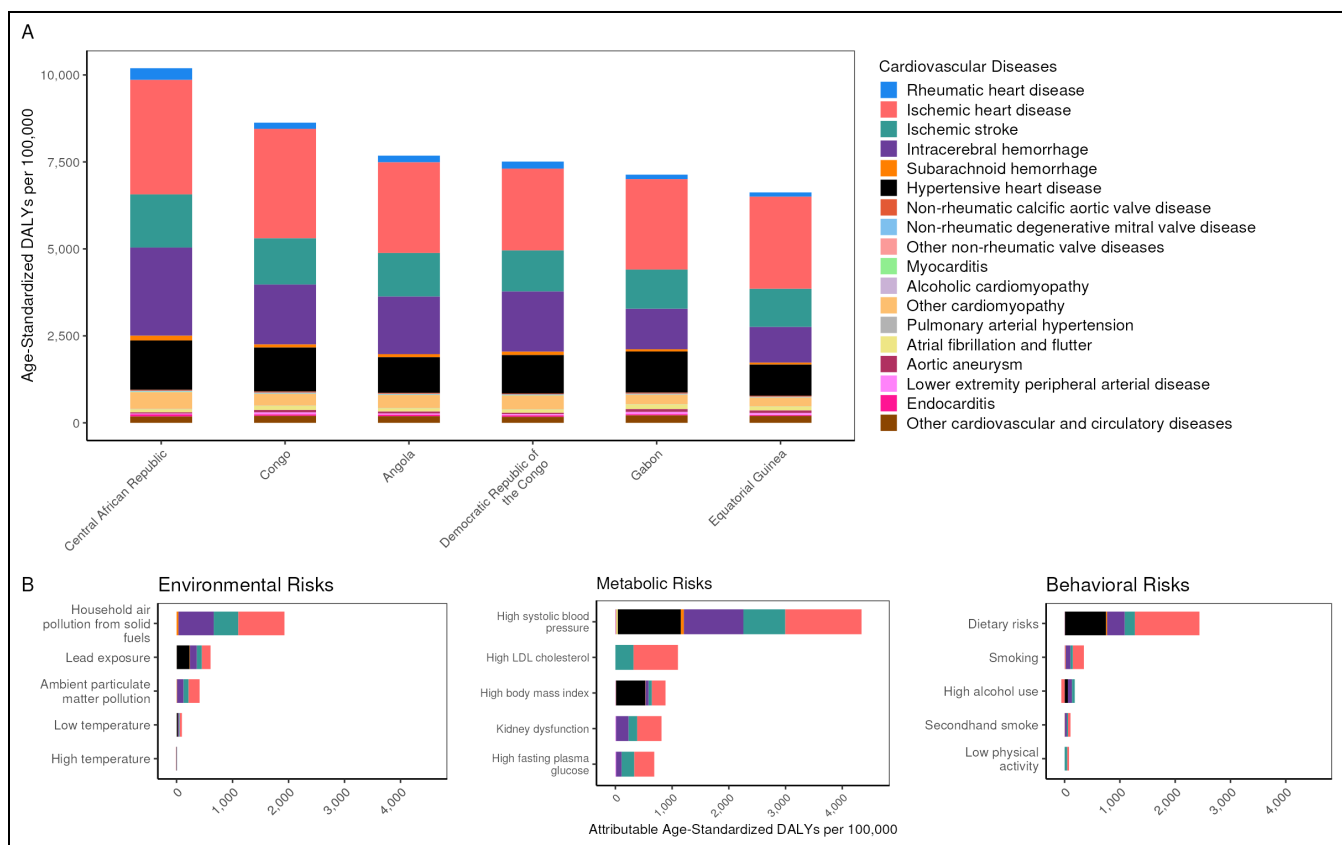
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
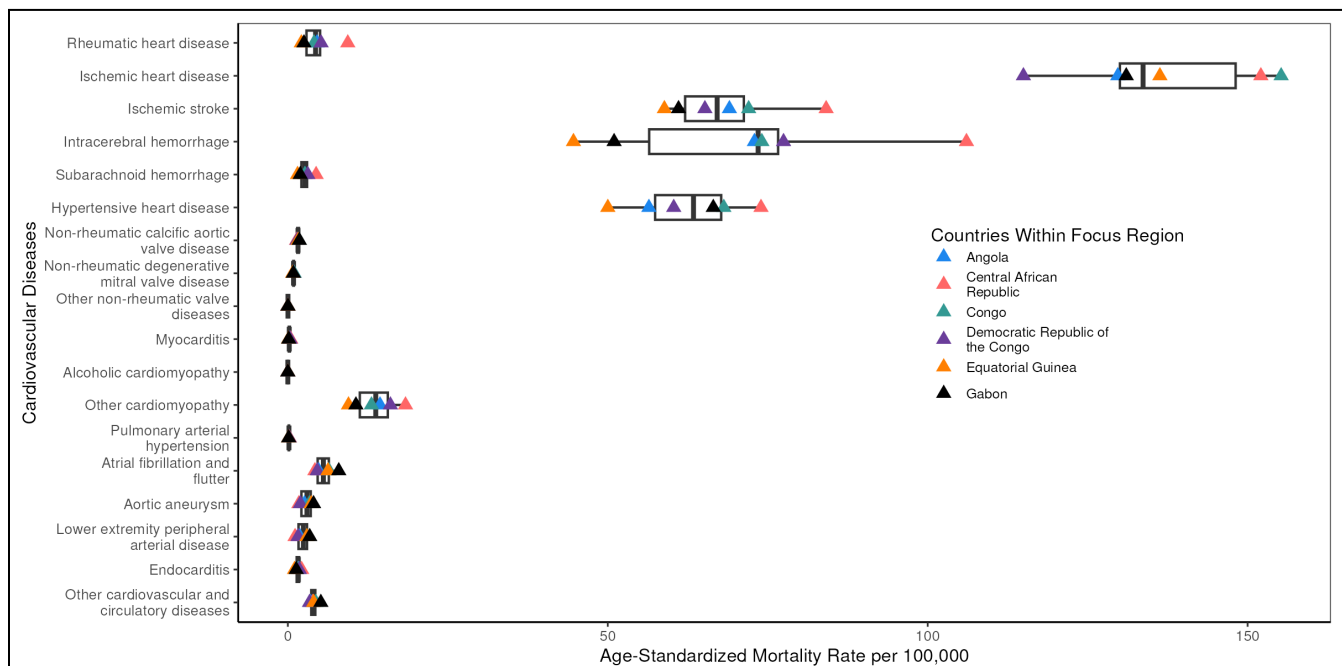

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Southeast Asia
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Southeast Asia ranged from 123.2 to 406.2 per 100,000 in 2022; a 3.3 fold difference. CVD mortality decreased by 16.9% from 1990 to 2022. Out of the 21 regions, Southeast Asia was ranked 8th in 1990 and 6th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 458.5 per 100,000. For all risks, high systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 3,925.7 per 100,000.
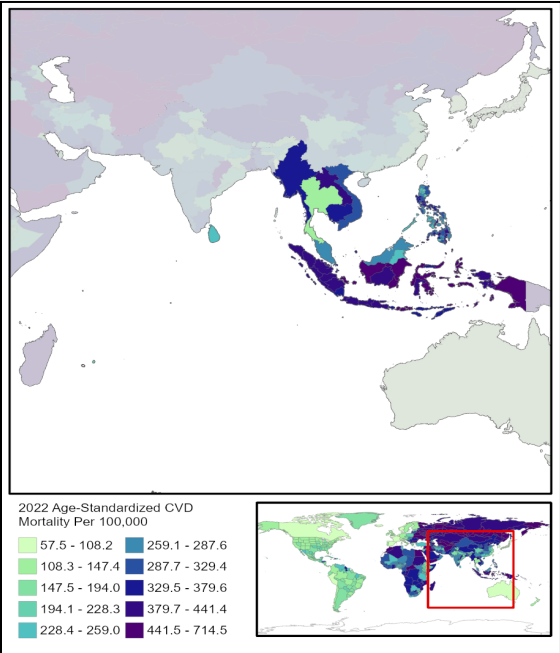
Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	5,706,614	11,882	769.9	1.7	113.3
Ischemic heart disease	31,693,855	656,205	4,589.4	110.7	2,501.3
Ischemic stroke	9,373,197	325,362	1,358.5	63.4	1,239.7
Intracerebral hemorrhage	3,334,389	526,960	441.4	82.5	2,002.4
Subarachnoid hemorrhage	1,194,567	38,419	158.1	6.0	186.6
Hypertensive heart disease	1,017,714	132,805	168.1	22.9	458.5
Non-rheumatic calcific aortic valve disease	157,395	1,425	25.6	0.3	5.1
Non-rheumatic degenerative mitral valve disease	513,144	635	84.3	0.1	3.7
Other non-rheumatic valve diseases	271	62	<0.1	<0.1	0.2
Myocarditis	44,350	1,369	6.5	0.3	7.6
Alcoholic cardiomyopathy	3,649	333	0.5	<0.1	1.7
Other cardiomyopathy	163,221	14,967	26.4	2.7	62.7
Pulmonary arterial hypertension	13,615	661	1.9	0.1	4.0
Atrial fibrillation and flutter	3,614,518	23,517	597.6	5.4	109.4
Aortic aneurysm	Not estimated	7,031	Not estimated	1.3	23.3
Lower extremity peripheral arterial disease	7,493,846	821	1,195.2	0.1	9.8
Endocarditis	37,970	7,559	6.1	1.2	35.5
Other cardiovascular and circulatory diseases	2,746,132	8,101	410.2	1.3	60.1

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
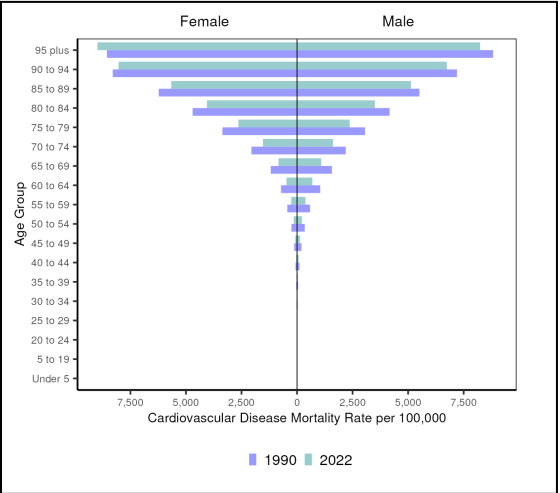

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
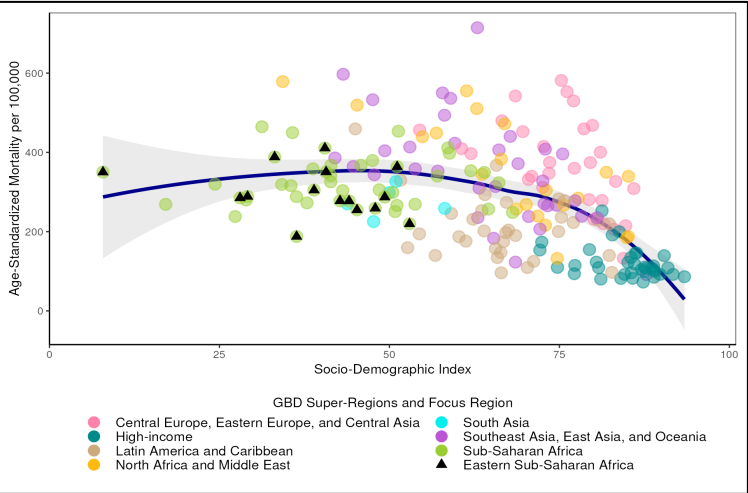

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
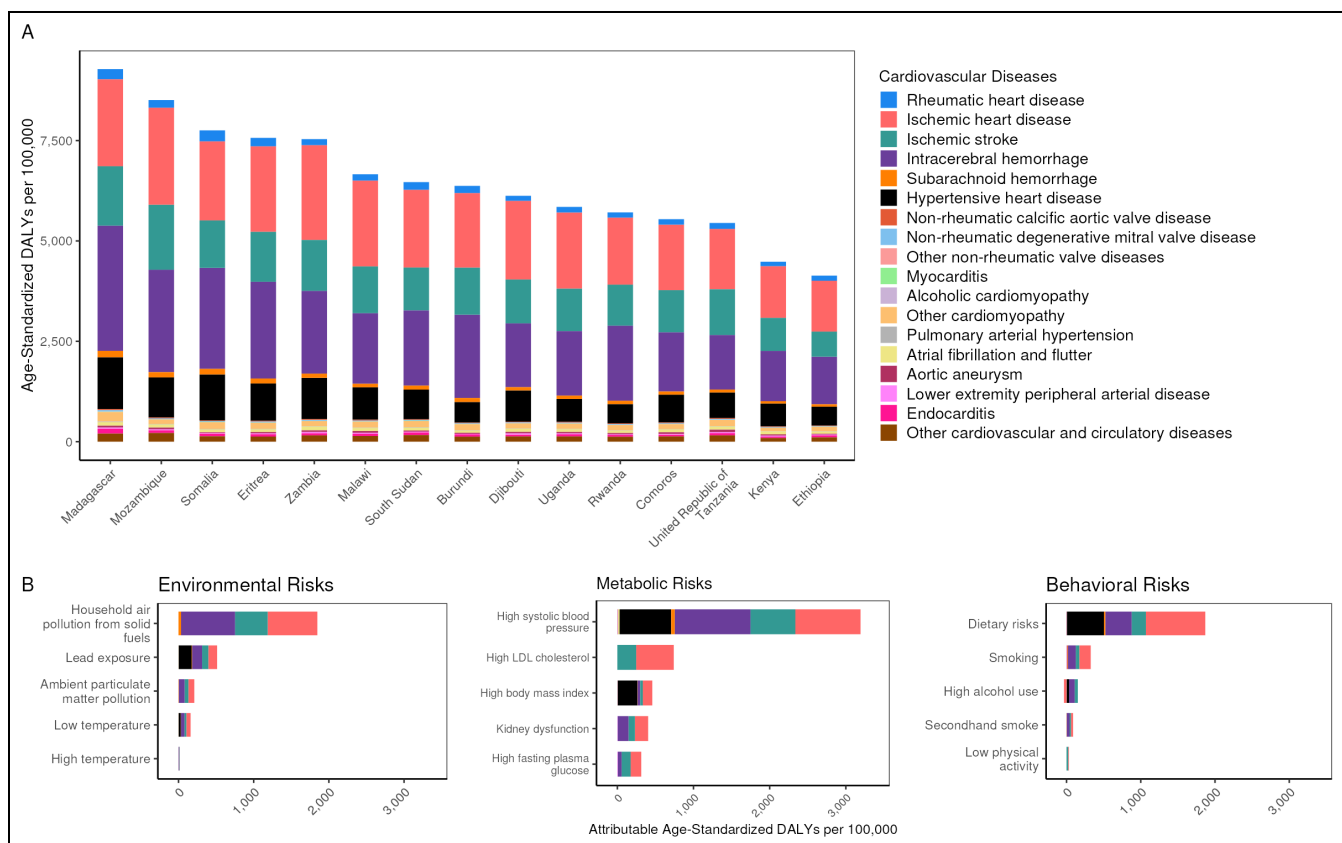
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level
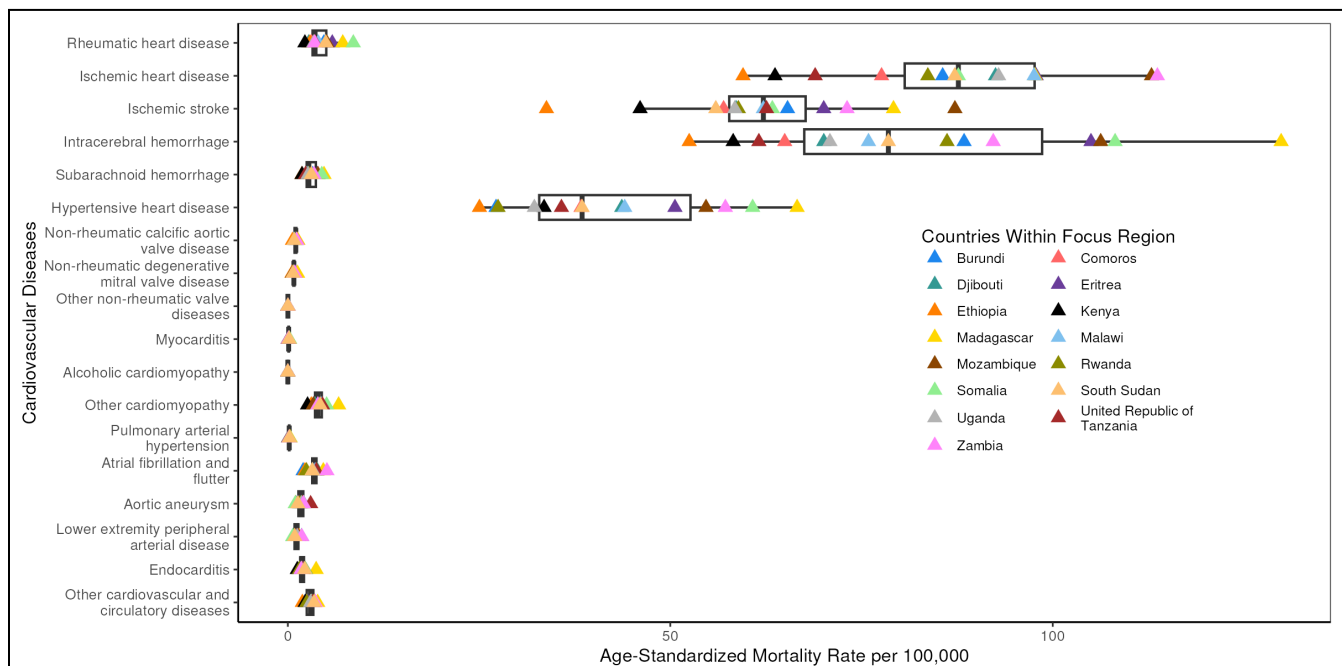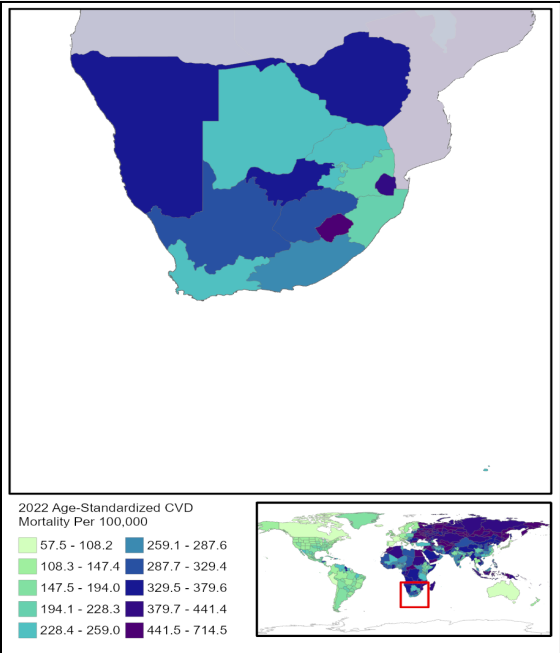

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Central Sub-Saharan Africa
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Central Sub-Saharan Africa ranged from 323.5 to 464.6 per 100,000 in 2022; a 1.4 fold difference. CVD mortality decreased by 12.3% from 1990 to 2022. Out of the 21 regions, Central Sub-Saharan Africa was ranked 6th in 1990 and 4th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 1,110.7 per 100,000. High systolic blood pressure accounted for the largest number of attributable age-standardized CVD DALYs at 4,339.8 per 100,000.
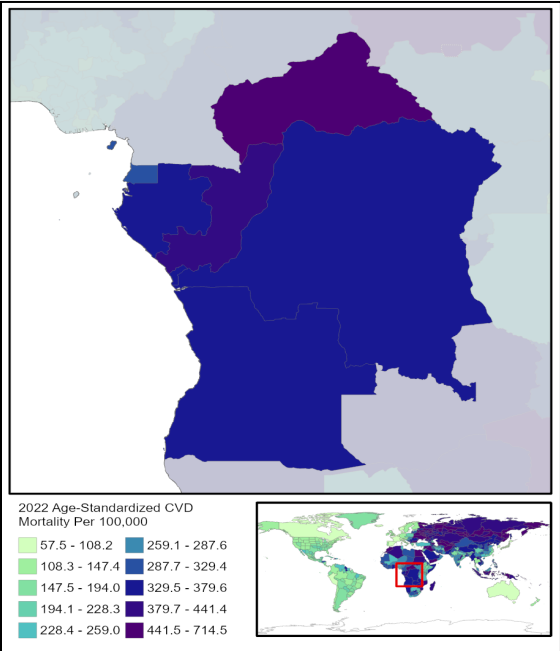
2022 Age-Standardized CVD Mortality Per 100,000

- 57.5 - 108.2
- 108.3 - 147.4
- 147.5 - 194.0
- 194.1 - 228.3
- 228.4 - 259.0
- 259.1 - 287.6
- 287.7 - 329.4
- 329.5 - 379.6
- 379.7 - 441.4
- 441.5 - 714.5

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	1,906,645	3,030	1,380.7	5.1	201.0
Ischemic heart disease	2,207,929	51,104	3,464.7	121.9	2,491.6
Ischemic stroke	781,664	21,875	1,239.4	66.7	1,209.9
Intracerebral hemorrhage	225,657	37,452	259.0	76.5	1,730.8
Subarachnoid hemorrhage	66,885	1,827	77.0	3.0	92.2
Hypertensive heart disease	112,616	23,406	254.0	60.4	1,110.7
Non-rheumatic calcific aortic valve disease	7,840	578	14.4	1.5	27.2
Non-rheumatic degenerative mitral valve disease	7,619	423	13.8	0.9	19.5
Other non-rheumatic valve diseases	46	10	<0.1	<0.1	0.4
Myocarditis	5,594	256	5.1	0.3	11.5
Alcoholic cardiomyopathy	1,823	2	2.1	<0.1	0.3
Other cardiomyopathy	116,974	8,352	112.0	15.5	387.0
Pulmonary arterial hypertension	1,727	134	1.8	0.2	6.1
Atrial fibrillation and flutter	198,070	1,357	443.8	4.8	98.8
Aortic aneurysm	Not estimated	999	Not estimated	2.2	45.6
Lower extremity peripheral arterial disease	306,848	612	726.1	1.8	33.3
Endocarditis	6,117	1,024	4.4	1.8	46.5
Other cardiovascular and circulatory diseases	1,122,426	1,897	1,885.0	3.5	178.8

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
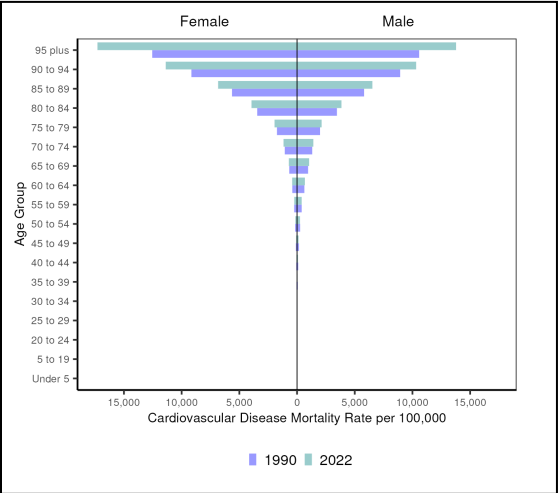

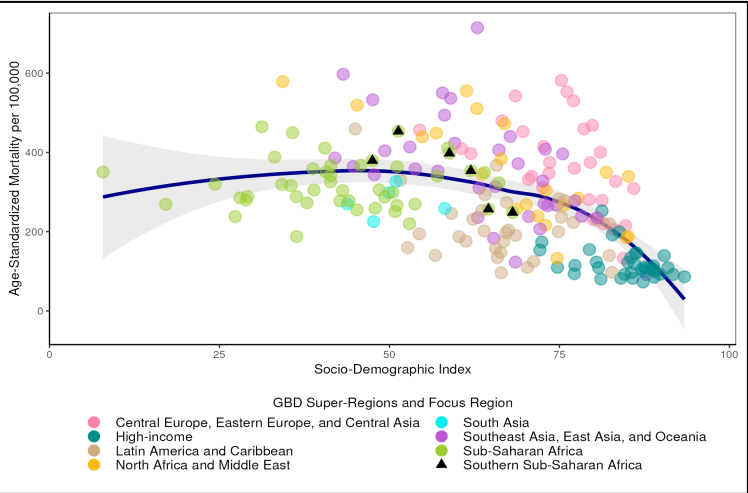Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
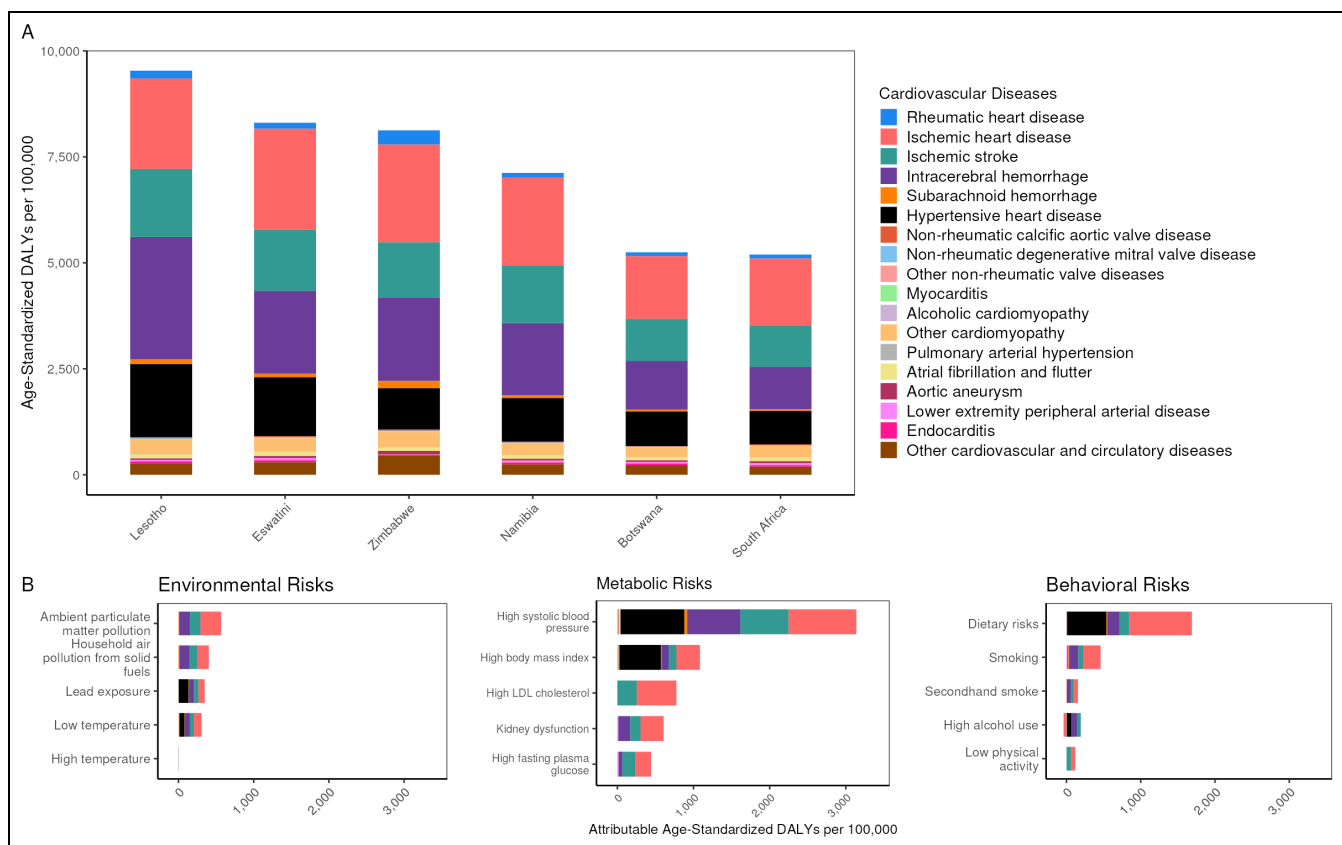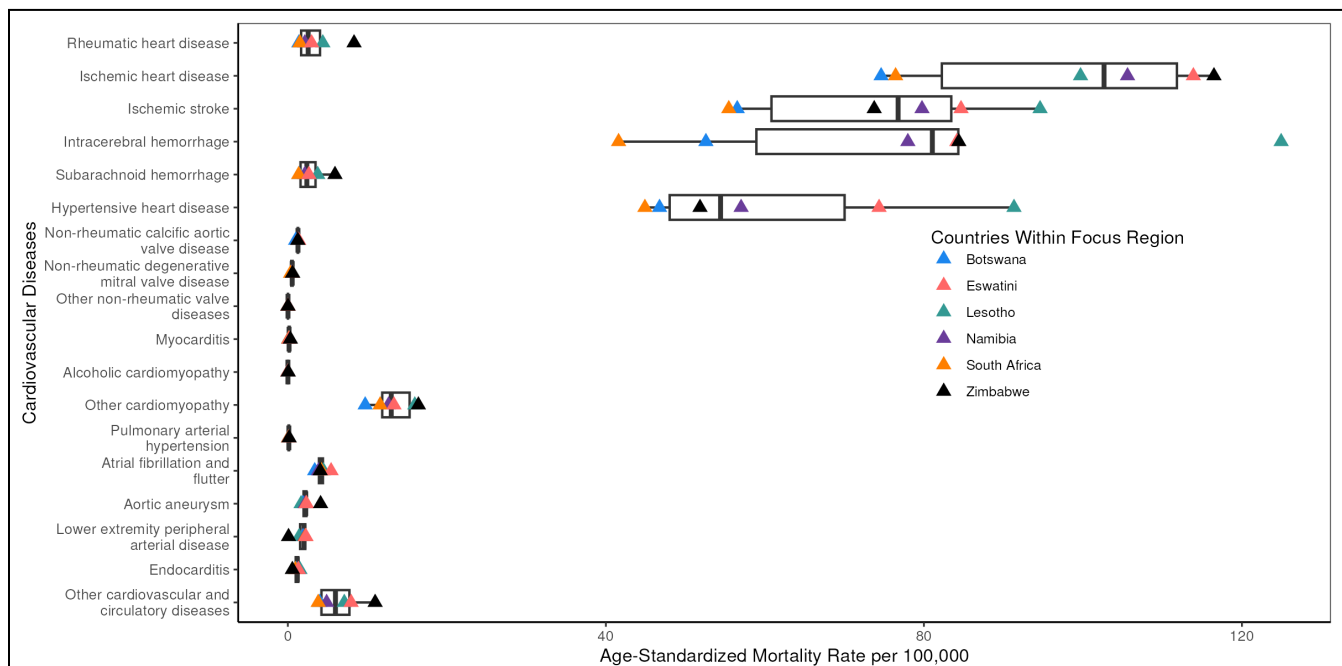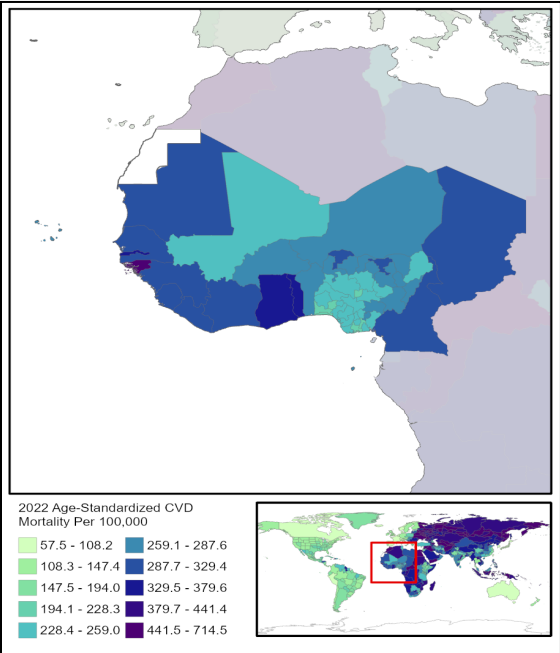
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Eastern Sub-Saharan Africa
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Eastern Sub-Saharan Africa ranged from 187.8 to 410.8 per 100,000 in 2022; a 2.2 fold difference. CVD mortality decreased by 23.6% from 1990 to 2022. Of the 21 regions, Eastern Sub-Saharan Africa ranked 10th in 1990 and 12th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 676.3 per 100,000. High systolic blood pressure had the largest number of attributable age-standardized CVD DALYs at 3,193.0 per 100,000.
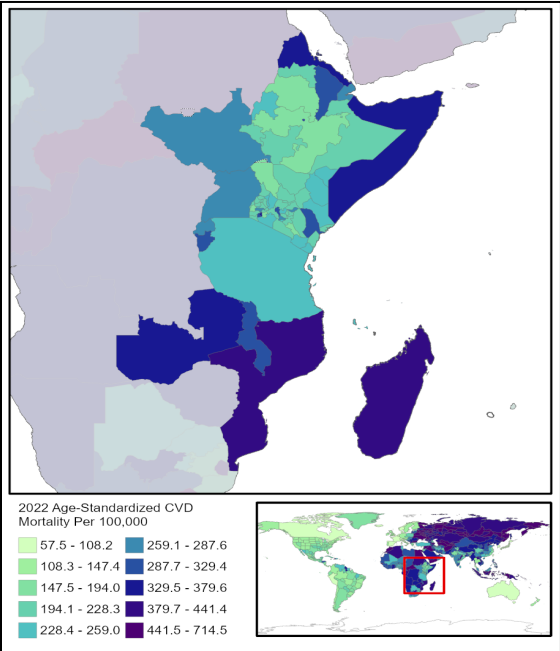
Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	5,548,728	6,452	1,295.3	3.8	153.1
Ischemic heart disease	6,423,413	109,091	3,169.3	77.6	1,664.7
Ischemic stroke	2,297,408	61,695	1,147.3	54.1	997.6
Intracerebral hemorrhage	734,889	114,782	270.5	72.4	1,671.9
Subarachnoid hemorrhage	213,645	5,213	78.6	2.6	85.7
Hypertensive heart disease	512,396	46,238	349.8	36.4	676.3
Non-rheumatic calcific aortic valve disease	23,487	1,206	13.8	0.9	16.8
Non-rheumatic degenerative mitral valve disease	22,598	1,266	13.0	0.7	17.9
Other non-rheumatic valve diseases	273	23	0.1	<0.1	0.3
Myocarditis	18,811	365	5.5	0.1	5.4
Alcoholic cardiomyopathy	9,559	3	3.1	<0.1	0.3
Other cardiomyopathy	498,218	8,394	161.4	3.8	134.5
Pulmonary arterial hypertension	6,099	453	2.1	0.2	6.4
Atrial fibrillation and flutter	578,307	3,044	400.7	3.2	71.7
Aortic aneurysm	Not estimated	2,549	Not estimated	1.7	35.8
Lower extremity peripheral arterial disease	933,431	1,280	675.1	1.1	21.9
Endocarditis	33,390	4,027	7.0	1.9	57.3
Other cardiovascular and circulatory diseases	2,582,036	5,139	1,283.6	2.7	135.9

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.
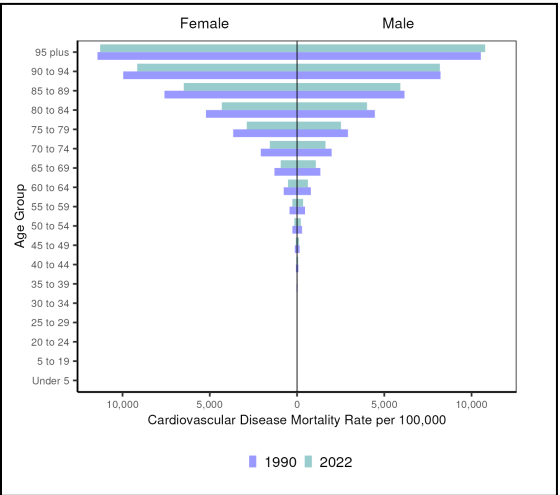

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022
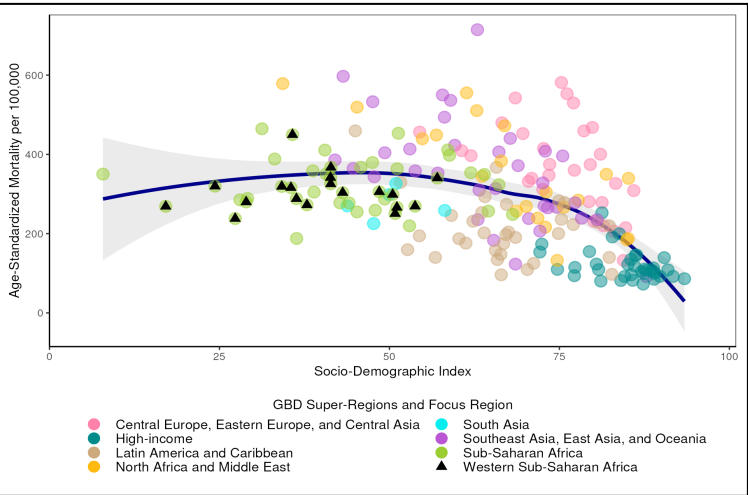

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.
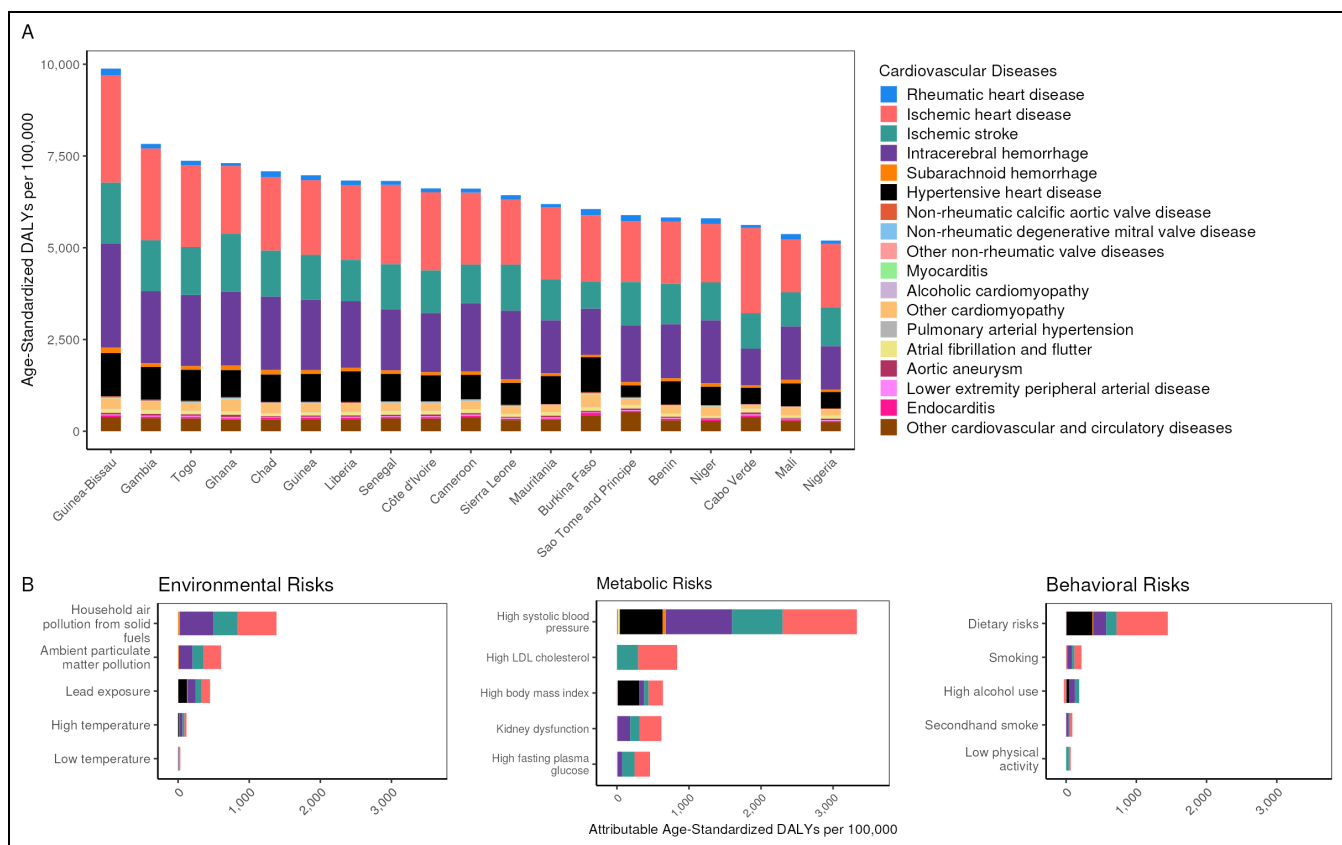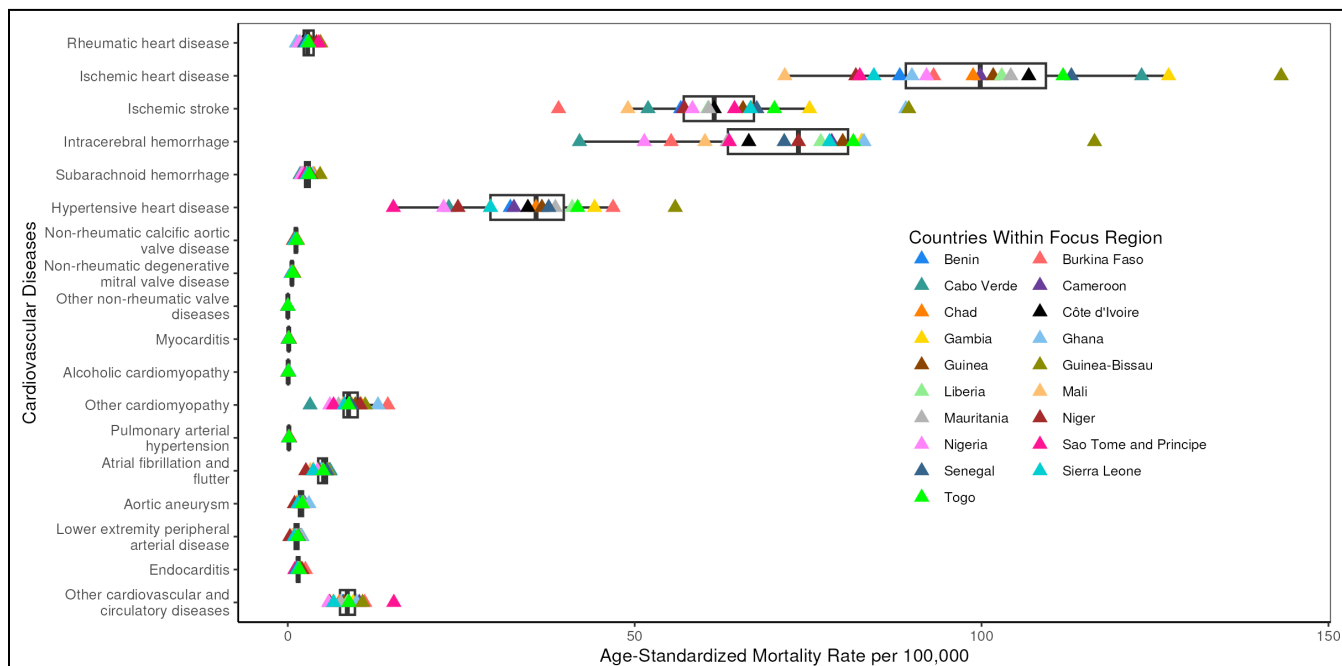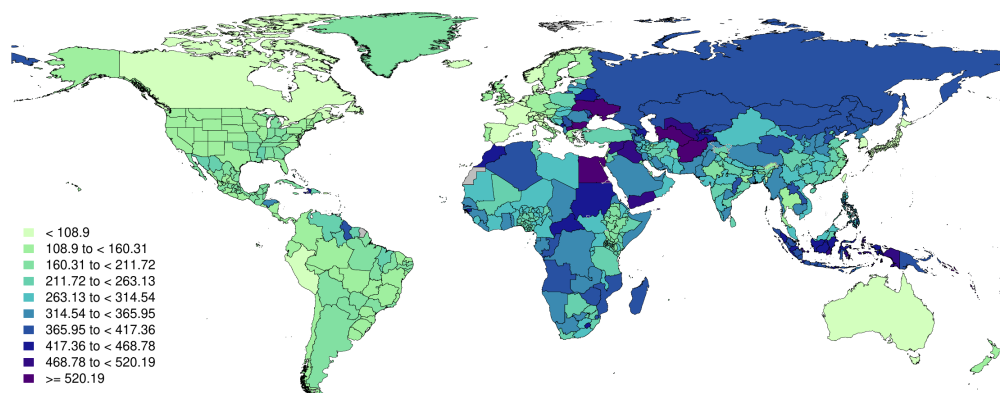
Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Southern Sub-Saharan Africa
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Southern Sub-Saharan Africa ranged from 248.3 to 453.3 per 100,000 in 2022; a 1.8 fold difference. CVD mortality increased by 8.0% from 1990 to 2022. Of the 21 regions, Southern Sub-Saharan Africa ranked 18th in 1990 and 9th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 839.6 per 100,000. High systolic blood pressure had the largest number of attributable age-standardized CVD DALYs at 3,138.2 per 100,000.

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	722,444	1,682	847.1	2.5	133.9
Ischemic heart disease	1,857,089	38,915	2,992.7	81.5	1,680.0
Ischemic stroke	800,106	23,969	1,339.5	58.6	1,038.3
Intracerebral hemorrhage	144,626	26,826	206.0	49.0	1,166.8
Subarachnoid hemorrhage	40,248	1,181	54.0	2.0	63.1
Hypertensive heart disease	80,643	21,221	153.2	47.1	839.6
Non-rheumatic calcific aortic valve disease	13,379	545	23.1	1.3	22.0
Non-rheumatic degenerative mitral valve disease	7,705	232	12.4	0.4	11.6
Other non-rheumatic valve diseases	22	8	<0.1	<0.1	0.4
Myocarditis	4,353	94	5.9	0.1	6.3
Alcoholic cardiomyopathy	374	4	0.5	<0.1	0.2
Other cardiomyopathy	67,206	6,134	91.0	12.1	276.7
Pulmonary arterial hypertension	1,625	66	2.3	0.1	3.9
Atrial fibrillation and flutter	263,389	1,435	510.9	4.2	89.4
Aortic aneurysm	Not estimated	1,246	Not estimated	2.5	50.5
Lower extremity peripheral arterial disease	488,286	940	973.7	2.0	42.8
Endocarditis	3,338	614	4.1	0.9	33.3
Other cardiovascular and circulatory diseases	1,460,546	2,386	2,458.0	4.7	225.9

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.

Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Cardiovascular Disease in Western Sub-Saharan Africa
FINDINGS FROM THE GLOBAL BURDEN OF DISEASE STUDY

Summary: Age-standardized CVD mortality rates among countries in Western Sub-Saharan Africa ranged from 238.1 to 449.7 per 100,000 in 2022; a 1.9 fold difference. CVD mortality decreased by 19.9% from 1990 to 2022. Of the 21 regions, Western Sub-Saharan Africa ranked 9th in 1990 and 8th in 2022 for age-standardized CVD mortality. After ischemic heart disease and all stroke subtypes, hypertensive heart disease had the highest age-standardized DALYs in 2022 at 593.8 per 100,000. High systolic blood pressure had the largest number of attributable age-standardized CVD DALYs at 3,330.4 per 100,000

Figure 1. Regional map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

Cardiovascular Disease Type	Prevalent Cases (Count)	Deaths (Count)	Prevalence (Rate)	Deaths (Rate)	Disability-Adjusted Life Years (DALYs, Rate)
Rheumatic heart disease	4,640,580	5,175	963.3	2.3	108.1
Ischemic heart disease	7,452,708	144,797	3,228.8	94.4	1,824.3
Ischemic stroke	3,203,095	82,875	1,240.4	60.9	1,114.1
Intracerebral hemorrhage	1,065,970	118,256	336.7	62.8	1,478.2
Subarachnoid hemorrhage	230,618	5,777	73.8	2.5	81.3
Hypertensive heart disease	496,314	47,933	289.7	29.3	593.8
Non-rheumatic calcific aortic valve disease	24,823	1,650	11.3	1.1	19.3
Non-rheumatic degenerative mitral valve disease	28,895	1,077	13.0	0.6	13.0
Other non-rheumatic valve diseases	220	27	0.1	<0.1	0.3
Myocarditis	26,383	478	6.1	0.1	5.8
Alcoholic cardiomyopathy	10,332	139	3.1	0.1	2.1
Other cardiomyopathy	312,714	16,486	83.9	8.2	204.8
Pulmonary arterial hypertension	9,646	444	3.0	0.1	5.4
Atrial fibrillation and flutter	809,397	4,749	474.5	4.6	88.4
Aortic aneurysm	Not estimated	3,377	Not estimated	2.0	40.0
Lower extremity peripheral arterial disease	1,166,933	1,641	708.6	1.3	23.1
Endocarditis	25,587	3,241	5.3	1.4	39.6
Other cardiovascular and circulatory diseases	5,350,530	14,280	2,502.3	7.4	293.3

Table 1. Regional cardiovascular disease in 2022: counts and age-standardized rates per 100,000. Results, uncertainty intervals, and methods available online.

Figure 2. Regional cardiovascular disease mortality rate per 100,000 by age and sex in 1990 vs. 2022

Figure 3. Age-standardized cardiovascular disease mortality rate per 100,000 by country (circle) in 2022 by socio-demographic index (0-100), a composite indicator of fertility, income, and education. Focus region countries indicated by triangles, loess line in blue with shaded 95% uncertainty interval.

Figure 4. Age-standardized disability-adjusted life years (DALYs) per 100,000 in 2022 for (A) cardiovascular diseases by country and (B) burden attributable to selected risk factors, for the region, compared to the theoretical minimum risk exposure level

Figure 5. Age-standardized mortality rate per 100,000 for cardiovascular diseases in 2022 by cause of death and country. Boxplot shows first quartile, median, and third quartile of mortality range.

Institute for Health Metrics and Evaluation - National Heart, Lung, and Blood Institute - American College of Cardiology Foundation

Global Burden of Cardiovascular Diseases and Risks Collaboration

Data from Global Burden of Disease Study, Institute for Health Metrics and Evaluation, University of Washington

www.healthdata.org/gbd

AGGREGATE CAUSE: CARDIOVASCULAR DISEASE

Figure 1. Global map of age−standardized cardiovascular disease mortality rate per 100,000 in 2022 with equal interval classification
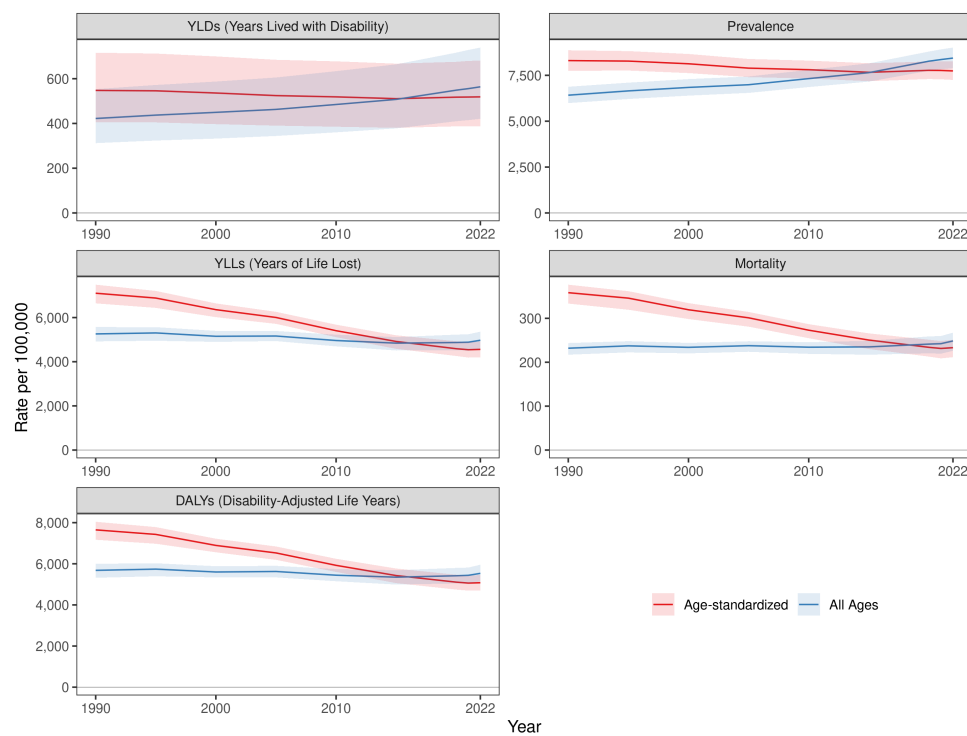
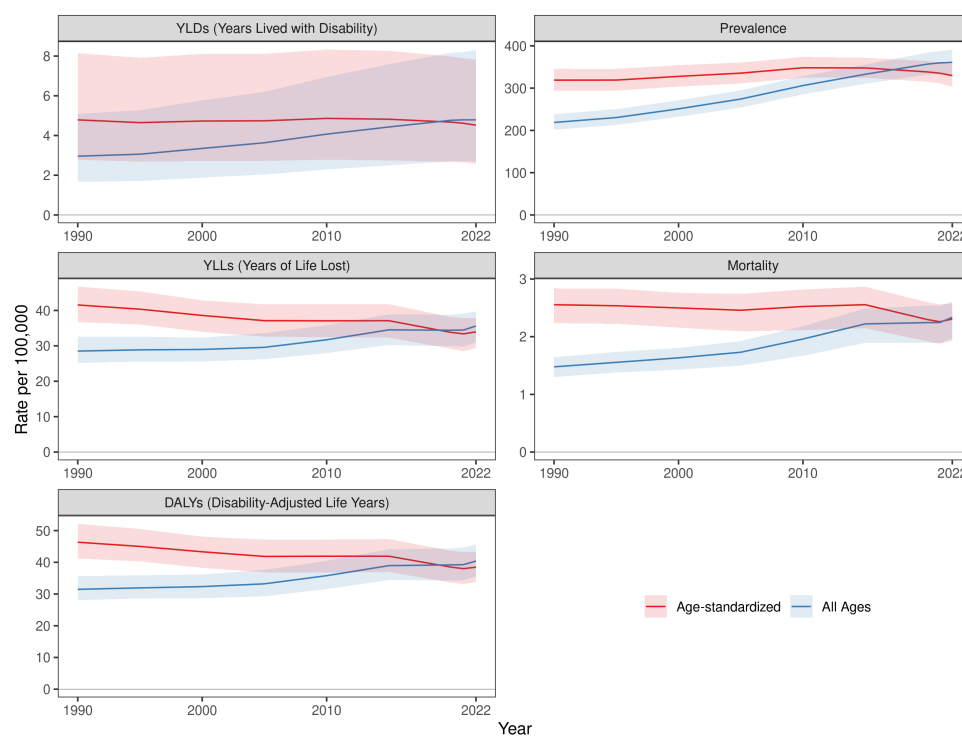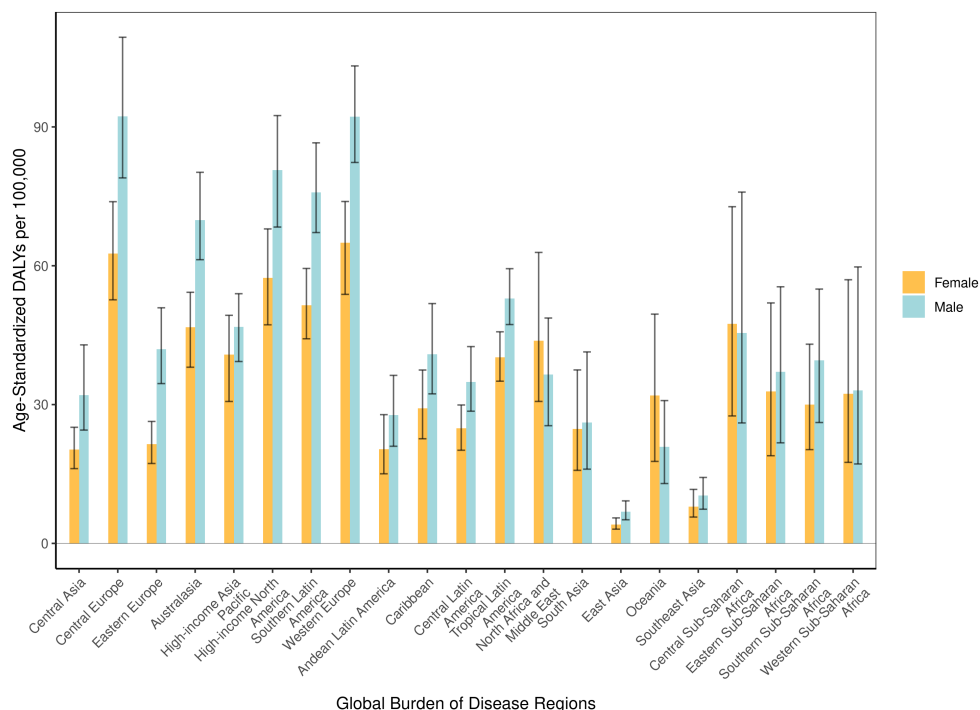Figure 2. Global cardiovascular disease estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
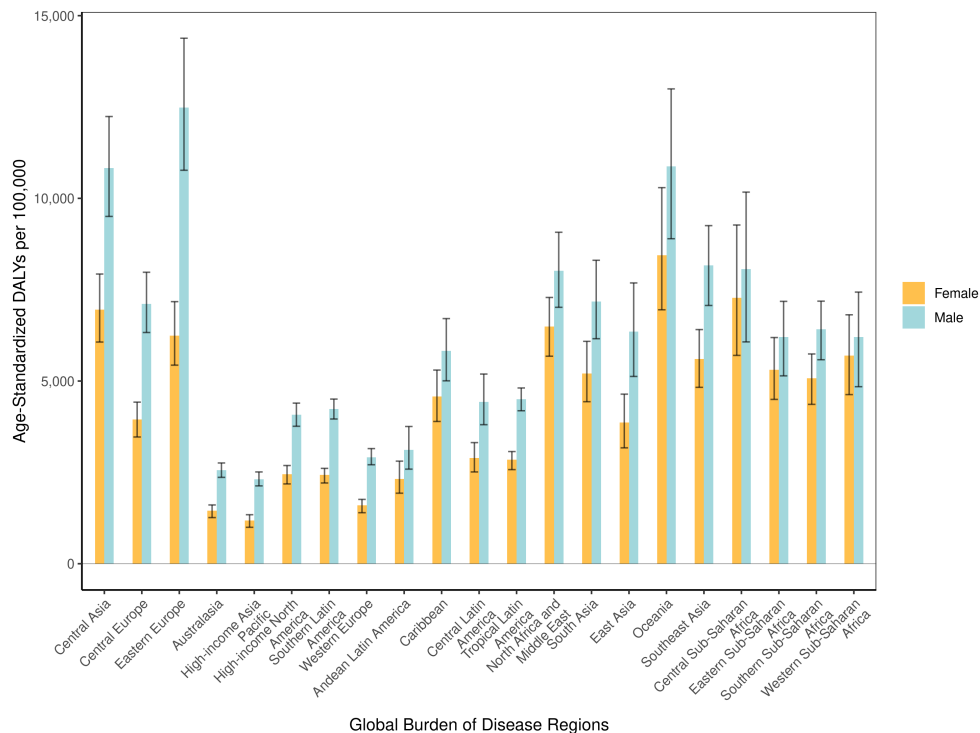
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
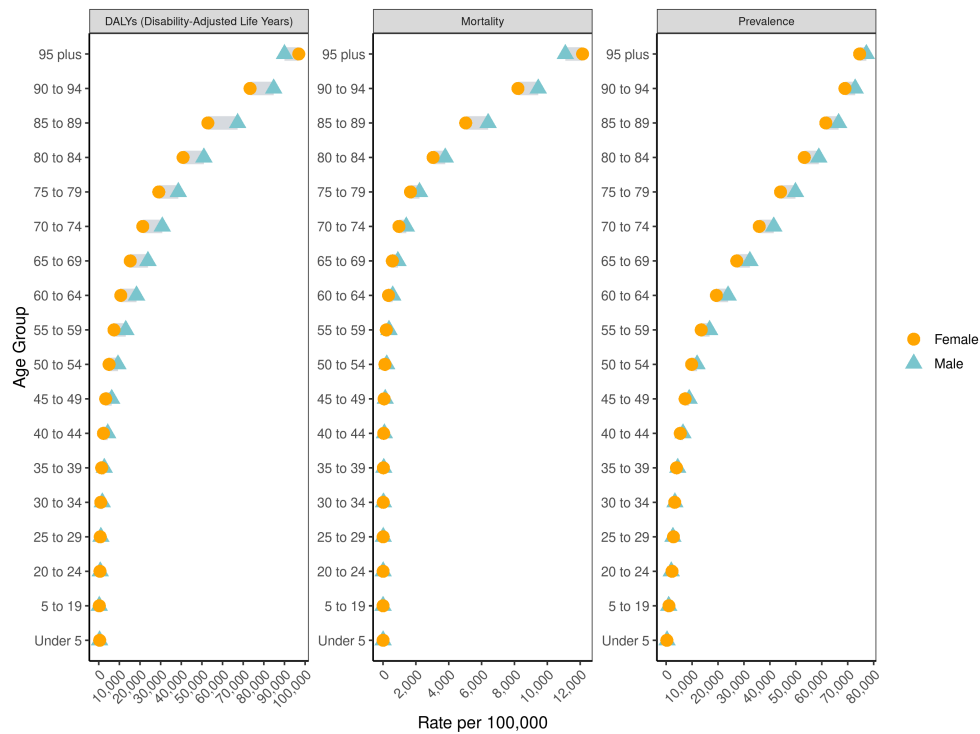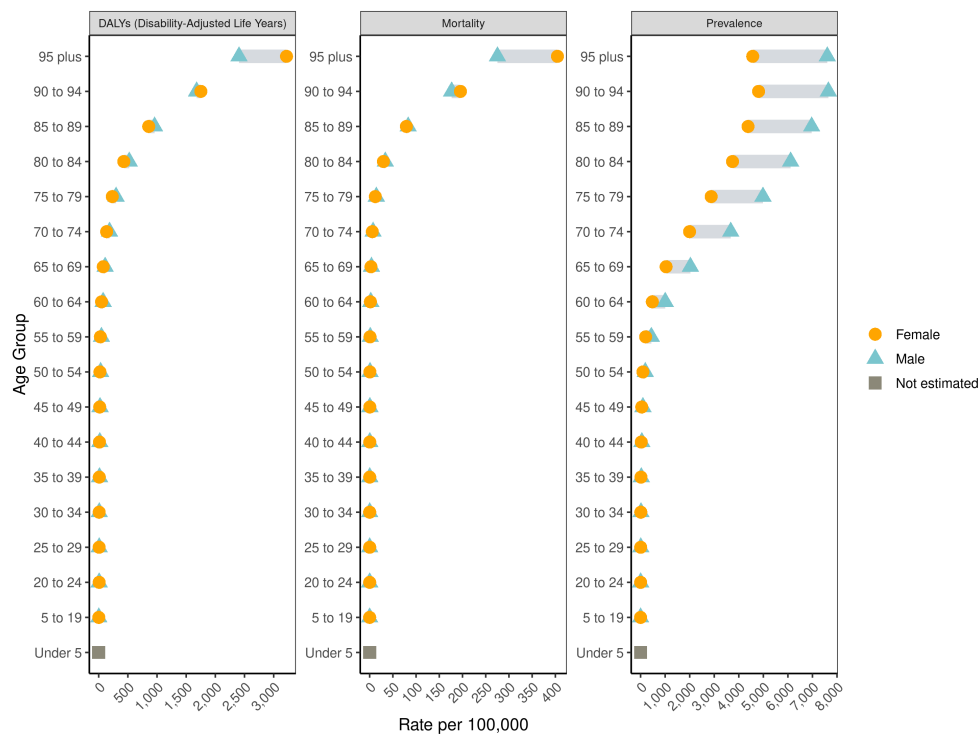

Figure 4. Global cardiovascular disease age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
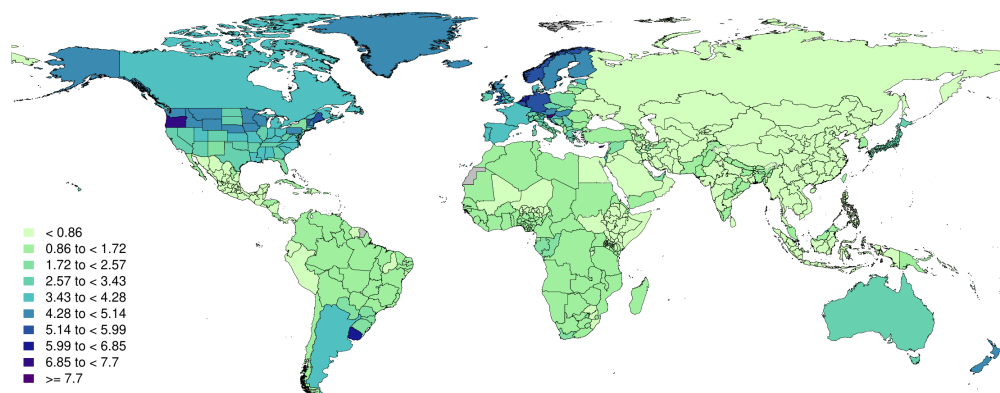
RHEUMATIC HEART DISEASE
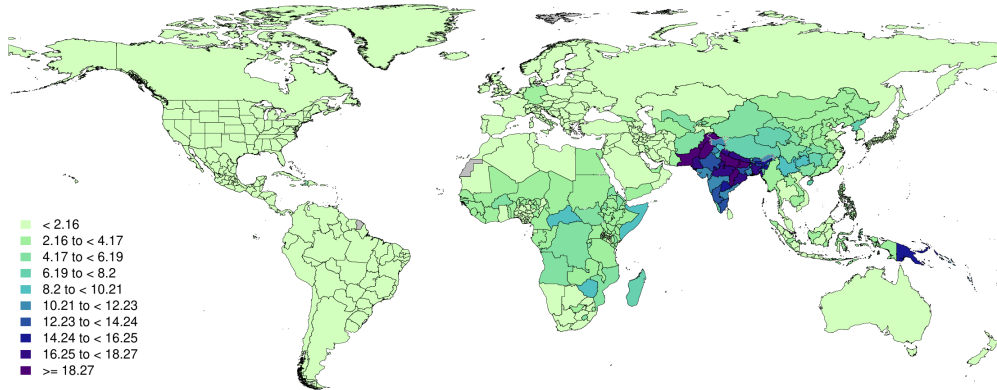
Figure 1. Global map of age–standardized rheumatic heart disease mortality rate per 100,000 in 2022 with equal interval classification
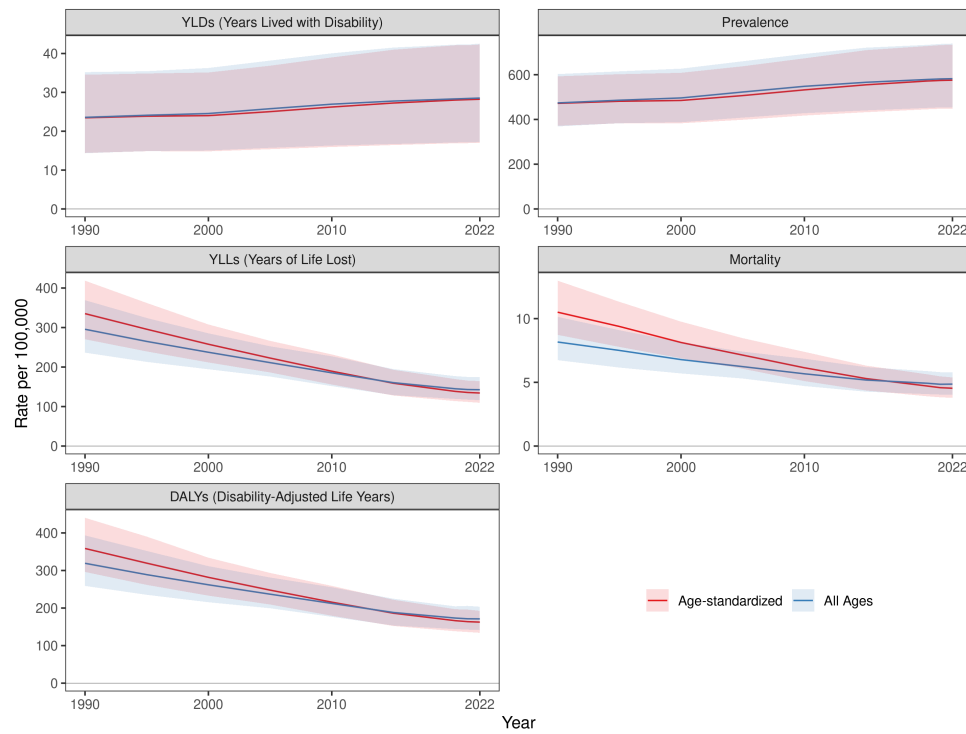
Figure 2. Global rheumatic heart disease estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
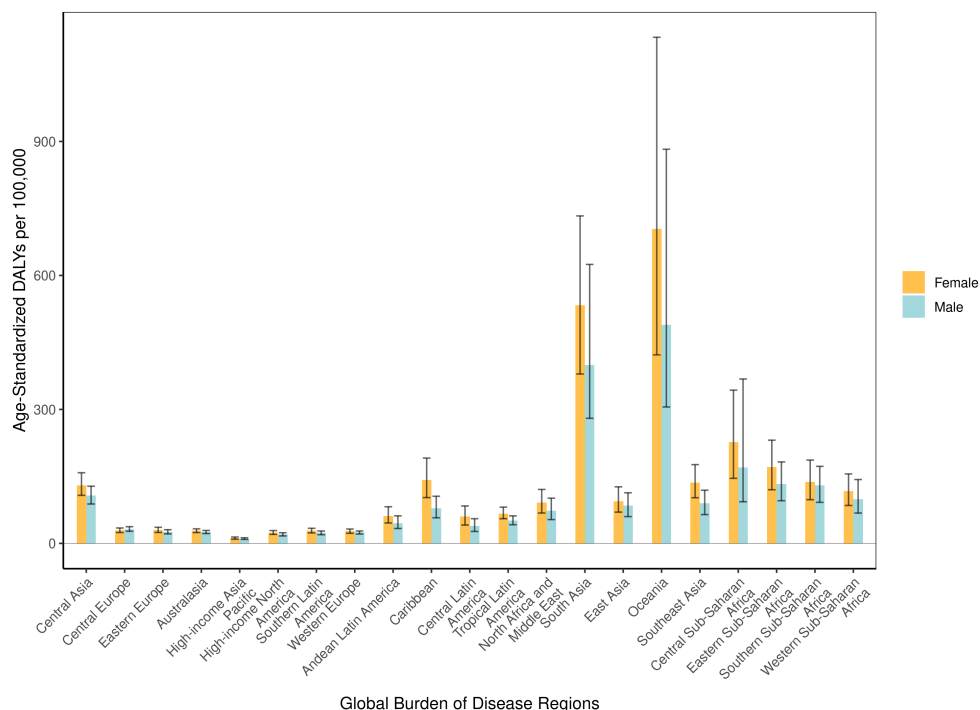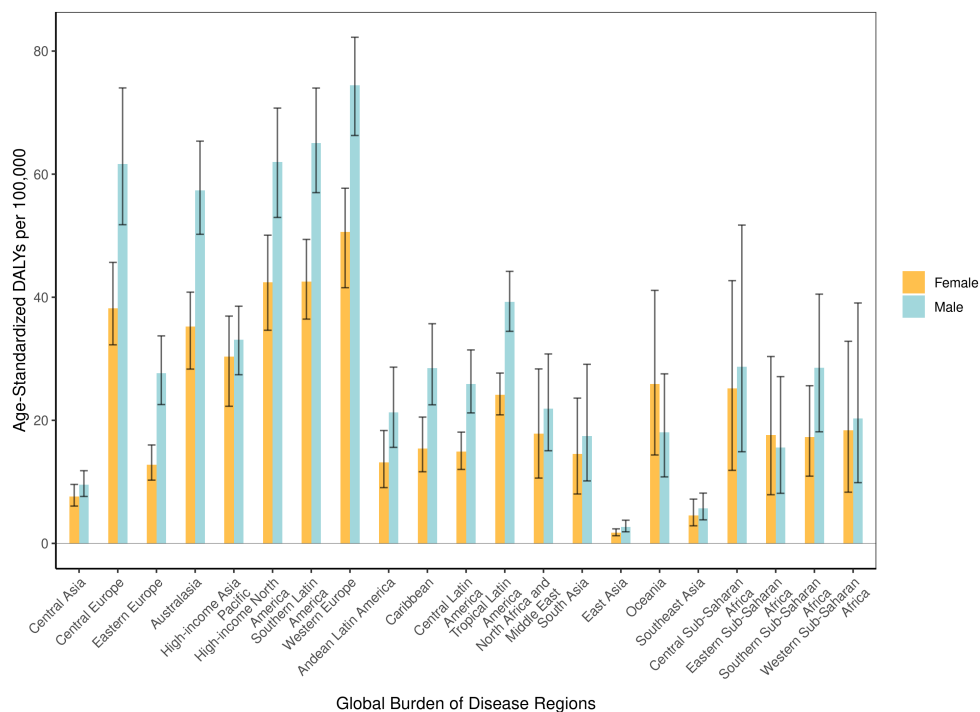
Figure 3. Rheumatic heart disease age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
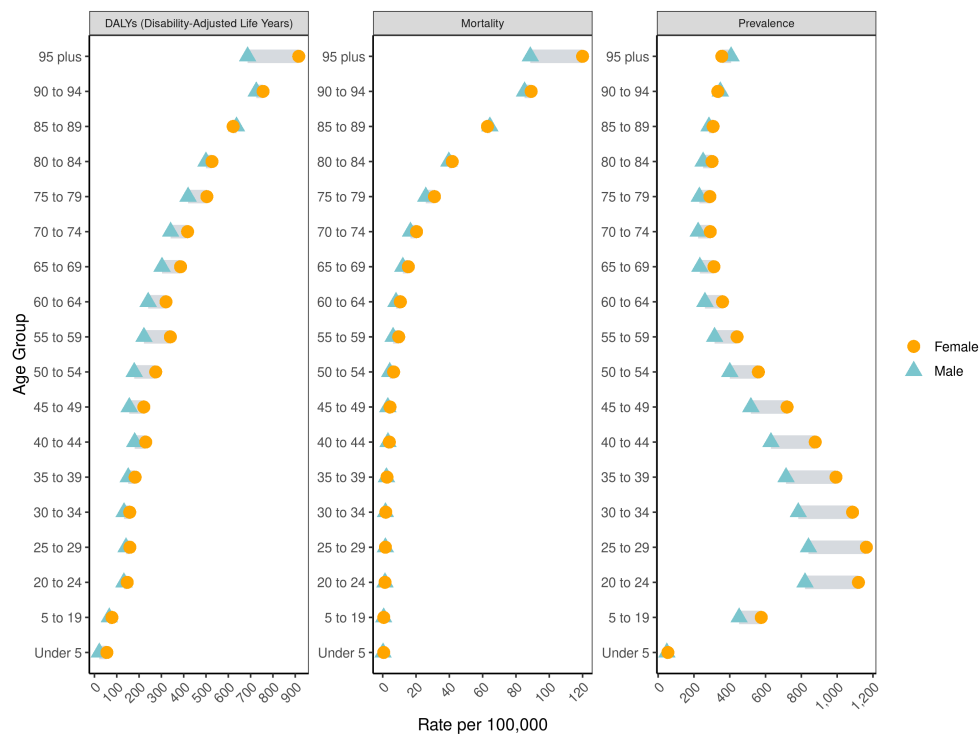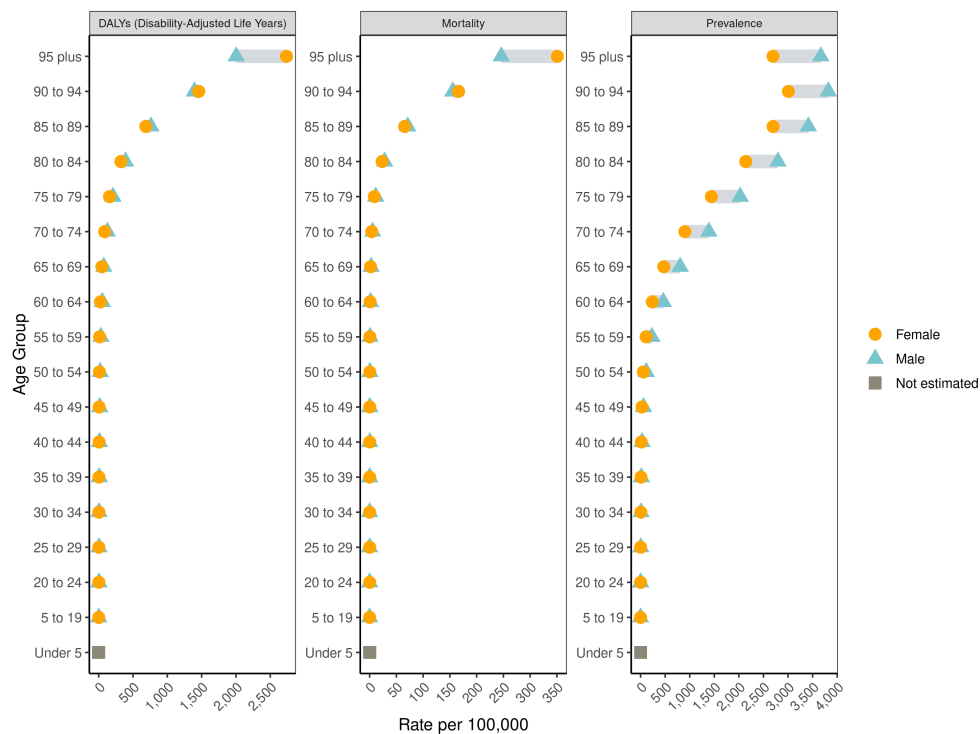

Figure 4. Global rheumatic heart disease age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

ISCHEMIC HEART DISEASE
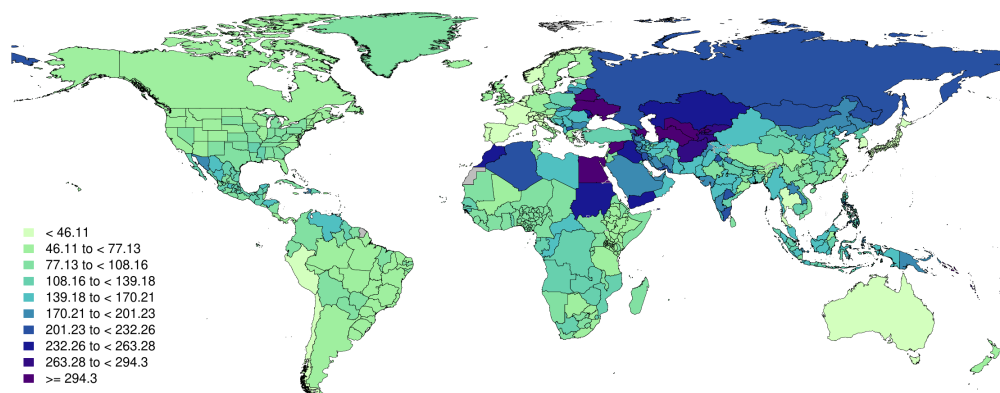
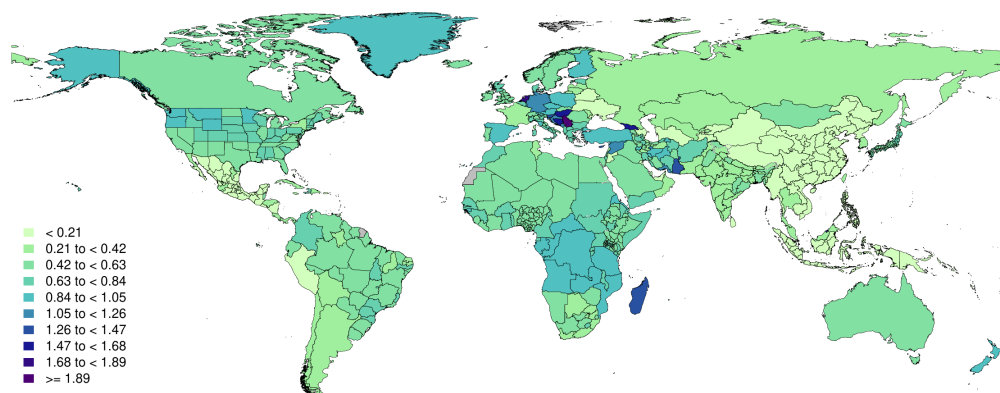Figure 1. Global map of age–standardized ischemic heart disease mortality rate per 100,000 in 2022 with equal interval classification
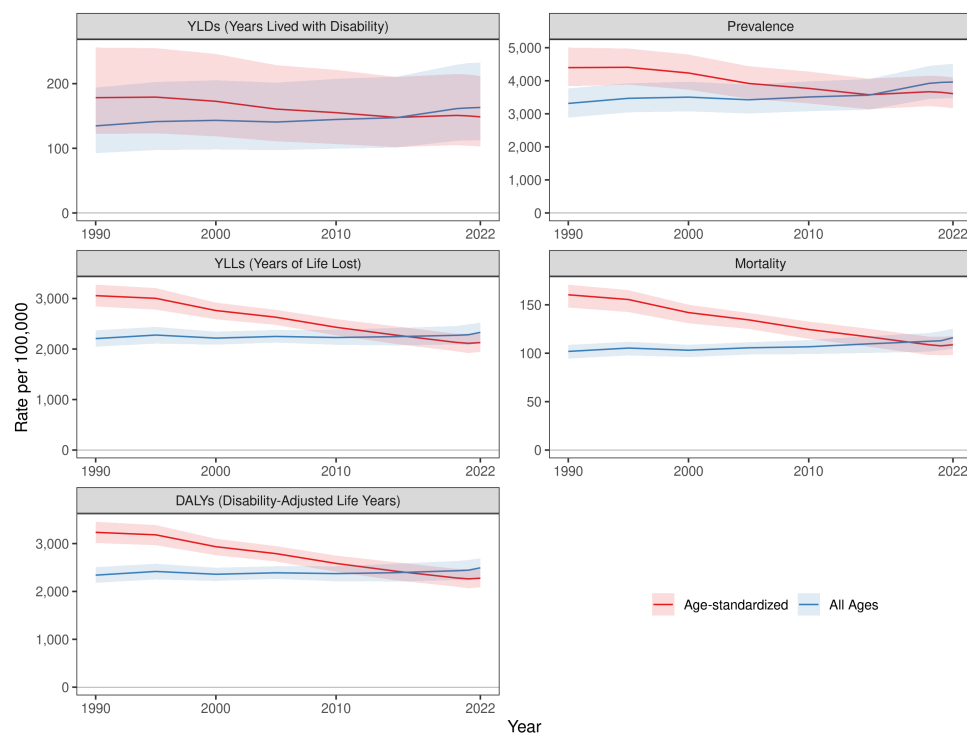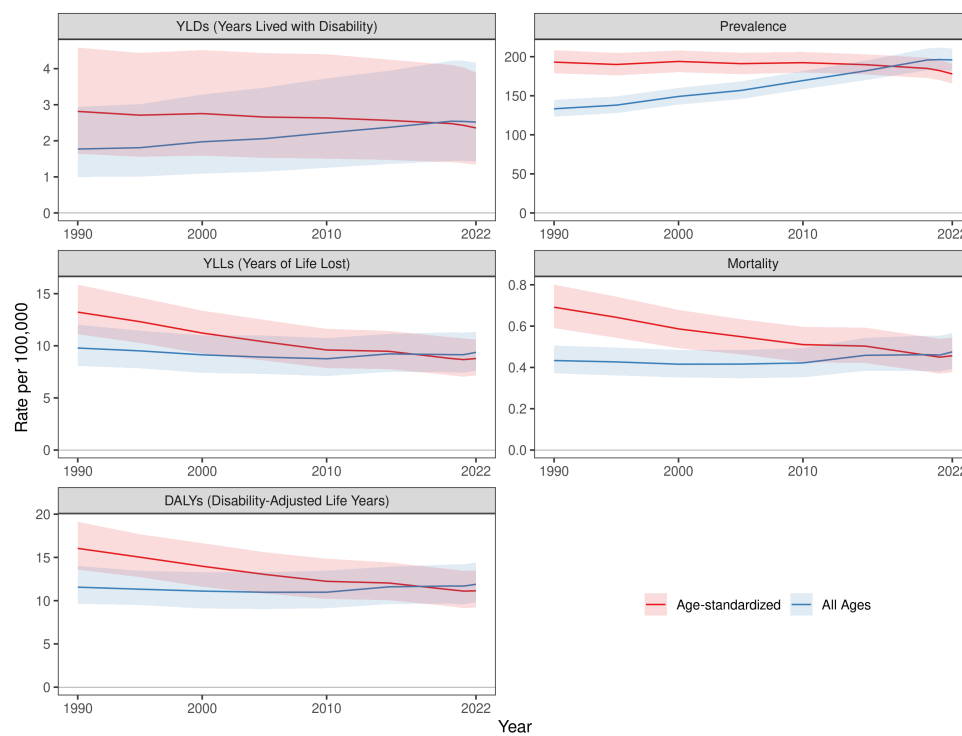

Figure 2. Global ischemic heart disease estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
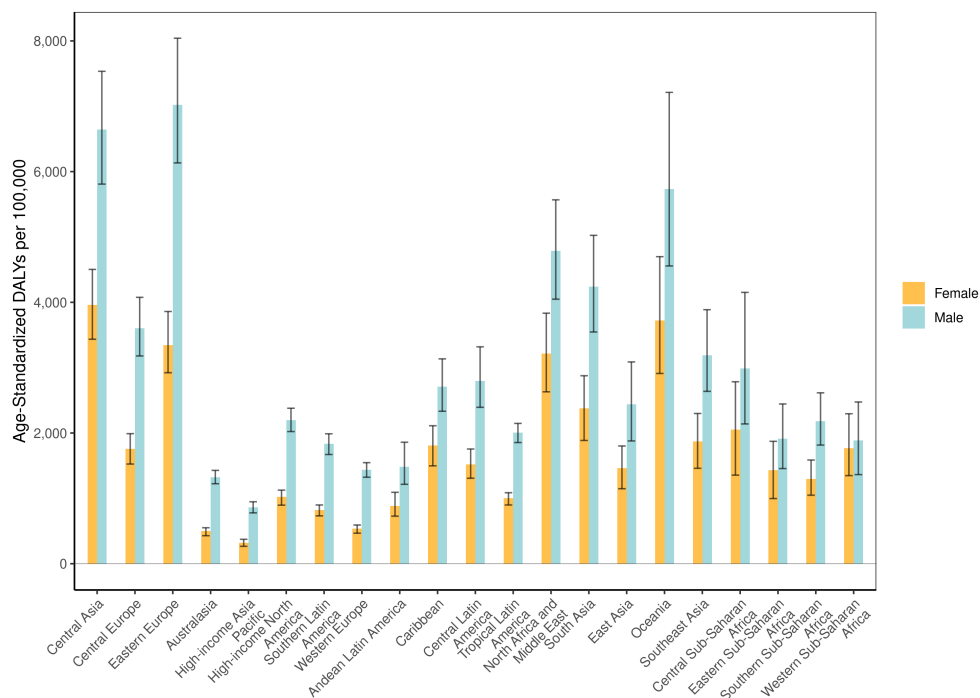
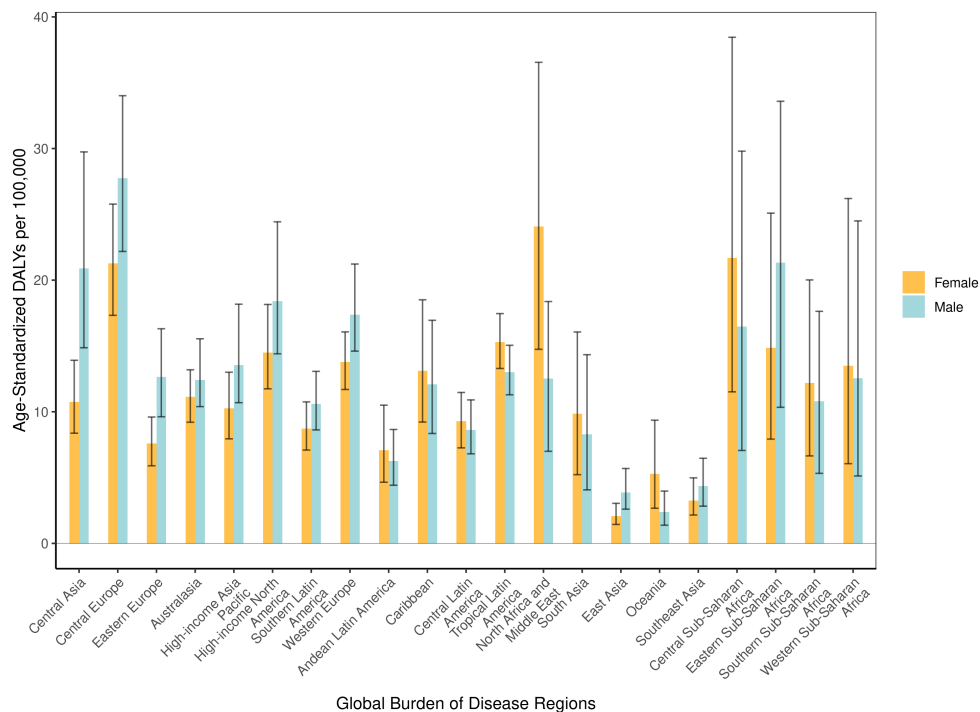Figure 3. Ischemic heart disease age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
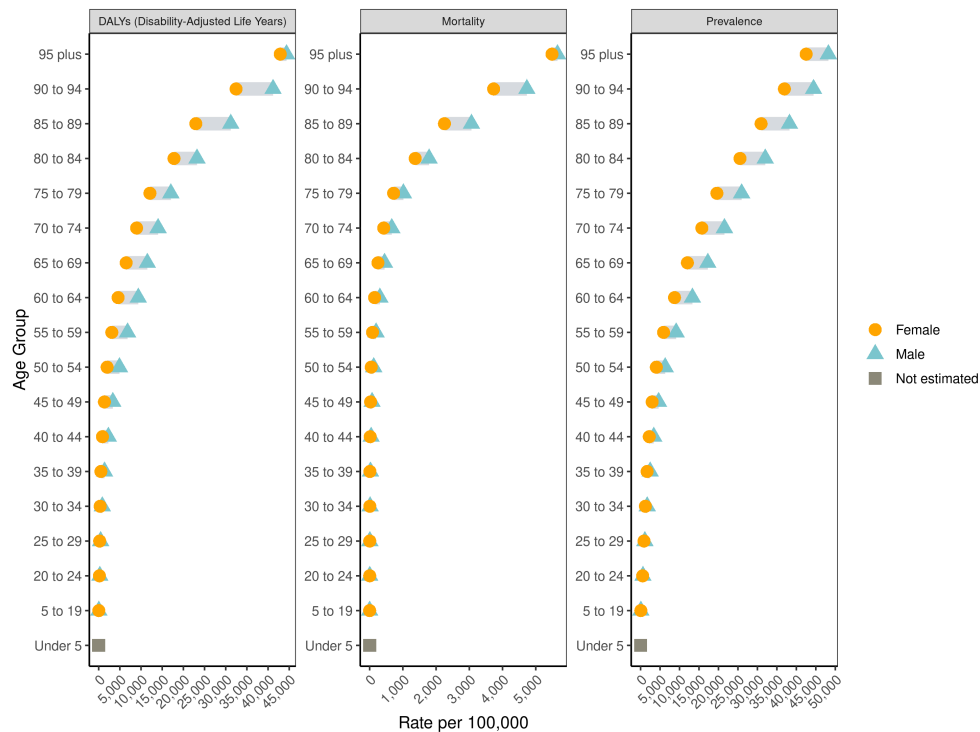
Figure 4. Global ischemic heart disease age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

AGGREGATE CAUSE: STROKE
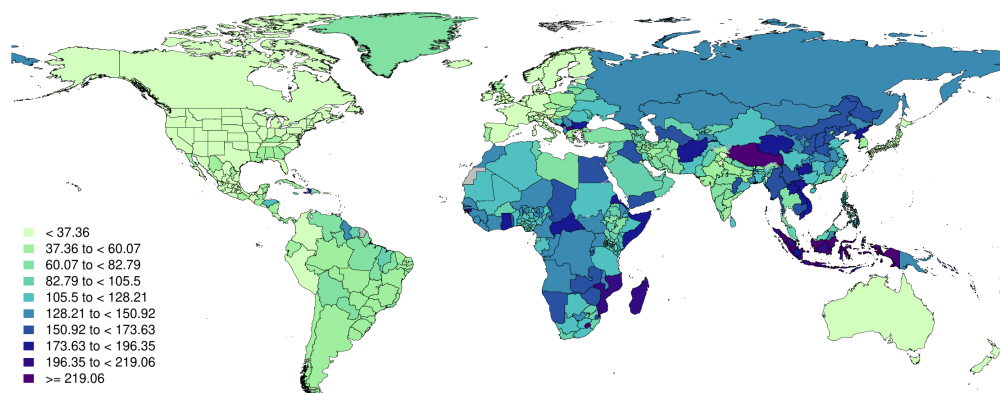
Figure 1. Global map of age–standardized stroke mortality rate per 100,000 in 2022 with equal interval classification
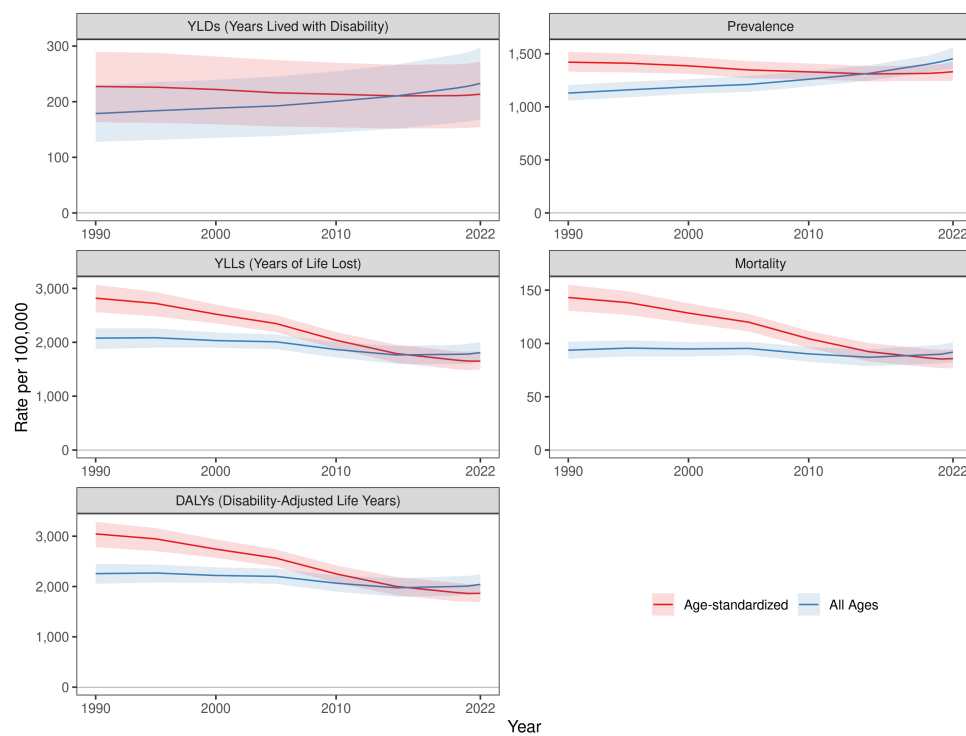
Figure 2. Global stroke estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
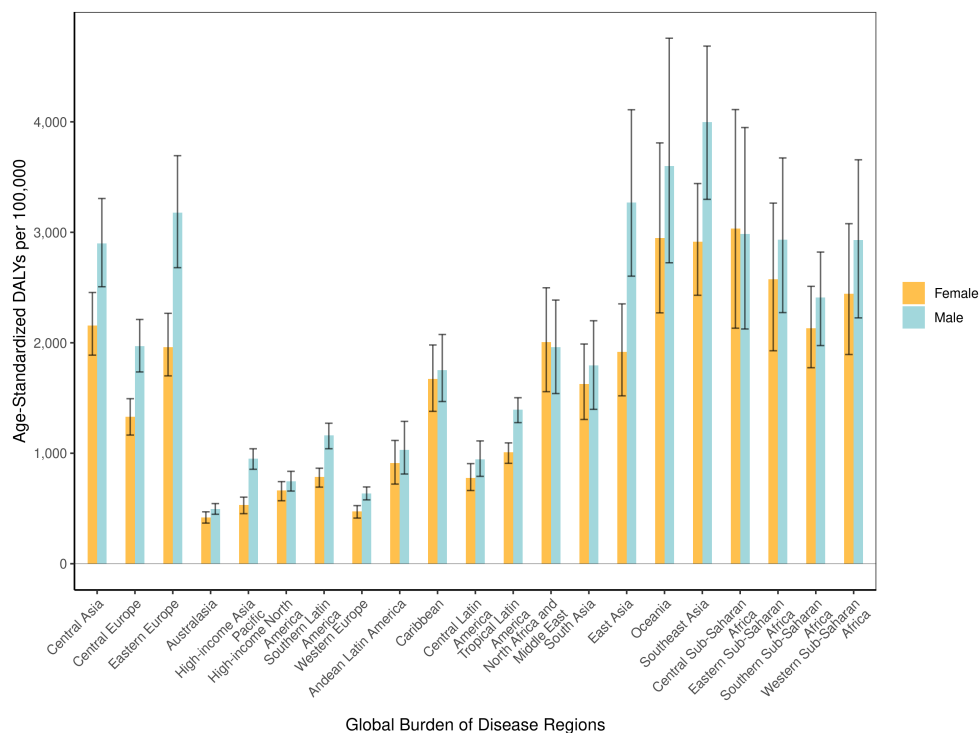
Figure 3. Stroke age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
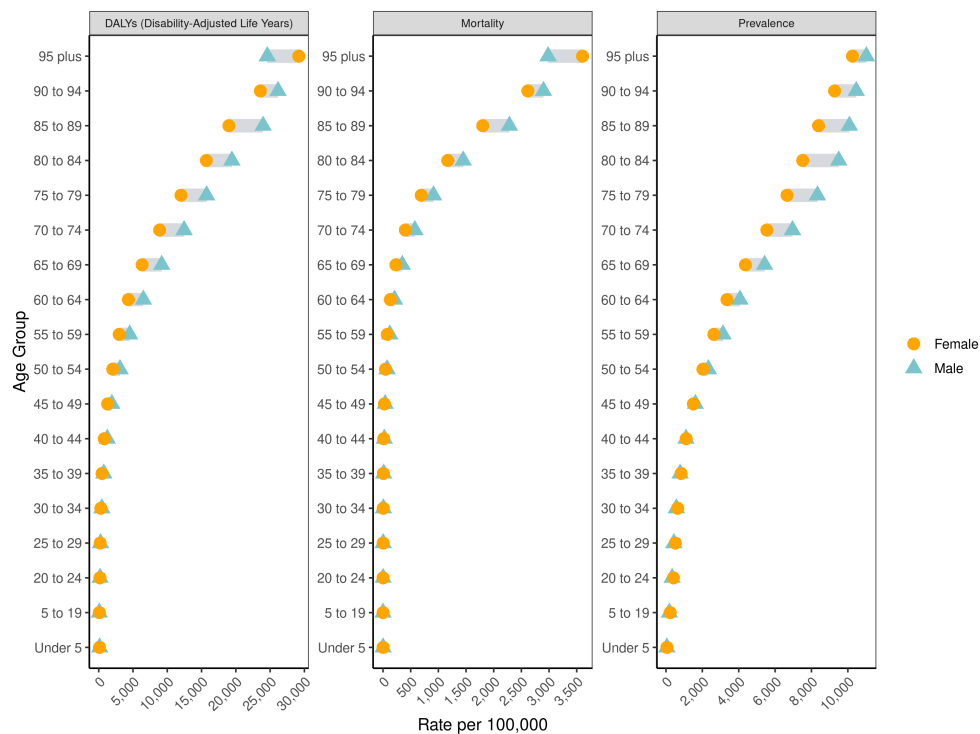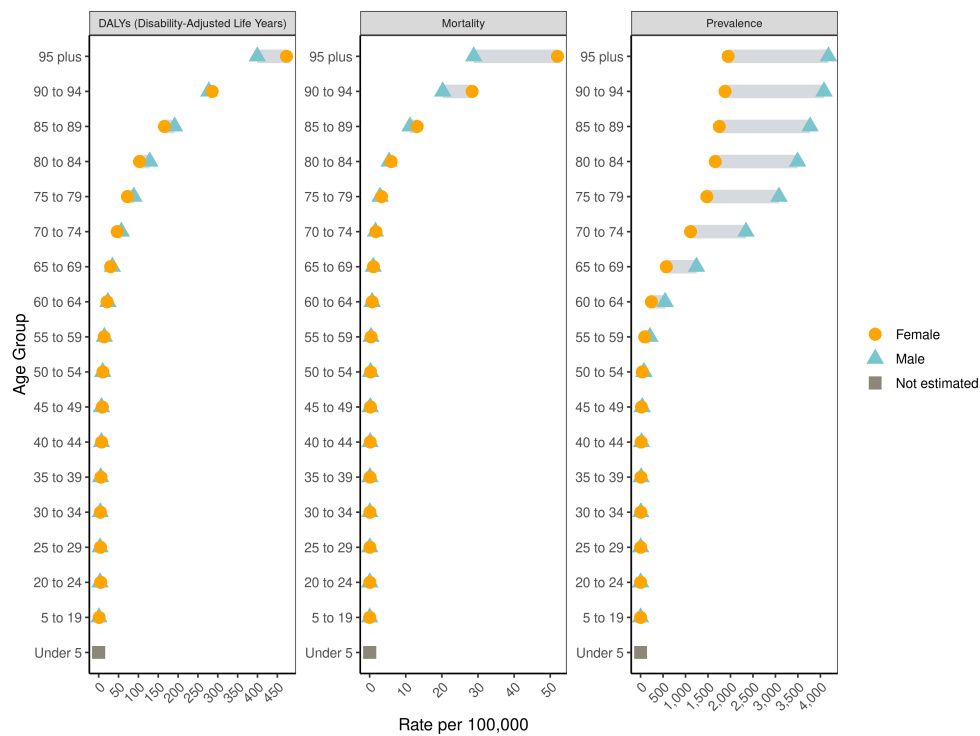

Figure 4. Global stroke age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

ISCHEMIC STROKE
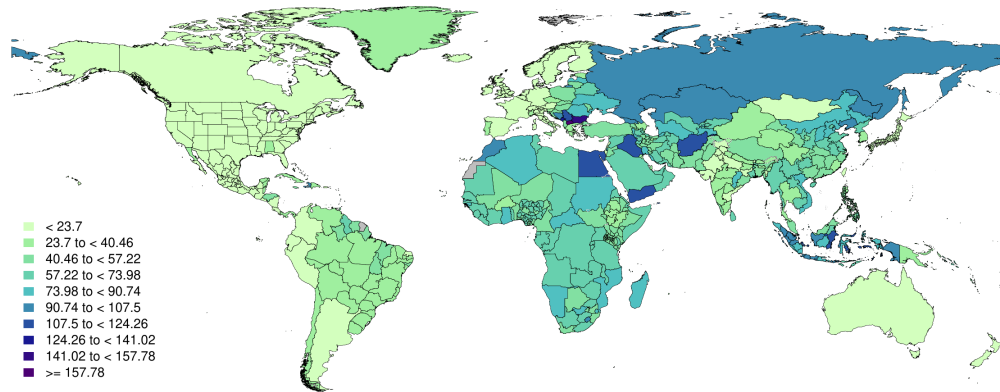
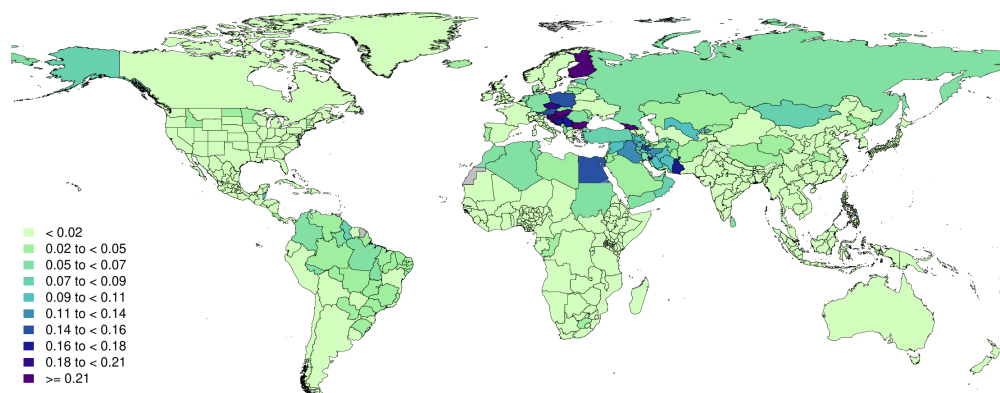Figure 1. Global map of age−standardized ischemic stroke mortality rate per 100,000 in 2022 with equal interval classification
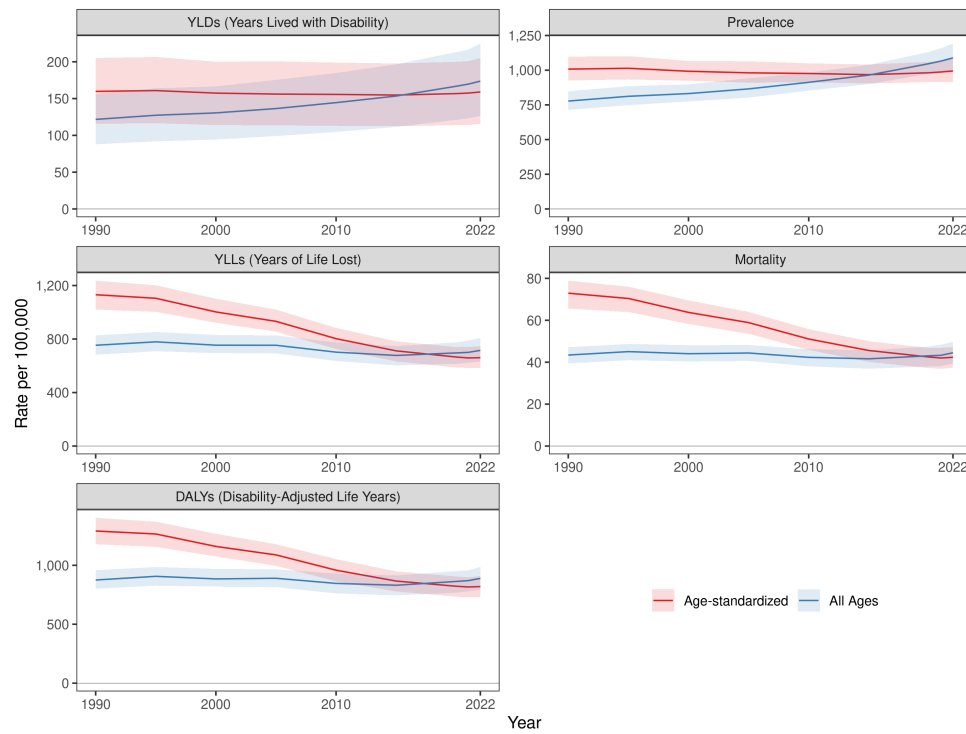
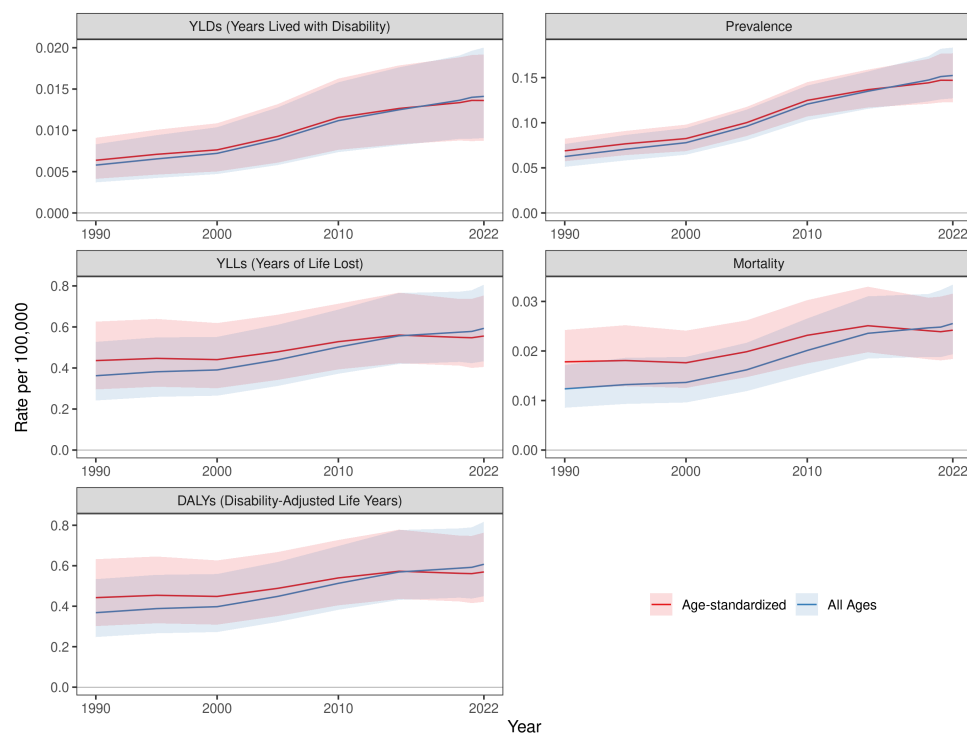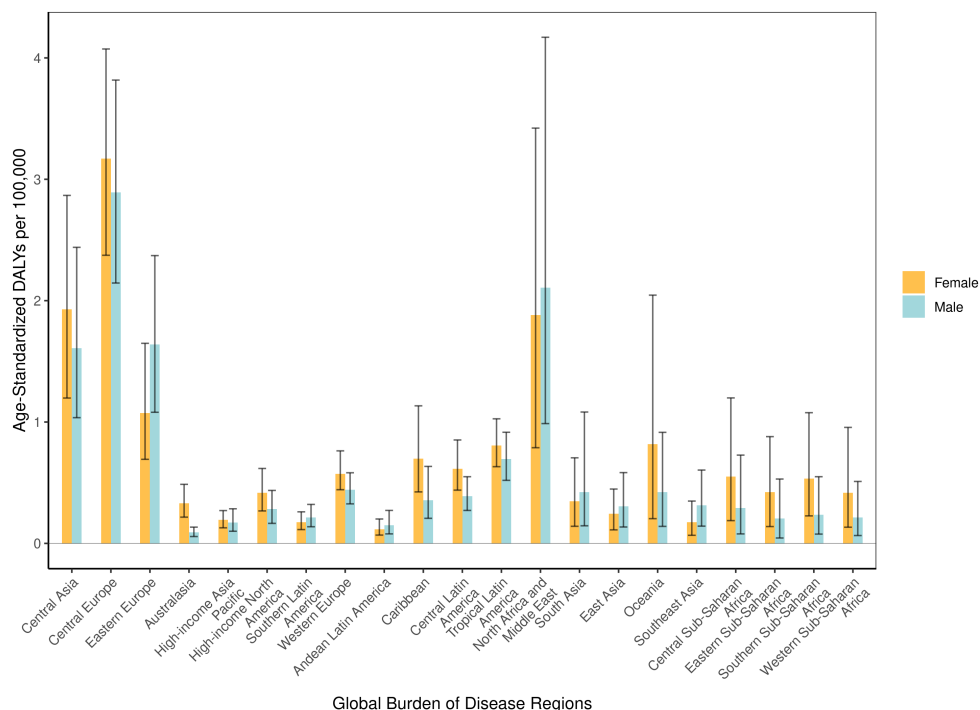Figure 2. Global ischemic stroke estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
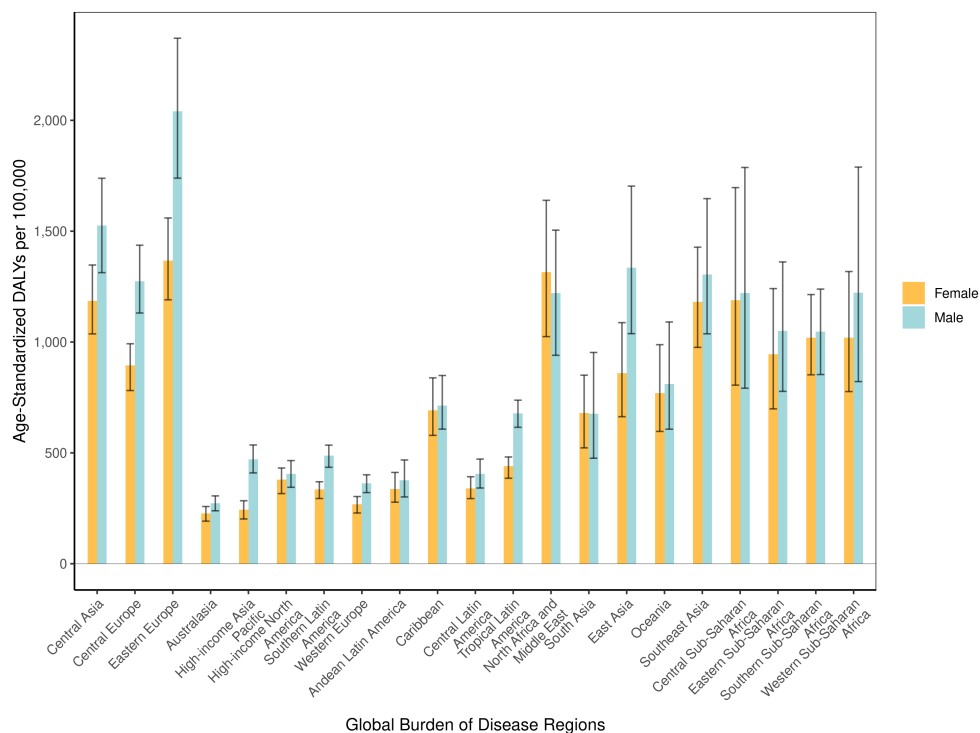
Figure 3. Ischemic stroke age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
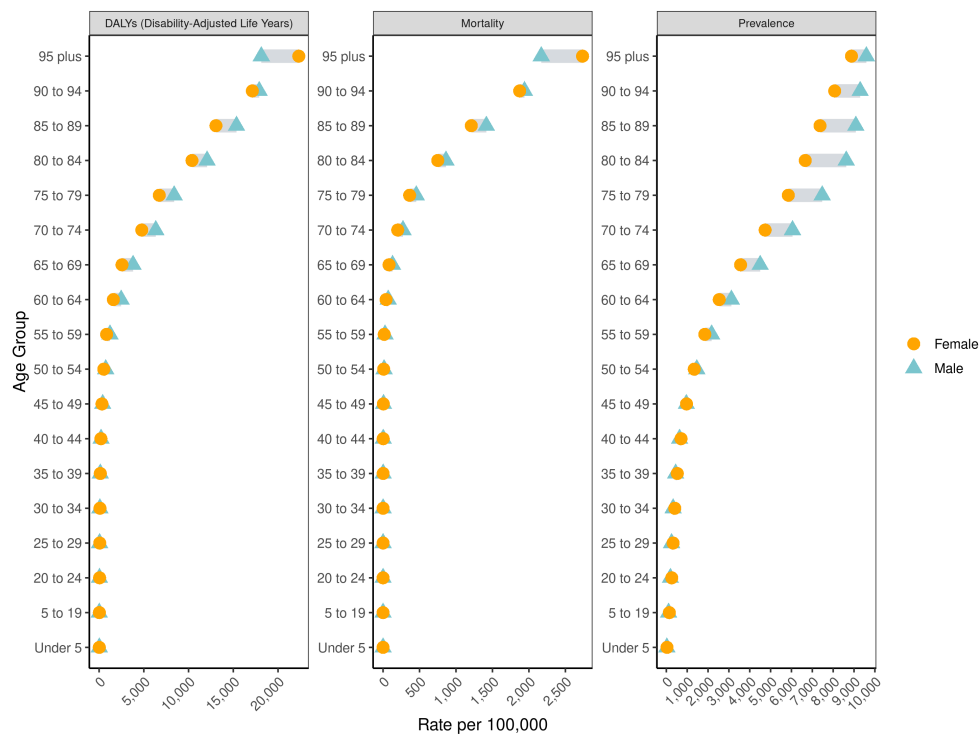
Figure 4. Global ischemic stroke age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

INTRACEREBRAL HEMORRHAGE
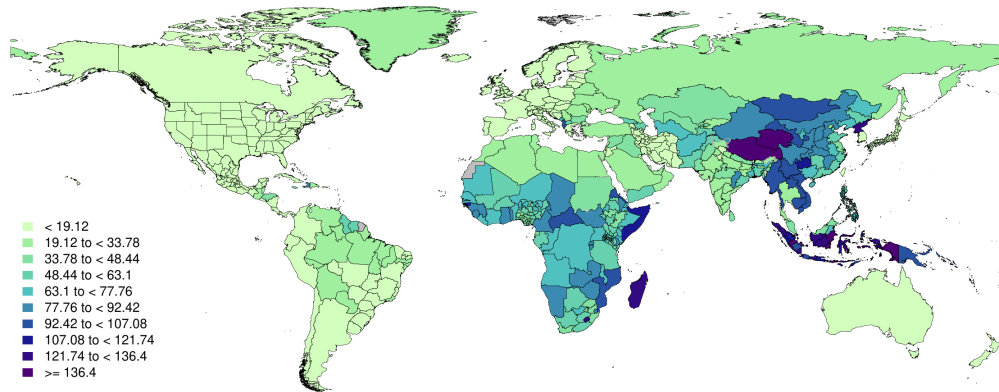
Figure 1. Global map of age–standardized intracerebral hemorrhage mortality rate per 100,000 in 2022 with equal interval classification
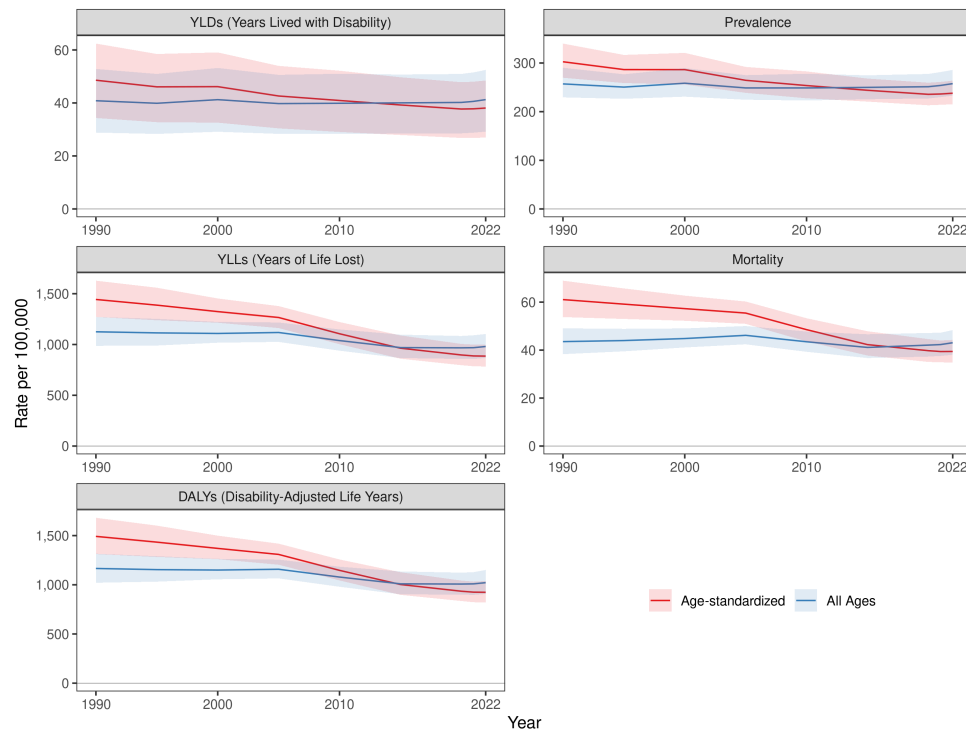
Figure 2. Global intracerebral hemorrhage estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
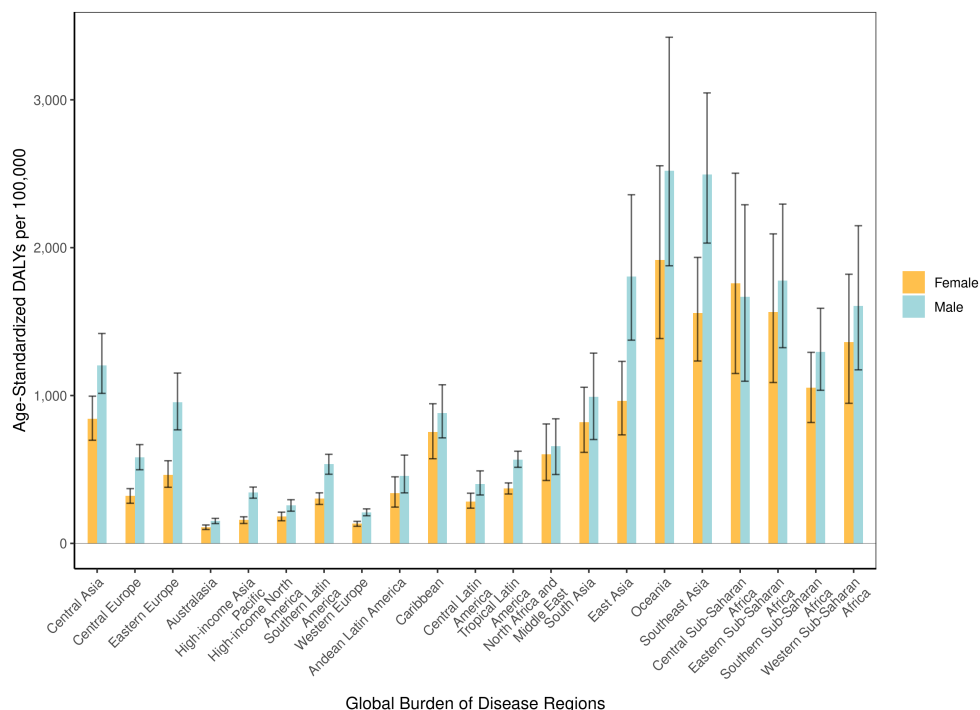
Figure 3. Intracerebral hemorrhage age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
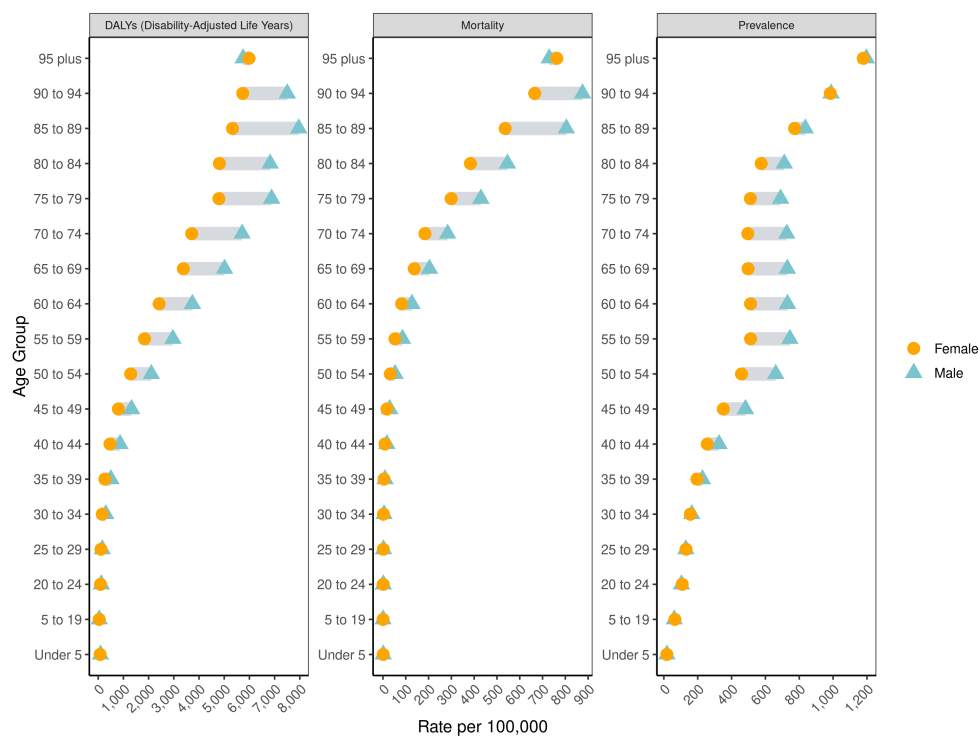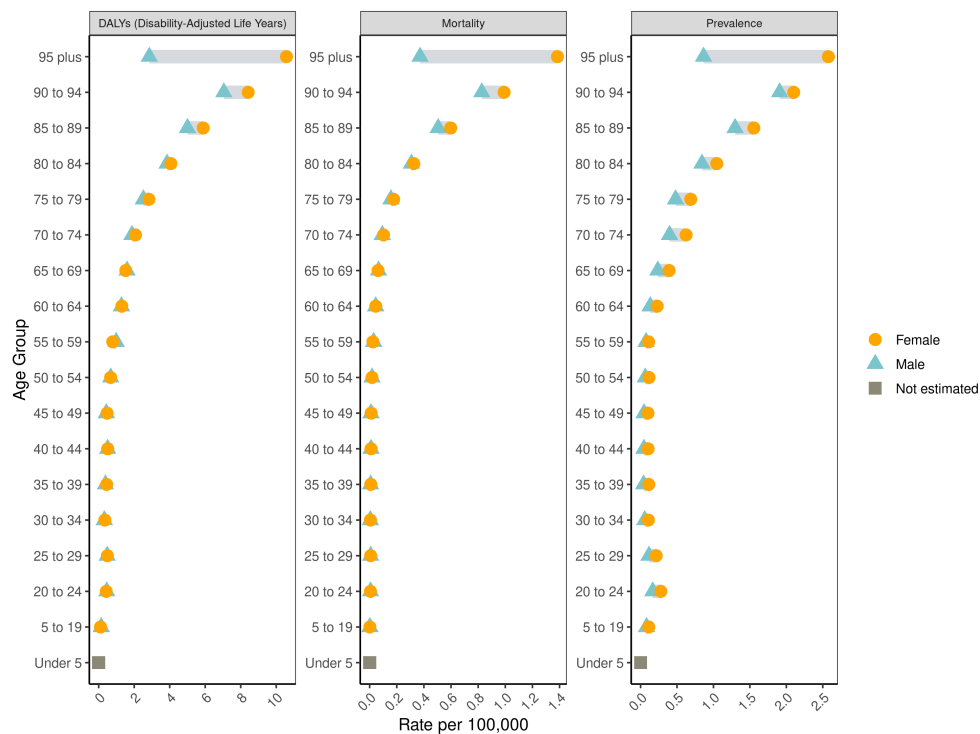

Figure 4. Global intracerebral hemorrhage age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

SUBARACHNOID HEMORRHAGE
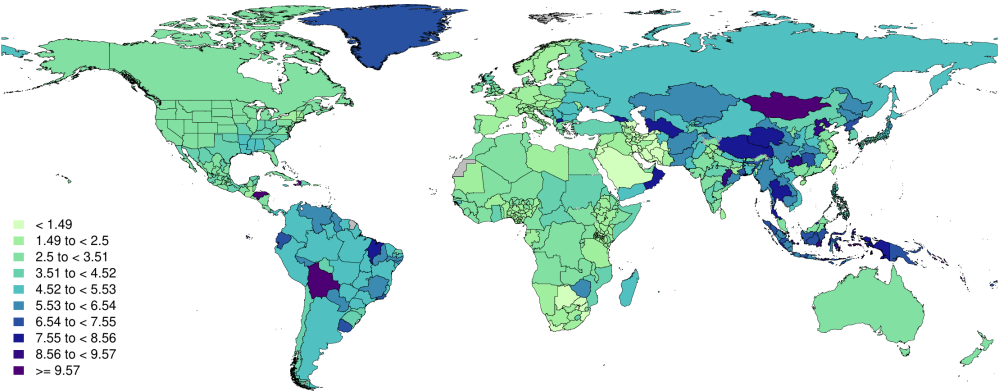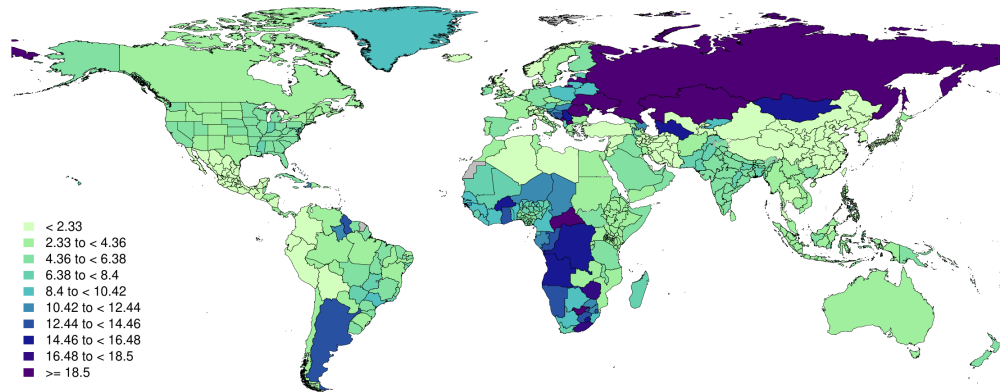

Figure 1. Global map of age–standardized subarachnoid hemorrhage mortality rate per 100,000 in 2022 with equal interval classification
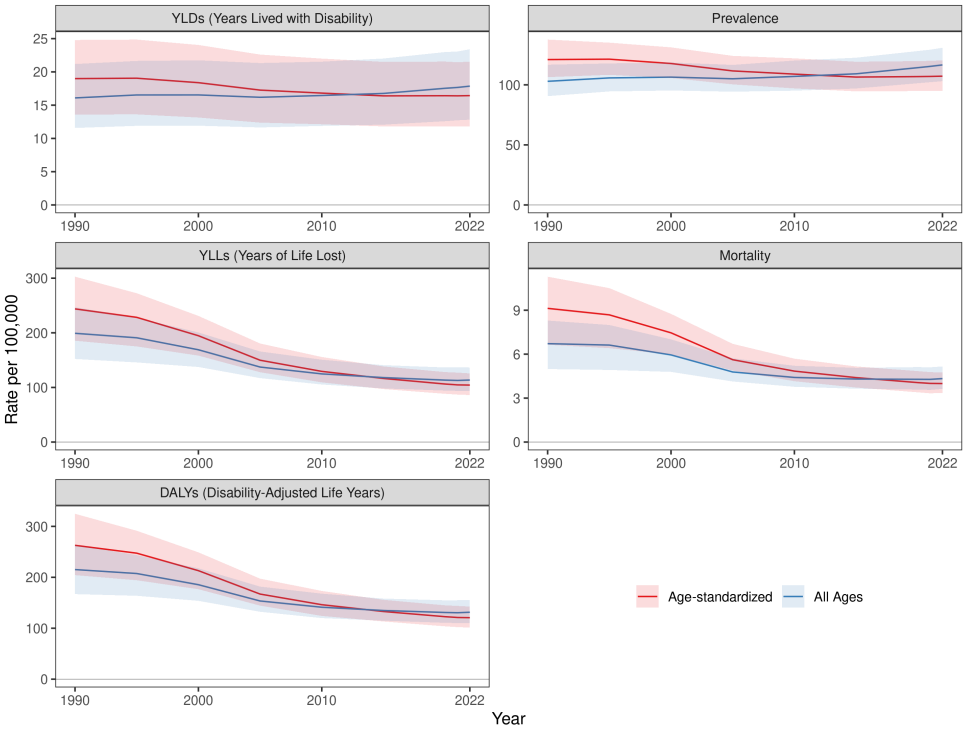
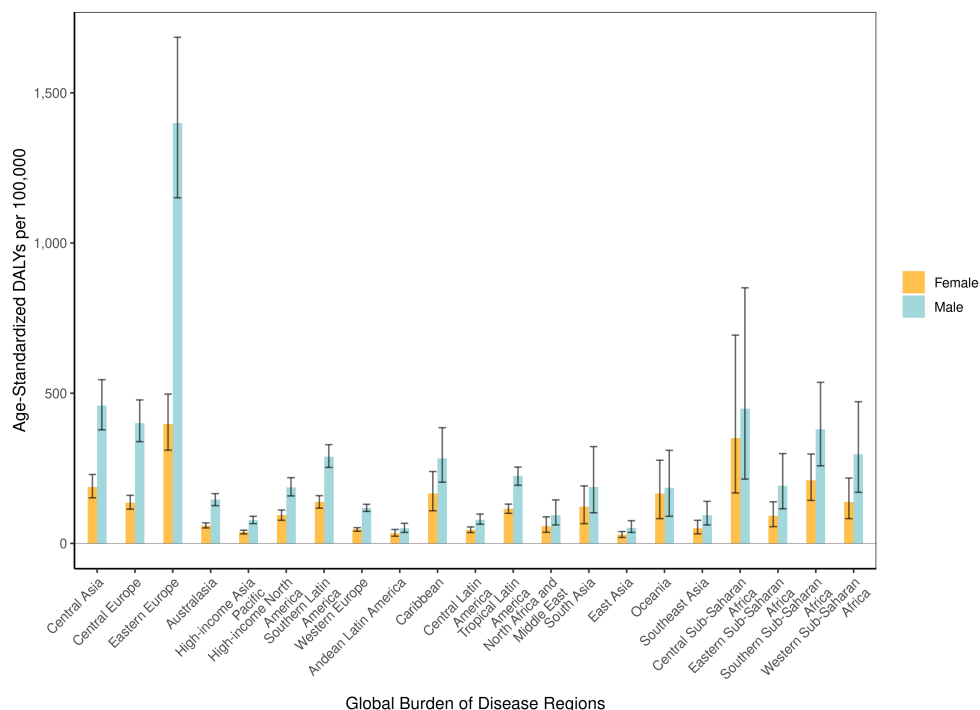Figure 2. Global subarachnoid hemorrhage estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
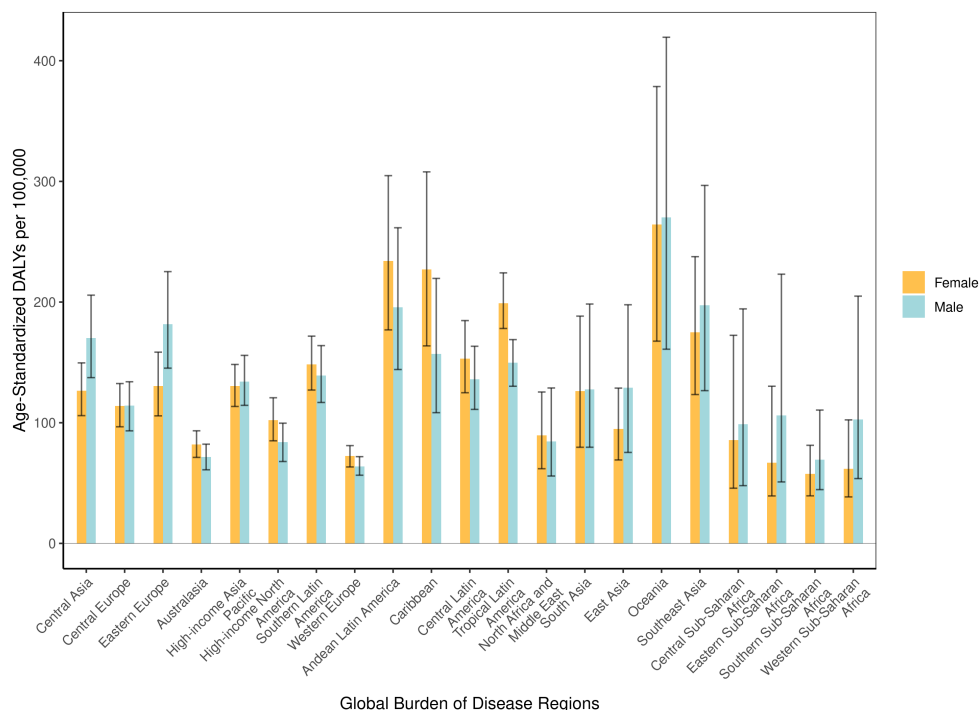
Figure 3. Subarachnoid hemorrhage age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
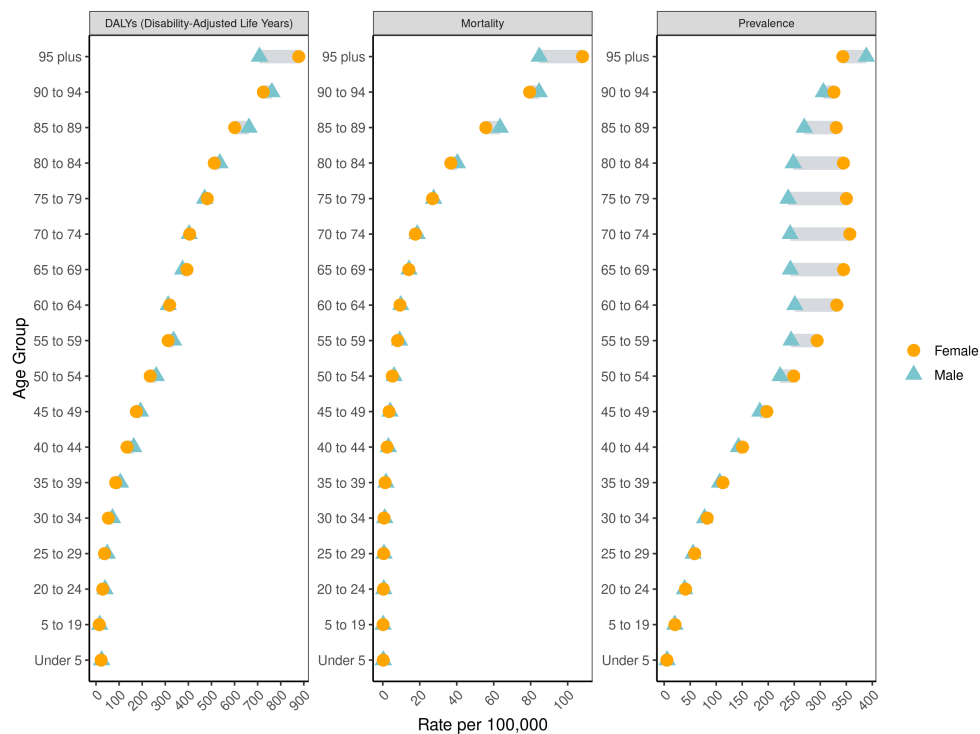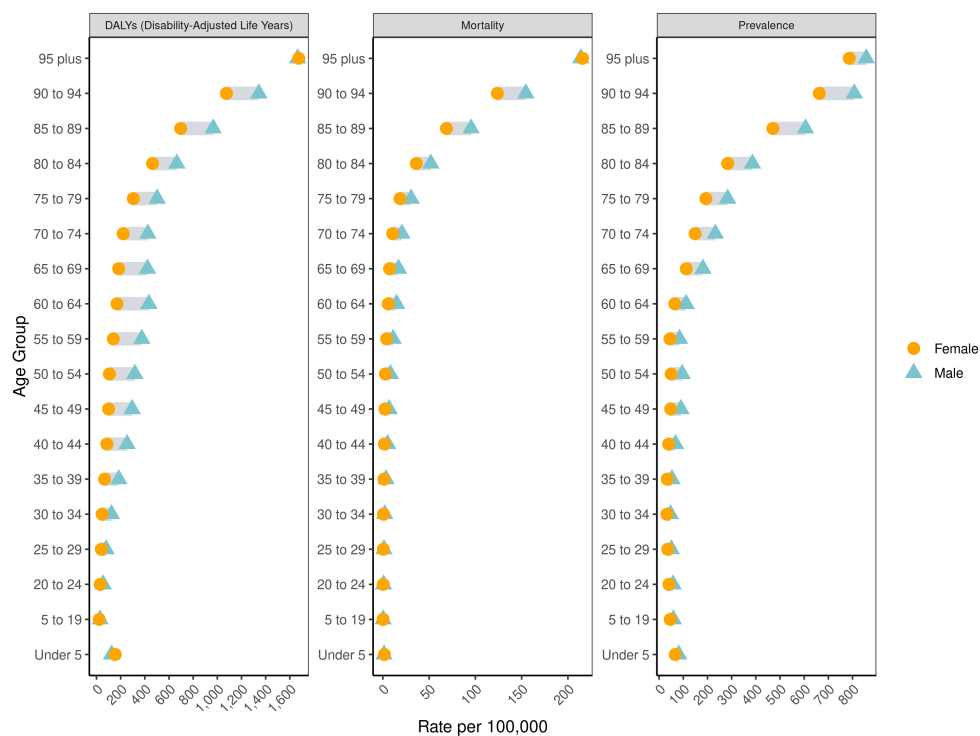

Figure 4. Global subarachnoid hemorrhage age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
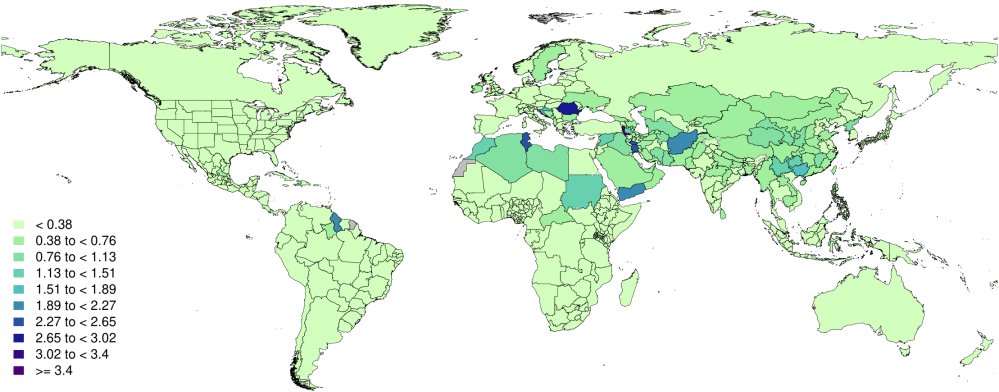
HYPERTENSIVE HEART DISEASE
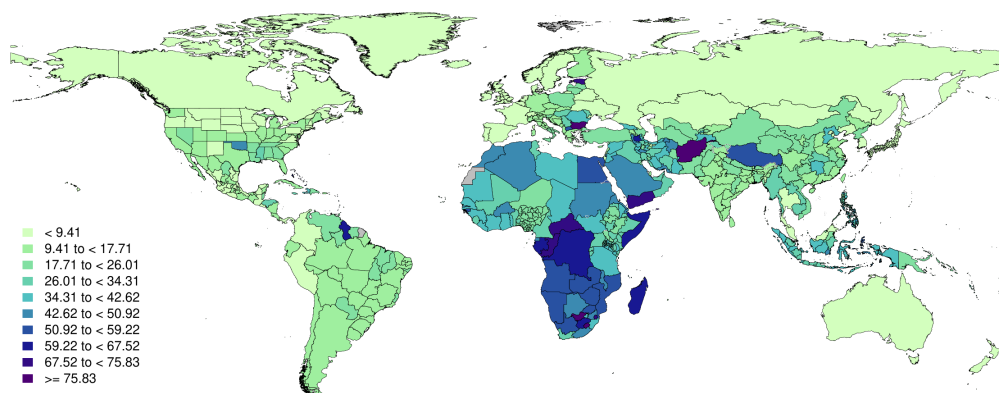
Figure 1. Global map of age–standardized hypertensive heart disease mortality rate per 100,000 in 2022 with equal interval classification
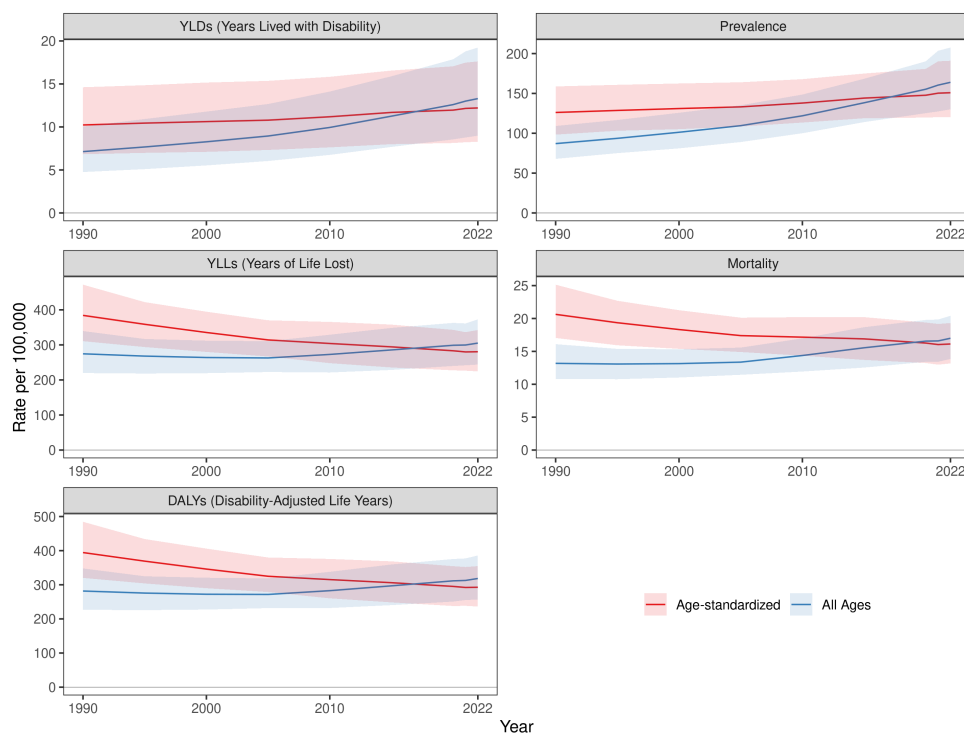
Figure 2. Global hypertensive heart disease estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
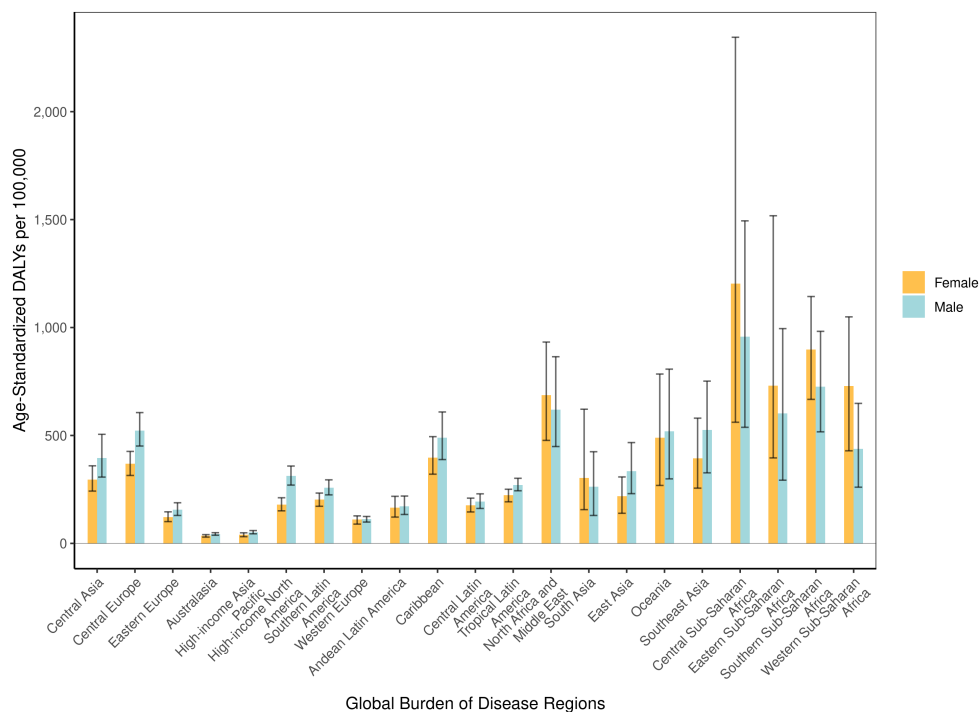
Figure 3. Hypertensive heart disease age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
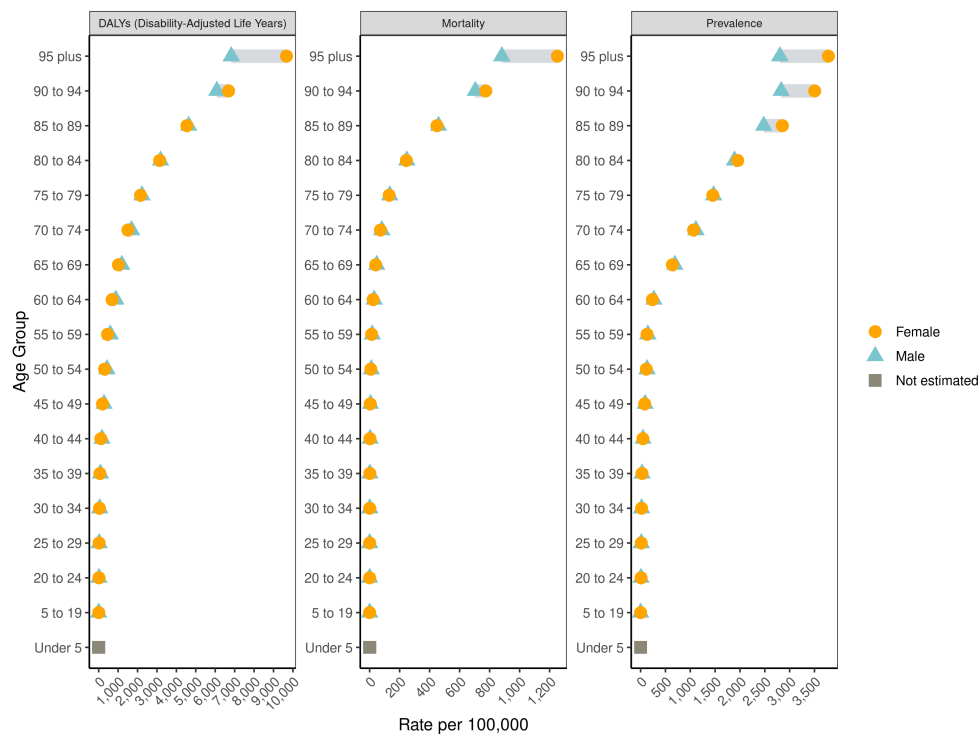
Figure 4. Global hypertensive heart disease age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

AGGREGATE CAUSE: NON–RHEUMATIC VALVULAR HEART DISEASE
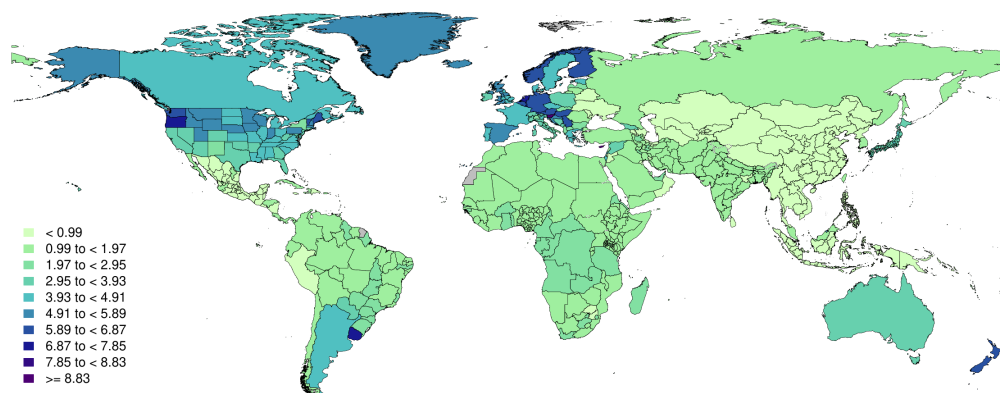
Figure 1. Global map of age–standardized non–rheumatic valvular heart disease mortality rate per 100,000 in 2022 with equal interval classification

Figure 2. Global non-rheumatic valvular heart disease estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

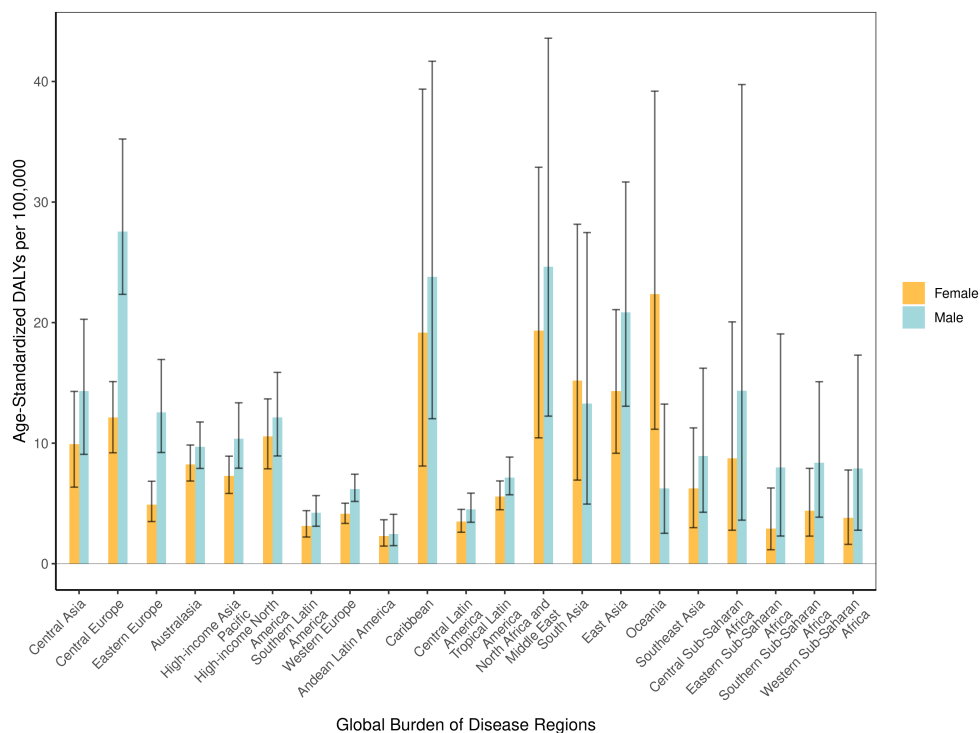Figure 3. Non-rheumatic valvular heart disease age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
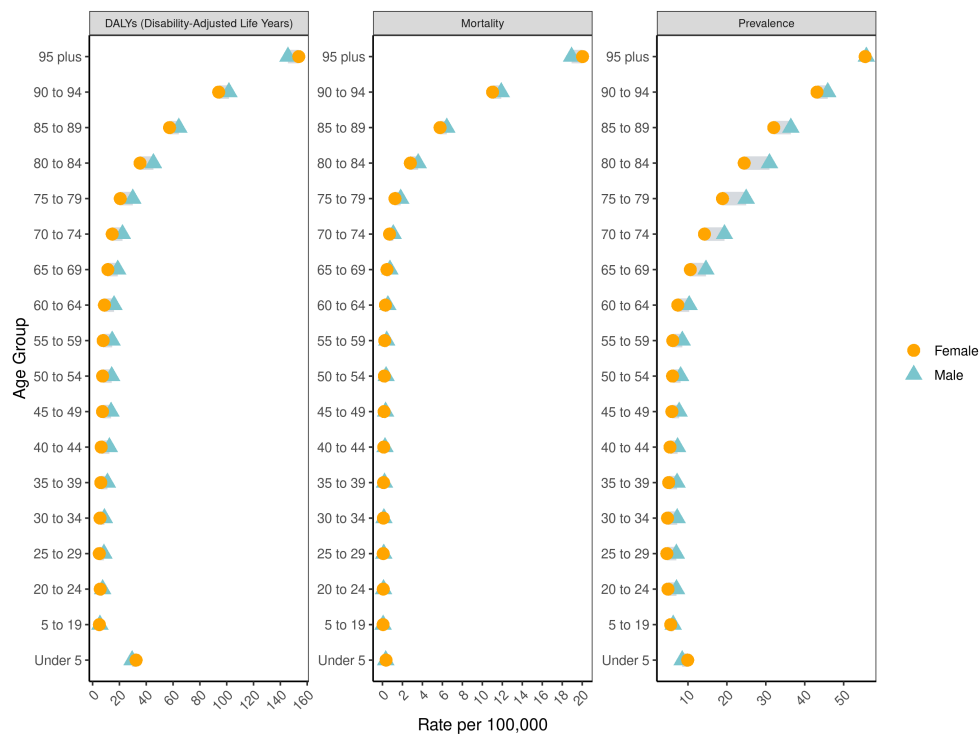

Figure 4. Global non-rheumatic valvular heart disease age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

NON–RHEUMATIC CALCIFIC AORTIC VALVE DISEASE

Figure 1. Global map of age–standardized non–rheumatic calcific aortic valve disease mortality rate per 100,000 in 2022 with equal interval classification
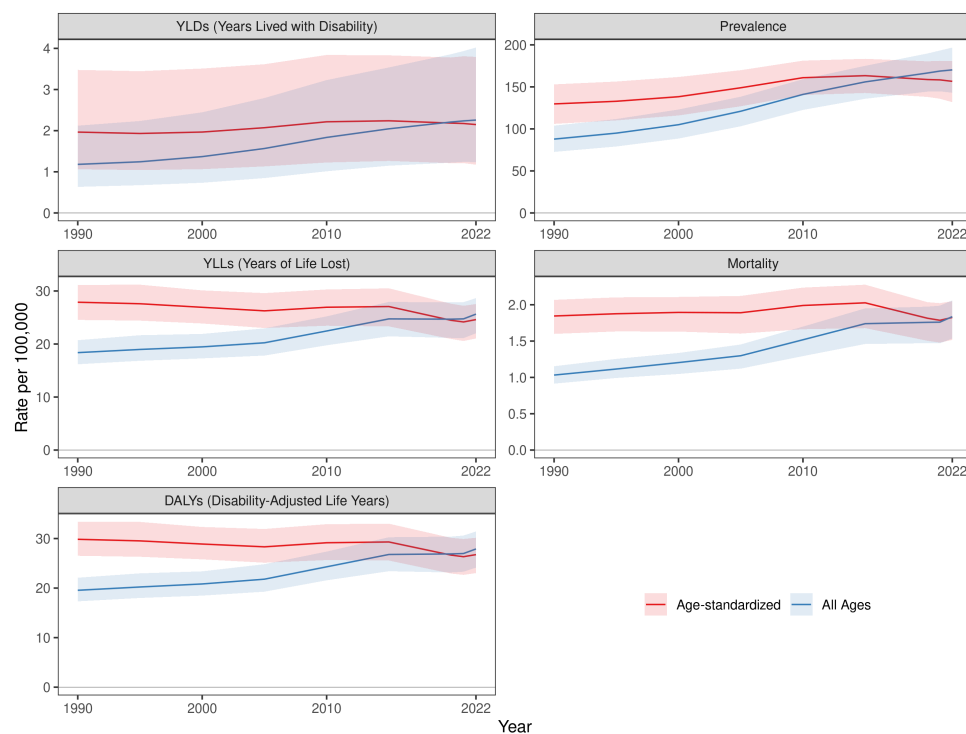
Figure 2. Global non-rheumatic calcific aortic valve disease estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

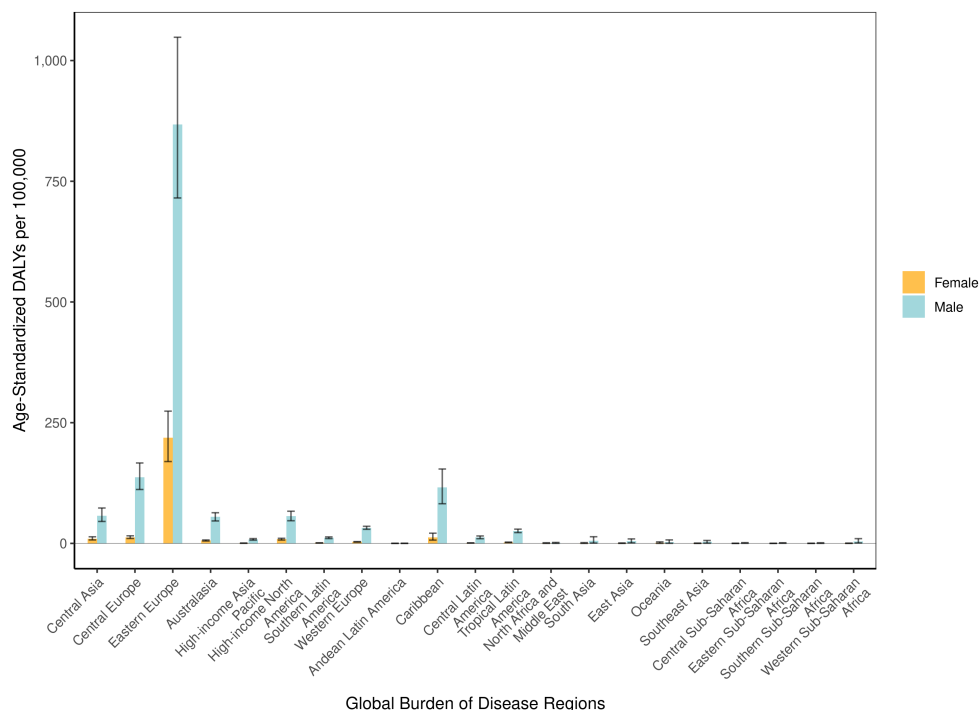Figure 3. Non-rheumatic calcific aortic valve disease age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
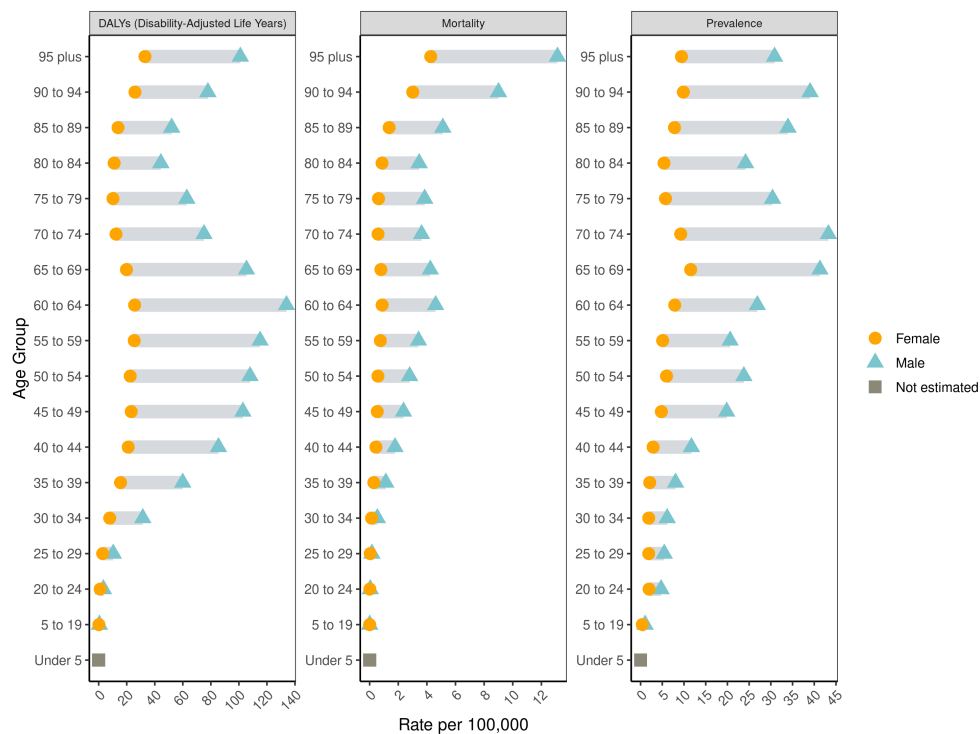

Figure 4. Global non-rheumatic calcific aortic valve disease age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

NON−RHEUMATIC DEGENERATIVE MITRAL VALVE DISEASE

Legend:
- < 0.21
- 0.21 to < 0.42
- 0.42 to < 0.63
- 0.63 to < 0.84
- 0.84 to < 1.05
- 1.05 to < 1.26
- 1.26 to < 1.47
- 1.47 to < 1.68
- 1.68 to < 1.89
- >= 1.89

Figure 1. Global map of age−standardized non−rheumatic degenerative mitral valve disease mortality rate per 100,000 in 2022 with equal interval classification

Figure 2. Global non-rheumatic degenerative mitral valve disease estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

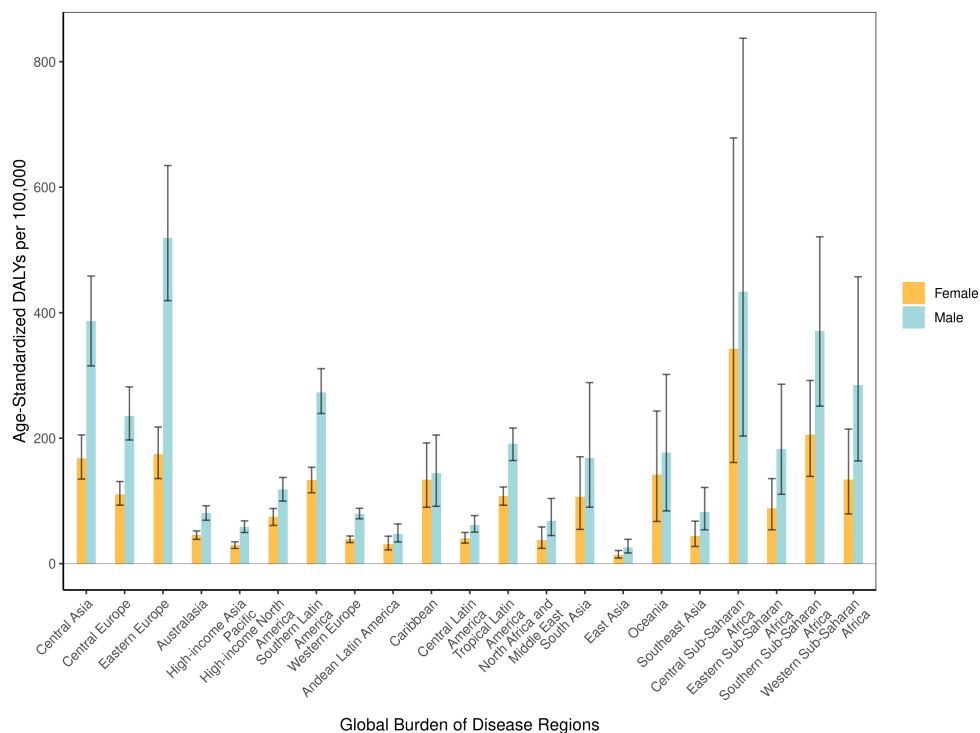Figure 3. Non-rheumatic degenerative mitral valve disease age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar

Figure 4. Global non-rheumatic degenerative mitral valve disease age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

OTHER NON–RHEUMATIC VALVE DISEASES

Figure 1. Global map of age–standardized other non–rheumatic valve diseases mortality rate per 100,000 in 2022 with equal interval classification

Figure 2. Global other non-rheumatic valve diseases estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

Figure 3. Other non-rheumatic valve diseases age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
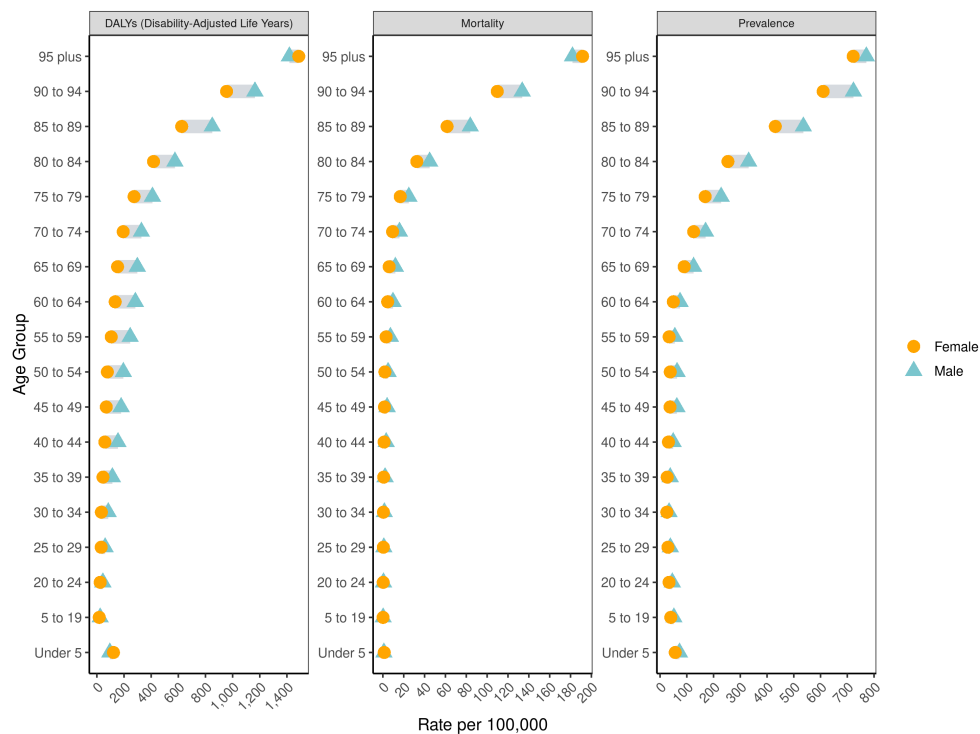

Figure 4. Global other non-rheumatic valve diseases age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

AGGREGATE CAUSE: CARDIOMYOPATHY AND MYOCARDITIS

Figure 1. Global map of age–standardized cardiomyopathy and myocarditis mortality rate per 100,000 in 2022 with equal interval classification
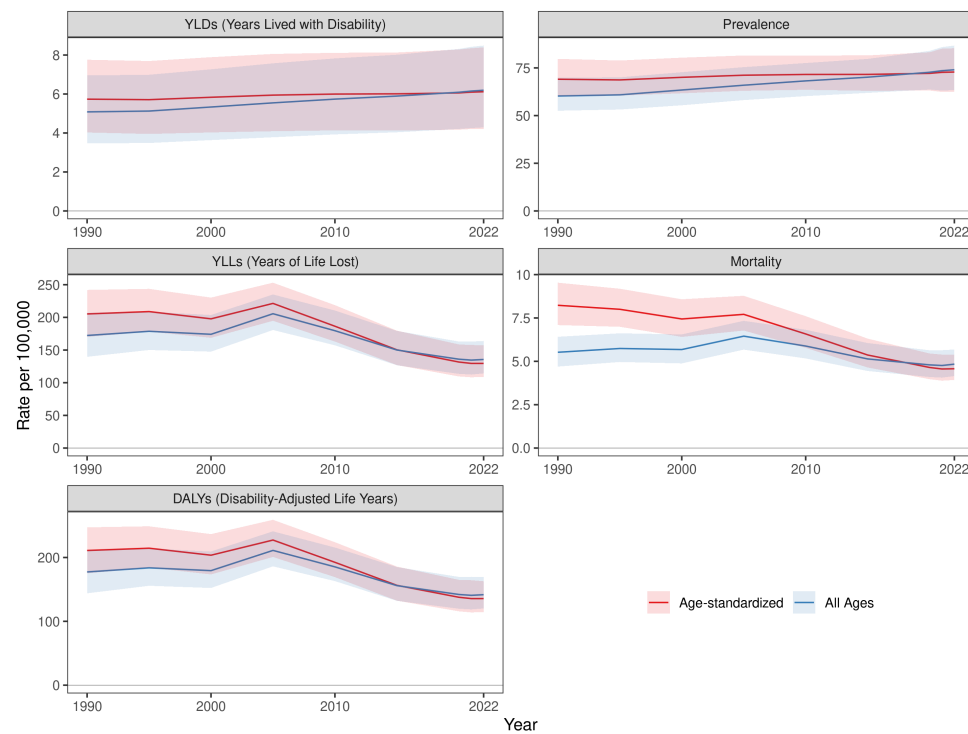
Figure 2. Global cardiomyopathy and myocarditis estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
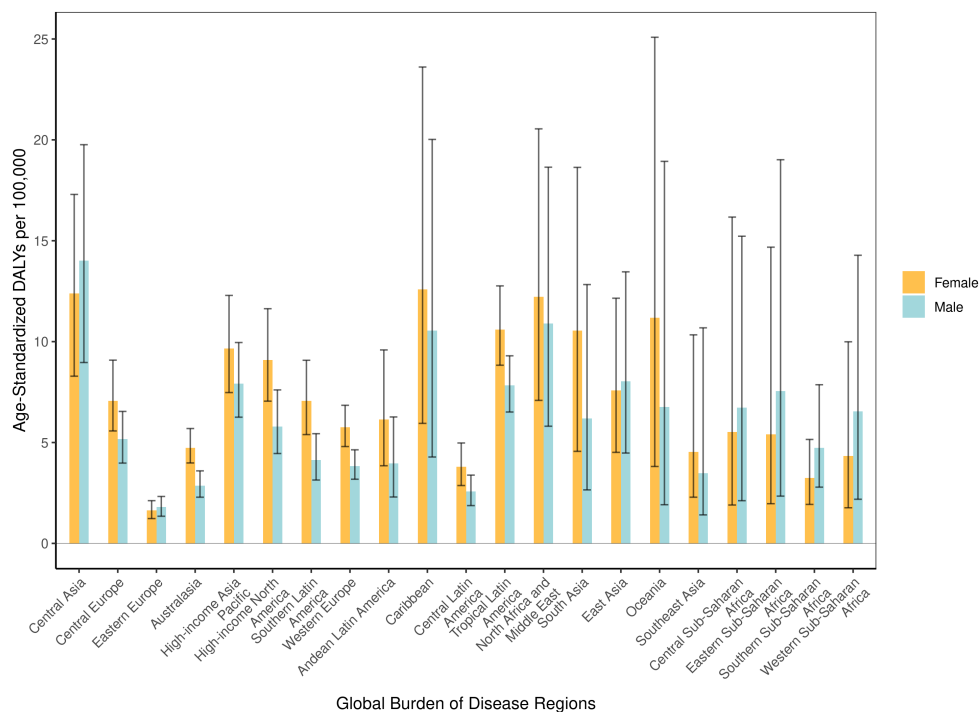
Figure 3. Cardiomyopathy and myocarditis age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
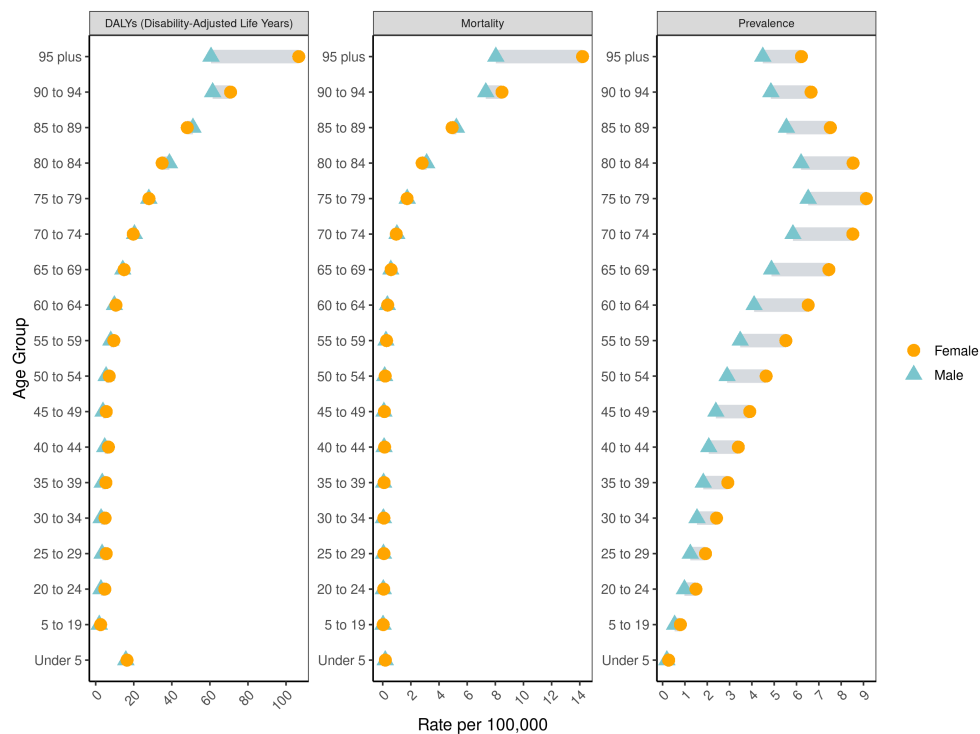

Figure 4. Global cardiomyopathy and myocarditis age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

MYOCARDITIS
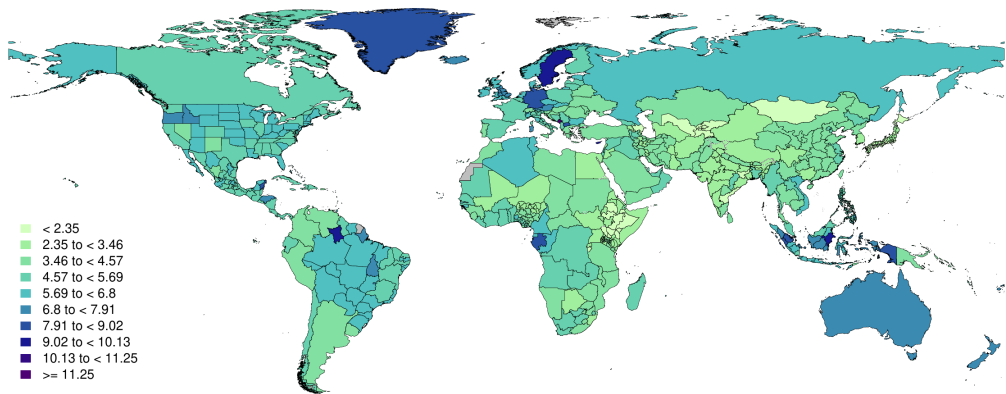

Figure 1. Global map of age−standardized myocarditis mortality rate per 100,000 in 2022 with equal interval classification
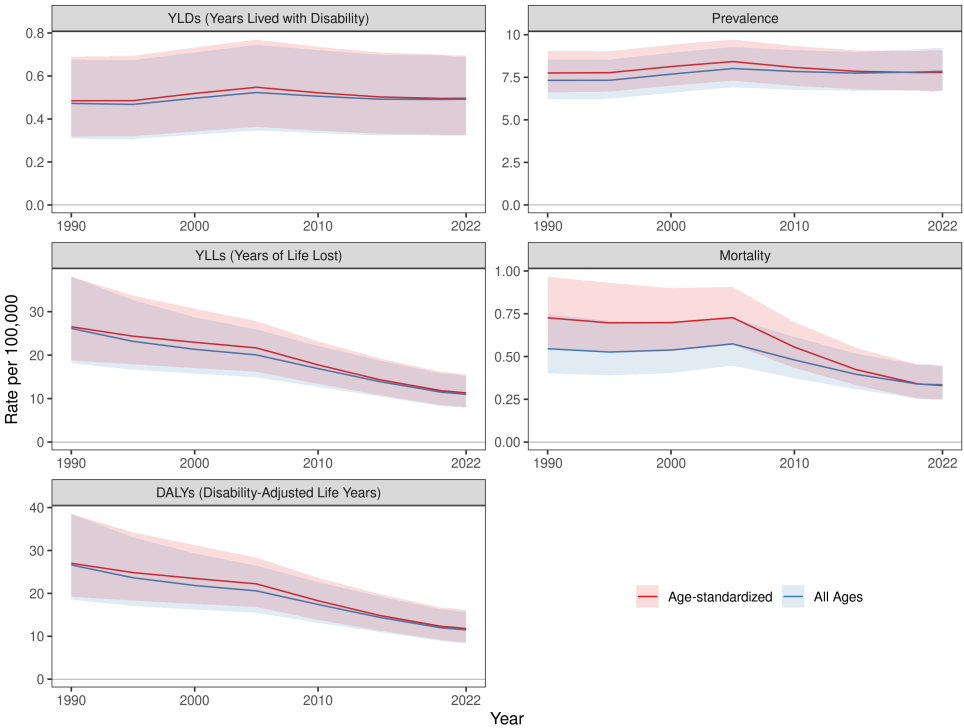
Figure 2. Global myocarditis estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
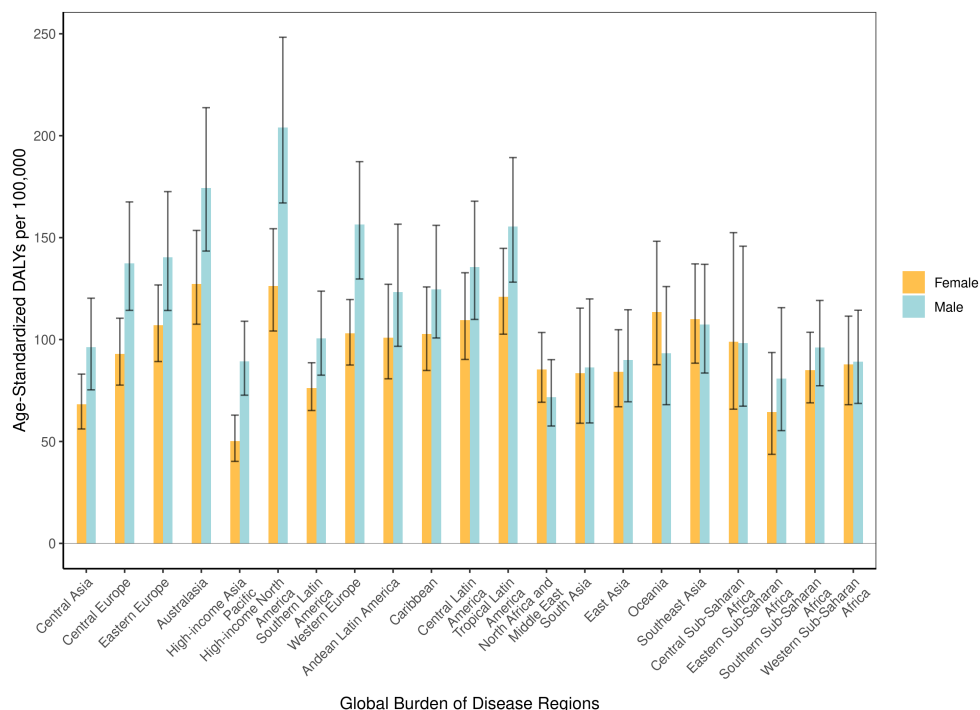
Figure 3. Myocarditis age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar

Figure 4. Global myocarditis age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

ALCOHOLIC CARDIOMYOPATHY
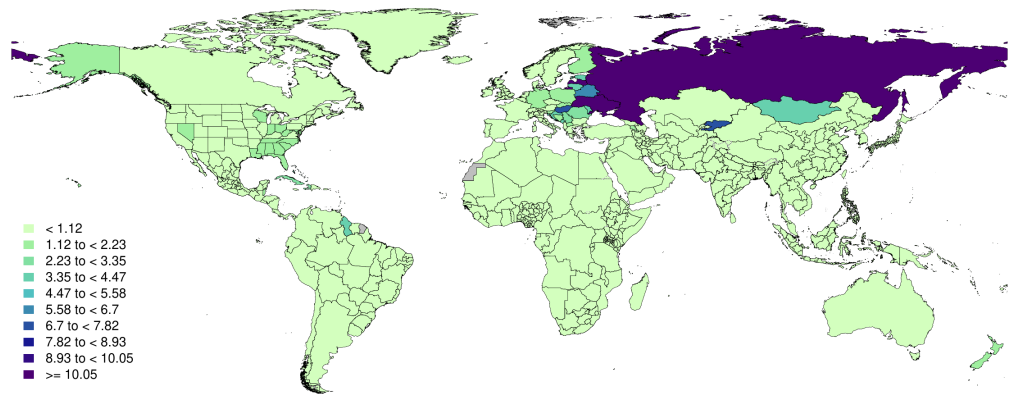
Figure 1. Global map of age–standardized alcoholic cardiomyopathy mortality rate per 100,000 in 2022 with equal interval classification
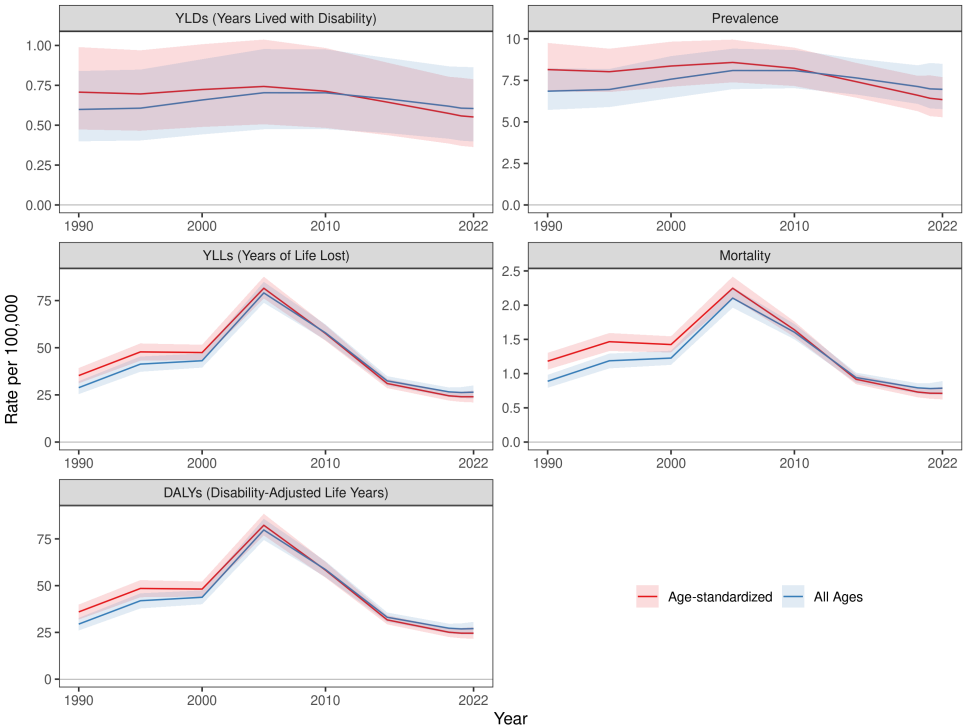
Figure 2. Global alcoholic cardiomyopathy estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

Figure 3. Alcoholic cardiomyopathy age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
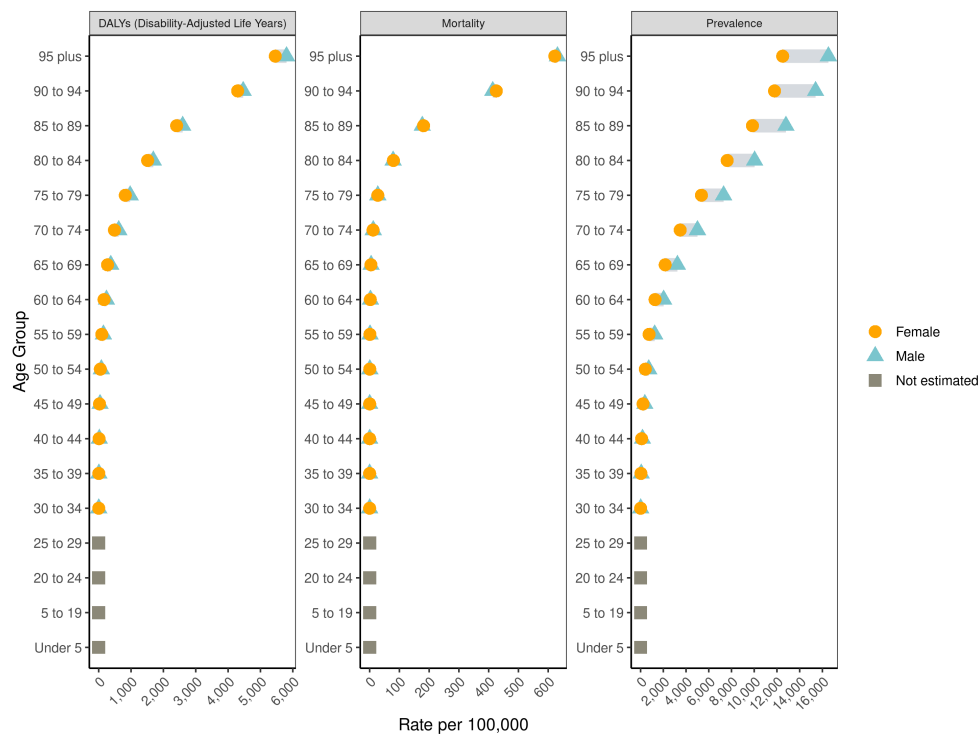

Figure 4. Global alcoholic cardiomyopathy age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
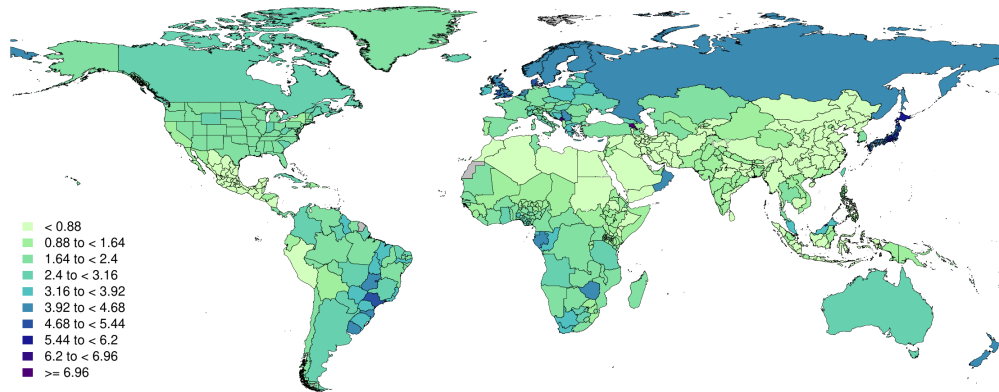
OTHER CARDIOMYOPATHY
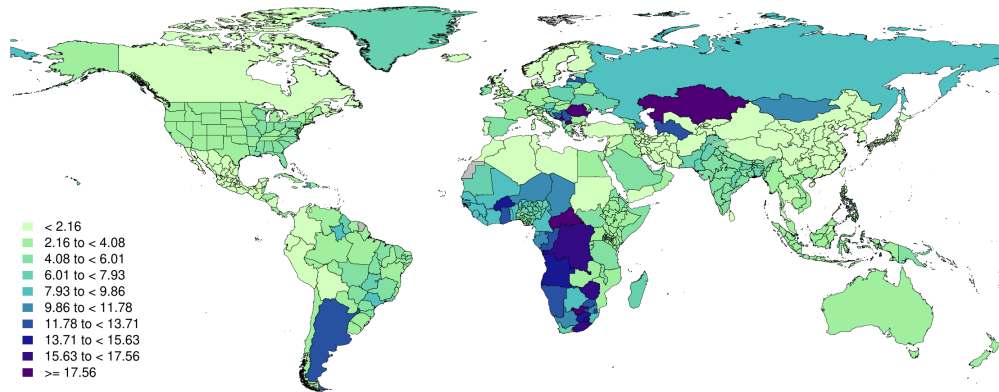
Figure 1. Global map of age–standardized other cardiomyopathy mortality rate per 100,000 in 2022 with equal interval classification
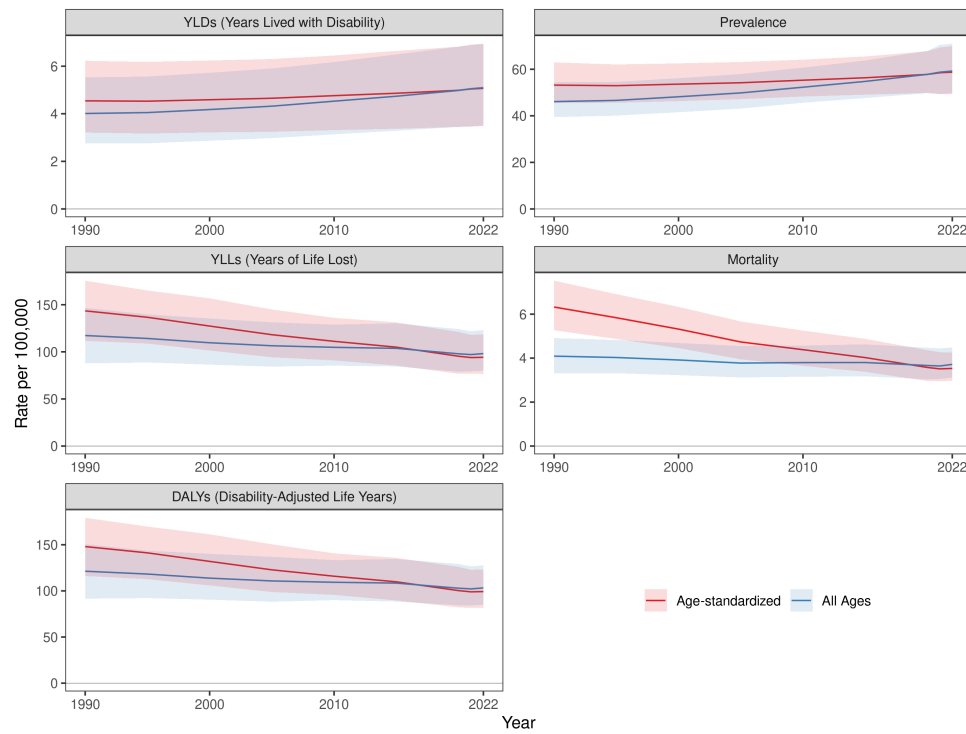
Figure 2. Global other cardiomyopathy estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
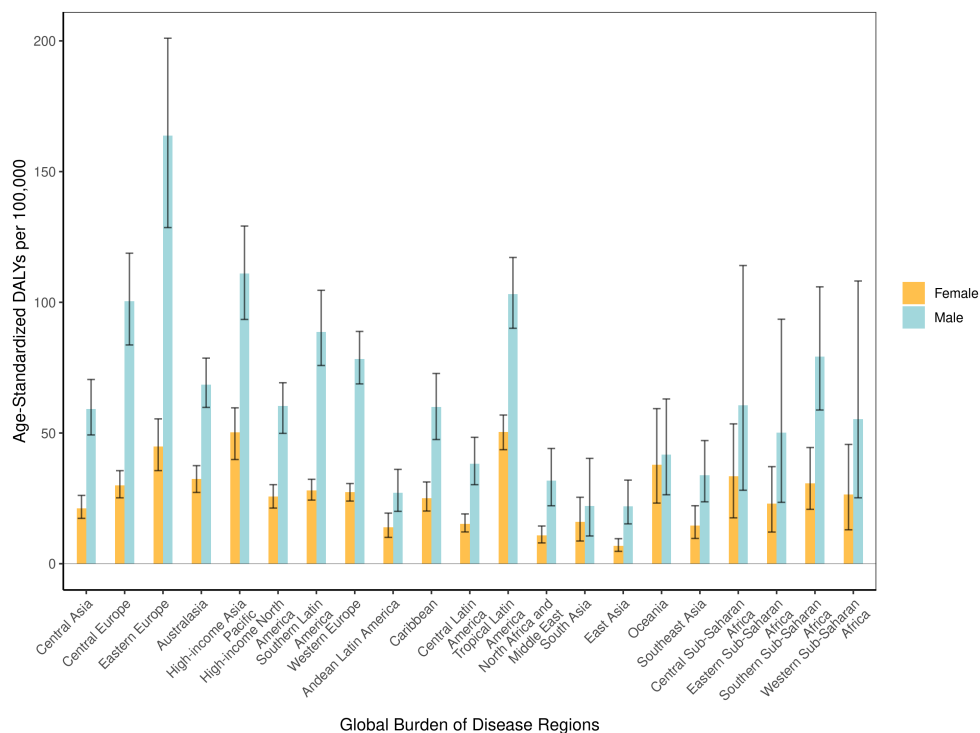
Figure 3. Other cardiomyopathy age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
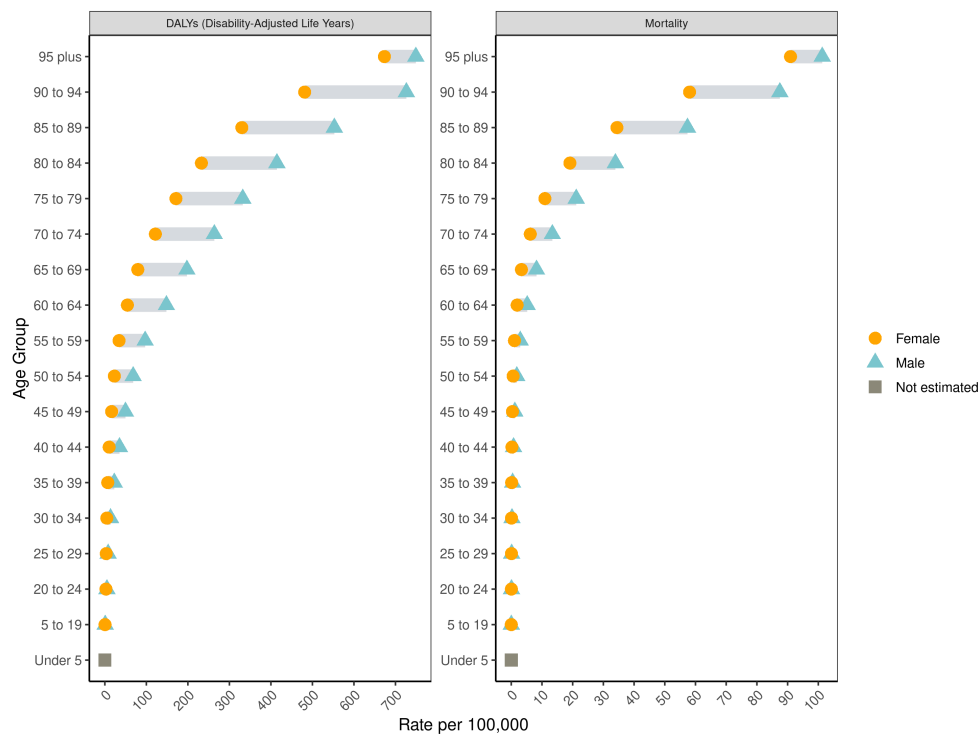

Figure 4. Global other cardiomyopathy age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

PULMONARY ARTERIAL HYPERTENSION
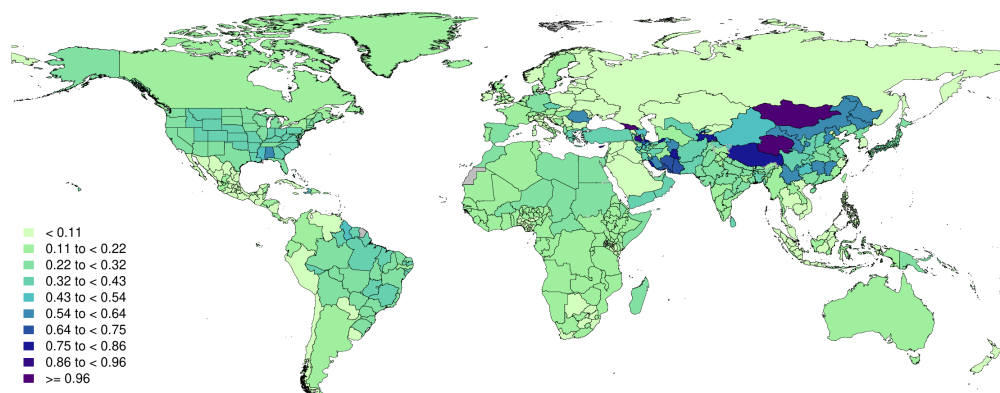
Figure 1. Global map of age–standardized pulmonary arterial hypertension mortality rate per 100,000 in 2022 with equal interval classification
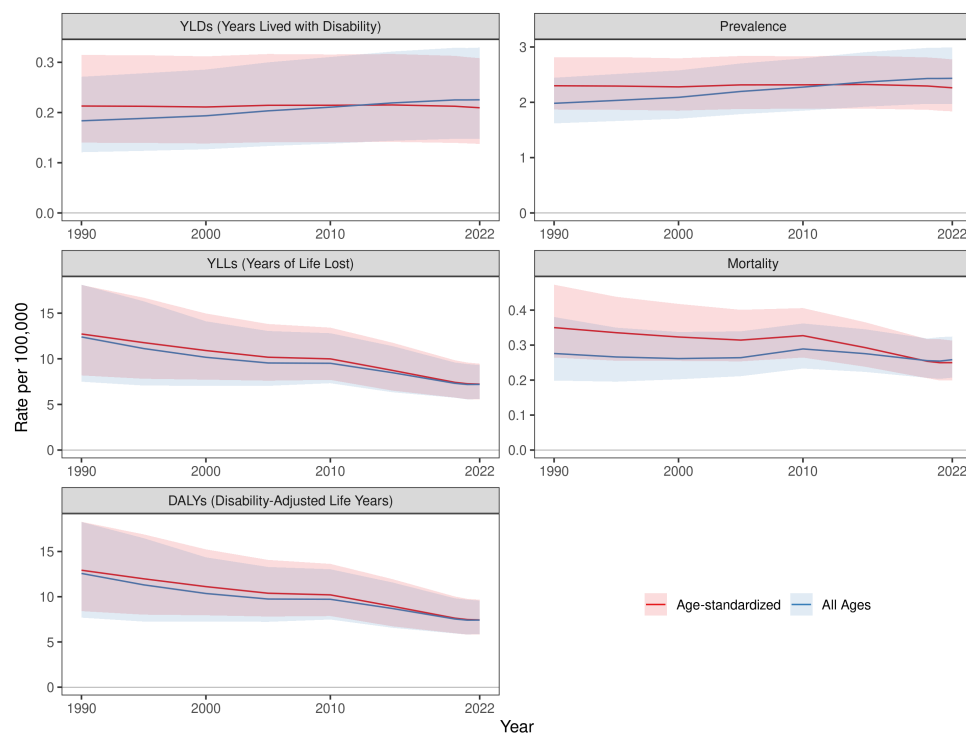
Figure 2. Global pulmonary arterial hypertension estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

Figure 3. Pulmonary arterial hypertension age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar

Figure 4. Global pulmonary arterial hypertension age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
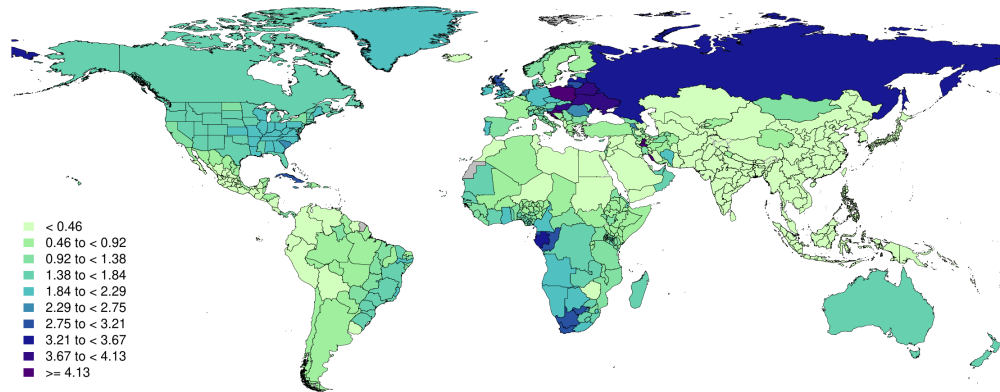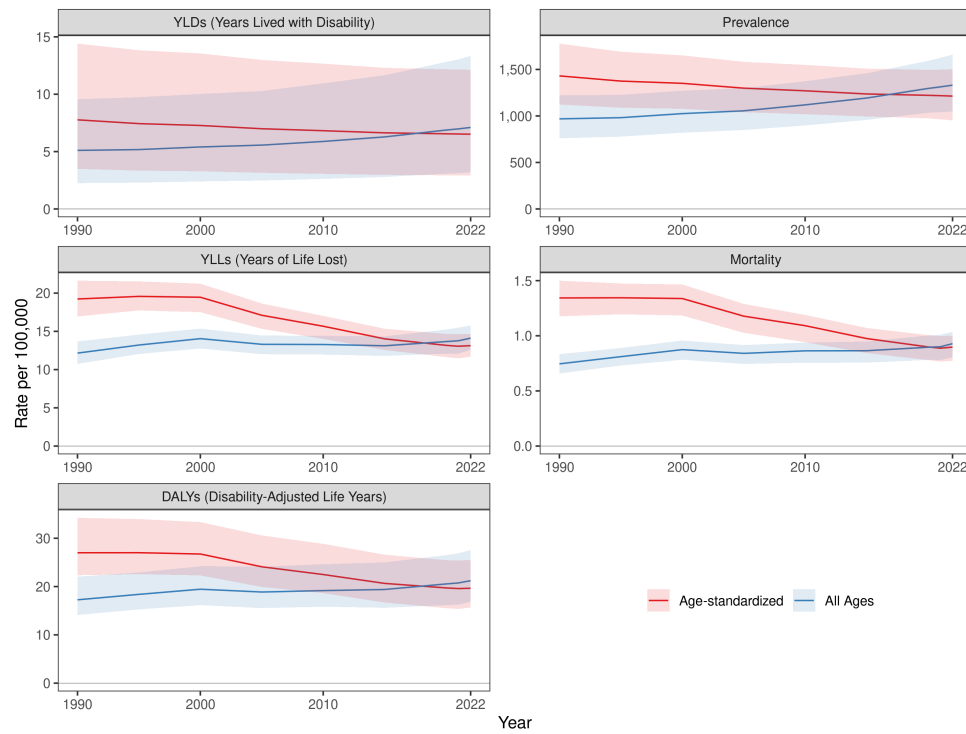
ATRIAL FIBRILLATION AND FLUTTER

Figure 1. Global map of age–standardized atrial fibrillation and flutter mortality rate per 100,000 in 2022 with equal interval classification
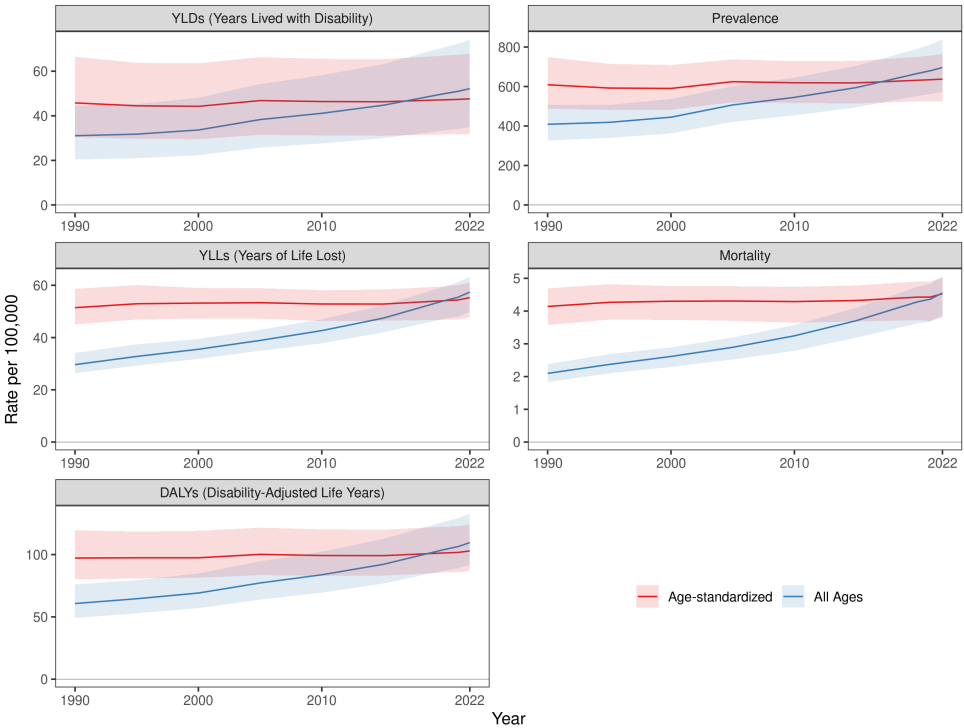
Figure 2. Global atrial fibrillation and flutter estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

Figure 3. Atrial fibrillation and flutter age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
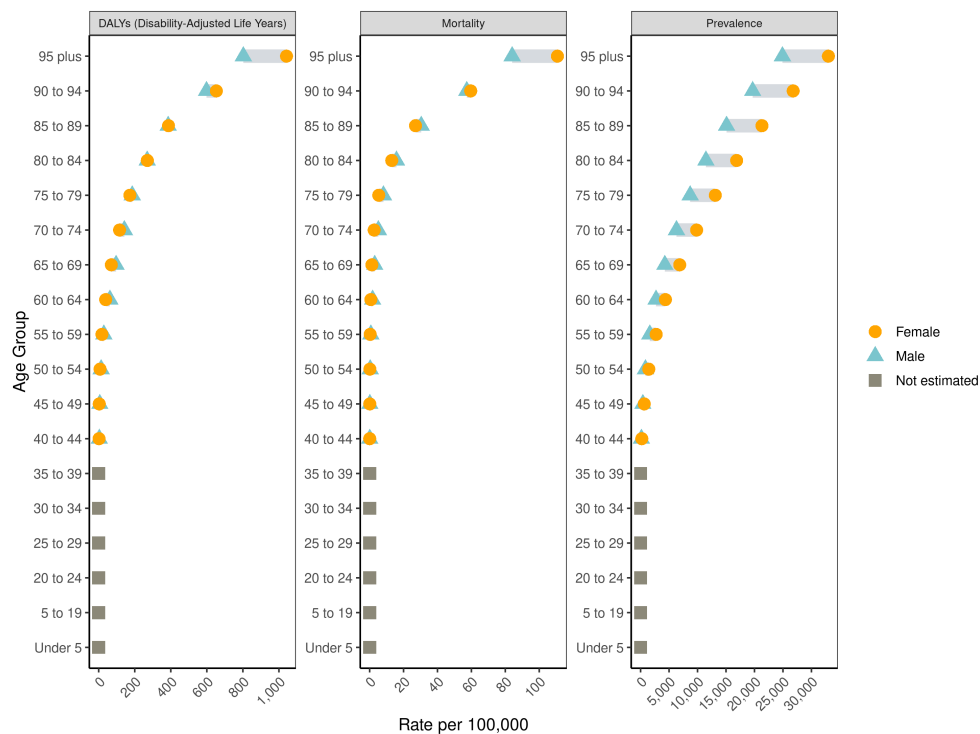

Figure 4. Global atrial fibrillation and flutter age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
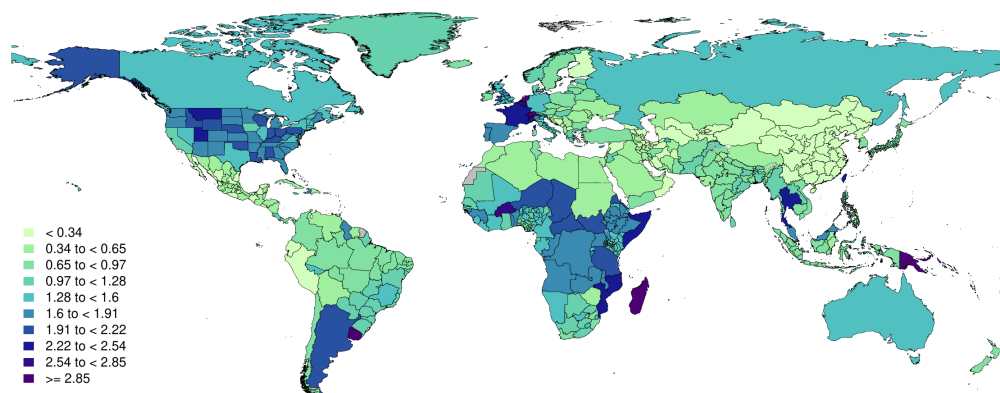
AORTIC ANEURYSM

Figure 1. Global map of age–standardized aortic aneurysm mortality rate per 100,000 in 2022 with equal interval classification
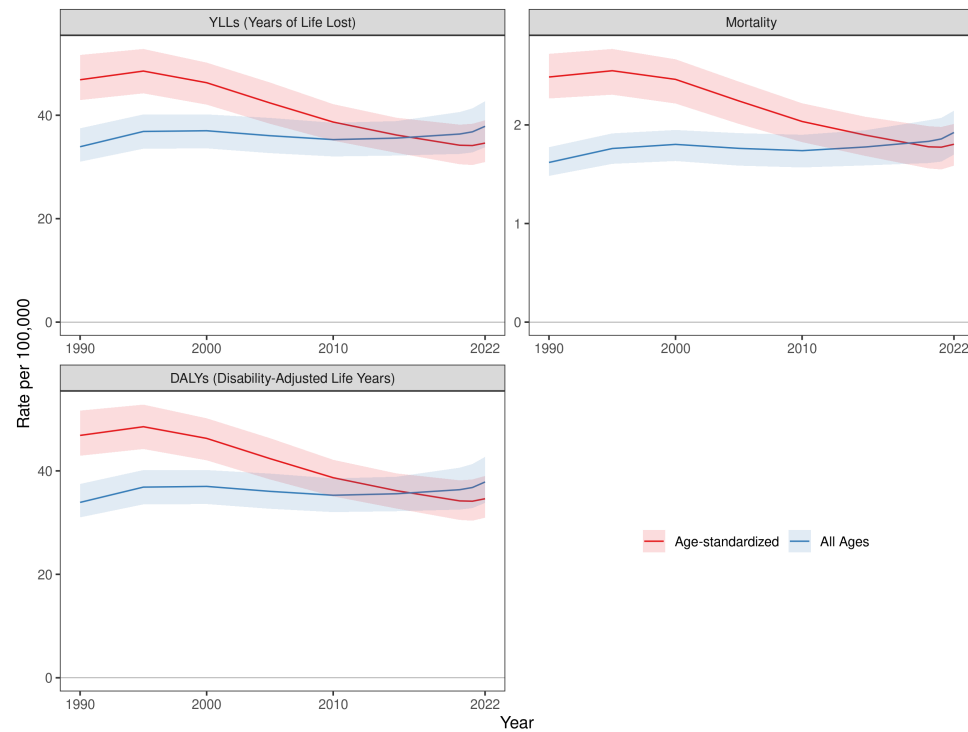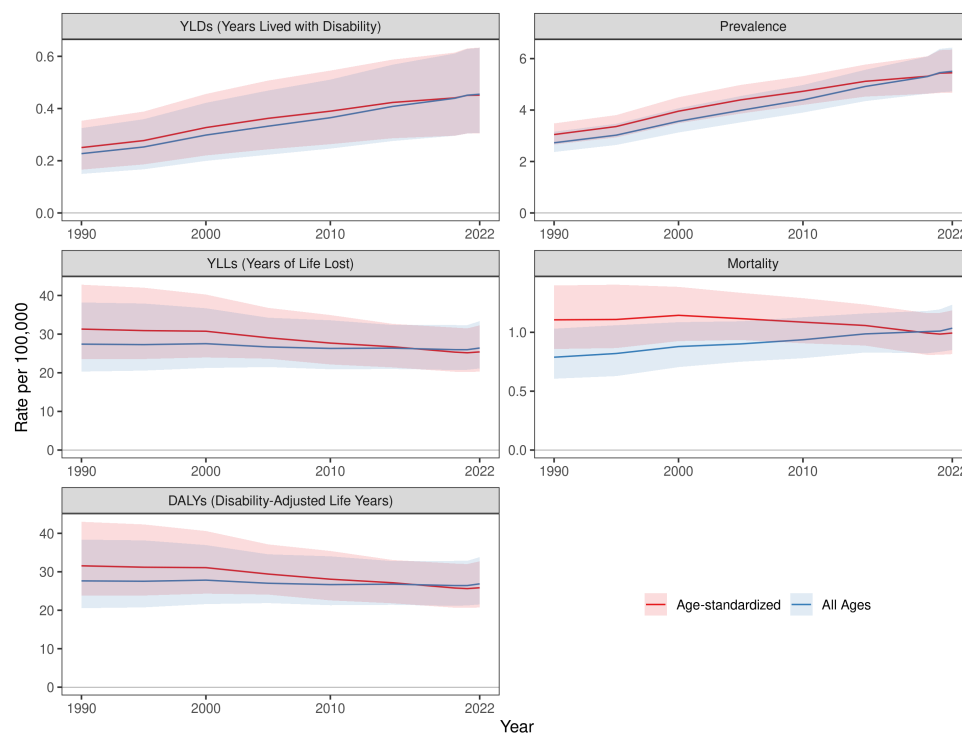

Figure 2. Global aortic aneurysm estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
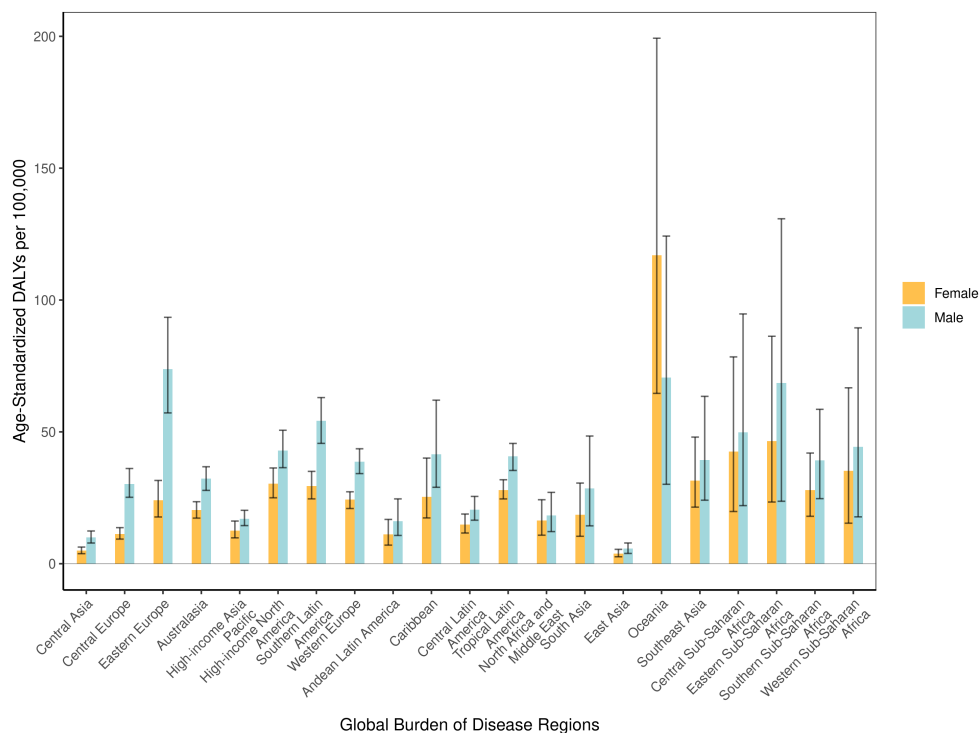
Figure 3. Aortic aneurysm age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar

Figure 4. Global aortic aneurysm age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

LOWER EXTREMITY PERIPHERAL ARTERIAL DISEASE

Figure 1. Global map of age–standardized lower extremity peripheral arterial disease mortality rate per 100,000 in 2022 with equal interval classification

Figure 2. Global lower extremity peripheral arterial disease estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
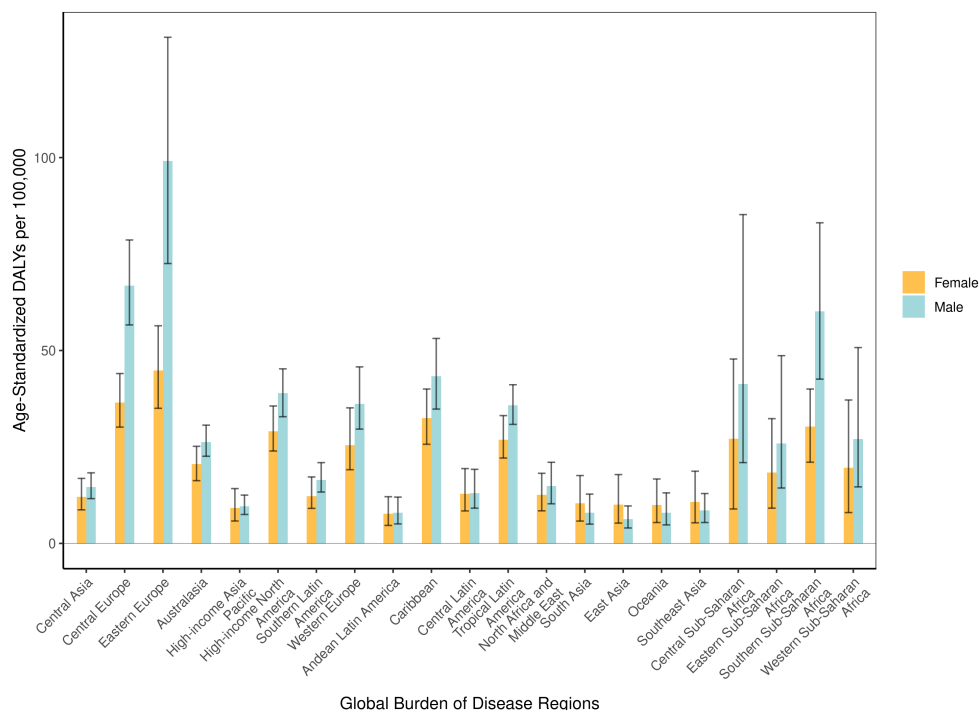
Figure 3. Lower extremity peripheral arterial disease age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
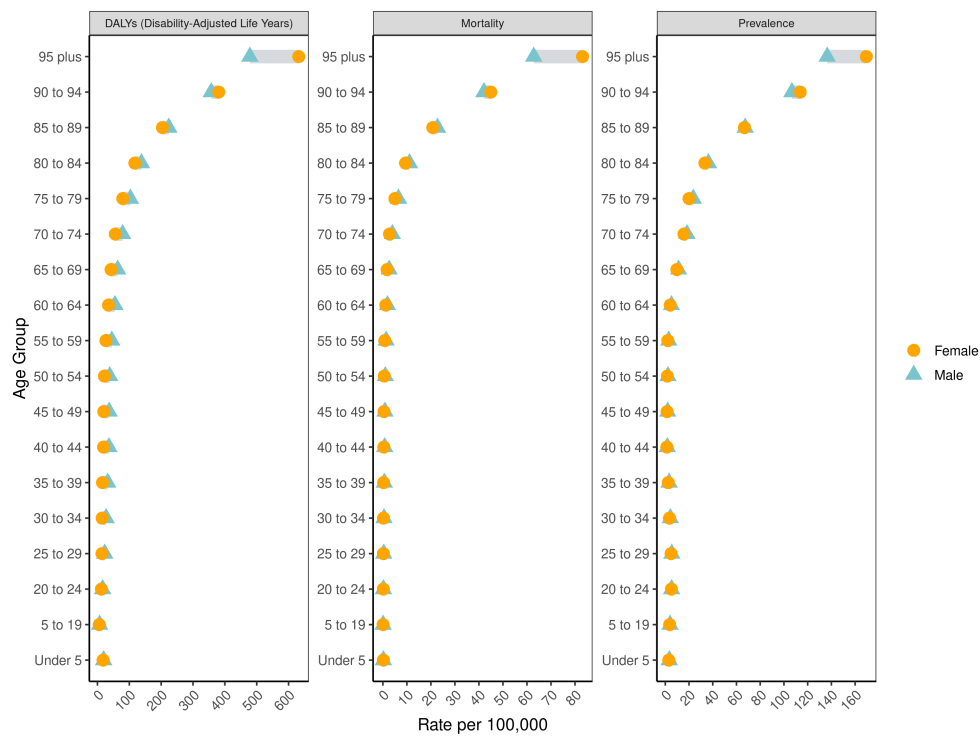

Figure 4. Global lower extremity peripheral arterial disease age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

ENDOCARDITIS

Figure 1. Global map of age−standardized endocarditis mortality rate per 100,000 in 2022 with equal interval classification
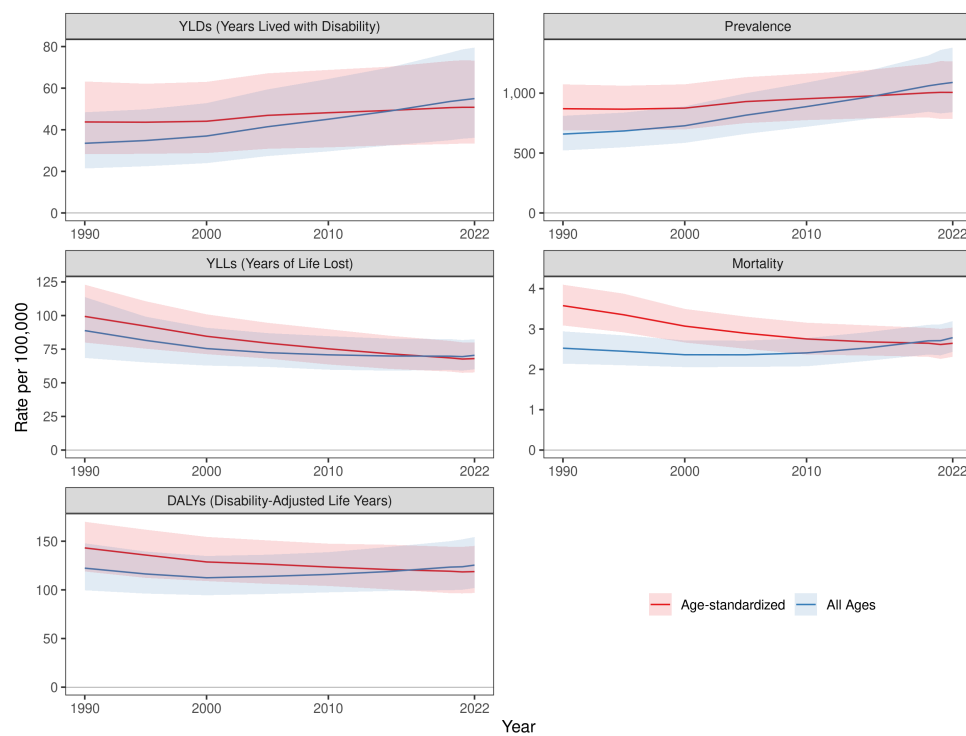

Figure 2. Global endocarditis estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
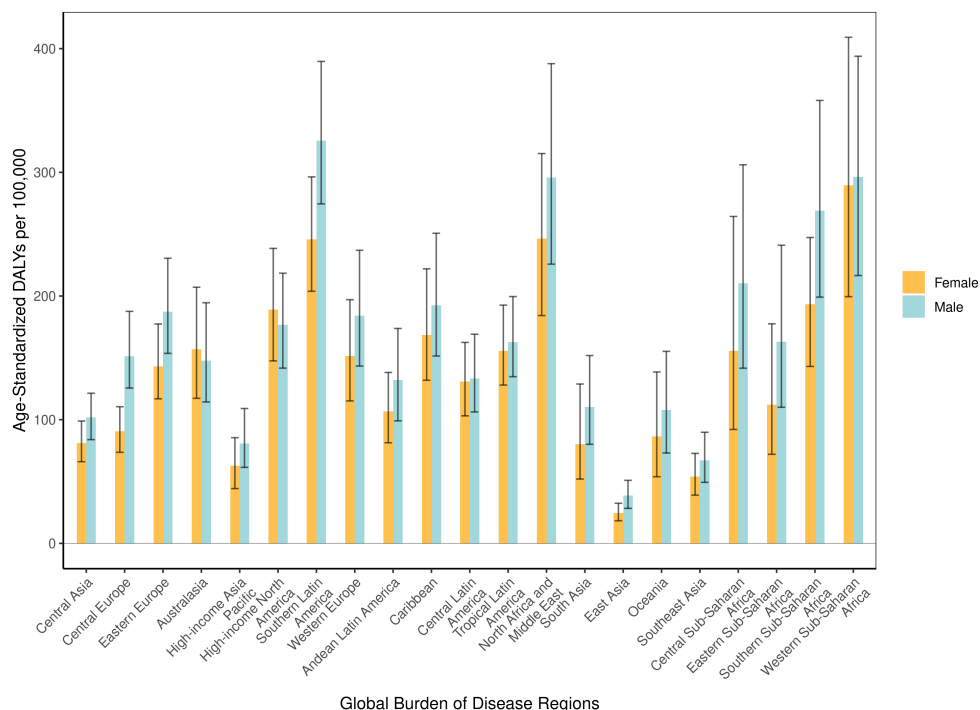
Figure 3. Endocarditis age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
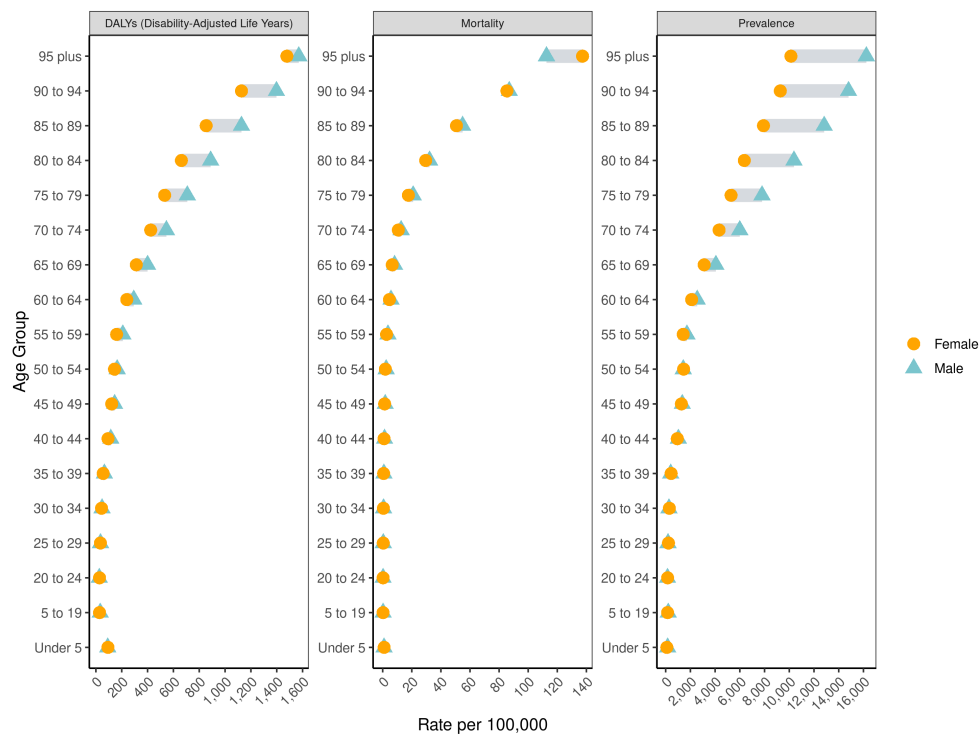

Figure 4. Global endocarditis age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

OTHER CARDIOVASCULAR AND CIRCULATORY DISEASES
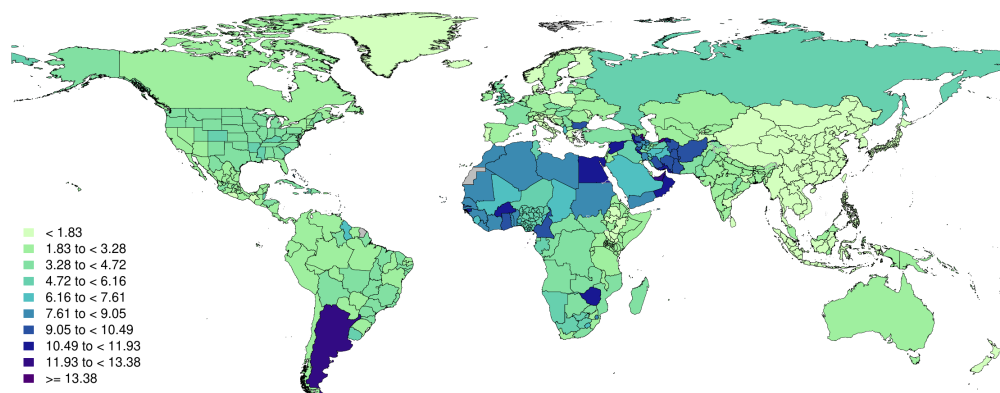
Figure 1. Global map of age–standardized other cardiovascular and circulatory diseases mortality rate per 100,000 in 2022 with equal interval classification

Figure 2. Global other cardiovascular and circulatory diseases estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

Figure 3. Other cardiovascular and circulatory diseases age-standardized disability-adjusted life years (DALYs) per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar

Figure 4. Global other cardiovascular and circulatory diseases age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
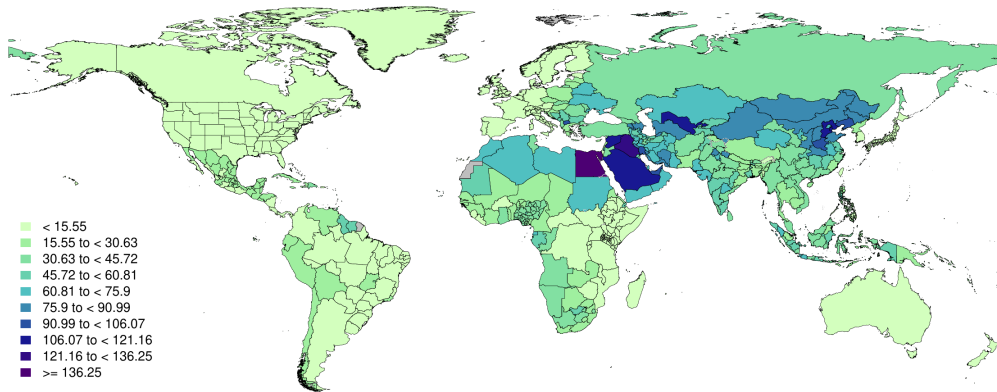
AMBIENT PARTICULATE MATTER POLLUTION

Figure 1. Global map of cardiovascular disease mortality attributable to ambient particulate matter pollution per 100,000 in 2022 with equal interval classification
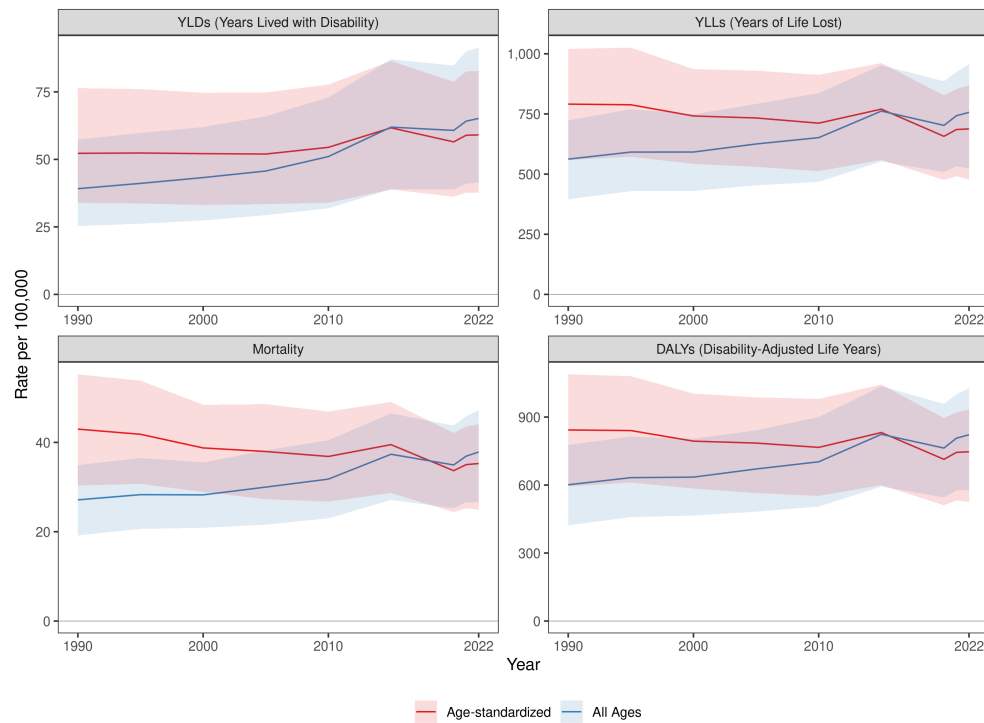

Figure 2. Global cardiovascular disease attributable to ambient particulate matter pollution estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
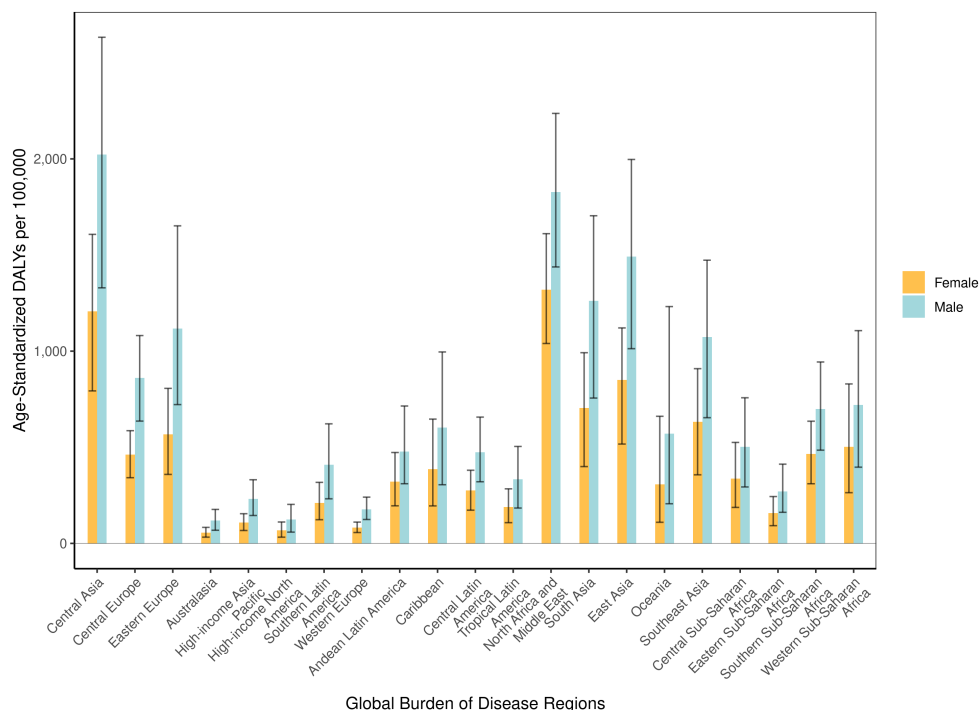
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to ambient particulate matter pollution per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
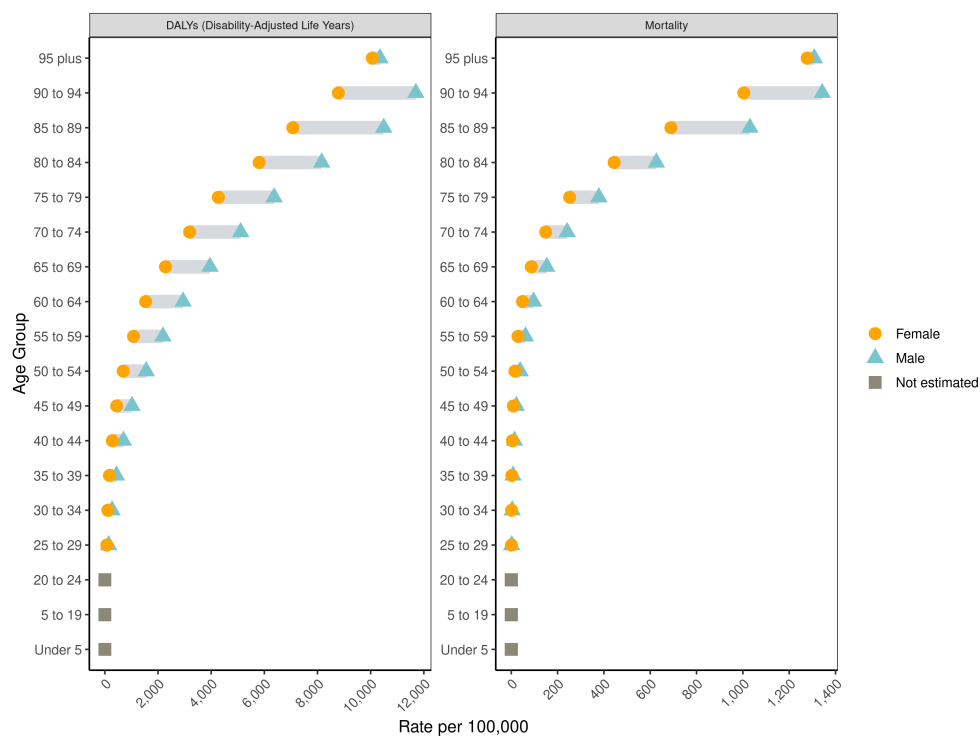

Figure 4. Global cardiovascular disease age-specific estimates attributable to ambient particulate matter pollution per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
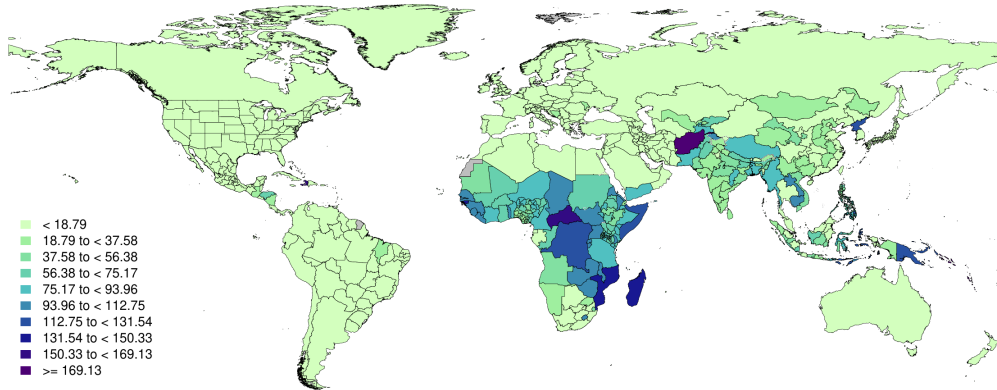
HOUSEHOLD AIR POLLUTION FROM SOLID FUELS

Figure 1. Global map of cardiovascular disease mortality attributable to household air pollution from solid fuels per 100,000 in 2022 with equal interval classification
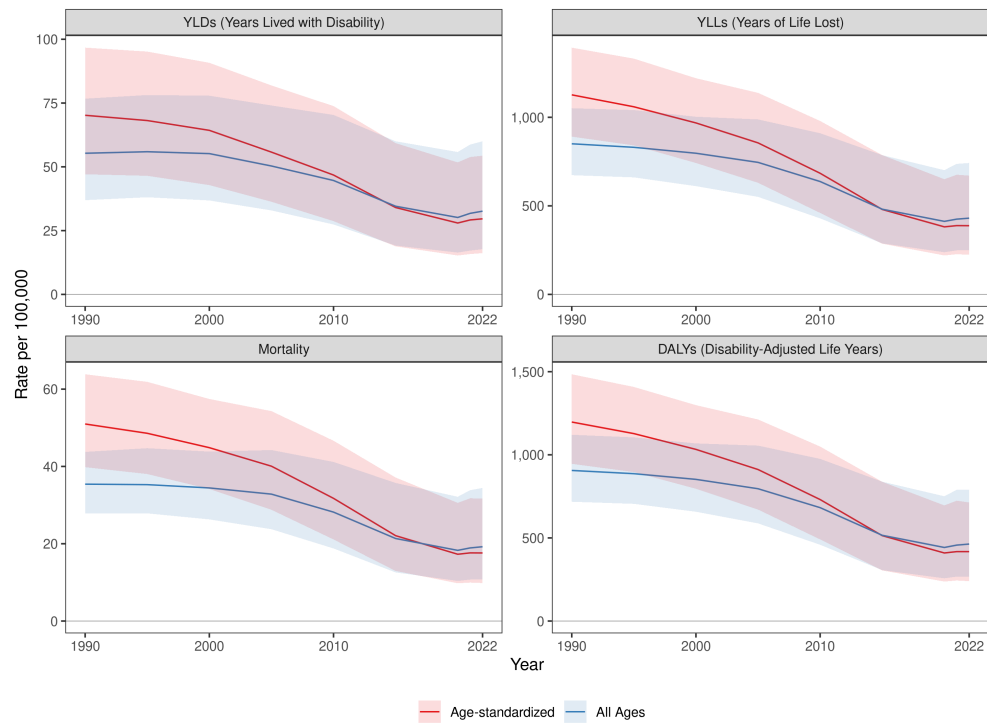

Figure 2. Global cardiovascular disease attributable to household air pollution from solid fuels estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
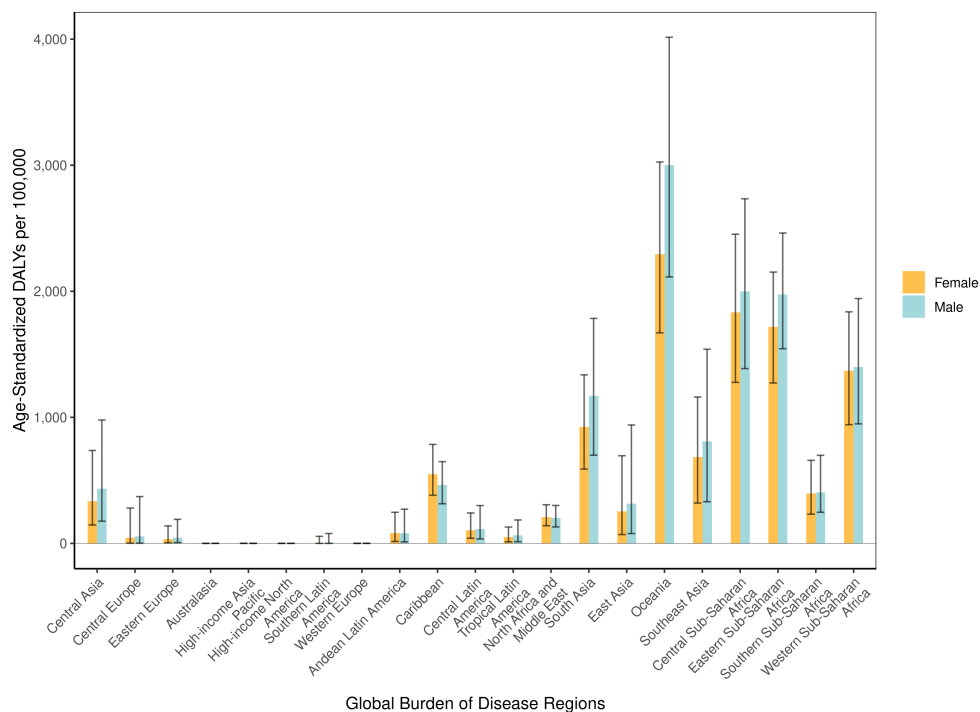
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to household air pollution from solid fuels per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
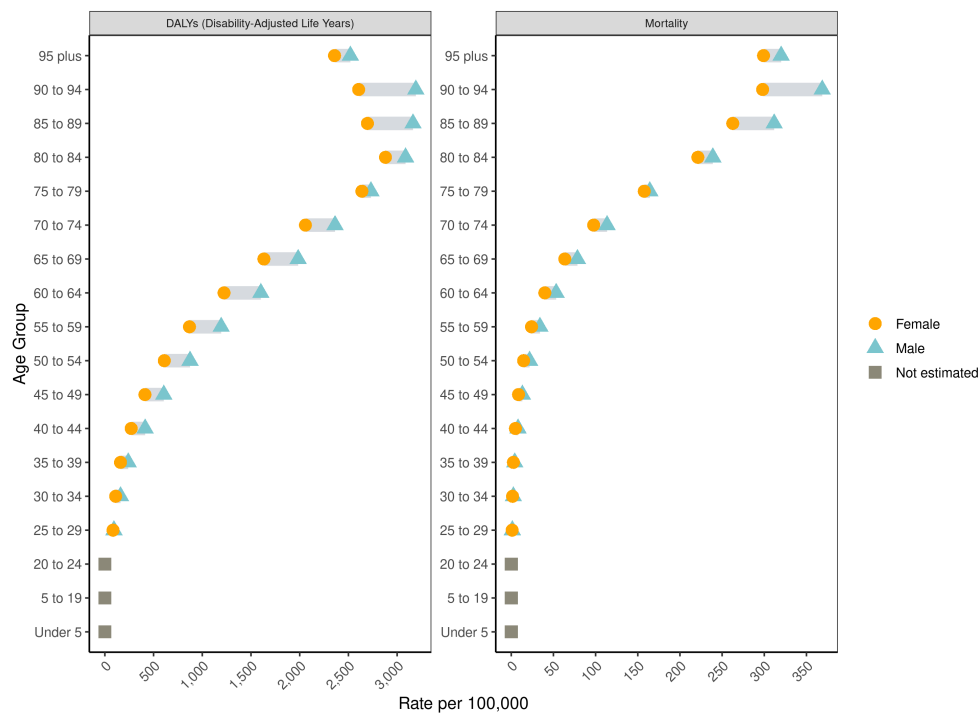

Figure 4. Global cardiovascular disease age-specific estimates attributable to household air pollution from solid fuels per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
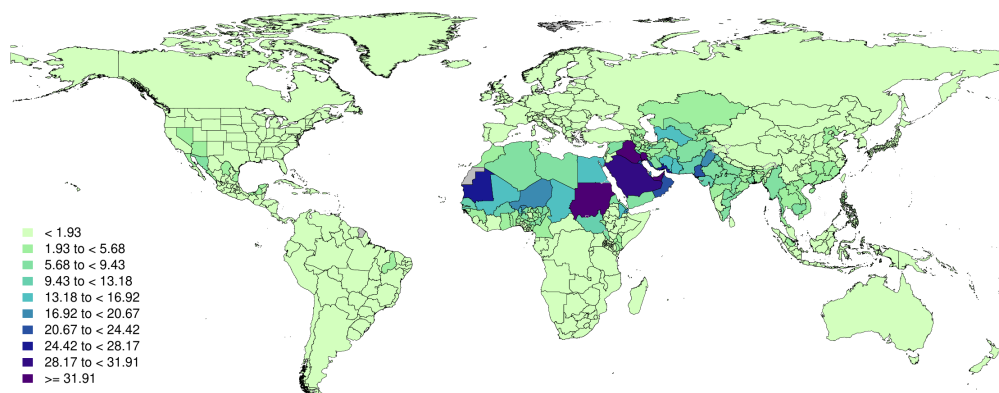
HIGH TEMPERATURE

Figure 1. Global map of cardiovascular disease mortality attributable to high temperature per 100,000 in 2022 with equal interval classification
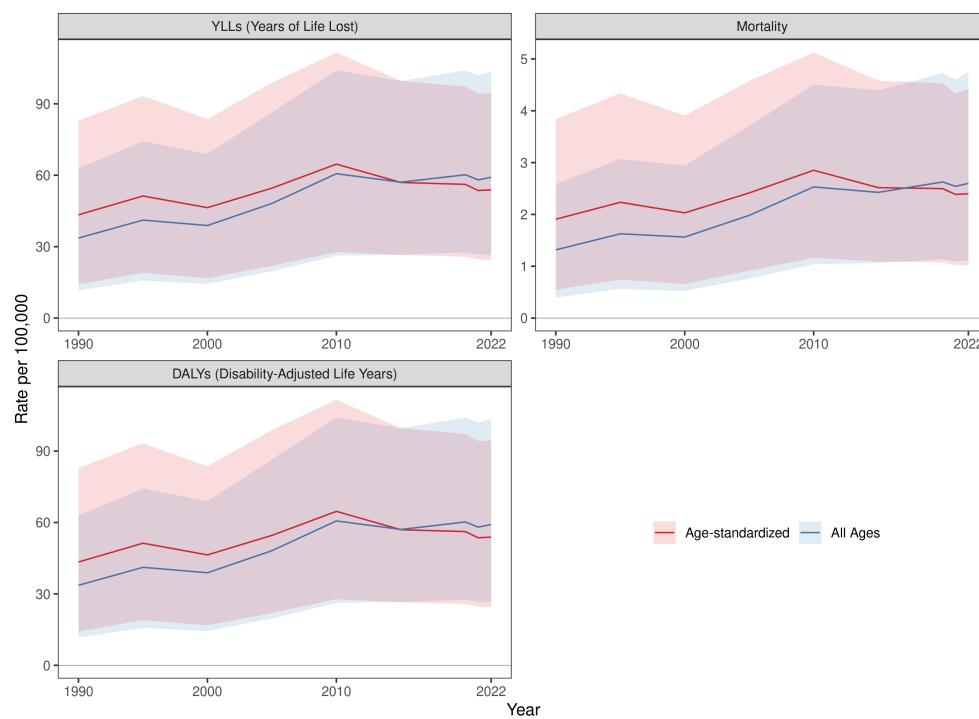

Figure 2. Global cardiovascular disease attributable to high temperature estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
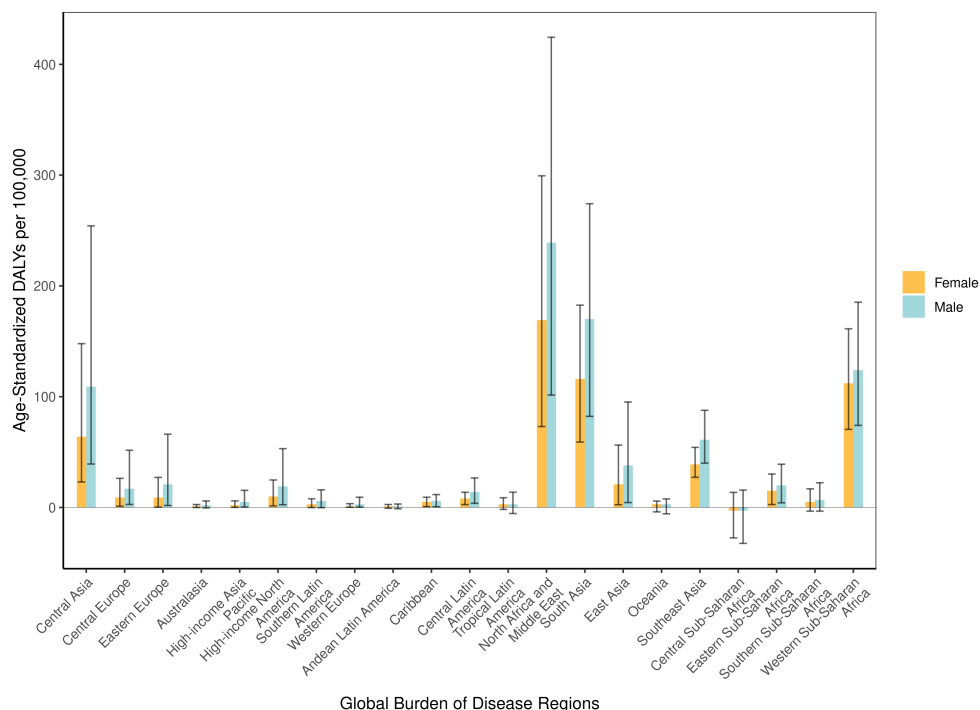
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to high temperature per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
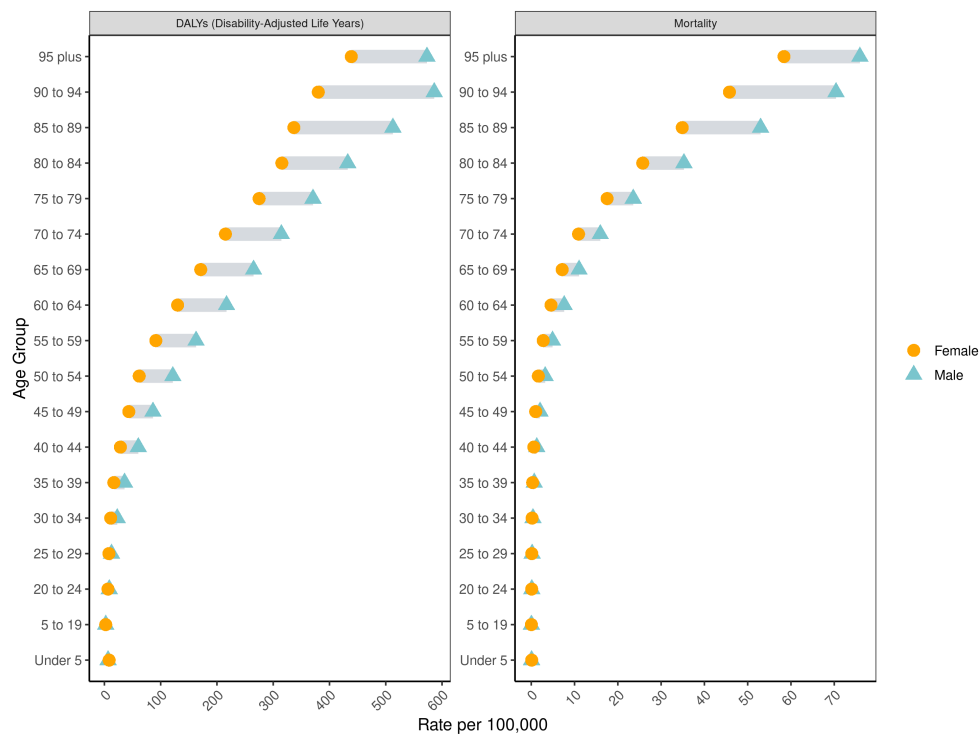

Figure 4. Global cardiovascular disease age-specific estimates attributable to high temperature per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
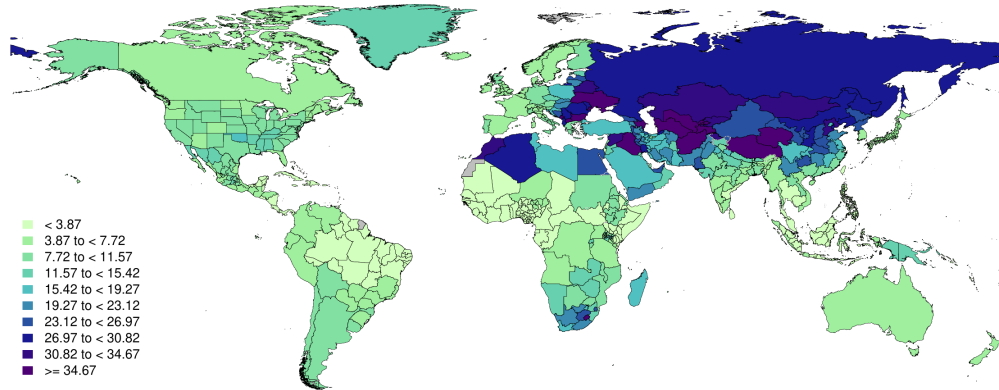
LOW TEMPERATURE

Figure 1. Global map of cardiovascular disease mortality attributable to low temperature per 100,000 in 2022 with equal interval classification
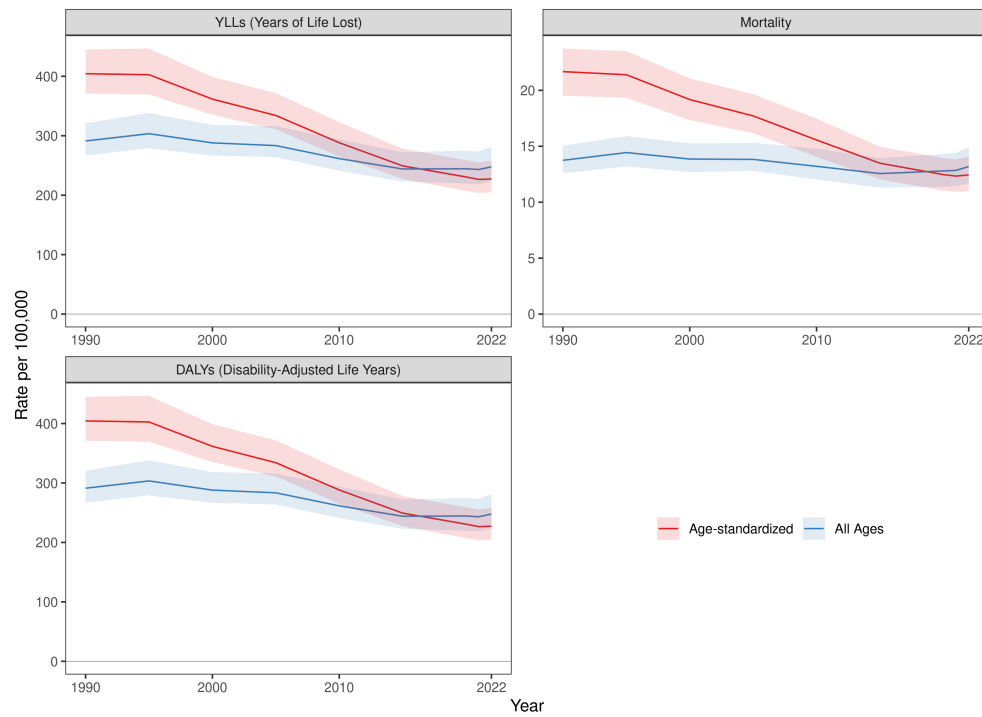

Figure 2. Global cardiovascular disease attributable to low temperature estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to low temperature per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar

Figure 4. Global cardiovascular disease age-specific estimates attributable to low temperature per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

LEAD EXPOSURE

Figure 1. Global map of cardiovascular disease mortality attributable to lead exposure per 100,000 in 2022 with equal interval classification

Figure 2. Global cardiovascular disease attributable to lead exposure estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
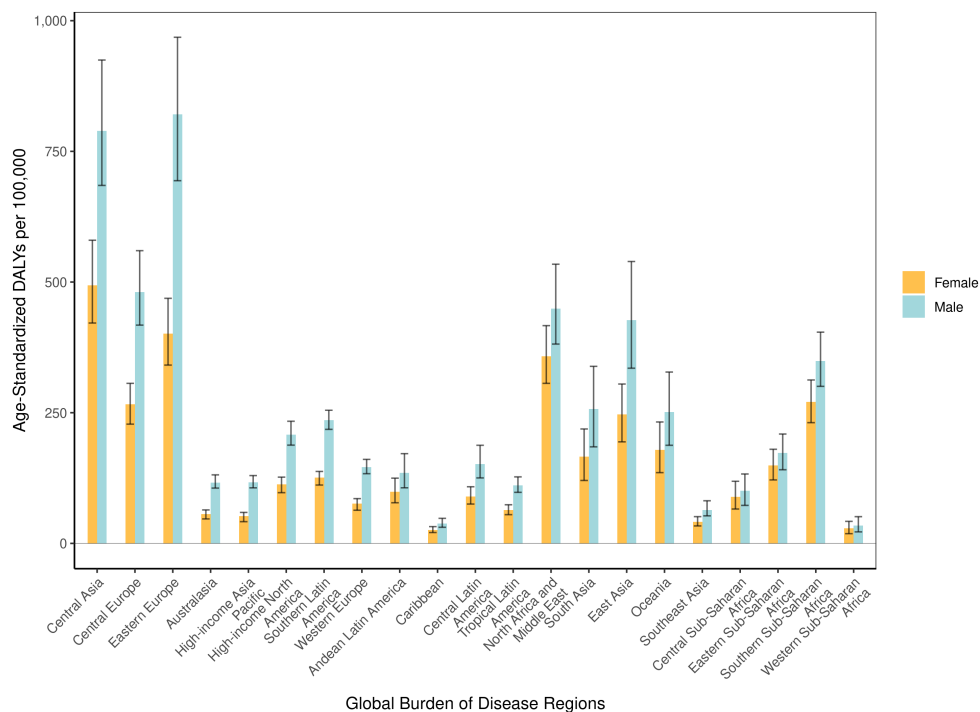
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to lead exposure per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
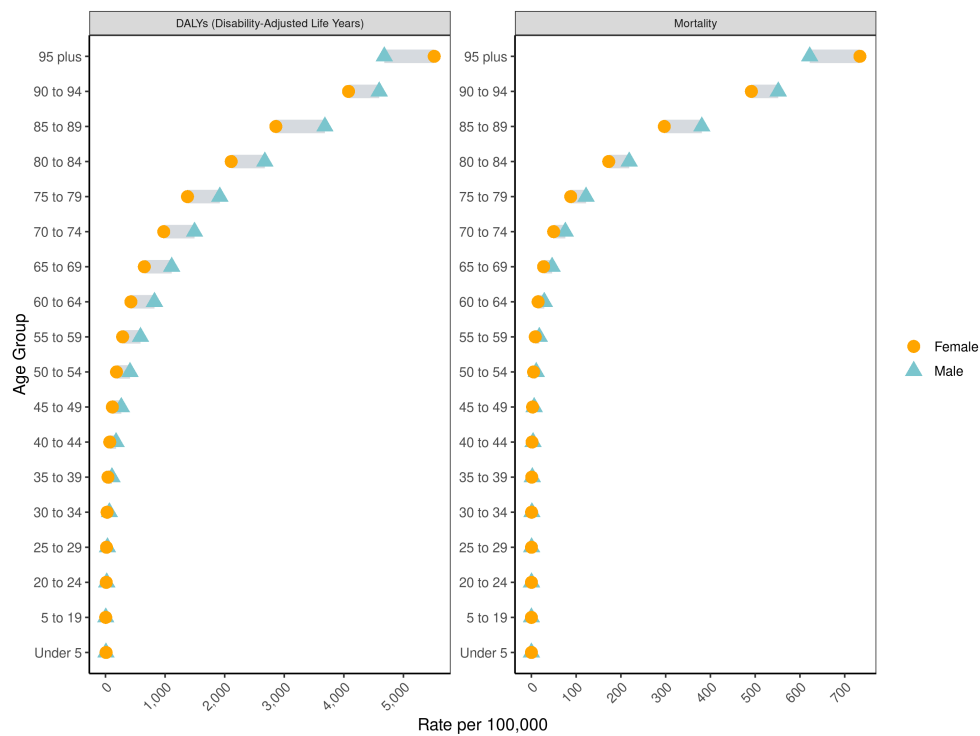

Figure 4. Global cardiovascular disease age-specific estimates attributable to lead exposure per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

SMOKING
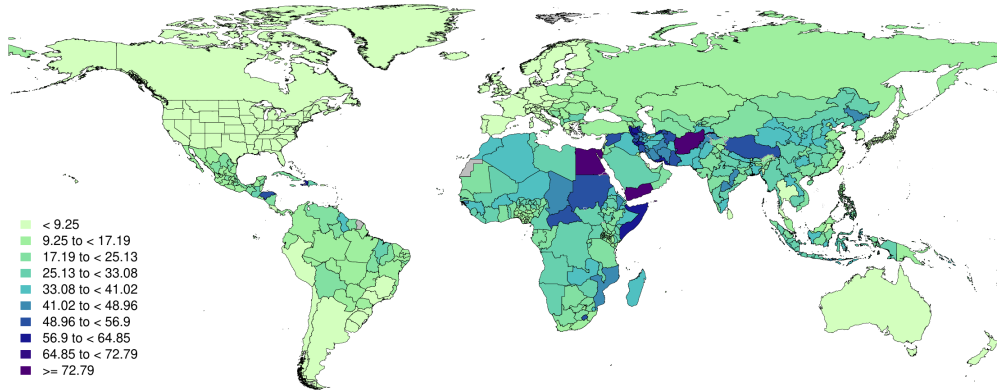

Figure 1. Global map of cardiovascular disease mortality attributable to smoking per 100,000 in 2022 with equal interval classification
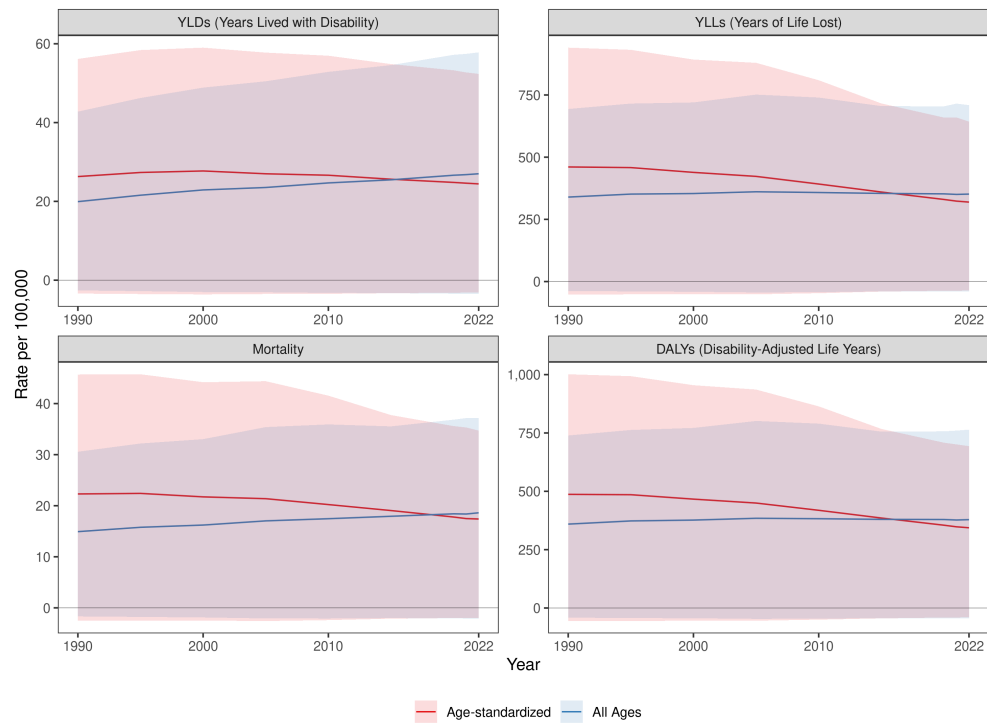

Figure 2. Global cardiovascular disease attributable to smoking estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
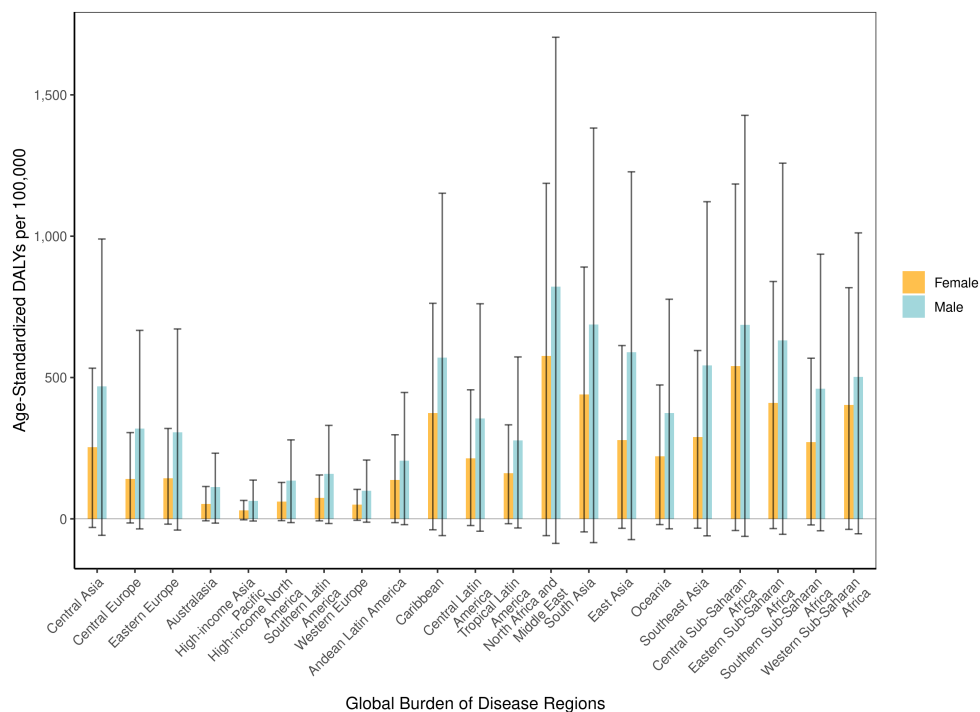
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to smoking per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar

Figure 4. Global cardiovascular disease age-specific estimates attributable to smoking per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

SECONDHAND SMOKE

Figure 1. Global map of cardiovascular disease mortality attributable to secondhand smoke per 100,000 in 2022 with equal interval classification

Figure 2. Global cardiovascular disease attributable to secondhand smoke estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to secondhand smoke per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
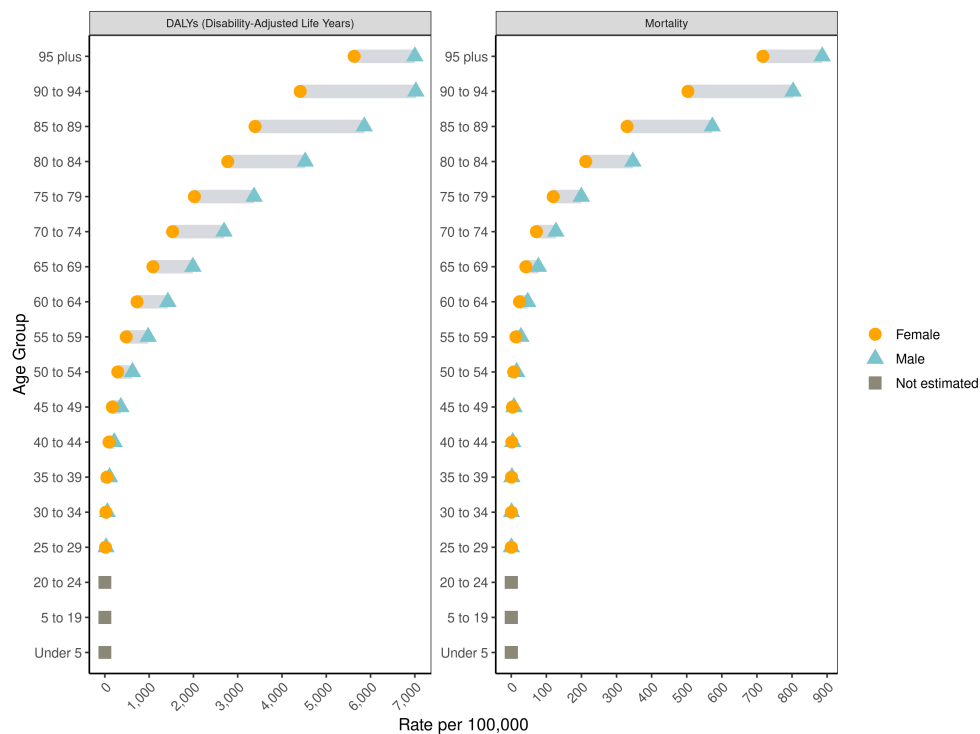

Figure 4. Global cardiovascular disease age-specific estimates attributable to secondhand smoke per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
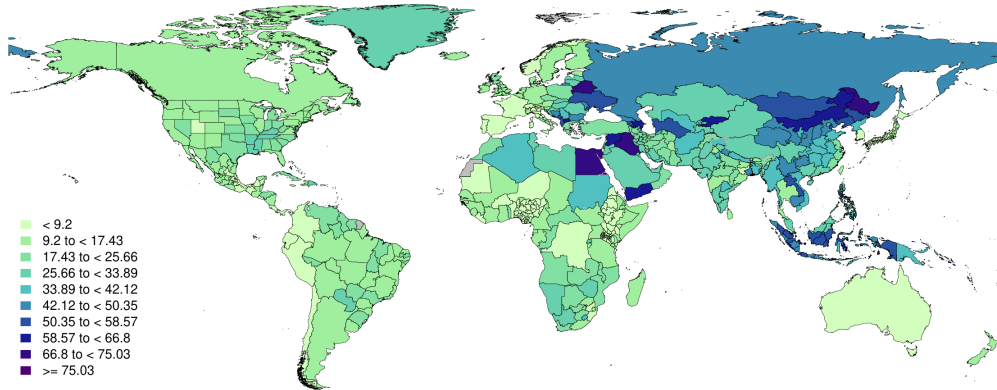
HIGH ALCOHOL USE

Figure 1. Global map of cardiovascular disease mortality attributable to high alcohol use per 100,000 in 2022 with equal interval classification
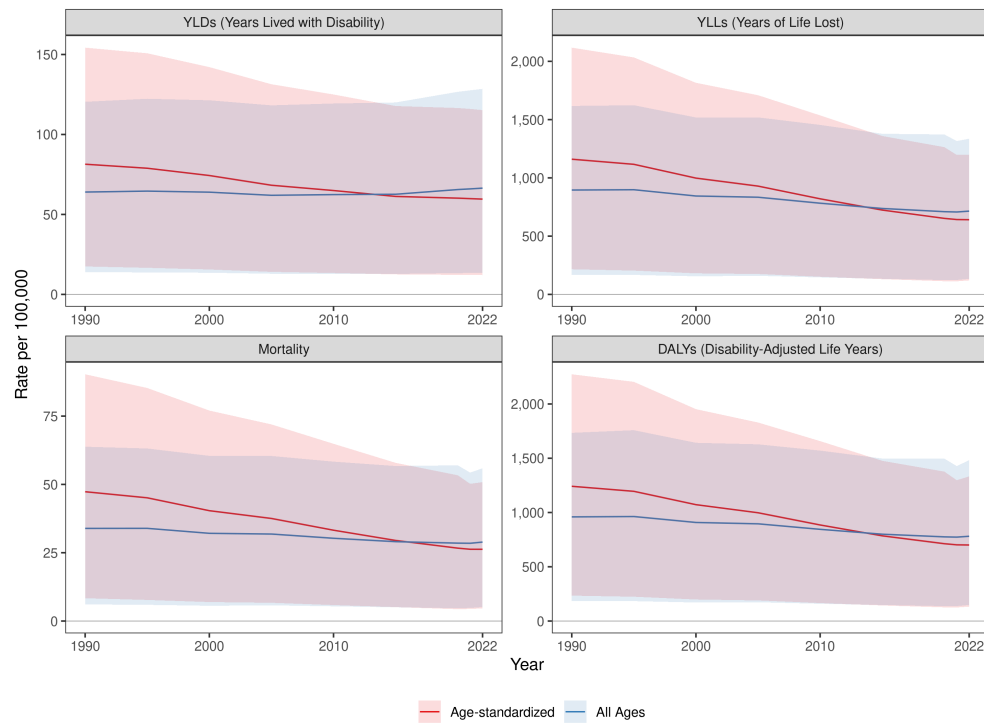

Figure 2. Global cardiovascular disease attributable to high alcohol use estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
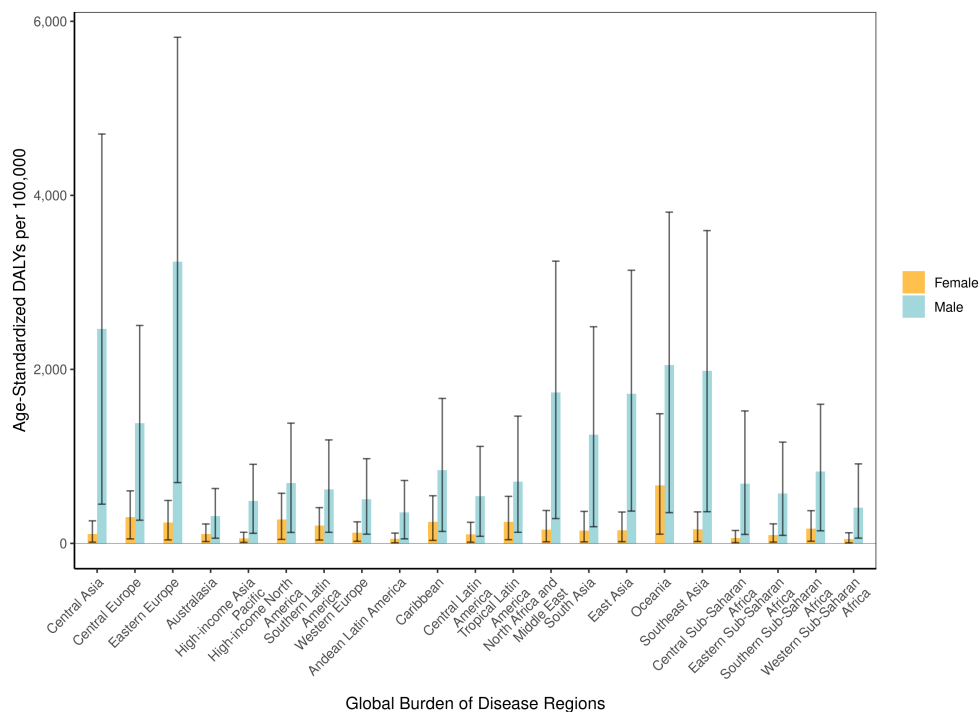
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to high alcohol use per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
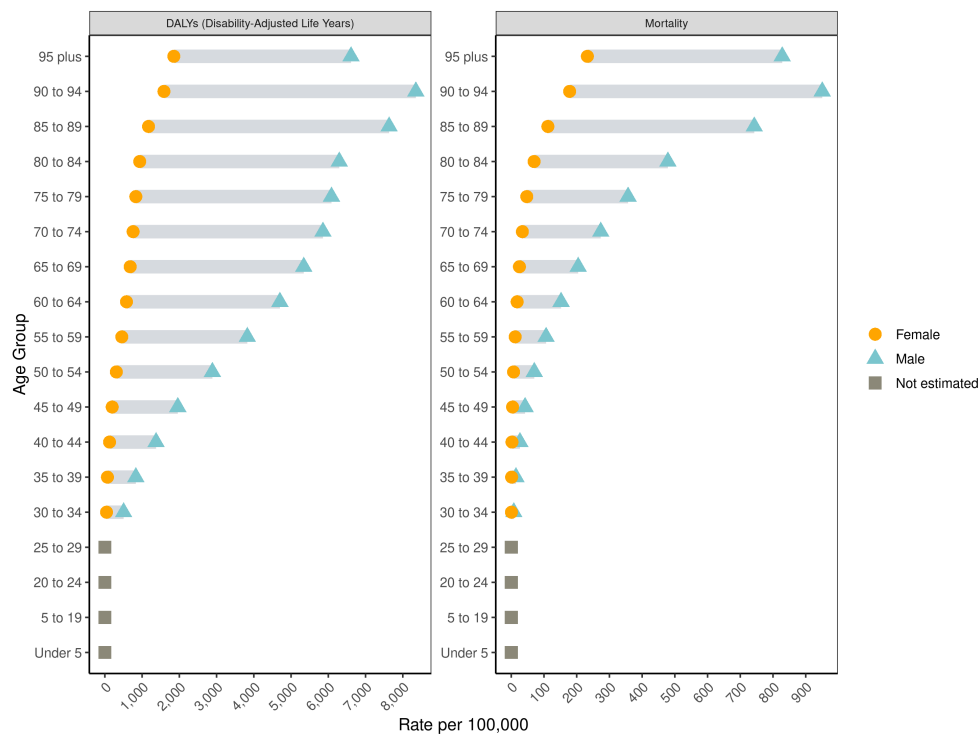

Figure 4. Global cardiovascular disease age-specific estimates attributable to high alcohol use per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
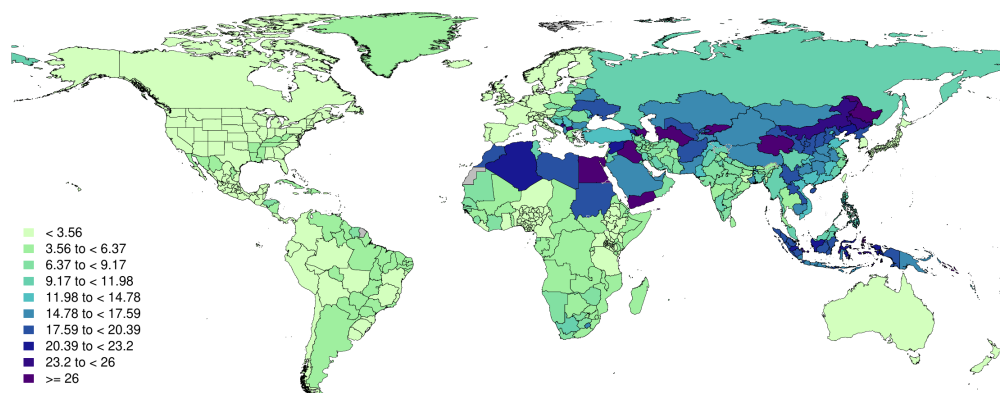
DIETARY RISKS

Figure 1. Global map of cardiovascular disease mortality attributable to dietary risks per 100,000 in 2022 with equal interval classification
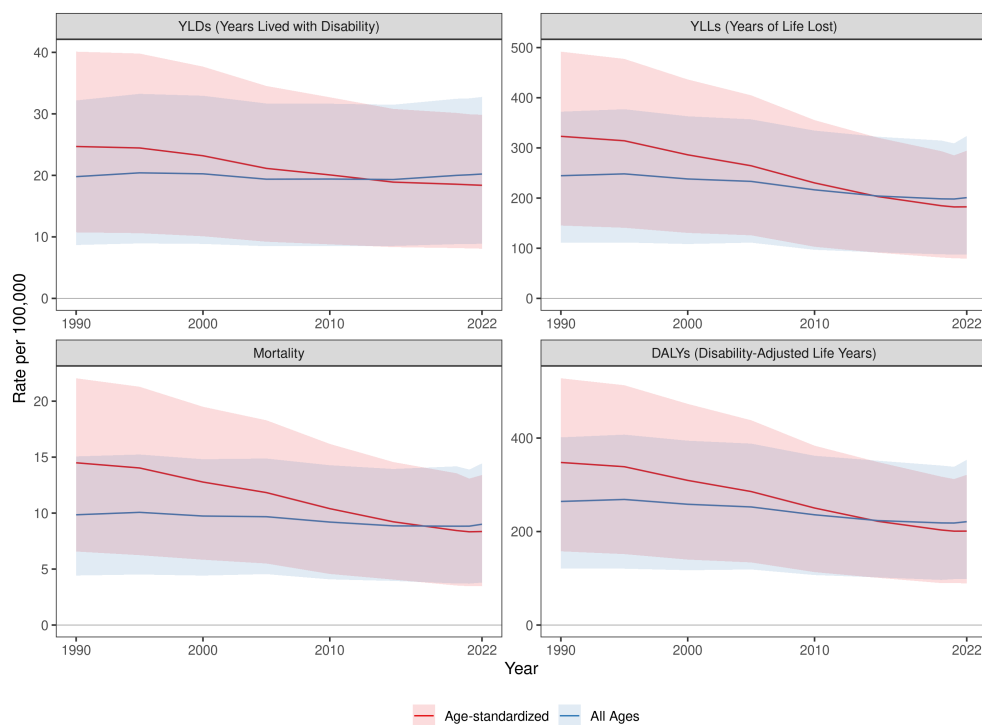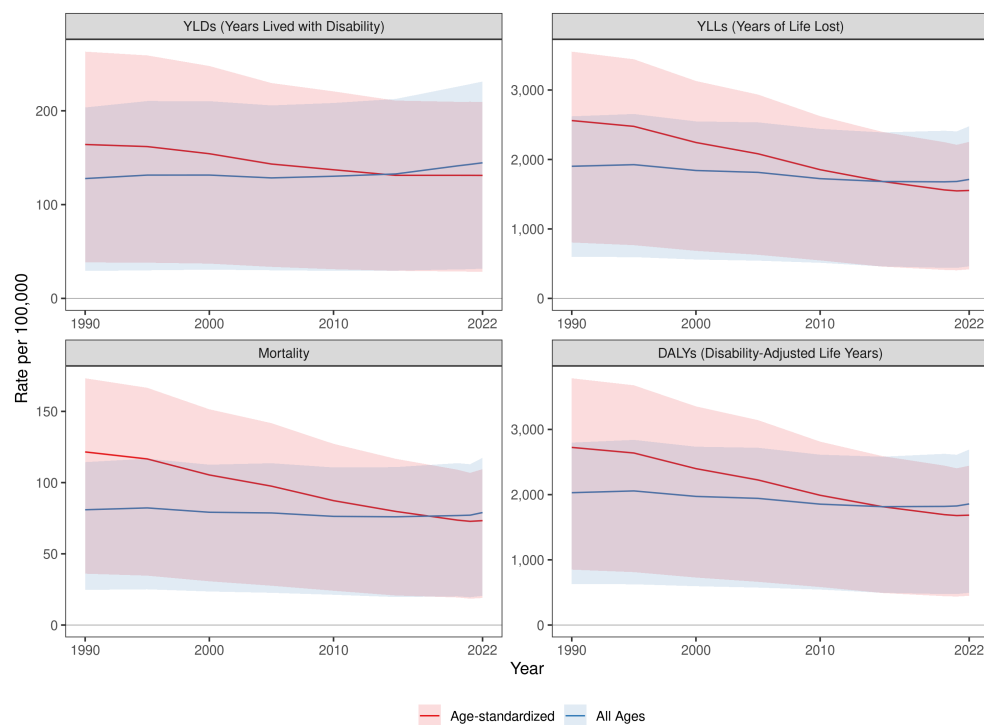

Figure 2. Global cardiovascular disease attributable to dietary risks estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
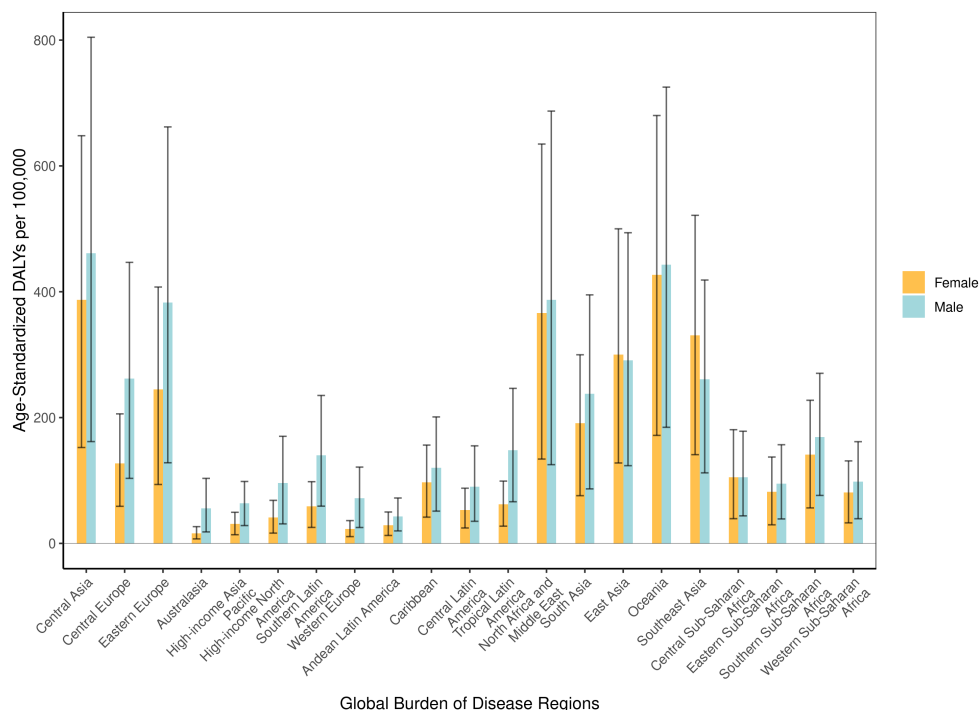
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to dietary risks per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar

Figure 4. Global cardiovascular disease age-specific estimates attributable to dietary risks per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

LOW PHYSICAL ACTIVITY

Figure 1. Global map of cardiovascular disease mortality attributable to low physical activity per 100,000 in 2022 with equal interval classification

Figure 2. Global cardiovascular disease attributable to low physical activity estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022

Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to low physical activity per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
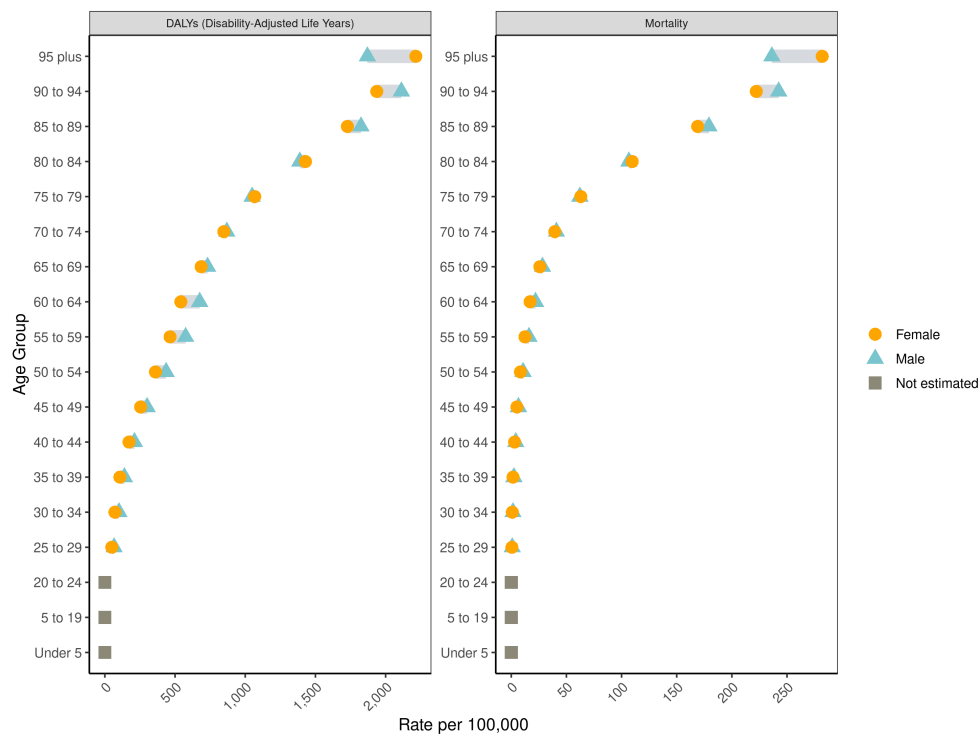

Figure 4. Global cardiovascular disease age-specific estimates attributable to low physical activity per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
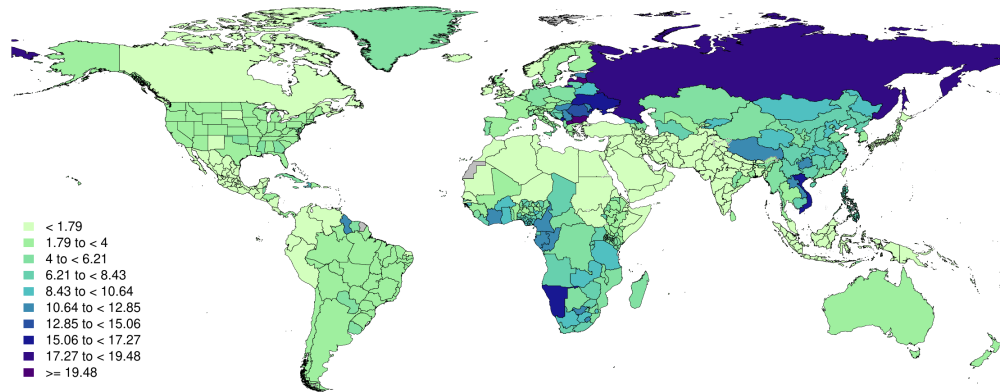
HIGH FASTING PLASMA GLUCOSE

Figure 1. Global map of cardiovascular disease mortality attributable to high fasting plasma glucose per 100,000 in 2022 with equal interval classification
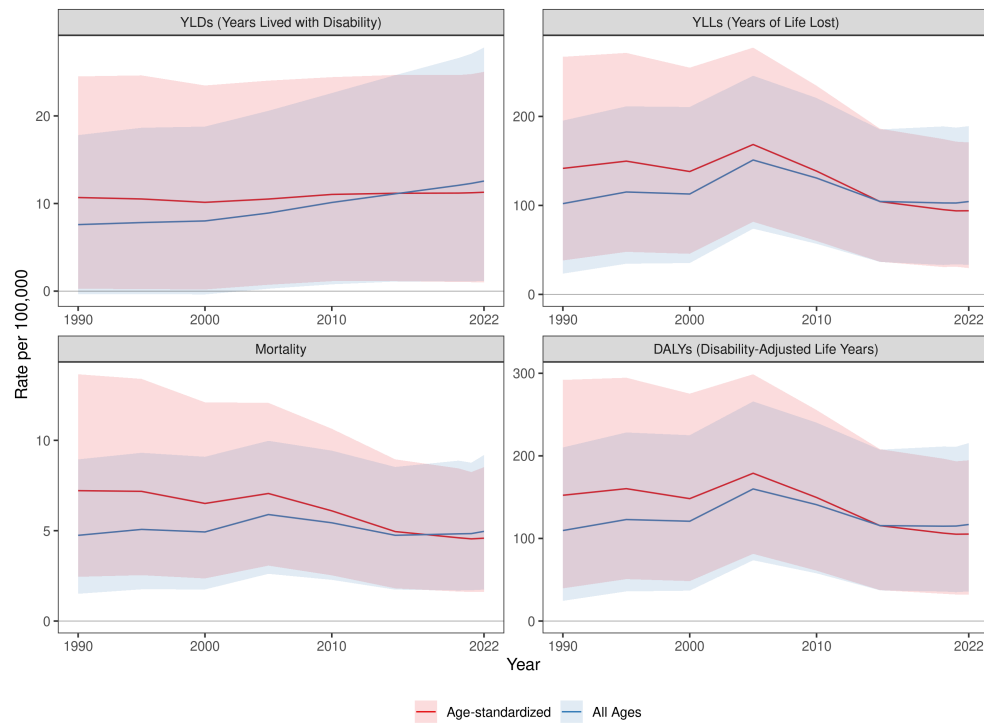

Figure 2. Global cardiovascular disease attributable to high fasting plasma glucose estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
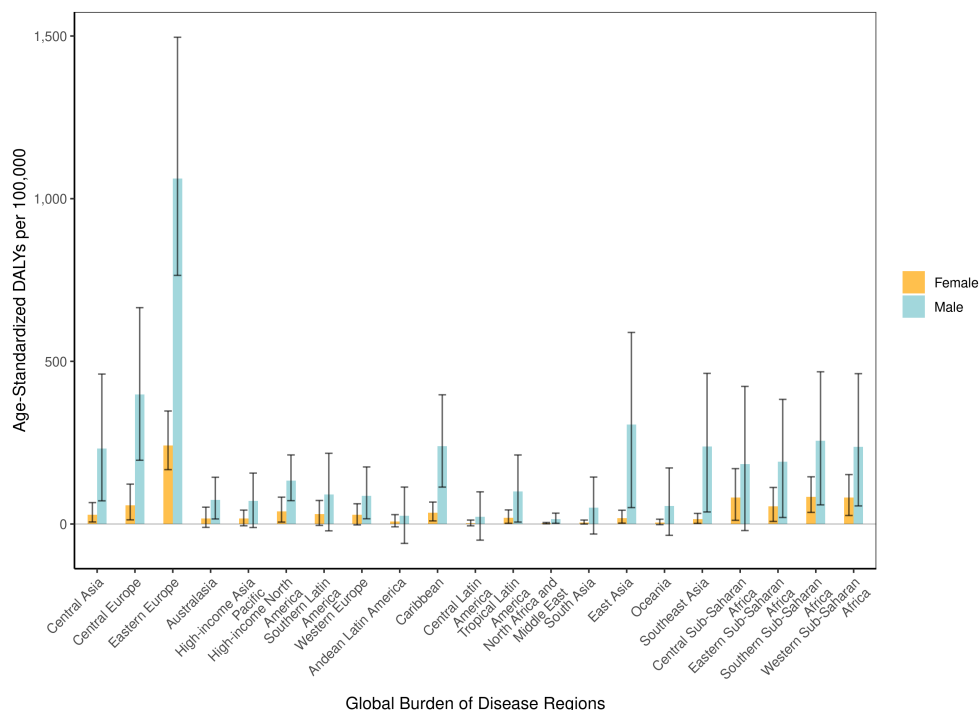
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to high fasting plasma glucose per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
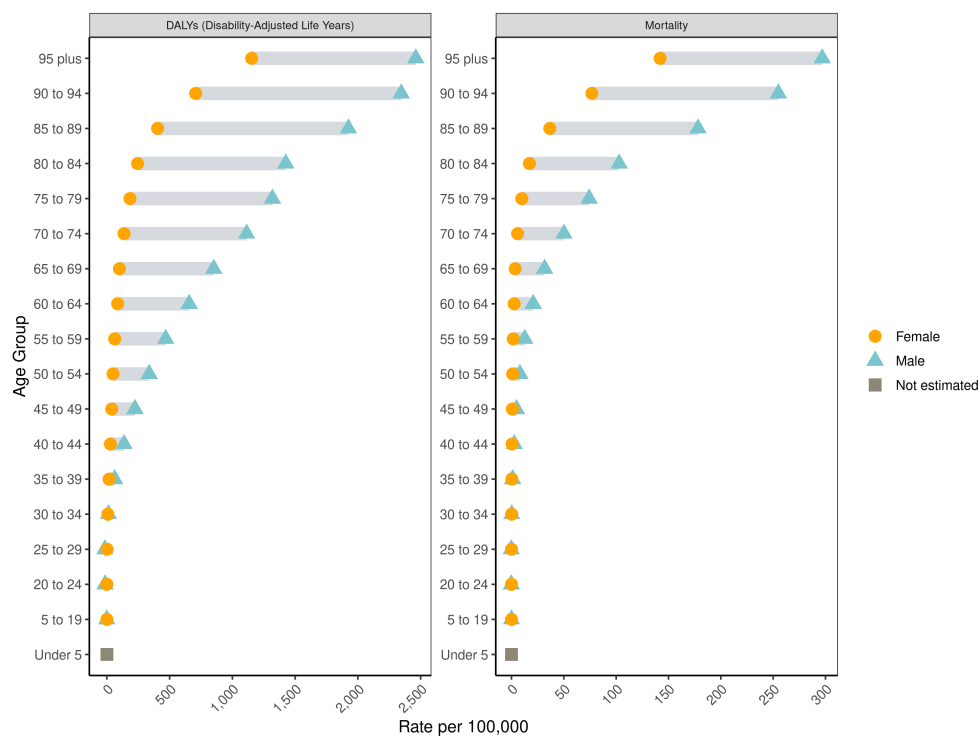

Figure 4. Global cardiovascular disease age-specific estimates attributable to high fasting plasma glucose per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

HIGH LDL CHOLESTEROL
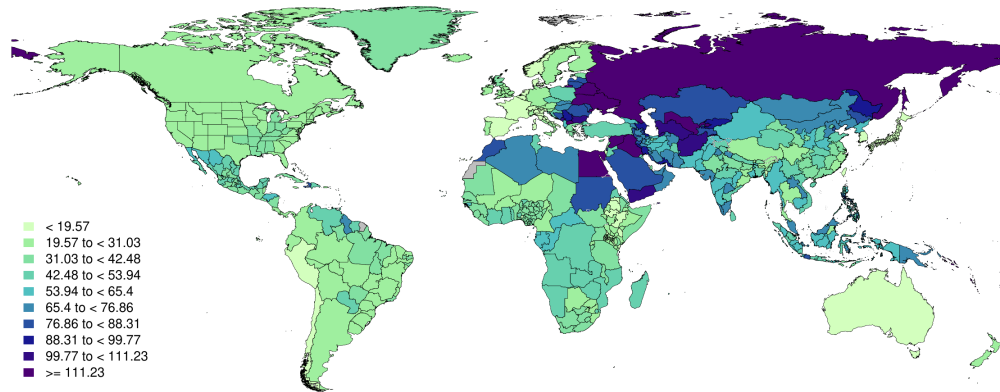
Figure 1. Global map of cardiovascular disease mortality attributable to high LDL cholesterol per 100,000 in 2022 with equal interval classification
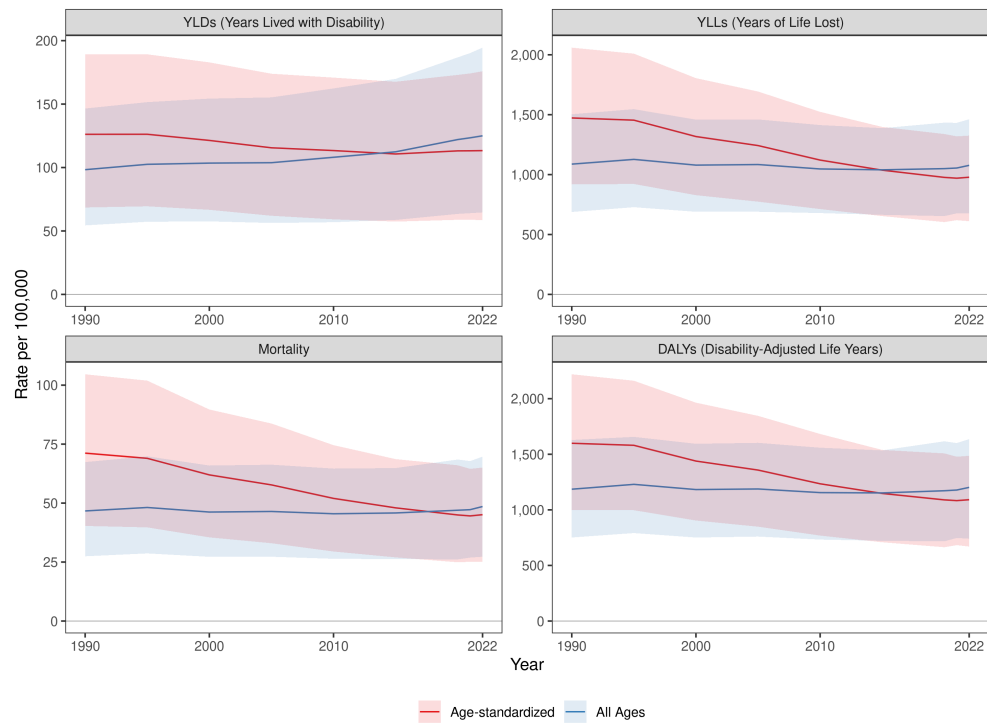
Figure 2. Global cardiovascular disease attributable to high LDL cholesterol estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
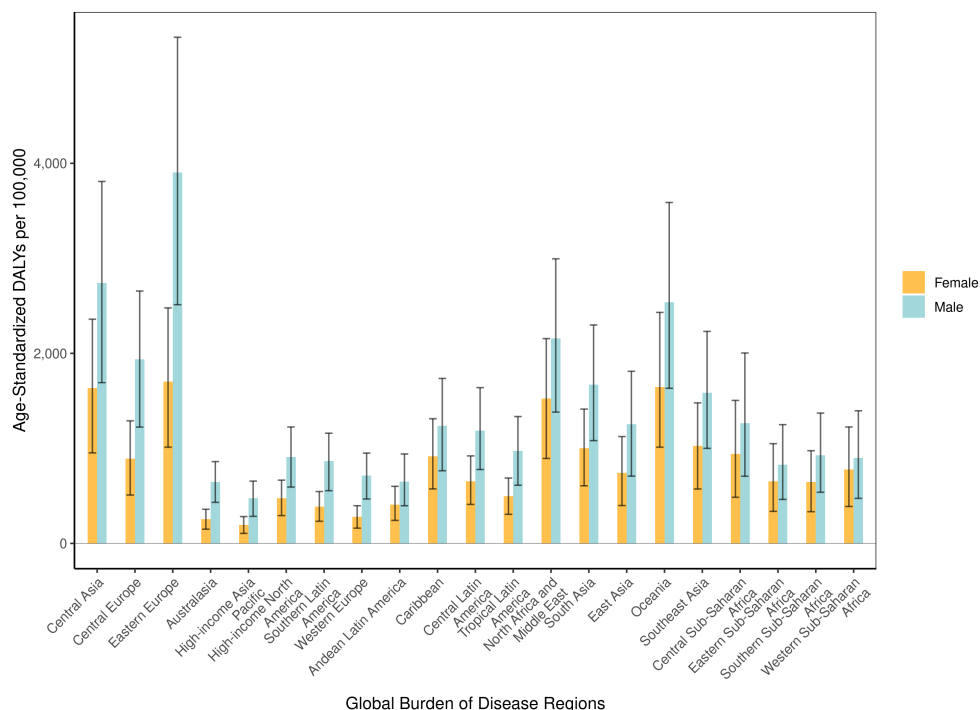
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to high LDL cholesterol per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
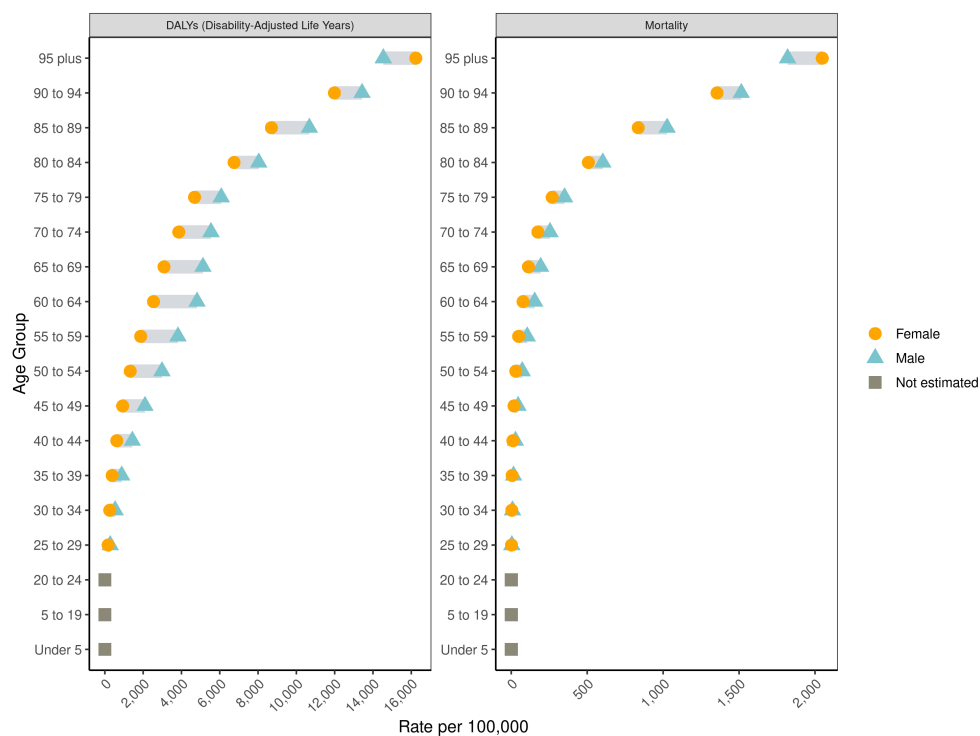
Figure 4. Global cardiovascular disease age-specific estimates attributable to high LDL cholesterol per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar
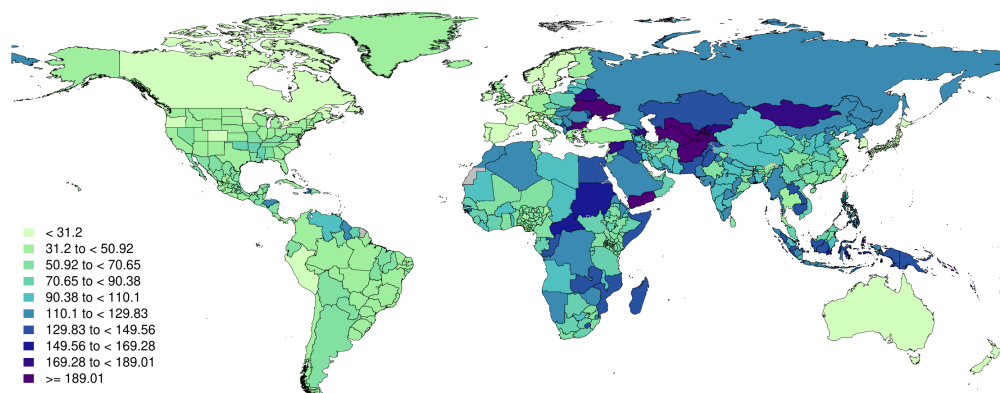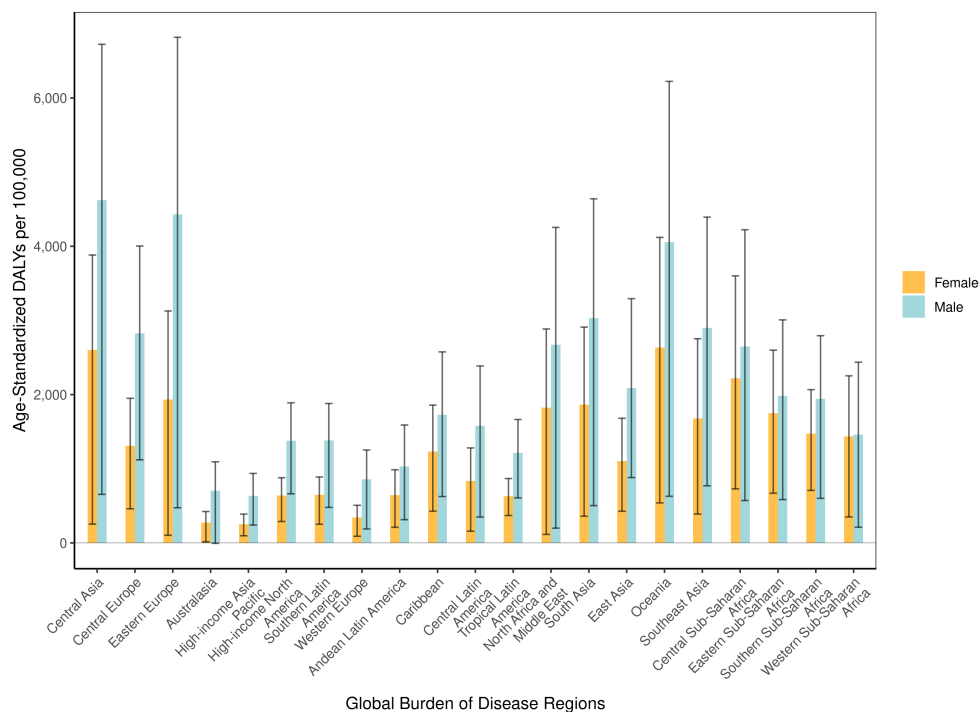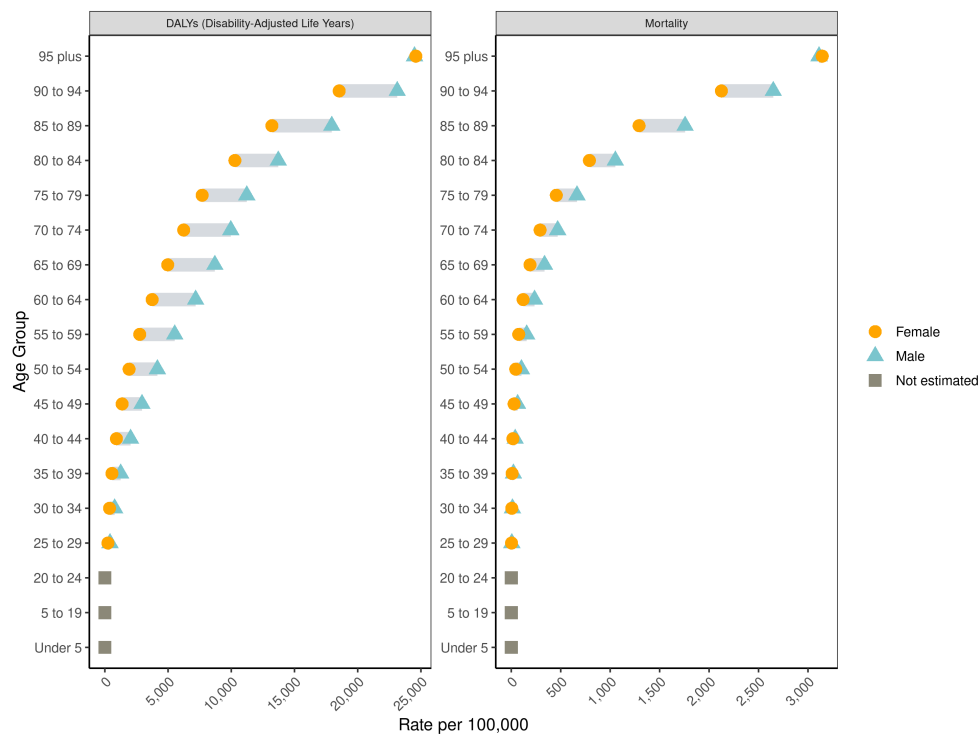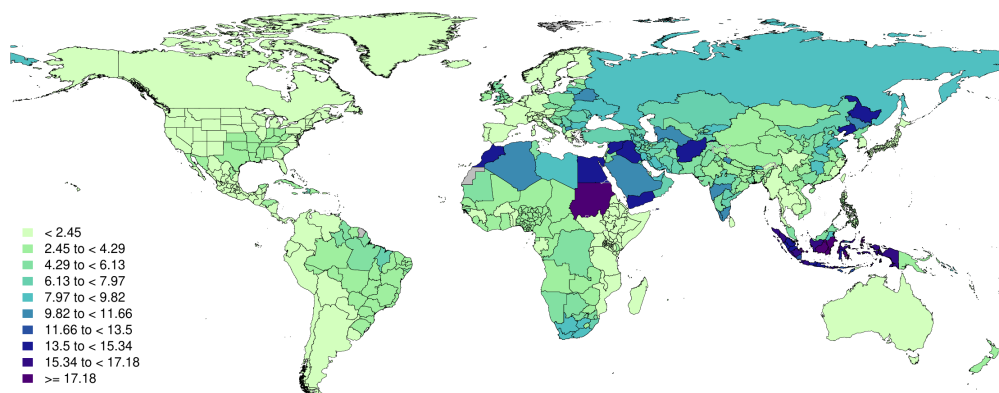
HIGH SYSTOLIC BLOOD PRESSURE
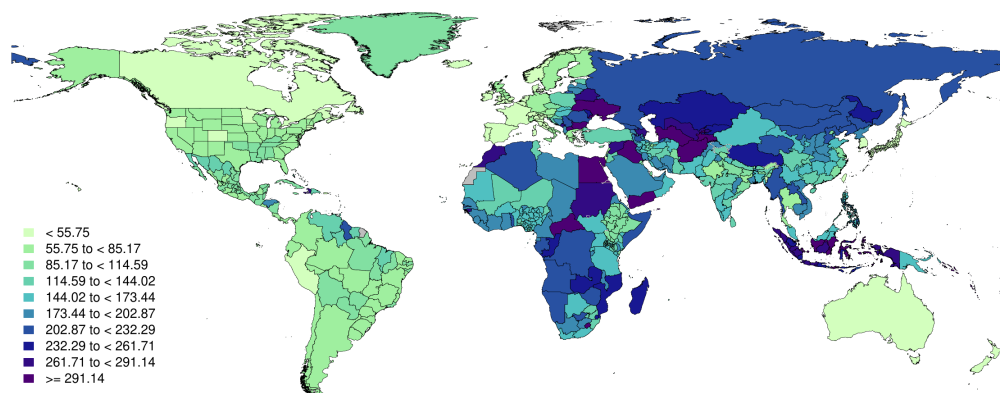
Figure 1. Global map of cardiovascular disease mortality attributable to high systolic blood pressure per 100,000 in 2022 with equal interval classification
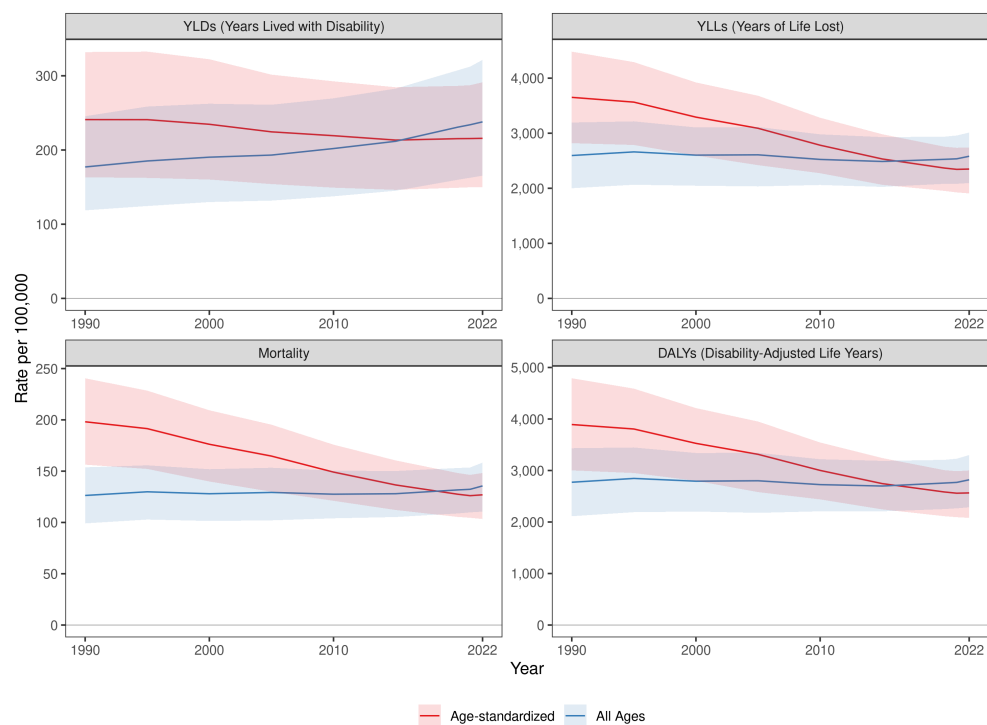
Figure 2. Global cardiovascular disease attributable to high systolic blood pressure estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
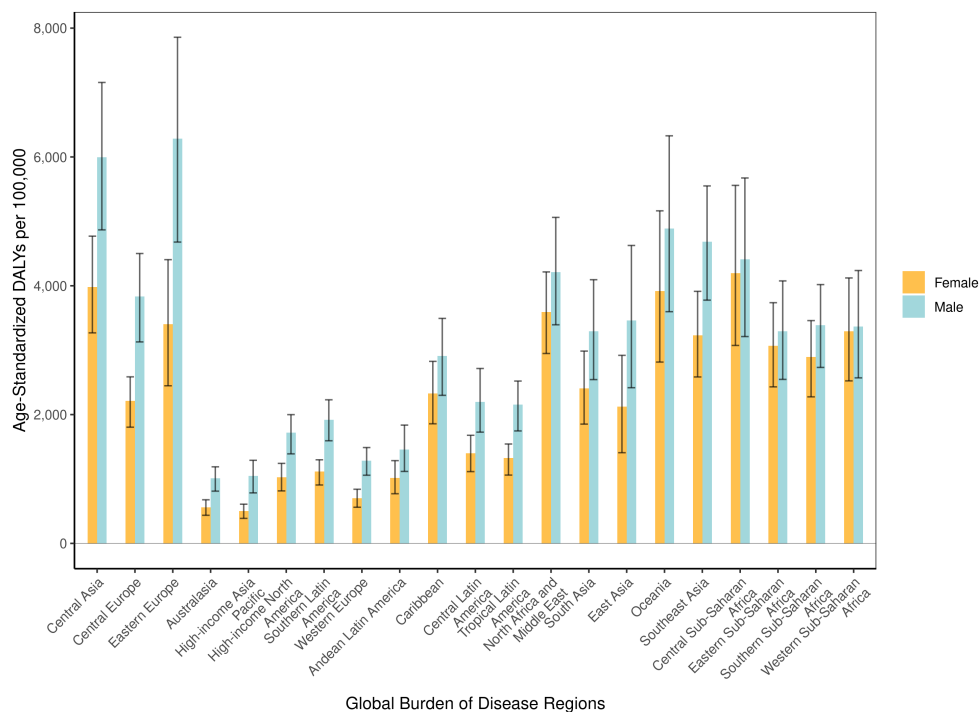
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to high systolic blood pressure per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
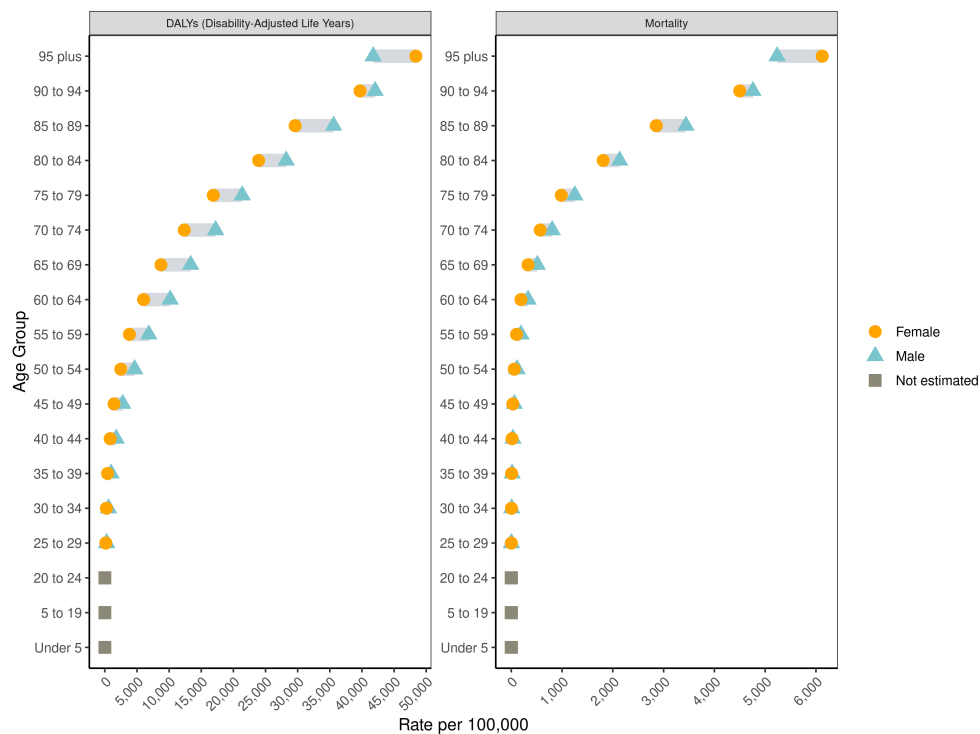
Figure 4. Global cardiovascular disease age-specific estimates attributable to high systolic blood pressure per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

HIGH BODY MASS INDEX
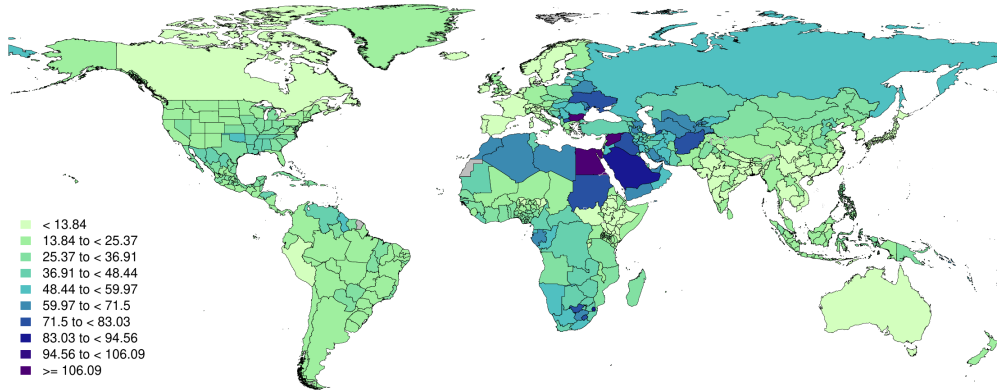
Figure 1. Global map of cardiovascular disease mortality attributable to high body mass index per 100,000 in 2022 with equal interval classification
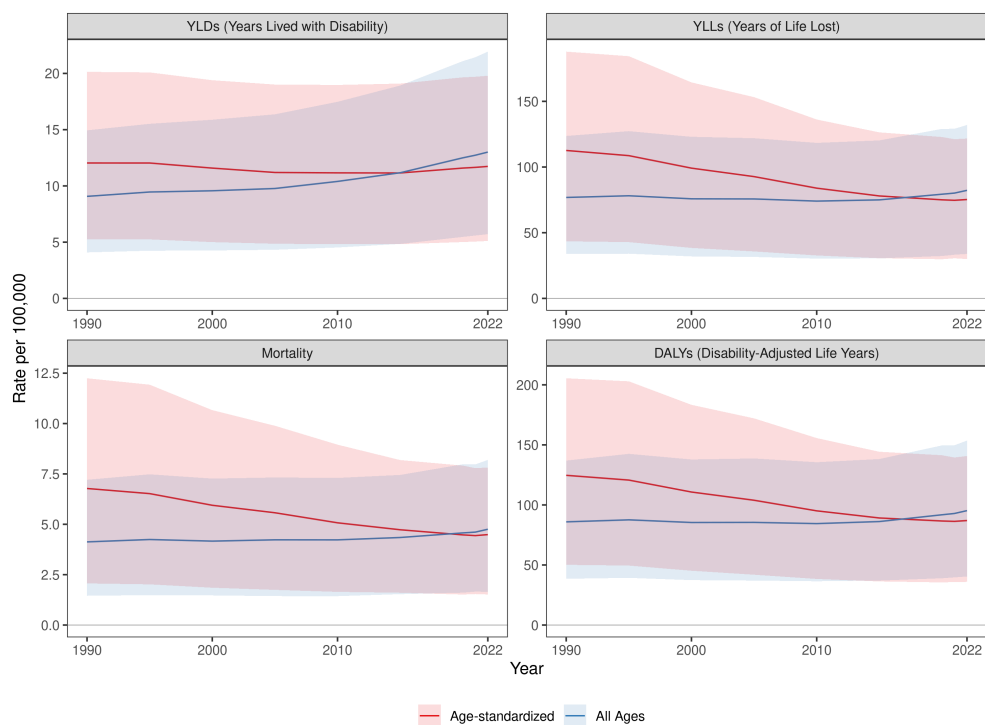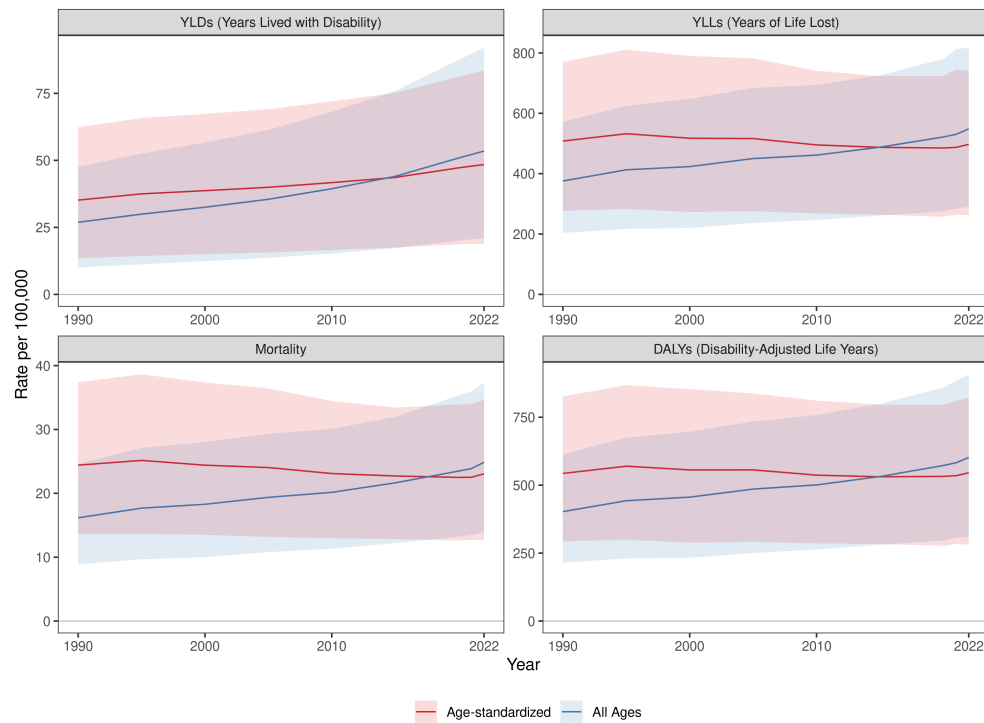

Figure 2. Global cardiovascular disease attributable to high body mass index estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
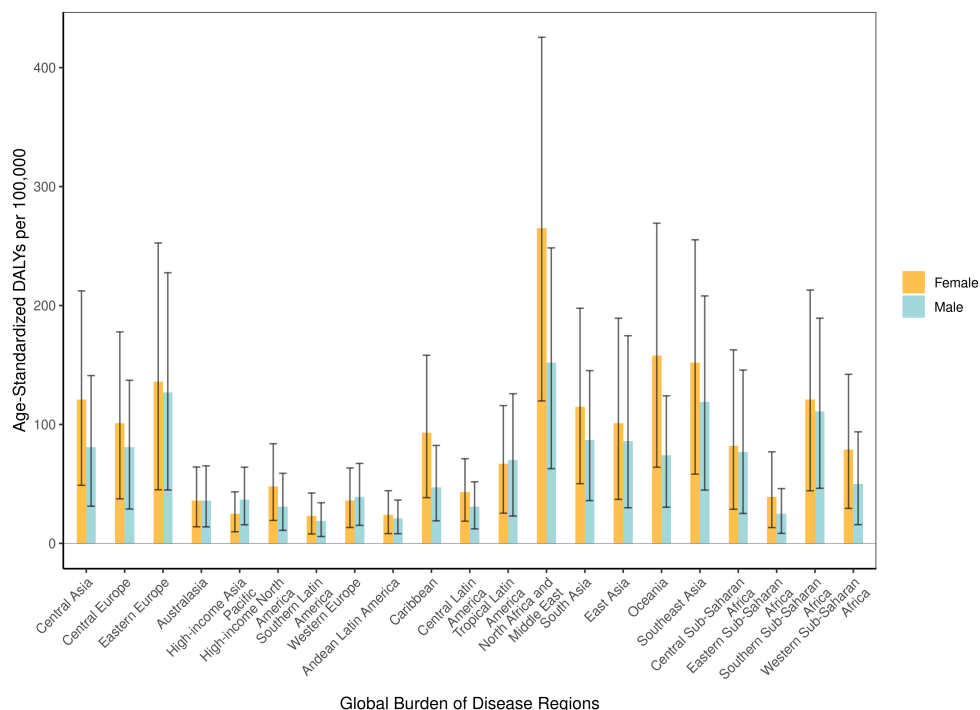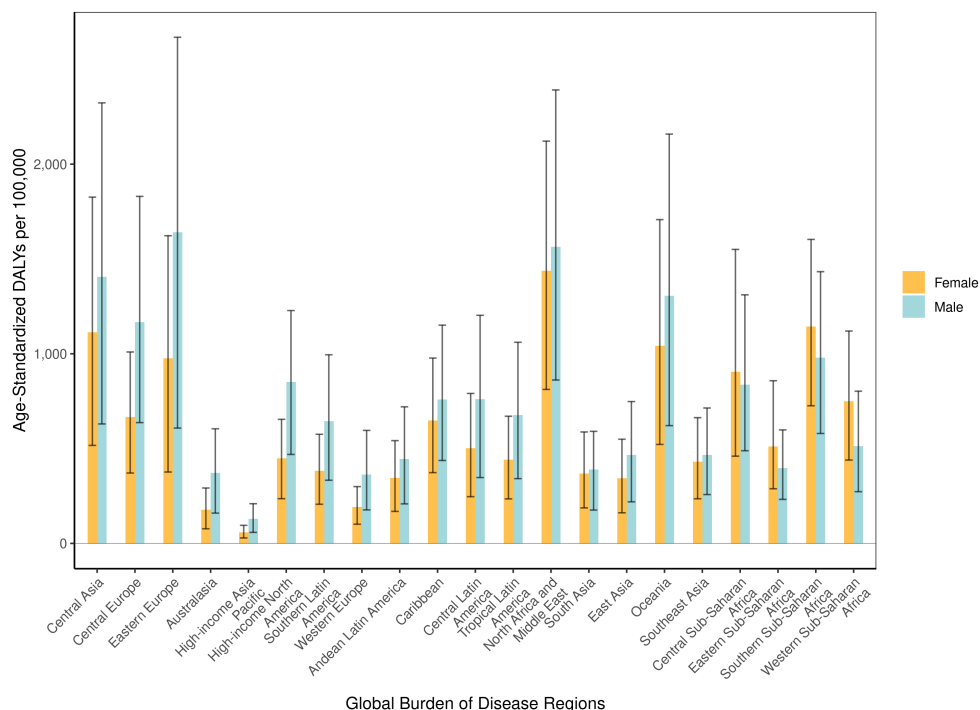
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to high body mass index per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
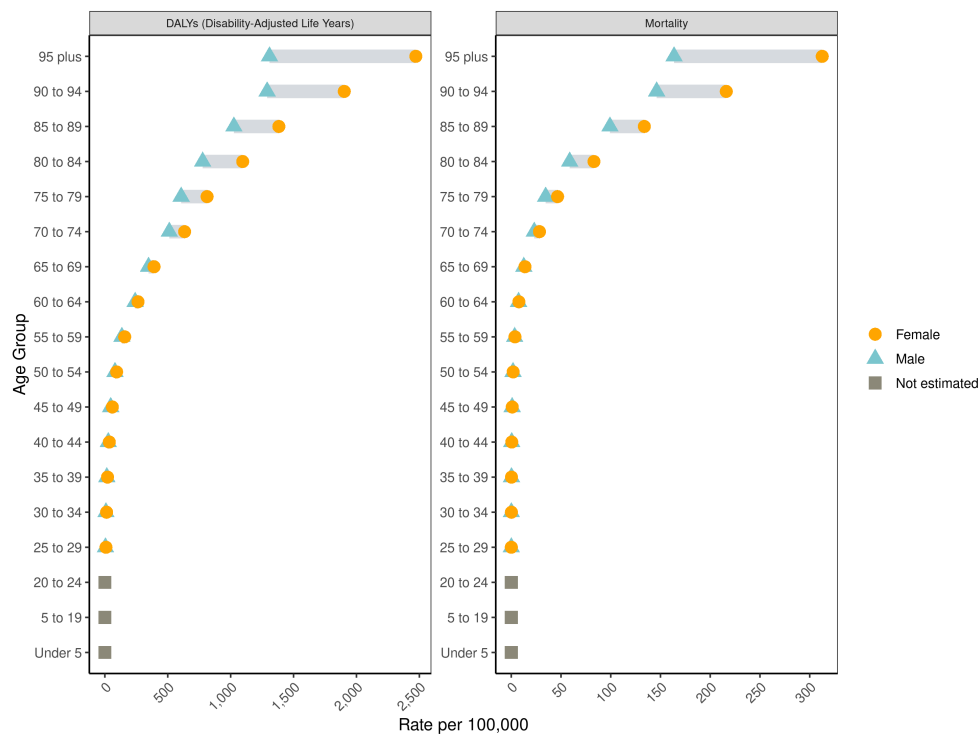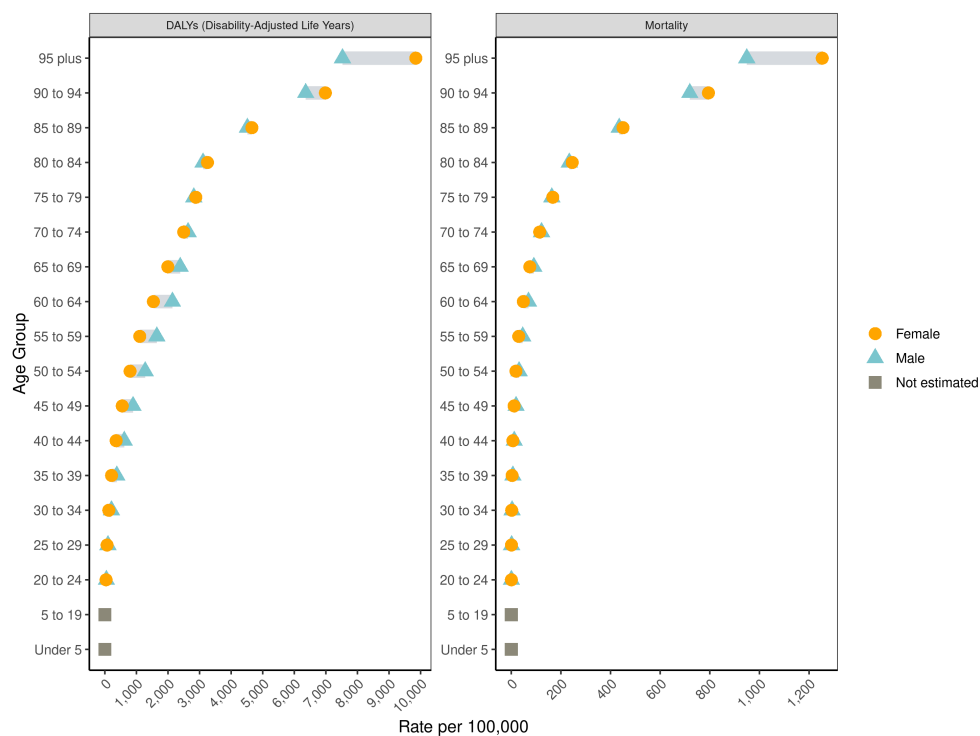

Figure 4. Global cardiovascular disease age-specific estimates attributable to high body mass index per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

KIDNEY DYSFUNCTION
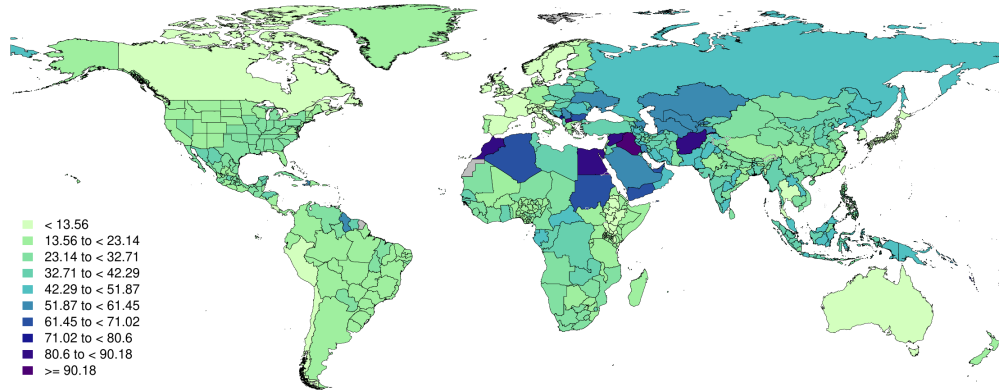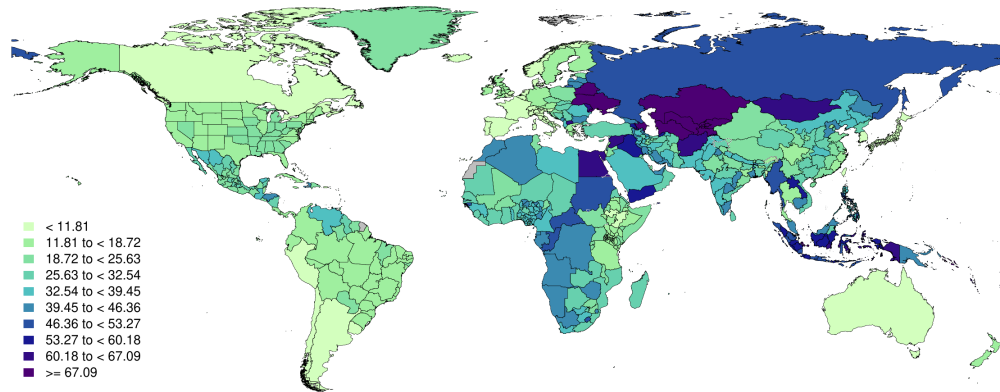

Figure 1. Global map of cardiovascular disease mortality attributable to kidney dysfunction per 100,000 in 2022 with equal interval classification
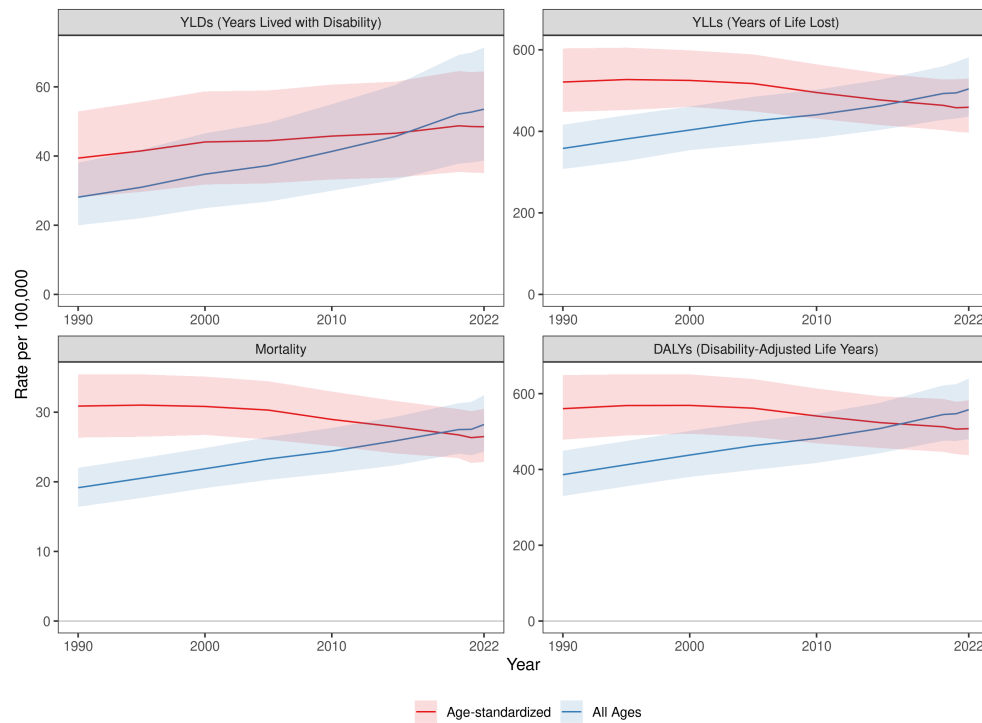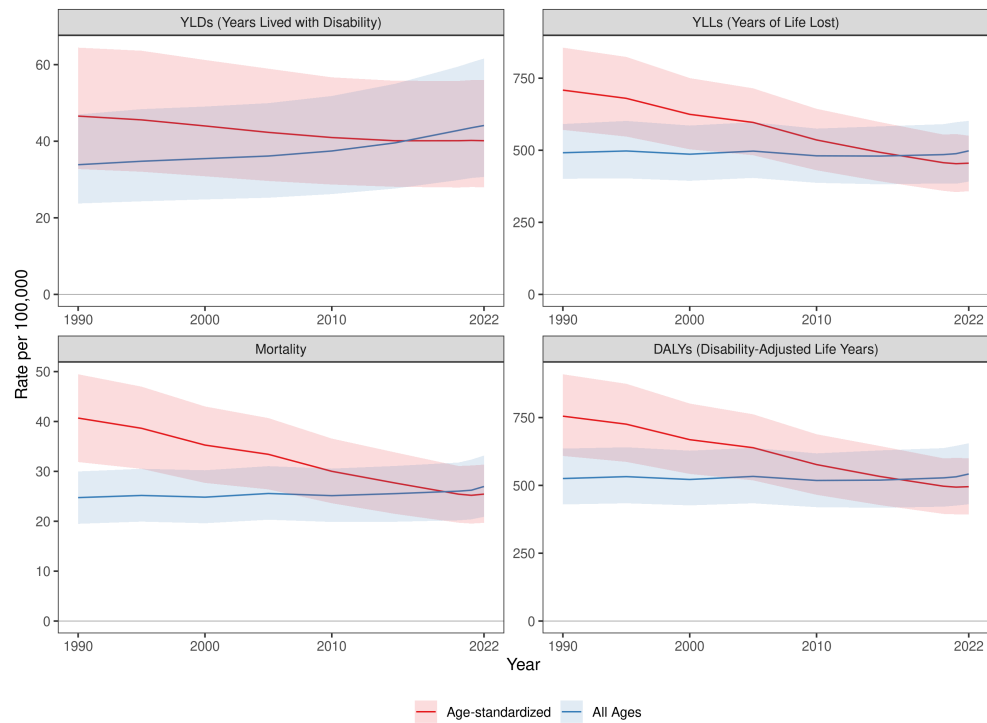

Figure 2. Global cardiovascular disease attributable to kidney dysfunction estimates per 100,000 by measure with shaded 95% uncertainty interval, 1990-2022
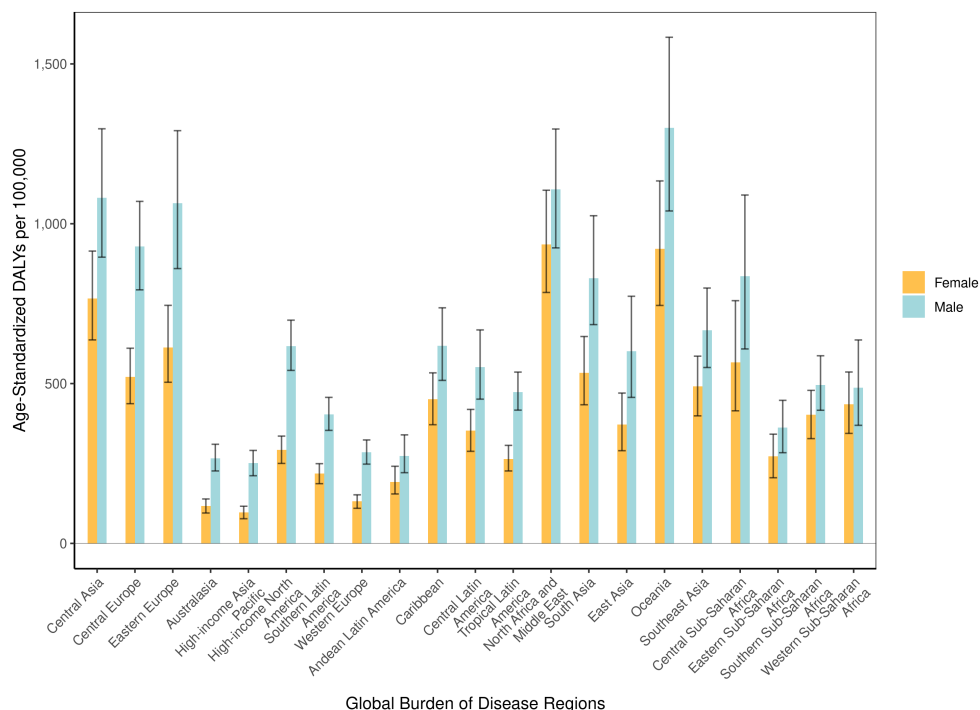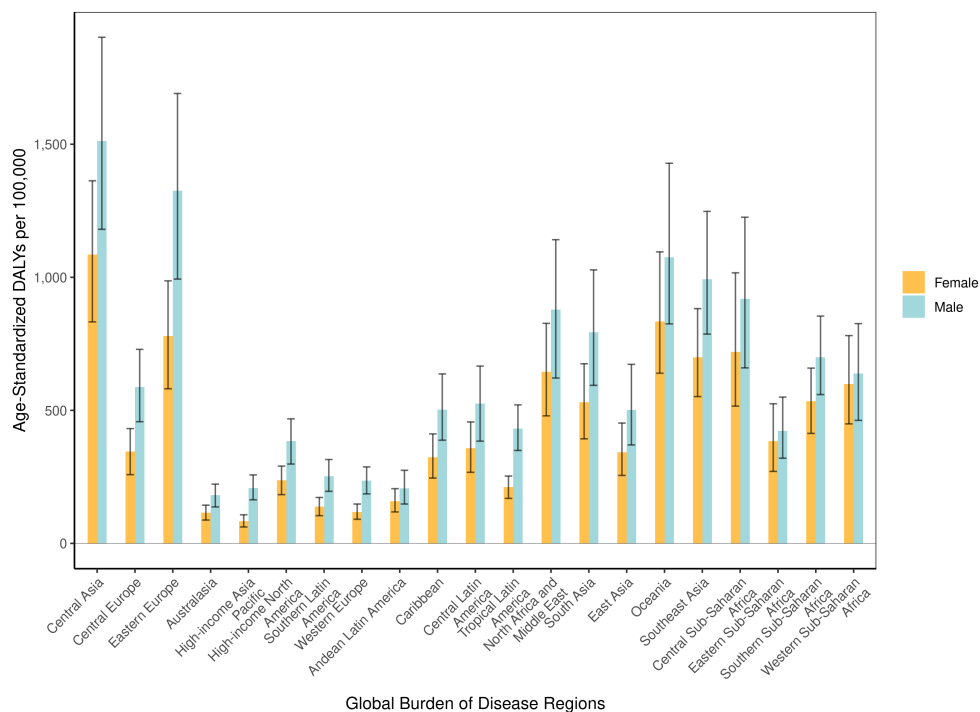
Figure 3. Cardiovascular disease age-standardized disability-adjusted life years (DALYs) attributable to kidney dysfunction per 100,000 by Global Burden of Disease region and sex in 2022, 95% uncertainty interval indicated by black bar
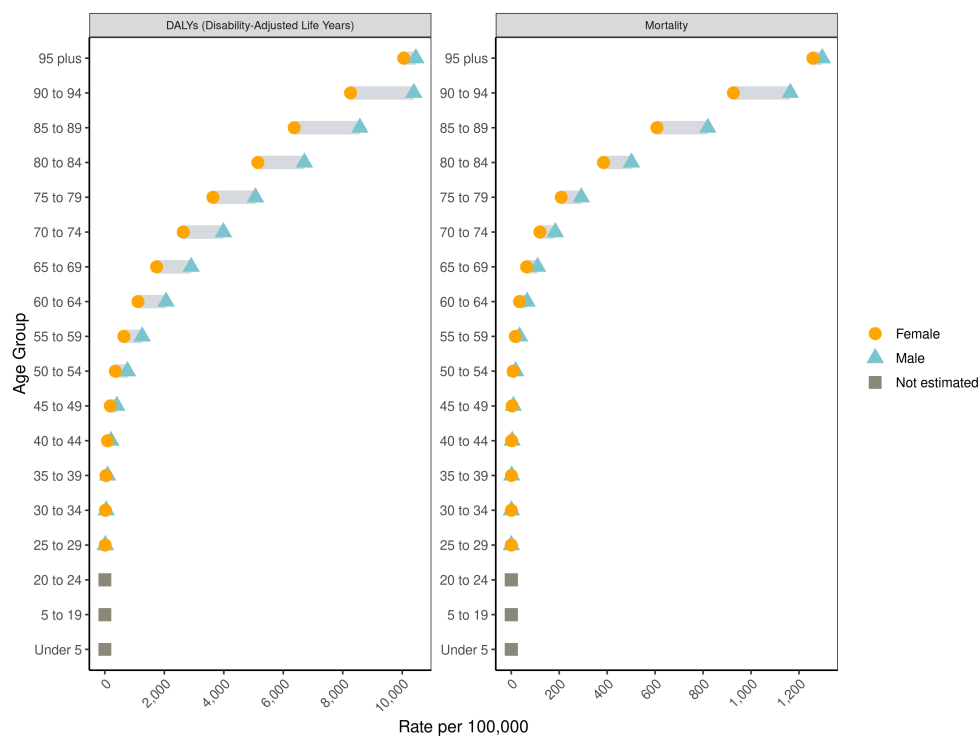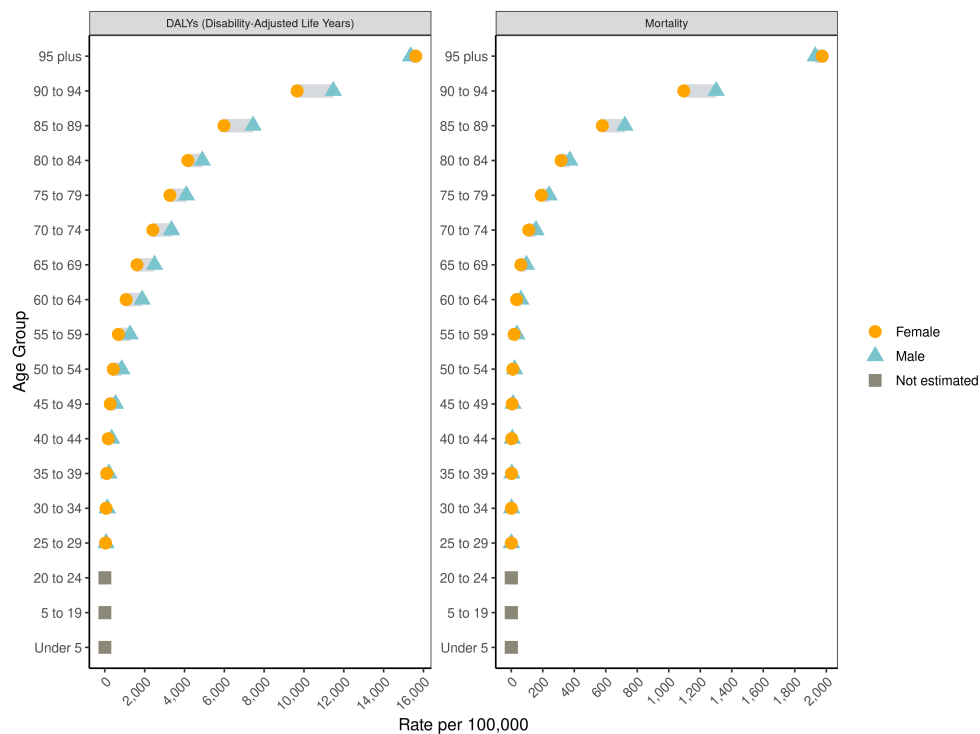

Figure 4. Global cardiovascular disease age-specific estimates attributable to kidney dysfunction per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

Summary of Global Burden of Disease Study Methods

Background
The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) is a multinational collaborative research study with over 10,000 collaborators around the world. GBD generates a time series of summary measures of health, including prevalence, cause-specific mortality (CSMR), years of life lost (YLLs), years lived with disability (YLDs), and disability-adjusted life years (DALYs) to provide a comprehensive view of health burden for a wide range of stakeholders including clinicians, public and private health systems, ministries of health, and other policymakers. These estimates are produced for 371 causes of death and 88 risk factors according to mutually exclusive, collectively exhaustive hierarchies of health conditions and risks. The study is led by a principal investigator and governed by a study protocol, with oversight from a Scientific Council, and an Independent Advisory Committee.[1] GBD is performed in compliance with Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER).[2] GBD uses de-identified data, and the waiver of informed consent was reviewed and approved by the University of Washington Institutional Review Board (study number 9060).

This almanac presents results for 18 cardiovascular diseases (CVD) and the CVD burden attributed to 15 risk factors (including an aggregate grouping of dietary risks) by GBD region. A summary of methods follows. Additional information can be found online at https://ghdx.healthdata.org/record/ihme-data/cvd-1990-2022, including:

1) Detailed methods, including information on the GBD location hierarchy, the GBD cause hierarchy, mapping of International Classification of Disease (ICD) codes to the GBD cause list, and health states and associated disability weights used in the comorbidity simulation.
2) Mean values and 95% uncertainty intervals for all estimates presented in the almanac, by country, sex, age group, and year.
3) Cause-specific write-ups outlining methods for estimation of mortality with details of model parameters for each cause, including selection of location-specific covariates.
4) Cause-specific write-ups outlining methods for estimation of prevalence, with details of systematic reviews, input data, all data adjustments, modeling frameworks, and model parameter selection.
5) Risk factor write-ups containing details of systematic reviews, input data, all data adjustments, modeling frameworks, and model parameter selection.
6) Documentation of compliance with GATHER

Methods
Demographic groupings
This study estimated CVD burden for 204 countries and territories grouped into 21 regions and seven super-regions. GBD regions are made up of countries and territories that are geographically close and epidemiologically similar. GBD regions are grouped into super-regions based on observed cause of death patterns. Estimates presented in this almanac were produced at the subnational level (e.g., region, state, or province) for a subset of locations including Brazil, China, Ethiopia, India, Indonesia, Italy, Iran, Japan, Kenya, Mexico, Nigeria, Norway, Pakistan, the Philippines, Russia, South Africa, the UK, and the USA. Since GBD 2019, the GBD location hierarchy has included all WHO member states. Each epidemiological quantity of interest was estimated for 23 age groups from birth to 95 years and older; males, females, and both sexes combined from 1990 to 2022. Age standardization used the direct method with the GBD standard global population age structure. This standard population is determined by using the population structure of all national locations with a population greater than 5 million people. First, the

proportion of the location-specific population in each age group is calculated. Second, these age-specific proportions are averaged across all locations.[3]

Sociodemographic index
Results are also presented by Socio-demographic Index (SDI) value. SDI is a composite measure of overall development comprised of lag-distributed income per capita (LDI), average years of education, and fertility rates among females younger than 25 years (TFU25). LDI and education are positively correlated with improved health outcomes, while TFU25 is negatively correlated. SDI is thus calculated as the geometric mean of LDI, education, and the inverse of TFU25.[3]

Cardiovascular Disease Case Definitions
A set of case definitions was used to consistently identify and harmonize data on cardiovascular diseases for all locations across the entire time period. CVD case definitions used by GBD are shown in Table 1. Of note, heart failure is classified as an impairment rather than an underlying cause of death in the GBD classification system. Heart failure is a structural or functional abnormality of the heart which impairs cardiac filling and output and, within the GBD, contributes burden to many underlying causes of death including all cardiovascular diseases listed below with the exception of aortic aneurysm and lower extremity peripheral arterial disease. GBD relies on data in which heart failure has been diagnosed by clinicians using structured criteria, such as the Framingham, European Society of Cardiology, or Universal Definition and Classification of Heart Failure criteria. Prevalent heart failure is defined as structural heart disease with current or previous symptoms of heart failure (ACCF/AHA stages C or D).[4] As part of the GBD estimation process, heart failure burden is included in the burden estimates for each etiologic underlying cause of death.

All-cause mortality and population estimates
GBD produces estimates of all-cause mortality and population; for cause-specific burden, these are integral inputs into the cause-specific estimation process. Detailed methods have been previously reported.[3]

Cause-specific mortality
Death records, including vital registration for all cardiovascular causes and verbal autopsy data for total cardiovascular disease, ischemic heart disease, and total stroke, were mapped to the GBD cause list. Records where the underlying cause was considered nonspecific, intermediate, or implausible were reassigned to a valid underlying cause of death via redistribution algorithms which utilized proportional information, cause-specific priors, or data sets with information on all contributing causes of death in addition to the underlying cause.[5] A counterfactual approach, based on data from 2014-2019, was used to estimate excess cause-specific deaths in 2020 and 2021 and reclassify them as deaths due to COVID-19. A noise reduction algorithm was applied to mortality data and a Bayesian geospatial ensemble regression model (CODEm, the cause of death ensemble model, Institute for Health Metrics and Evaluation (IHME), Seattle, Washington) was used with location-specific covariates to produce smoothed time series for each location, including where data was sparse or missing.[6] Individual models included in the ensemble are weighted according to performance on out-of-sample predictive validity testing.

CoDCorrect
As each cause-specific model is estimated separately, the sum of these models is not certain to equal the all-cause mortality estimates. The CoDCorrect process rescales each level of the GBD cause hierarchy such that the sum of the cause-specific estimates does not exceed the all-cause mortality estimates.[6] Using the GBD cause hierarchy, this process begins by rescaling the Level 1 causes to match the all-cause

mortality estimates. Level 2 causes are then rescaled to their corrected parent cause estimates. This process continues for Level 3 and Level 4 causes such that all levels of the hierarchy are rescaled.

Prevalence
Prevalence was estimated for each disease using the Disease Model—Bayesian meta-regression (DisMod-MR 2.1 (IHME, Seattle, Washington)) an epidemiologic state-transition disease modeling tool. DisMod-MR evaluates all available high-quality, population-representative data for disease incidence, prevalence, remission, and mortality, while enforcing consistency between these various parameters.[6] Possible input data sources included scientific literature identified via systematic reviews of published literature and expert review, population surveys, and administrative health facility data. Where applicable, network meta-analysis was performed using the meta-regression—Bayesian, regularised, trimmed software (MR-BRT, IHME, Seattle, Washington) to allow adjustment for study-level differences in case definition or measurement method.[7] If necessary, correction factors were calculated to adjust tabulated inpatient-only health facility data to account for readmission, non-primary diagnoses, and outpatient visits.

Risk factors
Definitions used for each risk factor can be found in Table 2.

Attributable burden estimation.
The GBD estimates disease burden attributable to risk factors using a comparative risk assessment framework.[8]

Population-level exposure to each risk factor was estimated using statistical models. Most risk exposure was estimated using spatiotemporal Gaussian process regression (ST-GPR) or DisMod-MR, described above. ST-GPR is a geospatial Gaussian process regression model which borrows strength between locations and over time to generate estimates of mean risk factor exposures.[8] Input data sources included scientific literature identified via systematic reviews of published literature and expert review, population health surveys, and for ambient air pollution, satellite data. Person-level data from cohort studies were used to determine the standard deviation of the risk factor exposure and to estimate the shape of the exposure distribution.

Each risk was assigned outcomes from the GBD study list of diseases to form risk-outcome pairs based on the availability of convincing or probable evidence of a disease-risk association. For each risk factor, the level of exposure where disease risk is minimized, or theoretical minimum risk exposure level (TMREL) was determined.

Relative risks were estimated for each risk outcome pair following the Burden of Proof (BoP) method, previously reported.[9] Briefly, following PRISMA guidelines, systematic reviews were performed for studies reporting relative risk or hazard ratios, and data were extracted using a standardized template.[10] Using MR-BRT, the relative risk between risk and disease outcome was modeled, integrating over the exposure ranges reported. This approach allows us to identify publication or reporting bias and to account for between-study heterogeneity and within-study correlation. An example of this approach has been reported in detail for the relationship between systolic blood pressure and ischemic heart disease.[11]

Population-attributable fractions (PAF) were then calculated for each risk-outcome pair using the exposure levels, the estimated relative risk, and the TMREL to generate the amount of burden for each

disease due to risk factor exposure. Attributable burden was then estimated as the PAF for that risk-outcome pair multiplied by the burden measure of interest.

Summary measures of disease burden
Years lived with disability (YLDs) were estimated by multiplying disease prevalence by the relevant disability weight after accounting for comorbidity in a simulation process.[6] Disability weights, which represent the magnitude of health loss associated with the outcome were constructed based on surveys of the general population, with a statistical adjustment made to account for comorbidity. Years of life lost (YLLs) due to premature mortality were computed by multiplying the number of estimated deaths by the standard life expectancy at age of death.[6] The standard life expectancy was determined by using the lowest observed age-specific mortality rates by location and sex across all estimation years from locations with total populations greater than 5 million in 2016 to establish a theoretical minimum risk reference life table. Disability-adjusted life years (DALYs) were calculated as the sum of YLLs and YLDs and represent the total health burden associated with each cause. All summary measures were estimated using 500 draws and uncertainty intervals were determined as the 2.5[th] and 97.5[th] values of the posterior distribution of model draws.

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Table 1: Cardiovascular case definitions

GBD Cause	Definition
Rheumatic heart disease	Diagnosis by a physician with use of echocardiography. This case definition for echocardiographic confirmation of rheumatic heart disease follows the World Heart Federation criteria for echocardiographic diagnosis[12]
Ischemic heart disease	1) Myocardial infarction as defined in the Fourth Universal Definition of Myocardial Infarction[13] 2) Coronary artery disease defined as At least moderate (>50%) stenosis of an epicardial coronary vessel based on angiographic or functional diagnostic testing[14, 15] 3) Heart failure due to ischemic heart disease defined as a clinical diagnosis based on structured criteria described above[4]
Ischemic stroke	Brain imaging showing blood flow to part of the brain being occluded and according to WHO criteria of rapidly developing clinical signs of disturbance of cerebral function lasting >24 hours or leading to death[16, 17]
Intracerebral hemorrhage	Brain imaging showing bleeding into the tissue of the brain and according to WHO criteria of rapidly developing clinical signs of disturbance of cerebral function lasting >24 hours or leading to death. Only non-traumatic events were included[16, 17]
Subarachnoid hemorrhage	Brain imaging or lumbar puncture indicating the rupture of a blood vessel resulting in bleeding into the subarachnoid space and according to WHO criteria of rapidly developing clinical signs of disturbance of cerebral function lasting >24 hours or leading to death. Only non-traumatic events were included[16, 17]
Hypertensive heart disease	Heart condition caused by long-term high blood pressure, resulting in left ventricular hypertrophy, diastolic dysfunction, and clinical heart failure with either preserved or reduced systolic function of the left ventricle. Clinical diagnosis of heart failure is based on structured criteria described above[4]
Non-rheumatic calcific aortic valve disease	Diagnosis by a physician based on echocardiographic findings of stenosis or regurgitation caused by progressive calcification of the valve, excluding congenital, rheumatic, or infectious causes but including stenosis of a bicuspid aortic valve[18]
Non-rheumatic mitral valve disease	Diagnosis by a physician based on echocardiographic findings of myxomatous degeneration or prolapse of the mitral valve leading to at least moderate mitral regurgitation, excluding disease due to annular dilation, congenital, rheumatic, or infectious causes[18]
Other non-rheumatic valve disease	Residual category capturing diagnosis by a physician based on echocardiographic findings of stenosis or regurgitation of pulmonary and tricuspid valves. Valve dysfunction due to congenital, infectious, or rheumatic causes was estimated separately[18]
Myocarditis	Acute myocarditis is defined by symptoms, clinical exam, cardiac imaging such as cardiac MRI or endomyocardial biopsy[19] Heart failure due to myocarditis is a clinical diagnosis of heart failure based on structured criteria described above with a history of myocarditis[4]
Alcoholic cardiomyopathy	Clinical diagnosis of heart failure based on structured criteria described above due to the toxic effects of ingested alcohol[4]
Other cardiomyopathy	Residual category capturing a clinical diagnosis of heart failure based on structured criteria described above without a history of other potential causes of heart failure[4]
Pulmonary arterial hypertension	Diagnosis by a physician based on findings of restricted blood flow and elevated pressure in the pulmonary arteries based on right heart catheterization or echocardiography[20]
Atrial fibrillation and flutter	ECG studies demonstrating irregularly irregular RR intervals; and no P waves[21, 22]
Aortic aneurysm	Abdominal or thoracic aorta is abnormally enlarged and weakened due to atherosclerosis, high blood pressure, or inflammation, which can lead to tearing or rupture of the blood vessel[23] Prevalence and YLDs are not currently estimated for aortic aneurysm
Lower extremity peripheral artery disease	An ankle-brachial index (ABI) less than or equal to 0.90[24]

Endocarditis	Acute infective endocarditis was diagnosed defined as a clinical diagnosis clinically via based on the Duke Criteria which includes confirmation through clinical signs and blood tests[25]
	Heart failure due to endocarditis was based on a clinical diagnosis of heart failure based on structured criteria described above with a history of acute infective endocarditis[4]
Other cardiovascular and circulatory diseases	This aggregate cause incorporates less common cardiovascular diseases that are not modelled independently, for example pericarditis. Diagnostic criteria vary based on the underlying condition.

Table 2: Risk factor exposure definitions

Risk factor	**Definition**
High systolic blood pressure	Brachial SBP greater than 105 to 115 mm Hg
High LDL cholesterol	LDL-cholesterol greater than 0.9 to 1.4 mmol/L
High body mass index	Body mass index greater than 20 to 23 kg/m^2
High fasting plasma glucose	Serum fasting plasma glucose greater than 4.9 to 5.3 mmol/L
Kidney dysfunction	Estimated glomerular filtration rate less than 60 ml/min/1.73m^2 and/or albumin to creatinine ratio less than or equal to 30 mg/g.
Ambient particulate matter pollution	Population-weighted annual average mass concentration of PM2.5 in a cubic meter of air greater than 2.4 µg/m^3 to 5.9 µg/m^3
Household air pollution from solid fuels	Proportion of individuals using solid cooking fuels and the level of PM2.5 air pollution exposure for these individuals greater than 2.4 ug/m^3 to 5.9 ug/m^3
High temperature	Exposure to temperatures warmer than the temperature associated with the lowest overall mortality attributable to the risk, in a given location and year.
Low temperature	Exposure to temperatures colder than the temperature associated with the lowest overall mortality attributable to the risk, in a given location and year.
Lead exposure	Micrograms of lead per gram of bone greater than the age-specific TMREL
Dietary risks	Composite risk factor consisting of suboptimal exposure to dietary factors including fruit, vegetables, whole grains, nuts and seeds, fiber, omega-3 fatty acids, polyunsaturated fatty acids, calcium, milk, legumes, red meat, processed meat, sugar-sweetened beverages, trans fatty acids, and sodium.
Smoking	Current or former users of any smoked tobacco product on a daily or occasional basis
Secondhand smoke	Current exposure of non-smokers to secondhand tobacco smoke at home, at work, or in other public places
High alcohol use	Grams per day of pure alcohol consumed among current drinkers greater than the age-, sex-, and region-specific TMREL
Low physical activity	Physical activity performed by adults older than 25 years of age, for at least ten minutes at a time, across all domains of life (leisure/recreation, work/household and transport) less than 3000-4500 metabolic equivalent-minutes per week.