

Global, regional, and national burden of epilepsy, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021

GBD Epilepsy Collaborators*



Summary

Background Epilepsy is one of the most common serious neurological disorders and affects individuals of all ages across the globe. The aim of this study is to provide estimates of the epilepsy burden on the global, regional, and national levels for 1990–2021.

Methods Using well established Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) methodology, we quantified the prevalence of active idiopathic (epilepsy of genetic or unknown origin) and secondary epilepsy (epilepsy due to an underlying abnormality of the brain structure or chemistry), as well as incidence, death, and disability-adjusted life-years (DALYs) by age, sex, and location (globally, 21 GBD regions and seven super-regions, World Bank country income levels, Socio-demographic Index [SDI], and 204 countries) and their trends from 1990 to 2021. Vital registrations and verbal autopsies provided information about deaths, and data on the prevalence and severity of epilepsy, largely came from population representative surveys. All estimates were calculated with 95% uncertainty intervals (UIs).

Findings In 2021, there were 51.7 million (95% UI 44.9–58.9) people with epilepsy (idiopathic and secondary combined) globally, with an age-standardised prevalence of 658 per 100 000 (569–748). Idiopathic epilepsy had an age-standardised prevalence of 307 per 100 000 (235–389) globally, with 24.2 million (18.5–30.7) prevalent cases, and secondary epilepsy had a global age-standardised prevalence of 350 per 100 000 (322–380). In 2021, 0.7% of the population had active epilepsy (0.3% attributed to idiopathic epilepsy and 0.4% to secondary epilepsy), and the age-standardised global prevalence of epilepsy from idiopathic and secondary epilepsy combined increased from 1990 to 2021 by 10.8% (1.1–21.3), mainly due to corresponding changes in secondary epilepsy. However, age-standardised death and DALY rates of idiopathic epilepsy reduced from 1990 to 2021 (decline of 15.8% [8.8–22.8] and 14.5% [4.2–24.2], respectively). There were three-fold to four-fold geographical differences in the burden of active idiopathic epilepsy, with the bulk of the burden residing in low-income to middle-income countries: 82.1% (81.1–83.4) of incident, 80.4% prevalent (79.7–82.7), 84.7% (83.7–85.1) fatal epilepsy, and 87.9% (86.2–89.2) epilepsy DALYs.

Interpretation Although the global trends in idiopathic epilepsy deaths and DALY rates have improved in the preceding decades, in 2021 there were almost 52 million people with active epilepsy (24 million from idiopathic epilepsy and 28 million from secondary epilepsy), with the bulk of the burden (>80%) residing in low-income to middle-income countries. Better treatment and prevention of epilepsy are required, along with further research on risk factors of idiopathic epilepsy, good-quality long-term epilepsy surveillance studies, and exploration of the possible effect of stigma and cultural differences in seeking medical attention for epilepsy.

Funding Bill and Melinda Gates Foundation

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Introduction

Epilepsy is one of the most common serious brain conditions of increasing burden that affects individuals of all ages across the globe,^{1,2} increases risk of premature death up to three times compared with the general population, and is characterised by recurrent, unprovoked seizures due to abnormal excessive or synchronous neuronal activity in the brain.³ The disease imposes a substantial economic, psychosocial, physical, and mental burden for health systems, societies, and affected individuals and their families.^{4,6}

In 2022, epilepsy was identified by the 75th World Health Assembly and WHO as one of the top priorities in prevention and control of non-communicable diseases, and a special intersectoral global action plan on epilepsy and other neurological disorders for 2022–31 was adopted.⁶ To enable evidence-based actions and awareness campaigns, and to strengthen public and private efforts to improve quality of and access to care and reduce the effect of the disease, accurate and regularly updated data on epilepsy incidence, prevalence, death, and disability by age, sex, and location are of crucial importance.² From public

Lancet Public Health 2025;

10: e203–27

Published Online

February 24, 2025

[https://doi.org/10.1016/S2468-2667\(24\)00302-5](https://doi.org/10.1016/S2468-2667(24)00302-5)

*Members listed at the end of the Article

Correspondence to:

Prof Valery L Feigin, Auckland University of Technology, Auckland 0627, New Zealand
valery.feigin@aut.ac.nz

Research in context

Evidence before this study

Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2016 showed that despite a substantial decrease in age-standardised rates of idiopathic epilepsy mortality (24.5% [95% UI 10.8–31.8]) and disability-adjusted life-years (DALYs; 19.4% [9.0–27.7]) from 1990 to 2016, there was a small, although non-substantial, increase in the age-standardised prevalence (6% [–4.0 to 16.7]). The number of survivors with idiopathic epilepsy who remained disabled (as measured by DALYs) had increased: 15.3 million (11.5–19.6) and 11.3 million (8.6–14.1) in 1990 to 25.1 million (19.0–31.4) and 13.1 million (10.0–16.7) in 2016, respectively to prevalence and disability. We searched PubMed for papers from Jan 10, 2016, to Jan 28, 2022, without language restrictions, using the terms (2016/10/01(PDAT) : 3000(PDAT)) AND (“epilepsy”(MeSH Terms) OR “epilepsy, partial, motor”(MeSH Terms) OR “epilepsy, benign neonatal”(MeSH Terms) OR “epilepsy, reflex”(MeSH Terms) OR “myoclonic epilepsy, juvenile”(MeSH Terms) OR “epilepsy, frontal lobe”(MeSH Terms) OR “epilepsy, complex partial”(MeSH Terms) OR “epilepsy, post-traumatic”(MeSH Terms) OR “epilepsy, temporal lobe”(MeSH Terms) OR “epilepsy, absence”(MeSH Terms) OR “epilepsy, tonic-clonic”(MeSH Terms) OR “epilepsies, myoclonic”(MeSH Terms) OR “epilepsies, partial”(MeSH Terms) OR epilep*(Title/Abstract)) AND (inciden*(Title/Abstract) OR prevalen*(Title/Abstract)) NOT (animals(MeSH) NOT humans(MeSH)). Previous studies have often been hampered by incomplete data and lack of differentiation between idiopathic and secondary epilepsy. We aimed to overcome these limitations by integrating comprehensive data from population-representative surveys and vital registrations, and offer a more accurate and detailed picture of the global epilepsy burden.

Added value of this study

This systematic analysis of the GBD 1990–2021 data advances previous GBD estimates on the epilepsy burden and provides the most up-to-date prevalence estimates of not only active idiopathic epilepsy but also active secondary epilepsy on global, regional, and national (204 countries) levels by age and sex for the 1990–2021 period.

Implications of all the available evidence

These data are important for evidence-based implementation of the WHO Resolution WHA73.10 on integrated (multisectoral) response to epilepsy and other neurological disorders for global health policy and resource allocation. By identifying regions with the highest burden of epilepsy, this study provides crucial data for targeted interventions. Policy makers can use these insights to prioritise funding for epilepsy care, improve access to antiseizure medications, and implement training programmes for health-care providers in underserved regions. Additionally, the study underscores the need for ongoing surveillance and research to track progress and adapt strategies as needed. Urgent efforts must be made by all key stakeholders and decision makers to increase awareness and education about epilepsy, eliminate stigmatisation and discrimination associated with epilepsy, better control secondary causes of epilepsy (eg, stroke, CNS zoonotic diseases, and other infectious diseases), improve access to existing treatments in economically disadvantaged countries or populations, and foster workforce development, especially in low-income countries. Further research on risk factors of idiopathic epilepsy, good-quality long-term epilepsy surveillance studies, and exploration of the possible effect of stigma and cultural differences in seeking medical attention for epilepsy is required, in addition to developing new effective and affordable treatments.

health perspectives, it is important to provide burden estimates for idiopathic (genetic) epilepsy separately from and combined with secondary epilepsy (epilepsy syndrome due to an underlying abnormality of the brain structure or chemistry)⁷ for identifying prognosis and opportunities for prevention efforts, which are clearly different between the two types of epileptic seizures. As in the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) report on epilepsies published in 2019,⁸ causes of secondary epilepsies included, among others, stroke, neurodegenerative disorders, infections and inflammatory disorders, brain tumours, traumatic brain injuries, and congenital abnormalities. In this GBD study, these conditions were not considered risks, but rather quantified as sequelae of the underlying causes of secondary epilepsy. Therefore, the causes of secondary epilepsy are more amendable to prevention, but their treatment usually is less successful because they do not address the often severe comorbid disabilities from motor or intellectual impairments. This

information might also be used for projections of the burden of epilepsy, which is also important for health-care planning and resource allocation.⁹ As emphasised by WHO, an understanding of the development of epilepsy after a brain insult or parasitic infection is crucial to the development of secondary prevention strategies.²

Previous epilepsy burden reports of GBD⁸ and GBD-based papers^{10–13} from the 1990–2016 period, and were largely limited to the burden of idiopathic epilepsy. This GBD 2021 study aims to quantify idiopathic and secondary epilepsy prevalence, as well as incidence, death, and disability-adjusted life-years (DALYs) by age, sex, and location (globally, 21 GBD regions and seven super-regions,¹⁴ World Bank country income levels,¹⁵ Socio-demographic Index [SDI],¹⁶ and 204 countries) and their trends from 1990 to 2021. This manuscript was produced as part of the GBD Collaborator Network and in accordance with the GBD Protocol.¹⁷

	Prevalence of idiopathic epilepsy			Prevalence of secondary epilepsy			Prevalence of idiopathic and secondary epilepsy combined		
	2021 age-standardised prevalence per 100 000	2021 counts*	Percentage change in age-standardised rates, 1990–2021	2021 age-standardised prevalence per 100 000	2021 counts*	Percentage change in age-standardised rates, 1990–2021	2021 age-standardised prevalence per 100 000	2021 counts*	Percentage change in age-standardised rates, 1990–2021
Global	307.4 (234.7 to 389.0)	2 421 000 (1 847 000 to 3 067 000)	6.9% (-9.7 to 25.5)	350.5 (322.3 to 380.5)	27 478 000 (25 245 000 to 29 861 000)	14.5% (5.3 to 25.5)	657.8 (569.0 to 748.4)	51 699 000 (44 924 000 to 58 903 000)	10.8% (1.1 to 21.3)
Central Europe, eastern Europe, and central Asia	326.3 (228.0 to 425.3)	1 385 000 (965 000 to 1 806 000)	-1.2% (-19.8 to 20.8)	340.7 (310.4 to 374.2)	1 421 000 (1 275 000 to 1 572 000)	-5.3% (-15.5 to 8.1)	667.0 (557.0 to 777.8)	2 806 000 (2 368 000 to 3 300 000)	-3.3% (-13.8 to 8.6)
Central Asia	449.7 (262.4 to 619.7)	426 000 (248 000 to 589 000)	7.8% (-32.8 to 70.7)	323.7 (294.9 to 355.8)	314 000 (286 000 to 345 000)	16.1% (0.5 to 33.5)	773.4 (593.0 to 947.5)	740 000 (567 000 to 907 000)	11.1% (-15.4 to 47.5)
Armenia	296.5 (95.5 to 496.2)	9 000 (3 000 to 15 000)	-3.1% (-72.1 to 282.9)	421.1 (367.8 to 475.1)	12 000 (11 000 to 14 000)	3.0% (-11.1 to 19.0)	717.5 (499.7 to 953.4)	21 000 (15 000 to 28 000)	0.4% (-34.9 to 58.5)
Azerbaijan	449.6 (133.3 to 745.2)	46 000 (14 000 to 77 000)	7.0% (-71.8 to 315.6)	319.2 (288.1 to 354.0)	33 000 (30 000 to 37 000)	33.5% (10.2 to 59.4)	768.8 (450.7 to 1066.5)	79 000 (47 000 to 110 000)	16.6% (-39.3 to 137.2)
Georgia	357.5 (110.3 to 573.4)	13 000 (4 000 to 21 000)	-15.5% (-77.4 to 210.2)	392.0 (355.8 to 433.0)	15 000 (13 000 to 16 000)	8.2% (-4.5 to 23.3)	749.5 (494.7 to 973.4)	28 000 (18 000 to 36 000)	-4.6% (-44.4 to 69.5)
Kazakhstan	475.8 (136.7 to 769.9)	90 000 (26 000 to 145 000)	9.0% (-72.4 to 304.0)	349.1 (312.5 to 396.4)	67 000 (59 000 to 76 000)	1.7% (-11.7 to 18.3)	824.9 (474.7 to 1112.7)	156 000 (90 000 to 210 000)	5.8% (-43.7 to 98.9)
Kyrgyzstan	416.9 (112.5 to 660.2)	28 000 (8 000 to 45 000)	-9.4% (-78.6 to 329.7)	320.3 (289.9 to 352.2)	23 000 (21 000 to 25 000)	28.6% (6.3 to 56.2)	737.2 (433.4 to 987.6)	51 000 (31 000 to 69 000)	4.0% (-48.0 to 129.9)
Mongolia	403.0 (82.2 to 672.8)	13 000 (3 000 to 22 000)	23.9% (-71.9 to 472.3)	439.9 (388.8 to 493.5)	15 000 (13 000 to 16 000)	40.3% (24.7 to 57.4)	842.2 (528.6 to 1113.5)	28 000 (18 000 to 37 000)	31.9% (-25.7 to 139.5)
Tajikistan	417.8 (113.0 to 698.8)	41 000 (11 000 to 69 000)	-18.3% (-78.0 to 213.4)	327.6 (292.8 to 363.4)	36 000 (32 000 to 39 000)	36.5% (14.4 to 60.9)	745.4 (445.2 to 1032.5)	77 000 (47 000 to 106 000)	-0.8% (-46.7 to 110.3)
Turkmenistan	459.8 (115.9 to 748.7)	24 000 (6 000 to 39 000)	18.5% (-70.9 to 300.8)	266.8 (239.1 to 296.4)	14 000 (13 000 to 16 000)	46.8% (18.7 to 80.2)	726.6 (374.9 to 1012.0)	38 000 (20 000 to 53 000)	27.5% (-38.8 to 165.9)
Uzbekistan	479.2 (142.1 to 765.4)	162 000 (48 000 to 261 000)	19.8% (-65.0 to 421.7)	281.3 (253.6 to 311.4)	100 000 (90 000 to 110 000)	37.1% (11.8 to 66.1)	760.5 (423.6 to 1045.6)	262 000 (148 000 to 359 000)	25.7% (-39.2 to 170.9)
Central Europe	387.9 (266.4 to 516.7)	469 000 (319 000 to 622 000)	1.0% (-24.5 to 36.9)	408.9 (372.0 to 451.6)	478 000 (431 000 to 534 000)	-4.6% (-14.8 to 8.4)	796.8 (655.6 to 937.0)	948 000 (787 000 to 1 126 000)	-1.9% (-14.6 to 14.1)
Albania	437.1 (113.6 to 705.2)	12 000 (3 000 to 19 000)	2.5% (-74.1 to 259.8)	372.3 (324.8 to 424.3)	9 000 (8 000 to 10 000)	-0.1% (-17.5 to 21.1)	809.4 (490.0 to 1 087.1)	21 000 (12 000 to 28 000)	1.3% (-43.4 to 81.9)
Bosnia and Herzegovina	379.1 (107.0 to 617.1)	13 000 (4 000 to 21 000)	16.2% (-70.4 to 325.8)	519.8 (458.2 to 580.7)	17 000 (15 000 to 19 000)	-5.3% (-11.9 to 2.3)	898.8 (614.2 to 1 157.1)	30 000 (20 000 to 38 000)	2.7% (-34.0 to 51.7)
Bulgaria	429.1 (118.8 to 682.0)	30 000 (8 000 to 47 000)	6.3% (-69.9 to 254.0)	383.1 (335.6 to 434.4)	22 000 (19 000 to 25 000)	-0.6% (-18.1 to 27.1)	812.1 (499.4 to 1 073.1)	52 000 (30 000 to 69 000)	3.0% (-38.5 to 75.9)
Croatia	443.8 (122.6 to 705.1)	20 000 (6 000 to 32 000)	-17.0% (-78.2 to 221.2)	456.7 (402.8 to 521.3)	20 000 (18 000 to 24 000)	-21.7% (-32.9 to -9.1)	900.5 (579.3 to 1 179.1)	41 000 (26 000 to 54 000)	-19.5% (-51.4 to 33.0)
Czechia	450.3 (126.9 to 694.6)	51 000 (15 000 to 79 000)	1.4% (-71.1 to 231.9)	375.8 (332.9 to 422.1)	35 000 (31 000 to 40 000)	-2.3% (-18.7 to 20.9)	826.0 (507.9 to 1 087.9)	87 000 (51 000 to 115 000)	-0.3% (-42.8 to 67.7)
Hungary	375.0 (118.2 to 588.8)	37 000 (12 000 to 58 000)	-12.6% (-73.7 to 229.6)	486.1 (431.8 to 544.4)	46 000 (41 000 to 53 000)	-12.4% (-23.9 to 3.3)	861.0 (591.0 to 1 105.3)	83 000 (57 000 to 108 000)	-12.5% (-44.3 to 35.9)
Montenegro	333.3 (89.4 to 532.7)	2 000 (1 000 to 3 000)	-4.7% (-73.3 to 249.2)	437.6 (388.5 to 487.1)	3 000 (2 000 to 3 000)	-7.5% (-14.6 to 2.5)	770.8 (523.4 to 998.7)	5 000 (3 000 to 6 000)	-6.3% (-38.0 to 42.7)
North Macedonia	341.9 (96.4 to 539.1)	8 000 (2 000 to 12 000)	-6.0% (-76.2 to 191.6)	464.4 (407.0 to 521.3)	10 000 (9 000 to 11 000)	-4.0% (-15.9 to 15.5)	806.3 (547.2 to 1 028.2)	18 000 (12 000 to 23 000)	-5.3% (-39.4 to 44.7)
Poland	350.7 (236.8 to 458.2)	141 000 (95 000 to 185 000)	18.1% (-14.7 to 59.7)	304.7 (266.5 to 345.8)	129 000 (109 000 to 152 000)	4.0% (-5.3 to 13.4)	655.4 (534.7 to 779.2)	271 000 (220 000 to 323 000)	11.1% (-4.7 to 30.2)

(Table 1 continues on next page)

	Prevalence of idiopathic epilepsy			Prevalence of secondary epilepsy			Prevalence of idiopathic and secondary epilepsy combined		
	2021 age-standardised prevalence per 100 000	2021 counts*	Percentage change in age-standardised rates, 1990-2021	2021 age-standardised prevalence per 100 000	2021 counts*	Percentage change in age-standardised rates, 1990-2021	2021 age-standardised prevalence per 100 000	2021 counts*	Percentage change in age-standardised rates, 1990-2021
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Romania	398.1 (121.7 to 617.6)	78 000 (24 000 to 122 000)	-3.1% (-69.7 to 238.3)	539.9 (482.8 to 609.4)	102 000 (90 000 to 116 000)	2.3% (-12.9 to 21.3)	938.0 (640.1 to 1196.8)	179 000 (124 000 to 230 000)	-0.1% (-34.0 to 57.5)
Serbia	371.2 (109.1 to 567.6)	36 000 (11 000 to 55 000)	-12.8% (-73.9 to 217.2)	434.4 (393.9 to 482.7)	41 000 (36 000 to 46 000)	-8.0% (-20.1 to 6.0)	805.6 (529.5 to 1020.8)	77 000 (50 000 to 97 000)	-10.3% (-44.4 to 44.0)
Slovakia	458.3 (136.9 to 772.4)	27 000 (8 000 to 42 000)	6.2% (-69.1 to 235.9)	519.1 (464.3 to 580.3)	29 000 (26 000 to 33 000)	-14.7% (-23.4 to -5.5)	977.4 (631.9 to 1257.2)	56 000 (35 000 to 73 000)	-6.0% (-40.5 to 46.7)
Slovenia	376.7 (120.6 to 590.9)	8 000 (3 000 to 13 000)	-18.5% (-77.4 to 168.8)	373.0 (319.1 to 430.2)	7 000 (6 000 to 8 000)	0.1% (-17.4 to 26.0)	749.7 (481.6 to 980.0)	15 000 (9 000 to 20 000)	-10.2% (-46.7 to 57.5)
Eastern Europe	226.5 (152.2 to 303.9)	489 000 (333 000 to 658 000)	-15.6% (-36.9 to 10.4)	302.3 (265.4 to 339.1)	629 000 (550 000 to 710 000)	-11.8% (-22.2 to 4.0)	528.8 (425.3 to 623.6)	1 118 000 (919 000 to 1 331 000)	-13.5% (-25.2 to -0.2)
Belarus	234.2 (65.1 to 384.3)	23 000 (6 000 to 37 000)	-25.5% (-78.7 to 161.6)	308.7 (275.5 to 347.3)	29 000 (26 000 to 33 000)	-18.7% (-31.6 to -2.7)	542.9 (361.0 to 700.1)	52 000 (35 000 to 67 000)	-21.8% (-51.5 to 23.7)
Estonia	420.7 (126.8 to 632.4)	6 000 (2 000 to 9 000)	17.4% (-65.4 to 340.7)	425.0 (377.0 to 478.7)	6 000 (5 000 to 7 000)	-6.3% (-14.2 to 2.7)	845.7 (550.0 to 1086.5)	12 000 (8 000 to 15 000)	4.2% (-34.1 to 64.0)
Latvia	362.8 (117.0 to 571.2)	7 000 (2 000 to 12 000)	16.5% (-65.0 to 377.4)	396.8 (348.4 to 446.7)	8 000 (7 000 to 9 000)	1.9% (-8.0 to 16.3)	759.5 (501.2 to 981.0)	15 000 (10 000 to 20 000)	8.4% (-31.0 to 72.4)
Lithuania	389.2 (123.9 to 586.2)	12 000 (4 000 to 18 000)	6.7% (-68.6 to 282.7)	391.4 (348.8 to 437.0)	11 000 (10 000 to 13 000)	-8.1% (-18.5 to 3.6)	780.6 (519.4 to 985.9)	23 000 (15 000 to 29 000)	-1.3% (-40.1 to 58.0)
Moldova	247.5 (76.3 to 407.6)	9 000 (3 000 to 15 000)	-22.5% (-79.0 to 183.2)	353.1 (314.2 to 391.6)	13 000 (11 000 to 14 000)	-13.8% (-25.7 to 0.1)	600.7 (418.8 to 776.8)	22 000 (15 000 to 28 000)	-17.6% (-48.7 to 27.5)
Russia	211.2 (143.6 to 281.8)	321 000 (220 000 to 436 000)	-15.2% (-30.1 to -1.9)	287.3 (246.2 to 327.5)	418 000 (364 000 to 478 000)	-11.1% (-21.1 to 6.0)	498.5 (404.5 to 592.2)	739 000 (609 000 to 891 000)	-12.8% (-21.6 to -2.5)
Ukraine	253.1 (77.6 to 403.7)	111 000 (34 000 to 176 000)	-16.0% (-73.4 to 176.9)	333.8 (297.2 to 369.9)	145 000 (127 000 to 162 000)	-11.1% (-22.6 to 4.1)	586.9 (393.9 to 748.9)	255 000 (175 000 to 328 000)	-13.3% (-43.9 to 31.6)
High income	343.7 (233.4 to 454.9)	4 073 000 (2 740 000 to 5 373 000)	8.9% (-12.4 to 27.7)	295.2 (271.2 to 321.3)	3 116 000 (2 848 000 to 3 406 000)	4.4% (-6.4 to 15.4)	638.9 (524.1 to 757.3)	7 189 000 (5 826 000 to 8 590 000)	6.8% (-4.2 to 17.3)
Australasia	316.1 (123.3 to 491.0)	102 000 (39 000 to 157 000)	-3.6% (-62.1 to 141.4)	248.1 (225.4 to 273.7)	71 000 (64 000 to 78 000)	-15.6% (-23.2 to -6.6)	564.3 (369.3 to 737.3)	172 000 (109 000 to 230 000)	-9.3% (-41.6 to 38.8)
Australia	316.5 (100.8 to 512.0)	85 000 (27 000 to 137 000)	-1.2% (-70.3 to 227.2)	251.9 (227.2 to 278.8)	60 000 (54 000 to 66 000)	-17.2% (-24.9 to -8.0)	568.4 (344.8 to 763.5)	145 000 (86 000 to 198 000)	-9.0% (-47.2 to 53.6)
New Zealand	312.9 (121.1 to 471.4)	16 000 (6 000 to 24 000)	-14.2% (-64.2 to 119.6)	229.5 (206.5 to 254.0)	11 000 (10 000 to 12 000)	-5.5% (-26.8 to 14.0)	542.5 (344.3 to 698.5)	27 000 (17 000 to 35 000)	-10.7% (-42.8 to 47.3)
High-income Asia Pacific	276.7 (168.6 to 384.4)	563 000 (345 000 to 767 000)	5.4% (-28.5 to 49.2)	231.4 (212.5 to 251.5)	394 000 (358 000 to 430 000)	4.5% (-14.2 to 22.8)	508.1 (398.5 to 618.1)	957 000 (735 000 to 1 174 000)	5.0% (-15.6 to 28.9)
Brunei	418.3 (132.5 to 644.5)	2 000 (1 000 to 3 000)	-21.4% (-71.6 to 194.9)	365.5 (333.8 to 399.7)	2 000 (2 000 to 2 000)	-5.9% (-16.6 to 5.8)	783.8 (496.0 to 1023.9)	4 000 (2 000 to 5 000)	-14.8% (-47.5 to 54.9)
Japan	261.6 (169.0 to 352.3)	377 000 (250 000 to 503 000)	11.3% (-7.7 to 31.9)	212.5 (192.0 to 233.9)	225 000 (203 000 to 248 000)	12.6% (-1.4 to 35.8)	474.1 (379.6 to 568.2)	602 000 (473 000 to 730 000)	11.9% (-4.5 to 27.1)
Singapore	271.3 (78.8 to 431.8)	15 000 (4 000 to 24 000)	14.6% (-70.7 to 332.6)	246.2 (225.4 to 268.6)	13 000 (12 000 to 15 000)	1.0% (-10.4 to 14.2)	517.5 (322.8 to 679.6)	29 000 (17 000 to 38 000)	7.7% (-39.0 to 81.0)
South Korea	315.4 (84.6 to 484.7)	169 000 (45 000 to 262 000)	-5.2% (-73.8 to 207.0)	278.4 (252.0 to 306.2)	154 000 (136 000 to 174 000)	-14.7% (-25.0 to -4.4)	593.8 (357.9 to 768.0)	323 000 (197 000 to 424 000)	-9.9% (-49.4 to 47.5)

(Table 1 continues on next page)

	Prevalence of idiopathic epilepsy			Prevalence of secondary epilepsy			Prevalence of idiopathic and secondary epilepsy combined		
	2021 age-standardised prevalence per 100 000	2021 counts*	Percentage change in age-standardised rates, 1990–2021	2021 age-standardised prevalence per 100 000	2021 counts*	Percentage change in age-standardised rates, 1990–2021	2021 age-standardised prevalence per 100 000	2021 counts*	Percentage change in age-standardised rates, 1990–2021
(Continued from previous page)									
High-income North America	334.7 (218.9 to 460.7)	1316 000 (855 000 to 1 780 000)	12.7% (-13.1 to 37.0)	354.6 (319.3 to 392.4)	1 350 000 (1 199 000 to 1 511 000)	3.0% (-4.1 to 10.2)	689.4 (555.4 to 821.8)	2 666 000 (2 152 000 to 3 202 000)	7.5% (-4.8 to 18.6)
Canada	272.3 (167.4 to 430.2)	110 000 (32 000 to 171 000)	3.3% (-66.2 to 214.5)	263.3 (239.6 to 289.1)	89 000 (81 000 to 98 000)	2.3% (-8.4 to 14.0)	535.6 (340.2 to 693.1)	199 000 (121 000 to 261 000)	2.8% (-35.1 to 62.5)
Greenland	554.6 (167.4 to 870.9)	330 (100 to 520)	-10.8% (-73.2 to 209.6)	290.9 (264.5 to 320.9)	150 (140 to 170)	2.4% (-12.2 to 19.4)	845.5 (455.8 to 1167.6)	490 (260 to 680)	-6.7% (-52.6 to 101.9)
USA	341.6 (217.9 to 466.9)	1 205 000 (771 000 to 1 614 000)	13.7% (-13.5 to 37.7)	365.3 (327.5 to 405.1)	1 261 000 (1 113 000 to 1 419 000)	3.4% (-4.3 to 10.6)	706.9 (573.1 to 837.0)	2 466 000 (2 001 000 to 2 953 000)	8.1% (-4.8 to 20.3)
Southern Latin America	339.7 (161.0 to 515.6)	233 000 (113 000 to 355 000)	7.3% (-44.9 to 120.5)	391.4 (356.4 to 425.4)	266 000 (241 000 to 291 000)	3.9% (-5.2 to 14.5)	731.1 (542.5 to 906.6)	499 000 (370 000 to 621 000)	5.4% (-22.6 to 41.4)
Argentina	277.7 (71.5 to 454.7)	127 000 (33 000 to 207 000)	11.9% (-72.5 to 301.6)	366.6 (331.2 to 401.3)	166 000 (149 000 to 183 000)	2.2% (-5.8 to 11.4)	644.4 (435.3 to 830.4)	293 000 (197 000 to 380 000)	6.1% (-30.8 to 57.2)
Chile	478.8 (148.1 to 773.6)	92 000 (29 000 to 149 000)	-0.1% (-74.0 to 254.5)	447.8 (404.6 to 496.1)	87 000 (78 000 to 97 000)	2.8% (-11.1 to 16.1)	926.5 (579.5 to 1 215.7)	179 000 (112 000 to 236 000)	1.3% (-41.2 to 77.8)
Uruguay	394.4 (95.3 to 636.9)	14 000 (3 000 to 23 000)	13.7% (-73.9 to 305.3)	472.9 (334.6 to 414.1)	13 000 (12 000 to 15 000)	7.8% (-5.1 to 21.1)	767.4 (460.9 to 1 017.6)	27 000 (16 000 to 36 000)	10.8% (-38.3 to 90.5)
Western Europe	381.1 (238.1 to 502.5)	1 859 000 (1 139 000 to 2 480 000)	8.3% (-21.3 to 44.3)	258.5 (234.8 to 285.5)	1 035 000 (946 000 to 1 143 000)	1.7% (-10.9 to 15.5)	639.6 (495.8 to 764.1)	2 894 000 (2 197 000 to 3 534 000)	5.5% (-12.4 to 25.1)
Andorra	348.7 (100.7 to 530.1)	310 (90 to 460)	-5.9% (-64.3 to 142.6)	214.0 (193.6 to 236.4)	170 (150 to 190)	-6.8% (-20.2 to 6.4)	562.7 (260 to 630)	470 (260 to 630)	-6.2% (-46.3 to 58.8)
Austria	332.7 (99.5 to 511.7)	31 000 (10 000 to 48 000)	3.4% (-61.0 to 315.7)	401.4 (361.7 to 447.0)	36 000 (32 000 to 41 000)	24.5% (11.5 to 37.7)	734.1 (488.2 to 931.2)	68 000 (45 000 to 86 000)	14.0% (-23.4 to 90.4)
Belgium	425.6 (125.9 to 656.7)	56 000 (16 000 to 85 000)	14.1% (-69.6 to 297.4)	176.9 (160.4 to 196.9)	18 000 (16 000 to 20 000)	12.6% (-1.2 to 28.5)	602.5 (302.3 to 832.2)	74 000 (34 000 to 104 000)	13.7% (-48.6 to 141.4)
Cyprus	287.6 (81.0 to 450.5)	4 000 (1 000 to 6 000)	-5.5% (-74.5 to 267.4)	230.4 (203.7 to 261.8)	3 000 (3 000 to 3 000)	-13.4% (-27.3 to 5.2)	517.9 (305.6 to 690.0)	7 000 (4 000 to 9 000)	-9.2% (-48.2 to 56.4)
Denmark	266.1 (74.9 to 413.4)	17 000 (5 000 to 26 000)	-1.5% (-65.6 to 208.5)	245.0 (218.8 to 277.4)	13 000 (11 000 to 15 000)	-5.3% (-18.7 to 12.0)	511.0 (311.0 to 663.6)	30 000 (17 000 to 40 000)	-3.4% (-38.5 to 56.1)
Finland	336.3 (91.5 to 529.4)	20 000 (6 000 to 32 000)	9.3% (-68.2 to 217.8)	201.5 (183.1 to 222.0)	10 000 (9 000 to 11 000)	-3.5% (-18.3 to 12.3)	537.7 (303.9 to 726.7)	30 000 (16 000 to 42 000)	4.1% (-45.2 to 86.2)
France	426.9 (155.3 to 661.3)	323 000 (119 000 to 501 000)	9.7% (-60.4 to 274.1)	191.0 (172.0 to 213.9)	112 000 (101 000 to 126 000)	-4.3% (-18.5 to 11.4)	617.9 (340.6 to 864.1)	436 000 (230 000 to 617 000)	4.9% (-42.7 to 107.7)
Germany	538.6 (163.0 to 815.6)	548 000 (171 000 to 827 000)	17.9% (-61.8 to 223.9)	349.2 (318.2 to 387.3)	256 000 (233 000 to 283 000)	-2.4% (-12.1 to 8.0)	887.8 (521.3 to 1 159.8)	804 000 (432 000 to 1 083 000)	9.0% (-36.6 to 88.5)
Greece	267.3 (68.7 to 422.8)	28 000 (7 000 to 44 000)	0.1% (-74.9 to 218.2)	321.5 (290.3 to 352.2)	32 000 (29 000 to 37 000)	30.3% (13.9 to 48.5)	588.8 (390.2 to 752.6)	61 000 (40 000 to 78 000)	14.6% (-30.4 to 85.5)
Iceland	308.1 (88.0 to 484.8)	1 000 (0 to 2 000)	11.0% (-66.5 to 250.3)	261.1 (237.5 to 285.6)	860 (780 to 940)	-3.1% (-15.1 to 9.8)	569.2 (346.5 to 749.5)	2 000 (1 000 to 3 000)	4.1% (-35.3 to 70.9)
Ireland	382.9 (113.0 to 589.7)	20 000 (6 000 to 30 000)	13.7% (-64.2 to 302.2)	222.3 (200.7 to 246.5)	10 000 (9 000 to 11 000)	-3.8% (-17.4 to 12.2)	605.2 (344.7 to 814.6)	30 000 (16 000 to 41 000)	6.6% (-41.6 to 93.7)
Israel	307.6 (105.5 to 466.1)	30 000 (10 000 to 46 000)	14.7% (-60.3 to 314.5)	291.5 (262.9 to 321.9)	28 000 (25 000 to 31 000)	-6.7% (-16.1 to 3.1)	599.1 (393.0 to 770.7)	59 000 (38 000 to 75 000)	3.2% (-34.0 to 60.4)
Italy	253.4 (174.1 to 344.3)	172 000 (116 000 to 234 000)	-3.7% (-28.3 to 25.3)	211.6 (192.2 to 234.5)	109 000 (99 000 to 121 000)	-4.7% (-25.7 to 16.0)	465.0 (377.0 to 561.2)	281 000 (224 000 to 344 000)	-4.2% (-20.6 to 13.7)

(Table 1 continues on next page)