



Title	Global burden and strength of evidence for 88 risk factors in 204 countries and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021
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Supplementary appendix 2

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: GBD 2021 Risk Factors Collaborators. Global burden and strength of evidence for 88 risk factors in 204 countries and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet* 2024; **403**: 2162–203.

Appendix 2: supplementary results appendix to “Global burden and strength of evidence for 88 risk factors in 204 countries and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021”

This supplement provides additional figures and tables containing more detailed results for “Global burden and strength of evidence for 88 risk factors in 204 countries and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021”

The results are available in an interactive data downloading tool in the Global Health Data Exchange (GHDx): vizhub.healthdata.org/gbd-results. The tool contains the complete set of results from all GBD 2021 papers. Specialised tables from the papers will be available as separate entries in the GHDx,

List of supplementary results tables and figures

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Supplementary results tables can be accessed at <https://ghdx.healthdata.org/record/ihme-data/gbd-2021-burden-by-risk-1990-2021>

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Table S2. Death PAFs, all-age death counts, all-age death rates (per 100 000), death, age-standardised death rate (per 100 000), DALY PAFs, all-age DALYs rate (per 100 000) age-standardised DALY rate (per 100 000) for each risk factor and outcome for both sexes combined in 1990, 2000, 2010, and 2021, excluding one- and two-star risk-outcome pairs, by geography. Percentage change for 1990-2021 and 2000-2021. Data in parenthesis are 95% uncertainty intervals. PAFs=population attributable fractions. DALYs=disability-adjusted life-years.

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Figure S1a. Leading 25 Level 3 risk factors for females by attributable DALYs, percentage of total DALYs (2000 and 2021), and percentage change in attributable DALY counts and age-standardised DALY rates from 2000 to 2021. DALY = disability-adjusted life-year. DALY = disability-adjusted life-year.

Leading risks 2000	Percent DALYs 2000	Leading risks 2021	Percent DALYs 2021	Percent change number of DALYs 2000-2021	Percent change age-standardised rate of DALYs 2000-2021
1 Particulate matter pollution	10.0 (7.8 to 11.8)	1 High systolic blood pressure	7.6 (6.1 to 8.9)	28.4 (19.2 to 37.1)	-27.8 (-33.1 to -22.9)
2 Child growth failure	9.6 (6.5 to 11.6)	2 Particulate matter pollution	7.5 (6.1 to 8.8)	-20.1 (-29.4 to -7.5)	-44.0 (-49.9 to -36.1)
3 Low birth weight and short gestation	8.1 (7.5 to 8.8)	3 High fasting plasma glucose	5.5 (4.8 to 6.2)	86.5 (77.4 to 96.0)	7.8 (2.5 to 13.6)
4 High systolic blood pressure	6.3 (5.2 to 7.4)	4 Low birth weight and short gestation	5.1 (4.4 to 5.8)	-32.5 (-40.8 to -23.1)	-33.5 (-41.6 to -24.1)
5 Unsafe water source	4.1 (2.3 to 5.5)	5 High body-mass index	5.1 (2.1 to 7.8)	93.2 (82.8 to 103.5)	13.7 (7.4 to 20.2)
6 Unsafe sex	3.5 (2.8 to 4.3)	6 Kidney dysfunction	2.9 (2.6 to 3.3)	45.7 (37.0 to 54.9)	-14.8 (-19.9 to -9.3)
7 Unsafe sanitation	3.4 (2.7 to 4.2)	7 High LDL cholesterol	2.6 (1.5 to 3.7)	23.1 (15.2 to 30.6)	-29.2 (-33.6 to -24.8)
8 High fasting plasma glucose	3.2 (2.8 to 3.6)	8 Child growth failure	2.6 (1.4 to 3.6)	-71.0 (-78.9 to -64.1)	-72.8 (-80.2 to -66.1)
9 High body-mass index	2.8 (1.2 to 4.5)	9 Unsafe sex	2.2 (2.0 to 2.4)	-33.3 (-43.2 to -18.8)	-51.5 (-58.1 to -41.8)
10 No access to handwashing facility	2.3 (-0.5 to 5.0)	10 Smoking	1.9 (1.5 to 2.4)	2.9 (-4.4 to 10.7)	-40.3 (-44.6 to -35.7)
11 High LDL cholesterol	2.3 (1.4 to 3.2)	11 Iron deficiency	1.9 (1.4 to 2.4)	7.5 (2.5 to 12.3)	-14.0 (-17.9 to -10.1)
12 Kidney dysfunction	2.2 (1.9 to 2.4)	12 Unsafe water source	1.5 (0.7 to 2.2)	-60.2 (-69.1 to -52.4)	-66.8 (-73.7 to -60.3)
13 Smoking	2.0 (1.5 to 2.4)	13 Diet low in fruits	1.4 (0.6 to 2.1)	23.3 (13.7 to 39.8)	-27.1 (-32.7 to -18.3)
14 Iron deficiency	1.9 (1.4 to 2.4)	14 Secondhand smoke	1.3 (0.7 to 2.0)	-18.9 (-26.6 to -8.6)	-48.3 (-52.8 to -42.8)
15 Secondhand smoke	1.7 (0.9 to 2.6)	15 Diet low in whole grains	1.2 (0.5 to 1.8)	26.8 (19.3 to 35.1)	-26.0 (-30.4 to -21.2)
16 Diet low in fruits	1.2 (0.5 to 1.8)	16 Unsafe sanitation	1.1 (0.8 to 1.5)	-64.1 (-71.7 to -56.9)	-69.8 (-75.8 to -63.3)
17 Suboptimal breastfeeding	1.2 (0.9 to 1.5)	17 Diet high in sodium	1.1 (0.2 to 2.7)	20.2 (-15.0 to 35.8)	-31.6 (-51.0 to -22.9)
18 Diet low in whole grains	1.0 (0.4 to 1.5)	18 Lead exposure	1.0 (-0.0 to 2.1)	29.2 (2.2 to 42.0)	-24.0 (-30.4 to -17.0)
19 Low temperature	1.0 (0.8 to 1.1)	19 Low temperature	0.9 (0.8 to 1.0)	-1.8 (-13.0 to 9.7)	-44.1 (-49.4 to -38.7)
20 Diet high in sodium	1.0 (0.2 to 2.3)	20 High alcohol use	0.8 (0.7 to 1.0)	4.9 (-2.1 to 12.5)	-32.3 (-36.8 to -27.3)
21 Lead exposure	0.9 (0.0 to 1.7)	21 No access to handwashing facility	0.8 (-0.2 to 1.8)	-61.6 (-70.4 to -52.5)	-66.9 (-74.4 to -58.7)
22 High alcohol use	0.9 (0.7 to 1.1)	22 Low physical activity	0.7 (0.3 to 1.1)	61.3 (47.6 to 77.6)	-9.0 (-17.0 to 1.1)
23 Intimate partner violence	0.7 (0.5 to 1.0)	23 Diet low in vegetables	0.7 (0.4 to 1.0)	26.8 (16.3 to 42.0)	-26.1 (-32.4 to -17.6)
24 Diet low in vegetables	0.6 (0.4 to 0.8)	24 Low bone mineral density	0.7 (0.6 to 0.8)	61.5 (55.5 to 68.0)	-9.6 (-12.9 to -6.2)
25 Diet low in fiber	0.6 (0.2 to 0.9)	25 Drug use	0.7 (0.6 to 0.8)	39.5 (29.5 to 49.2)	2.1 (-5.1 to 9.4)
26 Drug use	0.5 (0.4 to 0.6)	27 Intimate partner violence	0.5 (0.3 to 0.8)	-21.7 (-44.0 to -2.2)	-41.6 (-57.5 to -27.4)
30 Low physical activity	0.5 (0.2 to 0.7)	30 Diet low in fiber	0.5 (0.2 to 0.8)	-4.5 (-13.1 to 8.2)	-42.8 (-48.1 to -35.8)
32 Low bone mineral density	0.5 (0.4 to 0.5)	35 Suboptimal breastfeeding	0.3 (0.2 to 0.4)	-71.5 (-76.7 to -65.5)	-71.7 (-76.9 to -65.8)

Legend:

Environmental/occupational risks
Behavioural risks
Metabolic risks

Figure S1b. Leading 25 Level 3 risk factors for males by attributable DALYs, percentage of total DALYs (2000 and 2021), and percentage change in attributable DALY counts and age-standardised DALY rates from 2000 to 2021. DALY = disability-adjusted life-year. DALY = disability-adjusted life-year.

Leading risks 2000	Percent DALYs 2000	Leading risks 2021	Percent DALYs 2021	Percent change number of DALYs 2000-2021	Percent change age-standardised rate of DALYs 2000-2021
1 Particulate matter pollution	11.0 (9.0 to 12.7)	1 Smoking	9.0 (7.6 to 10.6)	12.4 (3.3 to 23.0)	-34.0 (-39.3 to -27.9)
2 Low birth weight and short gestation	9.7 (9.0 to 10.3)	2 Particulate matter pollution	8.5 (7.1 to 9.9)	-14.9 (-23.7 to -4.1)	-40.4 (-46.0 to -33.9)
3 Child growth failure	9.0 (6.2 to 10.8)	3 High systolic blood pressure	8.1 (6.7 to 9.4)	39.4 (29.5 to 50.6)	-21.0 (-26.5 to -15.0)
4 Smoking	8.8 (7.5 to 10.1)	4 Low birth weight and short gestation	5.9 (5.2 to 6.7)	-32.4 (-41.4 to -21.6)	-32.6 (-41.7 to -21.7)
5 High systolic blood pressure	6.4 (5.2 to 7.4)	5 High fasting plasma glucose	5.3 (4.7 to 5.9)	89.6 (79.3 to 100.0)	7.6 (2.0 to 13.7)
6 Unsafe water source	3.9 (2.1 to 5.2)	6 High body-mass index	3.9 (1.8 to 6.0)	100.2 (89.6 to 111.9)	18.8 (12.2 to 25.9)
7 High alcohol use	3.8 (3.0 to 4.8)	7 High alcohol use	3.9 (3.2 to 4.8)	13.9 (3.0 to 23.5)	-24.4 (-31.4 to -18.0)
8 Unsafe sanitation	3.3 (2.5 to 4.1)	8 High LDL cholesterol	3.4 (2.2 to 4.7)	29.7 (21.7 to 39.2)	-23.5 (-27.9 to -18.4)
9 High fasting plasma glucose	3.1 (2.7 to 3.4)	9 Kidney dysfunction	3.0 (2.7 to 3.4)	52.8 (44.2 to 62.8)	-10.3 (-15.3 to -4.7)
10 High LDL cholesterol	2.9 (1.9 to 3.9)	10 Child growth failure	2.6 (1.4 to 3.5)	-68.6 (-76.8 to -60.4)	-70.3 (-78.0 to -62.5)
11 Occupational injuries	2.6 (2.4 to 2.8)	11 Occupational injuries	1.8 (1.6 to 1.9)	-24.5 (-30.5 to -18.9)	-43.1 (-47.7 to -38.9)
12 No access to handwashing facility	2.3 (-0.5 to 4.8)	12 Diet high in sodium	1.7 (0.4 to 3.7)	31.9 (6.1 to 50.3)	-24.3 (-38.4 to -13.5)
13 Kidney dysfunction	2.2 (2.0 to 2.5)	13 Diet low in fruits	1.6 (0.6 to 2.5)	22.0 (13.5 to 33.4)	-26.3 (-31.3 to -20.2)
14 High body-mass index	2.2 (1.0 to 3.4)	14 Diet low in whole grains	1.6 (0.7 to 2.4)	32.1 (24.1 to 40.7)	-21.4 (-25.7 to -16.2)
15 Unsafe sex	1.7 (1.4 to 2.2)	15 Unsafe water source	1.4 (0.7 to 2.0)	-60.1 (-68.0 to -51.3)	-66.0 (-72.8 to -58.3)
16 Diet low in fruits	1.5 (0.5 to 2.2)	16 Lead exposure	1.3 (-0.1 to 2.6)	28.5 (7.7 to 45.0)	-23.8 (-29.8 to -16.3)
17 Diet high in sodium	1.4 (0.4 to 3.1)	17 Drug use	1.2 (1.1 to 1.3)	27.5 (20.0 to 35.0)	-7.4 (-12.8 to -2.1)
18 Secondhand smoke	1.4 (0.7 to 2.2)	18 Secondhand smoke	1.1 (0.6 to 1.7)	-12.9 (-20.5 to -1.6)	-41.7 (-46.3 to -35.7)
19 Diet low in whole grains	1.3 (0.6 to 2.0)	19 Unsafe sanitation	1.1 (0.8 to 1.5)	-63.6 (-70.5 to -55.5)	-68.9 (-74.8 to -61.7)
20 Suboptimal breastfeeding	1.2 (0.9 to 1.6)	20 Unsafe sex	1.0 (0.9 to 1.1)	-38.0 (-47.5 to -22.6)	-54.1 (-60.8 to -43.2)
21 Lead exposure	1.1 (-0.0 to 2.2)	21 Low temperature	0.9 (0.7 to 1.0)	22.2 (8.4 to 39.7)	-35.3 (-41.4 to -28.3)
22 Drug use	1.0 (0.9 to 1.2)	22 No access to handwashing facility	0.8 (-0.2 to 1.8)	-59.4 (-69.2 to -50.7)	-64.7 (-73.4 to -56.7)
23 Low temperature	0.8 (0.7 to 0.9)	23 Diet low in vegetables	0.7 (0.4 to 1.0)	18.0 (8.9 to 32.2)	-30.6 (-35.8 to -23.5)
24 Iron deficiency	0.7 (0.5 to 1.0)	24 Diet low in omega-6 polyunsaturated fatty acids	0.7 (-2.4 to 2.7)	34.8 (22.8 to 43.4)	-19.1 (-24.9 to -13.1)
25 Diet low in fiber	0.7 (0.2 to 1.1)	25 Diet low in nuts and seeds	0.7 (0.2 to 1.1)	12.1 (3.9 to 20.9)	-32.1 (-37.0 to -27.0)
26 Diet low in vegetables	0.7 (0.4 to 1.0)	26 Diet low in fiber	0.7 (0.2 to 1.0)	1.8 (-6.9 to 12.8)	-37.5 (-42.8 to -30.9)
27 Diet low in nuts and seeds	0.7 (0.2 to 1.0)	27 Iron deficiency	0.6 (0.4 to 0.8)	-11.4 (-16.8 to -6.0)	-27.1 (-31.3 to -22.7)
29 Diet low in omega-6 polyunsaturated fatty acids	0.6 (-2.0 to 2.2)	38 Suboptimal breastfeeding	0.3 (0.2 to 0.4)	-71.1 (-76.4 to -65.0)	-71.2 (-76.5 to -65.2)

Legend:

Environmental/occupational risks
Behavioural risks
Metabolic risks

Figure S2a. Leading 25* Level 3 risk factors for ages under 5 by attributable DALYs, percentage of total DALYs (2000 and 2021), and percentage change in attributable DALY counts and age-standardised DALY rates from 2000 to 2021.
DALY = disability-adjusted life-year.

Leading risks 2000	Percent DALYs 2000	Leading risks 2021	Percent DALYs 2021	Percent change number of DALYs 2000-2021	Percent change age-standardised rate of DALYs 2000-2021
1 Child growth failure	28.2 (19.7 to 33.1)	1 Low birth weight and short gestation	33.5 (31.7 to 34.8)	-35.5 (-44.3 to -25.1)	-33.0 (-41.6 to -22.8)
2 Low birth weight and short gestation	27.0 (25.9 to 28.0)	2 Child growth failure	15.9 (8.3 to 21.6)	-70.7 (-78.6 to -63.1)	-71.5 (-78.8 to -64.4)
3 Particulate matter pollution	14.7 (10.1 to 18.5)	3 Particulate matter pollution	14.4 (11.3 to 17.1)	-49.2 (-57.4 to -36.2)	-41.9 (-47.2 to -35.6)
4 Unsafe water source	9.0 (5.3 to 11.8)	4 Unsafe water source	5.2 (2.8 to 7.2)	-70.2 (-77.1 to -61.8)	-66.3 (-72.0 to -60.2)
5 Unsafe sanitation	7.6 (6.1 to 9.0)	5 Unsafe sanitation	4.1 (3.1 to 5.3)	-71.9 (-78.4 to -64.0)	-69.2 (-74.4 to -63.2)
6 No access to handwashing facility	5.6 (-1.4 to 11.9)	6 No access to handwashing facility	3.4 (-1.0 to 7.3)	-68.3 (-76.3 to -59.2)	-65.7 (-73.4 to -57.8)
7 Suboptimal breastfeeding	3.8 (2.8 to 4.6)	7 Suboptimal breastfeeding	2.1 (1.6 to 2.6)	-71.3 (-75.7 to -66.2)	-71.4 (-75.8 to -66.4)
8 Secondhand smoke	1.6 (0.5 to 2.7)	8 Iron deficiency	1.3 (0.8 to 1.9)	-11.4 (-14.9 to -8.1)	-18.1 (-21.2 to -15.2)
9 Vitamin A deficiency	1.5 (-3.7 to 5.6)	9 Secondhand smoke	0.8 (0.3 to 1.3)	-74.4 (-78.6 to -69.7)	-45.3 (-48.9 to -40.3)
10 Iron deficiency	0.8 (0.5 to 1.1)	10 High temperature	0.6 (0.2 to 1.0)	-51.4 (-61.0 to -40.4)	-19.8 (-29.5 to -7.9)
11 High temperature	0.7 (0.3 to 1.1)	11 Vitamin A deficiency	0.5 (-1.0 to 1.6)	-83.6 (-93.9 to -63.0)	-81.6 (-112.3 to -45.8)
12 Low temperature	0.5 (0.3 to 0.8)	12 Low temperature	0.2 (0.1 to 0.4)	-76.7 (-84.9 to -71.2)	-39.5 (-44.2 to -34.5)
13 Kidney dysfunction	0.1 (0.1 to 0.2)	13 Kidney dysfunction	0.2 (0.1 to 0.2)	-32.3 (-44.5 to -10.7)	-12.4 (-16.5 to -7.9)
14 Zinc deficiency	0.1 (-0.2 to 0.5)	14 Lead exposure	0.1 (0.0 to 0.1)	-34.3 (-39.9 to -30.3)	-23.9 (-28.9 to -18.4)
15 Lead exposure	0.0 (0.0 to 0.1)	15 High fasting plasma glucose	0.0 (0.0 to 0.0)	-20.9 (-39.5 to 1.2)	7.9 (3.3 to 12.9)
16 High fasting plasma glucose	0.0 (0.0 to 0.0)	16 Zinc deficiency	0.0 (-0.1 to 0.2)	-84.9 (-92.4 to -78.1)	-86.0 (-93.0 to -79.8)
17 High body-mass index	0.0 (0.0 to 0.0)	17 High body-mass index	0.0 (0.0 to 0.0)	14.6 (-2.3 to 31.0)	15.7 (9.9 to 21.7)
18 Nitrogen dioxide pollution	0.0 (0.0 to 0.0)	18 Nitrogen dioxide pollution	0.0 (0.0 to 0.0)	-27.3 (-56.4 to -14.4)	-30.4 (-60.9 to -18.8)
19 High alcohol use	0.0 (0.0 to 0.0)	19 High alcohol use	0.0 (0.0 to 0.0)	1.0 (-8.2 to 10.3)	-25.8 (-32.0 to -20.4)

*For ages under 5, GBD does not estimate 25 level 3 risk factors.

Legend:

Environmental/occupational risks
Behavioural risks
Metabolic risks

Figure S2b. Leading 25* Level 3 risk factors for ages 5-14 years by attributable DALYs, percentage of total DALYs (2000 and 2021), and percentage change in attributable DALY counts and age-standardised DALY rates from 2000 to 2021.

DALY = disability-adjusted life-year.

Leading risks 2000	Percent DALYs 2000	Leading risks 2021	Percent DALYs 2021	Percent change number of DALYs 2000-2021	Percent change age-standardised rate of DALYs 2000-2021
1 Iron deficiency	4.5 (3.4 to 5.8)	1 Iron deficiency	5.8 (4.4 to 7.4)	-0.1 (-8.2 to 9.2)	-18.1 (-21.2 to -15.2)
2 Unsafe water source	4.1 (2.0 to 6.1)	2 Unsafe water source	2.9 (1.5 to 4.3)	-45.5 (-58.4 to -31.1)	-66.3 (-72.0 to -60.2)
3 Unsafe sanitation	3.5 (2.3 to 4.8)	3 Low birth weight and short gestation	2.7 (2.1 to 3.2)	27.9 (21.9 to 33.7)	-33.0 (-41.6 to -22.8)
4 No access to handwashing facility	2.0 (-0.3 to 4.1)	4 Unsafe sanitation	2.2 (1.6 to 3.0)	-51.3 (-62.9 to -39.4)	-69.2 (-74.4 to -63.2)
5 Particulate matter pollution	1.8 (0.3 to 2.9)	5 No access to handwashing facility	1.3 (-0.2 to 2.7)	-48.2 (-60.4 to -36.0)	-65.7 (-73.4 to -57.8)
6 Low birth weight and short gestation	1.6 (1.3 to 2.0)	6 Particulate matter pollution	1.1 (0.2 to 1.9)	-50.9 (-57.8 to -43.4)	-41.9 (-47.2 to -35.6)
7 Child growth failure	1.1 (0.9 to 1.4)	7 Bullying victimization	0.7 (0.3 to 1.3)	14.7 (9.0 to 20.5)	12.9 (7.2 to 20.4)
8 High temperature	0.6 (0.4 to 0.8)	8 Kidney dysfunction	0.6 (0.5 to 0.7)	-12.7 (-21.4 to 2.1)	-12.4 (-16.5 to -7.9)
9 Kidney dysfunction	0.5 (0.4 to 0.6)	9 Child growth failure	0.6 (0.5 to 0.7)	-61.9 (-69.2 to -54.1)	-71.5 (-78.8 to -64.4)
10 Secondhand smoke	0.5 (0.2 to 0.9)	10 High temperature	0.5 (0.3 to 0.7)	-35.6 (-43.9 to -26.3)	-19.8 (-29.5 to -7.9)
11 Vitamin A deficiency	0.5 (0.3 to 0.6)	11 Lead exposure	0.4 (0.2 to 0.8)	-23.9 (-30.0 to -19.2)	-23.9 (-28.9 to -18.4)
12 Bullying victimization	0.5 (0.2 to 0.8)	12 Vitamin A deficiency	0.4 (0.3 to 0.5)	-37.2 (-45.7 to -25.9)	-81.6 (-112.3 to -45.8)
13 Lead exposure	0.5 (0.2 to 0.8)	13 Unsafe sex	0.3 (0.3 to 0.4)	41.1 (22.1 to 63.4)	-52.4 (-58.9 to -42.3)
14 High fasting plasma glucose	0.2 (0.2 to 0.2)	14 Secondhand smoke	0.3 (0.1 to 0.5)	-57.3 (-61.8 to -52.1)	-45.3 (-48.9 to -40.3)
15 Unsafe sex	0.2 (0.2 to 0.2)	15 High fasting plasma glucose	0.2 (0.2 to 0.3)	-10.3 (-22.2 to 0.3)	7.9 (3.3 to 12.9)
16 High alcohol use	0.1 (0.1 to 0.2)	16 High body-mass index	0.2 (0.1 to 0.4)	52.9 (41.6 to 64.7)	15.7 (9.9 to 21.7)
17 High body-mass index	0.1 (0.0 to 0.2)	17 High alcohol use	0.1 (0.1 to 0.2)	-3.5 (-12.3 to 5.9)	-25.8 (-32.0 to -20.4)
18 Nitrogen dioxide pollution	0.1 (-0.1 to 0.3)	18 Nitrogen dioxide pollution	0.1 (-0.1 to 0.4)	-18.8 (-54.5 to -5.6)	-30.4 (-60.9 to -18.8)
19 Childhood sexual abuse	0.0 (0.0 to 0.0)	19 Childhood sexual abuse	0.0 (0.0 to 0.1)	55.9 (29.8 to 80.3)	-16.0 (-23.4 to -7.1)
20 Drug use	0.0 (0.0 to 0.0)	20 Drug use	0.0 (0.0 to 0.0)	-2.5 (-12.1 to 3.7)	-4.6 (-10.1 to 0.8)
21 Low temperature	-0.8 (-1.0 to -0.6)	21 Low temperature	-0.4 (-0.5 to -0.3)	-62.4 (-66.1 to -58.3)	-39.5 (-44.2 to -34.5)

*For ages 5-14 years, GBD does not estimate 25 level 3 risk factors.

Legend:

Environmental/occupational risks
Behavioural risks
Metabolic risks

Figure S2c. Leading 25 Level 3 risk factors for ages 15-49 years by attributable DALYs, percentage of total DALYs (2000 and 2021), and percentage change in attributable DALY counts and age-standardised DALY rates from 2000 to 2021.

DALY = disability-adjusted life-year.

Leading risks 2000	Percent DALYs 2000	Leading risks 2021	Percent DALYs 2021	Percent change number of DALYs 2000-2021	Percent change age-standardised rate of DALYs 2000-2021
1 Unsafe sex	7.2 (5.6 to 9.2)	1 High alcohol use	3.8 (3.0 to 4.6)	-6.7 (-13.0 to -0.6)	-25.8 (-32.0 to -20.4)
2 Occupational injuries	4.6 (4.2 to 5.0)	2 Unsafe sex	3.6 (3.1 to 4.2)	-44.3 (-52.4 to -31.3)	-52.4 (-58.9 to -42.3)
3 High alcohol use	4.5 (3.5 to 5.9)	3 High body-mass index	3.2 (1.4 to 4.9)	75.2 (64.1 to 86.9)	15.7 (9.9 to 21.7)
4 Smoking	4.4 (3.5 to 5.2)	4 Smoking	3.1 (2.6 to 3.8)	-19.3 (-24.7 to -13.9)	-34.8 (-39.2 to -29.7)
5 Particulate matter pollution	3.3 (2.7 to 3.9)	5 Occupational injuries	2.9 (2.7 to 3.2)	-28.9 (-33.7 to -24.2)	-43.6 (-47.5 to -39.8)
6 High systolic blood pressure	2.7 (2.1 to 3.4)	6 High systolic blood pressure	2.8 (2.2 to 3.5)	14.6 (5.9 to 25.0)	-24.3 (-28.4 to -20.0)
7 Drug use	2.1 (1.9 to 2.4)	7 Particulate matter pollution	2.8 (2.2 to 3.3)	-6.6 (-13.7 to 1.1)	-41.9 (-47.2 to -35.6)
8 High LDL cholesterol	2.1 (1.5 to 2.6)	8 High fasting plasma glucose	2.6 (2.4 to 2.9)	67.1 (57.5 to 76.4)	7.9 (3.3 to 12.9)
9 Iron deficiency	2.1 (1.6 to 2.6)	9 Drug use	2.2 (1.9 to 2.5)	16.7 (10.3 to 23.0)	-4.6 (-10.1 to 0.8)
10 High body-mass index	2.0 (0.9 to 3.2)	10 High LDL cholesterol	2.1 (1.5 to 2.6)	10.7 (3.9 to 17.7)	-26.1 (-29.6 to -22.4)
11 High fasting plasma glucose	1.8 (1.6 to 1.9)	11 Kidney dysfunction	1.8 (1.6 to 2.0)	24.9 (17.0 to 32.9)	-12.4 (-16.5 to -7.9)
12 Kidney dysfunction	1.6 (1.4 to 1.8)	12 Iron deficiency	1.8 (1.4 to 2.2)	-3.9 (-9.6 to 1.4)	-18.1 (-21.2 to -15.2)
13 Diet low in fruits	1.3 (0.4 to 2.0)	13 Diet low in fruits	1.2 (0.4 to 1.9)	3.8 (-2.5 to 12.1)	-26.6 (-30.9 to -20.5)
14 Unsafe water source	1.1 (0.6 to 1.7)	14 Occupational ergonomic factors	1.0 (0.8 to 1.3)	12.5 (9.1 to 16.1)	-12.9 (-15.7 to -10.0)
15 Occupational ergonomic factors	1.0 (0.8 to 1.3)	15 Diet low in whole grains	1.0 (0.5 to 1.5)	12.3 (4.9 to 19.0)	-23.3 (-26.9 to -19.5)
16 Diet low in whole grains	1.0 (0.5 to 1.4)	16 Low birth weight and short gestation	0.8 (0.7 to 1.0)	63.2 (55.9 to 70.6)	-33.0 (-41.6 to -22.8)
17 Intimate partner violence	1.0 (0.6 to 1.3)	17 Unsafe water source	0.7 (0.4 to 1.1)	-29.1 (-41.9 to -14.3)	-66.3 (-72.0 to -60.2)
18 Unsafe sanitation	1.0 (0.6 to 1.5)	18 Secondhand smoke	0.7 (0.4 to 1.0)	-9.3 (-16.1 to -3.1)	-45.3 (-48.9 to -40.3)
19 Secondhand smoke	0.8 (0.5 to 1.2)	19 Intimate partner violence	0.6 (0.4 to 0.9)	-29.8 (-48.5 to -11.8)	-41.5 (-57.5 to -27.4)
20 Diet low in fiber	0.8 (0.2 to 1.2)	20 Bullying victimization	0.6 (0.3 to 1.1)	35.6 (28.2 to 45.8)	12.9 (7.2 to 20.4)
21 Lead exposure	0.6 (0.1 to 1.2)	21 Diet low in fiber	0.6 (0.2 to 0.9)	-13.7 (-21.3 to -3.0)	-39.8 (-43.9 to -34.3)
22 Diet high in sodium	0.6 (0.2 to 1.5)	22 Unsafe sanitation	0.5 (0.4 to 0.8)	-37.3 (-48.3 to -24.3)	-69.2 (-74.4 to -63.2)
23 Diet low in seafood omega-3 fatty acids	0.6 (0.1 to 0.9)	23 Diet low in vegetables	0.5 (0.3 to 0.7)	9.0 (0.4 to 20.5)	-28.5 (-33.4 to -21.3)
24 Low birth weight and short gestation	0.6 (0.5 to 0.7)	24 Diet low in nuts and seeds	0.5 (0.2 to 0.8)	-1.8 (-9.6 to 5.4)	-34.0 (-37.9 to -30.2)
25 Diet low in nuts and seeds	0.6 (0.2 to 0.9)	25 Diet high in sodium	0.5 (0.1 to 1.3)	-7.8 (-29.7 to 2.9)	-26.8 (-40.9 to -19.1)
26 Diet low in vegetables	0.5 (0.3 to 0.8)	26 Lead exposure	0.5 (0.1 to 0.9)	-13.1 (-19.9 to 13.2)	-23.9 (-28.9 to -18.4)
28 Bullying victimization	0.5 (0.2 to 1.0)	28 Diet low in seafood omega-3 fatty acids	0.5 (0.1 to 0.8)	-9.4 (-17.3 to -2.5)	-39.0 (-42.7 to -35.2)

Legend:

Environmental/occupational risks
Behavioural risks
Metabolic risks

Figure S2d. Leading 25 risk factors for ages 50-69 years by attributable DALYs, percentage of total DALYs (2000 and 2021), and percentage change in attributable DALY counts and age-standardised DALY rates from 2000 to 2021.

DALY = disability-adjusted life-year.

Leading risks 2000	Percent DALYs 2000	Leading risks 2021	Percent DALYs 2021	Percent change number of DALYs 2000-2021	Percent change age-standardised rate of DALYs 2000-2021
1 Smoking	14.5 (12.3 to 16.7)	1 High systolic blood pressure	11.6 (9.6 to 13.5)	33.6 (25.1 to 42.8)	-24.3 (-28.4 to -20.0)
2 High systolic blood pressure	14.3 (11.8 to 16.6)	2 Smoking	10.2 (8.5 to 11.9)	15.6 (6.9 to 25.8)	-34.8 (-39.2 to -29.7)
3 Particulate matter pollution	12.9 (11.3 to 14.6)	3 Particulate matter pollution	8.8 (7.3 to 10.2)	10.9 (2.6 to 21.2)	-41.9 (-47.2 to -35.6)
4 High fasting plasma glucose	7.0 (6.3 to 7.7)	4 High fasting plasma glucose	8.4 (7.5 to 9.3)	96.1 (86.5 to 106.4)	7.9 (3.3 to 12.9)
5 High LDL cholesterol	6.1 (3.9 to 8.3)	5 High body-mass index	7.6 (3.3 to 11.5)	105.6 (94.8 to 116.7)	15.7 (9.9 to 21.7)
6 High body-mass index	6.0 (2.6 to 9.5)	6 High LDL cholesterol	5.0 (3.2 to 6.7)	32.6 (25.7 to 40.0)	-26.1 (-29.6 to -22.4)
7 High alcohol use	4.3 (3.4 to 5.4)	7 Kidney dysfunction	4.1 (3.6 to 4.6)	57.9 (50.1 to 67.2)	-12.4 (-16.5 to -7.9)
8 Kidney dysfunction	4.2 (3.8 to 4.8)	8 High alcohol use	3.5 (2.9 to 4.2)	32.6 (19.7 to 45.0)	-25.8 (-32.0 to -20.4)
9 Diet high in sodium	3.2 (0.9 to 6.7)	9 Diet high in sodium	2.4 (0.6 to 5.3)	26.0 (2.2 to 41.0)	-26.8 (-40.9 to -19.1)
10 Diet low in fruits	3.2 (1.1 to 4.9)	10 Diet low in fruits	2.4 (0.9 to 3.7)	24.8 (17.4 to 34.9)	-26.6 (-30.9 to -20.5)
11 Diet low in whole grains	2.8 (1.2 to 4.2)	11 Diet low in whole grains	2.3 (1.0 to 3.5)	35.3 (28.3 to 43.0)	-23.3 (-26.9 to -19.5)
12 Secondhand smoke	2.3 (1.3 to 3.4)	12 Secondhand smoke	1.7 (0.9 to 2.4)	17.8 (9.0 to 26.9)	-45.3 (-48.9 to -40.3)
13 Lead exposure	2.2 (-0.2 to 4.5)	13 Lead exposure	1.7 (-0.2 to 3.4)	23.4 (14.6 to 33.3)	-23.9 (-28.9 to -18.4)
14 Unsafe sex	1.9 (1.7 to 2.1)	14 Unsafe sex	1.3 (1.1 to 1.4)	10.0 (-3.5 to 27.6)	-52.4 (-58.9 to -42.3)
15 Low temperature	1.8 (1.6 to 2.0)	15 Low temperature	1.2 (1.1 to 1.4)	9.5 (1.8 to 17.8)	-39.5 (-44.2 to -34.5)
16 Diet low in vegetables	1.5 (0.8 to 2.2)	16 Diet low in vegetables	1.1 (0.6 to 1.6)	21.4 (12.8 to 36.6)	-28.5 (-33.4 to -21.3)
17 Diet low in fiber	1.4 (0.4 to 2.2)	17 Diet low in omega-6 polyunsaturated fatty acids	1.0 (-3.2 to 3.7)	37.9 (29.0 to 45.7)	-21.3 (-25.7 to -17.0)
18 Unsafe water source	1.3 (0.6 to 2.2)	18 Diet low in nuts and seeds	0.9 (0.3 to 1.4)	14.5 (6.7 to 22.3)	-34.0 (-37.9 to -30.2)
19 Diet low in seafood omega-3 fatty acids	1.3 (0.3 to 2.2)	19 Diet low in fiber	0.9 (0.3 to 1.4)	5.4 (-4.3 to 18.3)	-39.8 (-43.9 to -34.3)
20 Diet low in nuts and seeds	1.3 (0.4 to 2.0)	20 Diet low in seafood omega-3 fatty acids	0.8 (0.2 to 1.4)	6.8 (-1.6 to 14.5)	-39.0 (-42.7 to -35.2)
21 Diet low in omega-6 polyunsaturated fatty acids	1.2 (-3.9 to 4.5)	21 Drug use	0.8 (0.7 to 0.9)	82.9 (66.6 to 99.6)	-4.6 (-10.1 to 0.8)
22 Occupational injuries	1.2 (1.1 to 1.3)	22 Low physical activity	0.8 (0.3 to 1.2)	67.0 (49.5 to 84.8)	-7.9 (-14.7 to 1.0)
23 Unsafe sanitation	1.1 (0.7 to 1.8)	23 Low bone mineral density	0.8 (0.7 to 0.9)	47.3 (41.8 to 52.7)	-11.9 (-14.9 to -8.9)
24 Occupational particulate matter, gases, and fumes	0.9 (0.7 to 1.1)	24 Occupational injuries	0.7 (0.6 to 0.8)	-3.1 (-12.0 to 5.1)	-43.6 (-47.5 to -39.8)
25 Low bone mineral density	0.9 (0.7 to 1.0)	25 Occupational ergonomic factors	0.7 (0.5 to 0.9)	57.1 (49.9 to 64.3)	-12.9 (-15.7 to -10.0)
27 Low physical activity	0.8 (0.3 to 1.2)	27 Occupational particulate matter, gases, and fumes	0.6 (0.5 to 0.7)	9.7 (0.2 to 20.7)	-33.3 (-39.2 to -27.3)
28 Drug use	0.7 (0.6 to 0.9)	29 Unsafe water source	0.5 (0.2 to 0.8)	-35.4 (-45.9 to -22.8)	-66.3 (-72.0 to -60.2)
29 Occupational ergonomic factors	0.7 (0.5 to 1.0)	36 Unsafe sanitation	0.4 (0.2 to 0.6)	-45.2 (-52.8 to -35.2)	-69.2 (-74.4 to -63.2)

Legend:

Environmental/occupational risks
Behavioural risks
Metabolic risks

Figure S2e. Leading 25 Level 3 risk factors for ages 70+ years by attributable DALYs, percentage of total DALYs (2000 and 2021), and percentage change in attributable DALY counts and age-standardised DALY rates from 2000 to 2021.

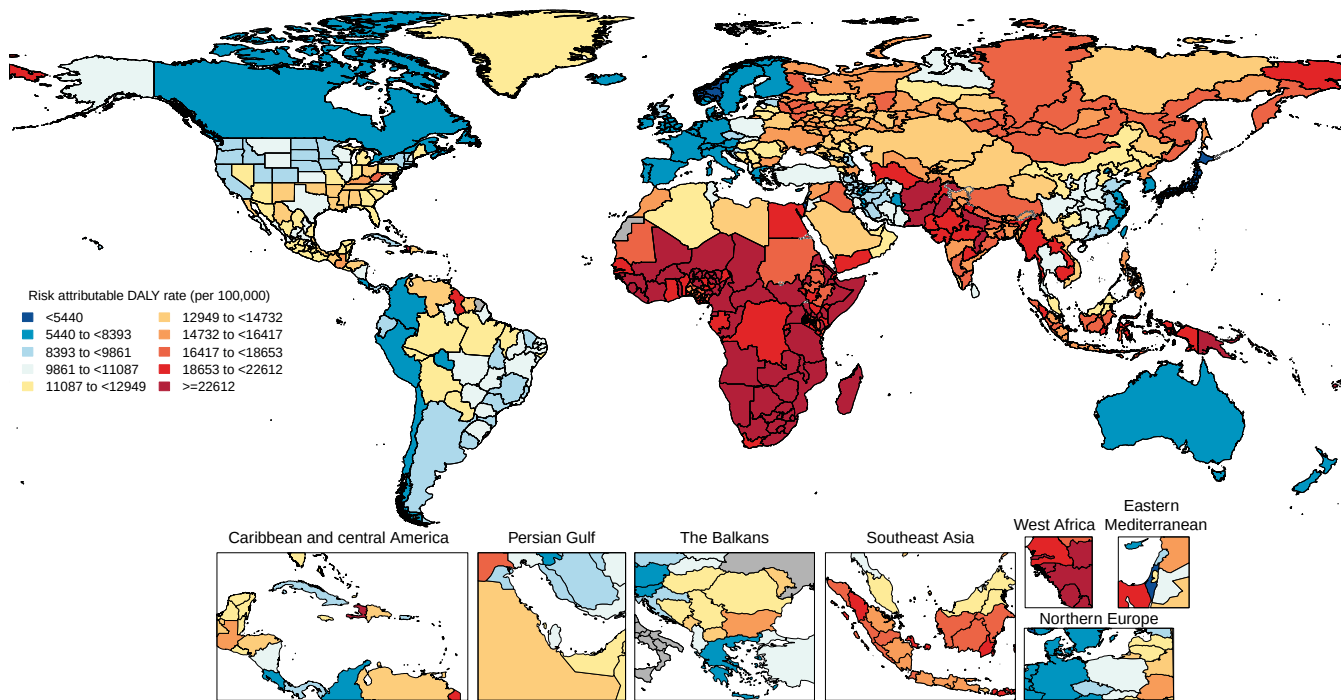
DALY = disability-adjusted life-year.

Leading risks 2000	Percent DALYs 2000	Leading risks 2021	Percent DALYs 2021	Percent change number of DALYs 2000-2021	Percent change age-standardised rate of DALYs 2000-2021
1 High systolic blood pressure	21.2 (17.7 to 24.5)	1 High systolic blood pressure	17.1 (14.4 to 19.7)	40.6 (31.8 to 49.8)	-24.3 (-28.4 to -20.0)
2 Particulate matter pollution	17.1 (14.7 to 19.3)	2 Particulate matter pollution	11.4 (9.4 to 13.5)	16.0 (5.8 to 26.9)	-41.9 (-47.2 to -35.6)
3 Smoking	11.9 (9.8 to 13.9)	3 High fasting plasma glucose	10.2 (8.7 to 11.9)	90.2 (82.4 to 97.4)	7.9 (3.3 to 12.9)
4 High fasting plasma glucose	9.4 (8.0 to 10.8)	4 Smoking	8.7 (7.1 to 10.2)	27.2 (17.4 to 38.2)	-34.8 (-39.2 to -29.7)
5 High LDL cholesterol	6.2 (3.1 to 9.5)	5 High body-mass index	6.2 (2.7 to 9.7)	100.6 (90.7 to 110.5)	15.7 (9.9 to 21.7)
6 Kidney dysfunction	6.1 (5.1 to 7.1)	6 Kidney dysfunction	5.7 (4.9 to 6.5)	62.4 (54.9 to 71.0)	-12.4 (-16.5 to -7.9)
7 High body-mass index	5.4 (2.3 to 8.6)	7 High LDL cholesterol	4.7 (2.3 to 7.3)	31.3 (25.1 to 37.5)	-26.1 (-29.6 to -22.4)
8 Low temperature	3.4 (3.1 to 3.7)	8 Diet high in sodium	2.8 (0.5 to 6.5)	43.7 (13.6 to 61.4)	-26.8 (-40.9 to -19.1)
9 Diet high in sodium	3.3 (0.7 to 7.8)	9 Lead exposure	2.5 (-0.3 to 5.0)	64.2 (52.4 to 77.5)	-23.9 (-28.9 to -18.4)
10 Diet low in fruits	2.6 (1.2 to 3.9)	10 Low temperature	2.4 (2.1 to 2.6)	21.7 (13.9 to 29.8)	-39.5 (-44.2 to -34.5)
11 Lead exposure	2.6 (-0.3 to 5.3)	11 Diet low in fruits	2.1 (1.1 to 3.1)	39.8 (29.2 to 56.5)	-26.6 (-30.9 to -20.5)
12 Diet low in whole grains	2.6 (1.1 to 4.1)	12 Diet low in whole grains	2.0 (0.9 to 3.3)	37.6 (31.8 to 44.6)	-23.3 (-26.9 to -19.5)
13 Secondhand smoke	2.5 (1.3 to 3.7)	13 Secondhand smoke	1.9 (1.0 to 2.8)	29.0 (18.9 to 39.7)	-45.3 (-48.9 to -40.3)
14 High alcohol use	2.0 (1.4 to 2.8)	14 High alcohol use	1.7 (1.2 to 2.3)	47.7 (33.1 to 62.8)	-25.8 (-32.0 to -20.4)
15 Unsafe water source	1.7 (0.8 to 2.7)	15 Low bone mineral density	1.4 (1.2 to 1.6)	86.3 (80.5 to 93.1)	-11.9 (-14.9 to -8.9)
16 Occupational particulate matter, gases, and fumes	1.6 (1.2 to 1.9)	16 Low physical activity	1.3 (0.5 to 2.1)	67.7 (52.1 to 87.0)	-7.9 (-14.7 to 1.0)
17 Diet low in vegetables	1.5 (0.9 to 2.1)	17 Occupational particulate matter, gases, and fumes	1.2 (0.9 to 1.5)	29.1 (15.7 to 42.6)	-33.3 (-39.2 to -27.3)
18 Unsafe sanitation	1.5 (0.9 to 2.3)	18 Diet low in vegetables	1.1 (0.8 to 1.6)	32.6 (22.8 to 46.6)	-28.5 (-33.4 to -21.3)
19 Low physical activity	1.3 (0.5 to 2.2)	19 Diet low in omega-6 polyunsaturated fatty acids	0.9 (-2.3 to 3.3)	45.3 (37.0 to 52.3)	-21.3 (-25.7 to -17.0)
20 Low bone mineral density	1.3 (1.1 to 1.5)	20 Ambient ozone pollution	0.8 (0.2 to 1.4)	56.5 (43.3 to 74.5)	-18.8 (-25.9 to -8.8)
21 Diet low in seafood omega-3 fatty acids	1.2 (0.2 to 2.1)	21 Unsafe water source	0.8 (0.3 to 1.3)	-22.7 (-39.1 to -1.6)	-66.3 (-72.0 to -60.2)
22 Diet low in fiber	1.1 (0.4 to 1.9)	22 Diet low in nuts and seeds	0.8 (0.2 to 1.3)	18.4 (10.5 to 25.2)	-34.0 (-37.9 to -30.2)
23 Diet low in nuts and seeds	1.1 (0.3 to 1.9)	23 Diet low in seafood omega-3 fatty acids	0.7 (0.1 to 1.3)	9.1 (2.5 to 16.0)	-39.0 (-42.7 to -35.2)
24 Diet low in omega-6 polyunsaturated fatty acids	1.0 (-2.8 to 4.1)	24 Diet low in fiber	0.7 (0.3 to 1.1)	8.6 (0.8 to 19.9)	-39.8 (-43.9 to -34.3)
25 Ambient ozone pollution	0.9 (0.2 to 1.6)	25 Diet high in processed meat	0.6 (0.1 to 1.0)	24.0 (7.6 to 32.4)	-30.4 (-41.3 to -24.8)
26 Diet high in processed meat	0.8 (0.2 to 1.3)	27 Unsafe sanitation	0.5 (0.3 to 0.9)	-35.5 (-47.5 to -19.4)	-69.2 (-74.4 to -63.2)

Legend:

Environmental/occupational risks
Behavioural risks
Metabolic risks

Figure S3. Age-standardised DALY rate (per 100 000) for all-causes attributable to (A) all GBD risk-outcome pairs, and (B) GBD risk-outcome pairs, excluding one- and two-star associations, 2021.
(A) All GBD risk-outcome pairs, 2021



(B) GBD risk-outcome pairs, excluding one- and two-star associations, 2021

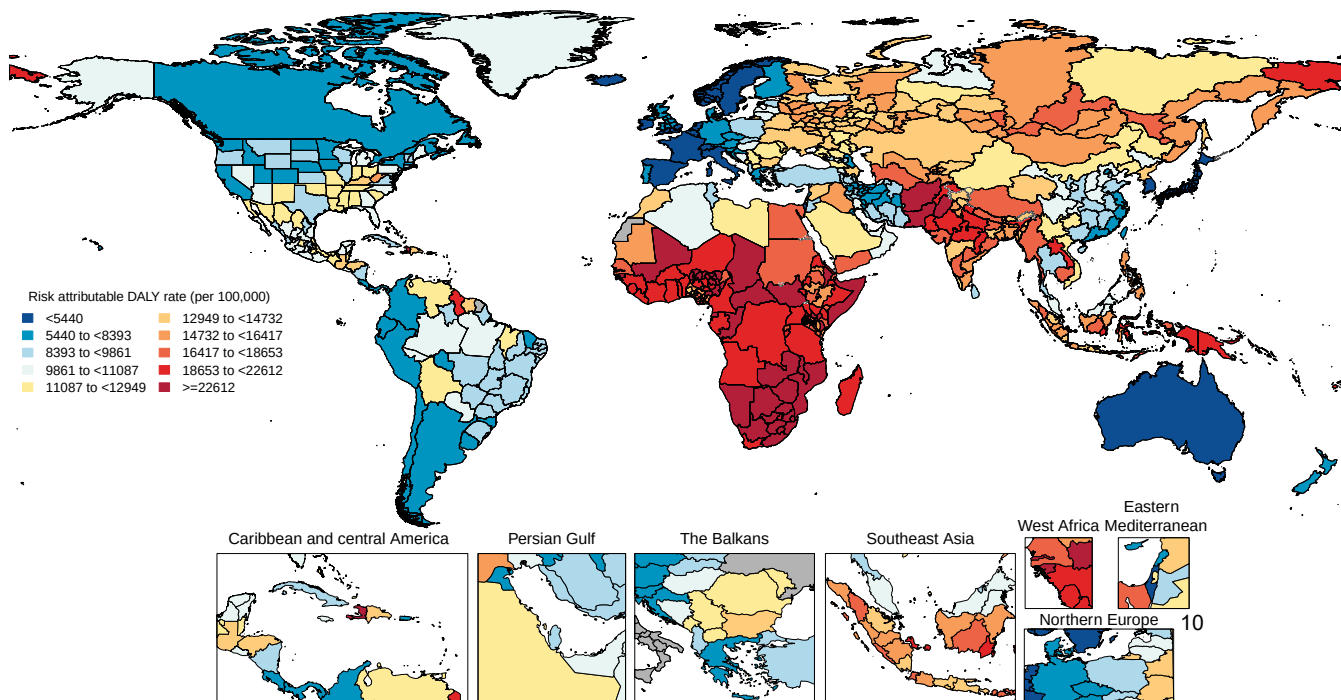


Figure S4. Global DALY counts attributable to risk factors for all GBD risk–outcome pairs (A) versus GBD risk–outcome pairs excluding one- and two-star associations (B), 2021.

