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Global, regional, and national caries of permanent teeth incidence, prevalence, and disability-adjusted life years, 1990-2021: analysis for the global burden of disease study

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Abstract

Objectives This study aims to analyze the global, regional, and national incidence, prevalence, and disability-adjusted life years (DALYs) related to caries of permanent teeth from 1990 to 2021, as part of the Global Burden of Disease Study (GBD).

Study design and methods Data on incidence, prevalence, and DALYs were extracted and analyzed for various demographic and regional categories. Age-standardized incidence rates (ASIR), age-standardized prevalence rates (ASPR), and age-standardized DALY rates (ASDAR) were calculated. Temporal trends and associations with sociodemographic index (SDI) were also examined.

Results In 2021, there were approximately 2.37 billion cases of caries of permanent teeth, with an ASIR of 29,777.03 per 100,000 population. The prevalence was around 2.24 billion, with an ASPR of 27,543.34 per 100,000. Females exhibited a higher disease burden than males, and the burden increased with age, peaking in the 20–24 age group. Regions with lower SDI showed higher ASIRs, while the highest burden was noted in Tropical Latin America. Significant increases in disease burden were observed from 1990 to 2021, particularly in China and Colombia, while Japan showed a decrease. The Bayesian age-period-cohort (BAPC) predictions indicate that the burden of caries of permanent teeth will continue to increase year by year.

Conclusion The burden of caries of permanent teeth varies significantly across regions and demographics, with higher rates in lower SDI areas. The findings underscore the importance of targeted interventions and resource allocation in high-burden regions to improve dental health outcomes.

Keywords Caries of permanent teeth, Global burden of disease, Incidence, Prevalence, DALYs, Socioeconomic factors

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Introduction

Caries of permanent teeth, a highly prevalent chronic disease, poses a substantial burden on global health and well-being. Understanding its temporal trends, geographical variations, and disease burden in terms of incidence, prevalence, and disability-adjusted life years (DALYs) is critical for informing public health policies and interventions aimed at mitigating its impact. Previous research, such as the Global Burden of Oral Diseases studies, has underscored the significant contribution of dental caries to the overall oral health burden worldwide [1, 2]. However, a comprehensive and updated analysis encompassing recent data spanning three decades is lacking, which limits our understanding of the evolving caries landscape and hinders the development of effective strategies to address this pressing health issue.

Existing studies often lack detailed temporal trend analyses, geographical comparisons at fine resolutions, and in-depth explorations of the drivers behind observed patterns. Furthermore, oral diseases, including dental caries, have been increasingly recognized as integral to overall health and well-being, with links to various systemic conditions such as cardiovascular disease, diabetes, and respiratory illnesses [3, 4]. Therefore, addressing the burden of caries of permanent teeth is not merely an oral health concern but a crucial aspect of promoting overall population health.

Notably, the distribution of caries burden is heterogeneous, with notable disparities across geographical regions and socioeconomic strata. Low- and middle-income countries often bear a disproportionately higher burden due to limited access to oral healthcare services, poor oral hygiene practices, and unhealthy diets [5, 6]. This study aims to delve deeper into these issues, highlighting these disparities and their implications for global health equity.

To fill this knowledge gap, we leverage the rigorous methodology and extensive data sources of the Global Burden of Disease (GBD) framework. By utilizing GBD estimates, this study seeks to: (1) quantify the incidence, prevalence, and DALYs of caries of permanent teeth globally, regionally, and nationally; (2) analyze temporal trends in these metrics over the past three decades; and (3) identify key drivers of the observed patterns and variations, specifically focusing on sex, age, socioeconomic factors, and geographic location. By addressing these specific deficiencies in the existing research, this study aims to contribute significantly to our understanding of dental caries and its impact on global health.

Building on this rationale, the present study aimed to analyze the global, regional, and national trends in the incidence, prevalence, and DALYs of caries of permanent teeth from 1990 to 2021, utilizing the comprehensive

data and methodology of the GBD 2021 study. By identifying key trends and drivers, we hope to inform more targeted and effective strategies to reduce the burden of dental caries globally, thereby promoting overall population health and equity.

Methods

This retrospective study analyzed the burden of caries of permanent teeth across 204 countries and territories from 1990 to 2021. Below, we detail the data sources, estimation frameworks, and statistical approaches used to address the study's objectives.

Data sources and estimation methods

Data for this study were sourced from the GBD 2021 database, which integrates diverse datasets including cancer registries, population surveys, published literature, and surveillance systems. The GBD 2021 framework harmonizes these data through a multi-step process:

1. **Data Harmonization:** Definitions, classifications, and measurement units were aligned across sources to ensure consistency in health outcome reporting. Disease categories were mapped to a common taxonomy, minimizing discrepancies in case definitions.
2. **Population Standardization:** Age-standardized rates were applied to account for demographic variations, enabling equitable comparisons across populations.
3. **Geographical and Temporal Adjustment:** Data were aggregated to common geographical resolutions (e.g., national levels) and adjusted for temporal trends to reduce confounding from regional or period-specific biases.

To address missing data, the GBD 2021 employed:

1. **Imputation Techniques:** Multiple imputation and regression-based methods estimated missing values using covariate patterns and temporal trends.
2. **Data Extrapolation:** Subnational gaps were filled using hierarchical models that borrowed strength from analogous regions or higher aggregation levels.

The GBD employs a systematic and standardized approach to estimate health outcomes, including the use of DisMod-MR 2.1, a Bayesian meta-regression tool, to ensure consistency and comparability across locations and time [7].

To address data limitations, particularly the reliance on secondary sources and the lack of granular geographic information for large countries like China, DisMod-MR 2.1 incorporates a series of methods to handle data sparsity and uncertainty. These include the use of hierarchical

models, which borrow strength across related geographical units or time points, and the application of smoothing techniques to produce plausible estimates even in areas with limited data [8]. However, it is acknowledged that these methods may introduce some biases, and the resulting estimates should be interpreted with caution, particularly in regions where data scarcity is a concern.

The GBD 2021 database provided data for 204 countries and territories. For geographical analysis, the 204 countries and territories were segmented into 54 GBD regions. Moreover, these same countries were categorized by socioeconomic development status into five Sociodemographic Index (SDI) levels: low, low-middle, middle, high-middle, and high. The methodological framework of the GBD 2021 has been described in prior studies [9, 10]. All data, along with their respective 95% uncertainty intervals (UIs), were derived from various sources, including cancer registries, published studies, surveillance data, census data, and other relevant sources [11]. The estimates were tailored to specific locations, sexes, and age groups. The DALYs were calculated by aggregating the Years lived with disability (YLDs) and Years of Life Lost (YLLs) for each respective cause [12].

For regions lacking longitudinal data, incidence rates were estimated via:

1. Cross-Sectional Studies: Prevalence data were converted to incidence estimates using disease duration and mortality rates.
2. Expert Elicitation: Field experts provided contextual insights for underdocumented outcomes.
3. Spatial–Temporal Modeling: Bayesian frameworks integrated sparse data with covariates (such as socioeconomic indicators) to generate plausible estimates.

Statistical analyses

The statistical analyses conducted in this study were comprehensive and rigorous. First, in 2021, incidence, prevalence, and DALYs of caries of permanent teeth, along with corresponding Age-Standardized Rates (ASRs), were assessed globally and by subtypes such as age, sex, SDI regions, GBD regions, and countries. Second, a thorough analysis was carried out to investigate the temporal trends of this disease burden globally and by subtype from 1990 to 2021. A linear regression model was used to calculate the estimated annual percentage change (EAPC).

In addition, the relationship between EAPCs, caries of permanent teeth-related ASRs in 1990, and Human Development Index (HDI) in 2021 was assessed. Because these three factors were not normally distributed, the Spearman correlation analysis was used to investigate

their associations. Furthermore, a hierarchical cluster analysis was carried out, using the EAPC values, to analyze the changing patterns of disease burden across various GBD regions and find those with comparable tendencies. As a result, all 54 GBD locations were divided into four unique categories: substantial rise, slight increase, steady or small drop, and significant decrease.

Moreover, we used the Bayesian Age-Period-Cohort (BAPC) model, together with nested Laplace approximations, to forecast the future illness burden from 2022 to 2046. The BAPC model was chosen for our forecasting analysis due to its ability to account for complex dependencies between age, period, and cohort effects, which are often present in epidemiological data. This model allows for the simultaneous estimation of these effects, providing a more nuanced understanding of trends and patterns over time. Additionally, the Bayesian framework enables the incorporation of prior information and the quantification of uncertainty in our estimates, which is crucial for making informed decisions in public health policy and practice.

Decomposition analyses were used to look deeper into the mechanisms driving changes in the illness burden between 1990 and 2021, with an emphasis on age structure, population size, and epidemiological alterations. Finally, frontier analysis was used to determine the relationship between disease burden and socioeconomic development. By developing a nonlinear frontier, we were able to determine the lowest possible burden based on a country's or region's current development state. Non-parametric data envelope analysis was used to facilitate this research, with earlier studies providing methodological direction. The effective difference, which represents the gap between the observed DALY rate and the frontier, represents the potential health improvements that could be realized at the current level of development.

Statistical significance was determined at a P-value of less than 0.05. We used R software (version 4.0.2) to generate, collate, and analyze the database.

Results

The disease burden attributable to caries of permanent teeth in 2021

The disease burden attributable to caries of permanent teeth in 2021 is significant. Specifically, the number of incidence cases reached 2,370,414,032, with a range of 2,099,098,156 to 2,661,346,388, corresponding to an age-standardized incidence rate (ASIR) of 29,777.03 per 100,000 population, ranging from 26,310.27 to 33,490.91. Similarly, the number of prevalence cases amounted to 2,242,874,758, ranging from 1,957,579,677 to 2,599,622,169, with an age-standardized prevalence rate (ASPR) of 27,543.34 per 100,000 population, varying

between 23,976 and 32,018.09. Additionally, the number of DALYs cases was 2,198,064, with a range of 988,183 to 4,174,725, corresponding to an age-standardized DALY rate (ASDAR) of 27.02 per 100,000 population, ranging from 12.1 to 51.36 (Tables 1, 2 and 3).

Gender differences in the disease burden were observed, with females experiencing slightly higher prevalence and DALYs than males, although incidence rates were comparable between sexes (Figure S1, Tables 1, 2 and 3).

Figure 2 depicts the incidence, prevalence, and DALYs for each age group in 2021. The disease burden initially rises with age, peaking in the 20–24 age range, before declining (Figure S2, Tables 1, 2 and 3).

At the SDI region level, the low-middle SDI region exhibited the highest ASIR at 31,182.47, with a range of 27,260.31 to 35,209.32, whereas the high-middle SDI regions had the lowest ASIRs at 28,068.89, ranging from 24,352.04 to 31,973.91. Notably, ASPR and ASDAR values decreased with increasing SDI region levels, indicating a higher disease burden in less developed regions (Figure S3, Tables 1, 2 and 3). Intriguingly, the age-standardized rates for incidence, prevalence, and DALYs displayed a "W-shaped" relationship with SDI, with peak rates observed when the SDI was approximately 0.75, as depicted in Fig. 1.

Regionally, Tropical Latin America had the highest caries of permanent teeth-related ASIR, while East Asia had the lowest, across the 54 GBD regions. Andean Latin America ranked highest in ASPR and ASDAR, with High-income Asia Pacific ranking lowest for prevalence and DALYs (Figure S4, Tables 1, 2 and 3).

At the country level, Cambodia had the highest ASIR, Madagascar had the highest ASPR, and Serbia had the highest ASDAR per 100,000 population in 2021. In contrast, Taiwan (Province of China) had the lowest ASIR, Japan had the lowest ASPR and ASDAR. India reported the highest absolute number of incidence, prevalence, and DALYs cases, while Tokelau had the lowest. These findings highlight the substantial global variation in the disease burden of caries of permanent teeth (Fig. 2, Figure S5, Tables 1, 2 and 3).

Temporal trend for caries of permanent teeth-related disease burden from 1990 to 2021

The number of incidence cases of caries in permanent teeth globally increased from 1990 to 2021, despite a slight decline in the ASIR during the same period. However, the prevalence and DALYs estimates exhibited a contrasting pattern: while cases increased, both the ASPR and ASDAR declined (Fig. 3, Tables 1, 2 and 3).

When examining trends by gender, we found that they mirrored those observed in the overall population

consistently (Figure S6, Tables 1, 2 and 3). Similarly, trends across most age groups were also consistent, aligning with the overall population trends (Figure S7, Tables 1, 2 and 3). At the SDI region level, the ASIR increased in low and low-middle SDI regions, whereas it decreased in other SDI regions. In contrast, for ASPR and ASDAR, the middle SDI region demonstrated an upward trend, while other regions showed a declining trend (Figure S8, Tables 1, 2 and 3).

The disease burden associated with caries in permanent teeth varied significantly across GBD regions. In this study, we employed a hierarchical clustering approach to identify locations with similar illness load variations. The results revealed significant increases in ASRs in several regions, including Eastern Africa, Central Europe, and Southeast Asia. Conversely, significant decreases were observed in East Asia and the Western Pacific Region (Figure S9).

When analyzing trends across countries and territories, we noted notable differences. China experienced the most pronounced increase in ASIR from 1990 to 2021, with an EAPC of 1.3 (95% confidence interval: 1.02–1.58). In contrast, Colombia showed the most significant increase in ASPR and ASDAR, with EAPCs of 0.83 (95% CI: 0.46–1.2) and 0.83 (95% CI: 0.47–1.2), respectively. Conversely, Japan exhibited the most notable decrease in ASPR and ASDAR, with an EAPC of –0.53 (95% CI: –0.64 to –0.43). Similarly, Morocco also showed a substantial decline in both ASPR and ASDAR, with EAPCs of –1.17 (95% CI: –1.51 to –0.83) and –1.17 (95% CI: –1.5 to –0.83), respectively (Figure S10, Tables 1, 2 and 3).

The influential factors for EAPC

Our analysis revealed that the EAPCs for caries of permanent teeth are associated with both the ASRs in 1990 and the HDIs in 2021. Specifically, the ASRs in 1990 reflected the existing disease pool at that time, serving as a baseline for comparison. In contrast, the HDIs in 2021 served as indicators of healthcare access and quality across different countries. Notably, we observed a strong correlation between EAPCs and both the ASRs of prevalence and DALYs, suggesting that improvements in oral healthcare and prevention measures have positively contributed to reducing the severity of dental caries. However, no significant relationship was found between EAPCs and HDIs, hinting that factors beyond healthcare may also influence disease trends (Fig. 4).

The predicted results from 2022 to 2046

The predictive outcomes from the BAPC model indicate an increase in the number of incidence cases, prevalence cases, and DALYs for both sexes from 2022 to 2046

Table 1 The number of incidence cases and the age-standardized incidence rate attributable to caries of permanent teeth in 1990 and 2021 and its trends from 1990 to 2021 globally

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Global	1527618388 (1329926847– 1740865232)	28091.58 (24489.95– 31836.26)	2370414032 (2099098156– 2661346388)	29777.03 (26310.27– 33490.91)	0.23 (0.2–0.26)
Sex					
Female	764829981 (666728069– 868205308)	28373.11 (24800.95– 32071.45)	1179064868 (1045956816– 1324945906)	29877.72 (26437.48– 33602.38)	0.23 (0.19–0.26)
Male	762788407 (661968864– 872513572)	27824.43 (24222.86– 31679.78)	1191349164 (1052116661– 1337867524)	29678.33 (26169.01–33359.6)	0.23 (0.21–0.25)
Age					
5–9 years	104867522 (52004029– 181258915)	17971.21 (8911.96– 31062.45)	111399490 (55654635– 197328050)	16214.09 (8100.48– 28720.91)	–0.2 (–0.27–0.13)
10–14 years	179245435 (122599522– 242863180)	33461.13 (22886.6– 45337.14)	234985412 (160000535– 319574382)	35249.44 (24001.19– 47938.37)	0.21 (0.15–0.28)
15–19 years	208319379 (161240214– 257395353)	40105.89 (31042.15– 49554.05)	288411039 (226734324– 354013171)	46221.21 (36336.8– 56734.71)	0.47 (0.44–0.5)
20–24 years	241465792 (192472585– 289875194)	49069.65 (39113.46–58907.2)	324412059 (263901543– 379505989)	54325.99 (44192.91– 63552.01)	0.34 (0.32–0.36)
25–29 years	197366964 (147291983– 247704208)	44590.65 (33277.33– 55963.22)	286313878 (220180486– 348927834)	48664.43 (37423.82– 59306.85)	0.34 (0.31–0.38)
30–34 years	151466906 (115747929– 183546332)	39298.93 (30031.44– 47622.11)	252878319 (196171016– 301713807)	41834.01 (32452.85– 49912.94)	0.29 (0.23–0.34)
35–39 years	120298454 (91659585– 147910117)	34151.98 (26021.58– 41990.76)	206235228 (159506736– 249985406)	36770.85 (28439.36– 44571.32)	0.27 (0.23–0.31)
40–44 years	87843014 (67027574– 111870923)	30662.7 (23396.81– 39049.95)	163056644 (125374016– 206635224)	32594.98 (25062.23– 41306.33)	0.21 (0.19–0.24)
45–49 years	63635852 (49923961– 80485693)	27406.15 (21500.83–34662.9)	134127726 (106545483– 169604200)	28326.59 (22501.47– 35818.91)	0.13 (0.08–0.17)
50–54 years	51568264 (39195168– 66791560)	24259.26 (18438.58– 31420.76)	108417964 (83694273– 138558102)	24367.8 (18810.96– 31142.04)	0.06 (0.02–0.11)
55–59 years	39127120 (29843800– 50303134)	21126.96 (16114.37– 27161.53)	83070474 (63167534– 106518454)	20991.81 (15962.36– 26917.09)	0.05 (0.02–0.07)
60–64 years	30494416 (23411068– 39005392)	18986.71 (14576.41–24285.9)	60798347 (47115300– 77612426)	18996.64 (14721.33– 24250.26)	–0.02 (–0.05–0.01)
65–69 years	21412647 (17046384– 27611119)	17322.82 (13790.52– 22337.38)	46411498 (37007765– 59582909)	16825.38 (13416.28– 21600.36)	–0.1 (–0.13–0.08)
70–74 years	13352878 (10241022– 17760878)	15772.14 (12096.48– 20978.78)	31469300 (24484669– 41314580)	15288.29 (11895.05– 20071.29)	–0.11 (–0.16–0.07)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
75–79 years	9414369 (7198791–12281147)	15294.11 (11694.8– 19951.34)	18768014 (14579538– 24471218)	14230.65 (11054.79– 18555.05)	–0.15 (–0.21–0.1)
80–84 years	5098490 (3893454–6552459)	14412.32 (11005.94– 18522.37)	11623756 (8956045– 14947420)	13271.69 (10225.77– 17066.57)	–0.21 (–0.26–0.16)
85–89 years	2032044 (1549558–2602858)	13447.38 (10254.45– 17224.84)	5570056 (4326156–7075925)	12182.5 (9461.91– 15476.05)	–0.25 (–0.28–0.22)
90–94 years	508774 (364850–674121)	11872.86 (8514.21– 15731.43)	1962618 (1413187–2596897)	10970.86 (7899.59– 14516.42)	–0.28 (–0.3–0.26)
95 + years	100067 (55211–153613)	9828.95 (5423.04– 15088.38)	502211 (282029–766053)	9214.37 (5174.55– 14055.22)	–0.22 (–0.3–0.15)
SDI region					
High-middle SDI	286672766 (249434472– 328582906)	25928.82 (22532.92– 29735.87)	354901014 (312769941– 402702372)	28068.89 (24352.04– 31973.91)	0.39 (0.3–0.48)
High SDI	273099853 (244997182– 301645977)	30412.41 (27047.52– 33661.65)	311697352 (280824483– 345208230)	30049.02 (26769.17– 33354.51)	0.02 (–0.02–0.06)
Low-middle SDI	351990156 (303692201– 403346112)	30900.69 (26974.62– 35103.05)	623984154 (545108731– 703956895)	31182.47 (27260.31– 35209.32)	–0.03 (–0.09–0.03)
Low SDI	138385602 (120948207– 157279709)	29298.84 (25980.17– 32898.15)	330220061 (288016584– 375331729)	29403.82 (25801.98– 33007.58)	–0.02 (–0.05–0.01)
Middle SDI	475902508 (406309069– 550193824)	26442.49 (22826.55– 30343.41)	747613546 (661350067– 845051324)	29951.73 (26314.08– 33821.61)	0.51 (0.44–0.57)
GBD region					
Advanced Health System	417740839 (373267671– 465144786)	31203.62 (27640.41– 34768.96)	450128126 (405317871– 501379807)	30818.7 (27262.48– 34386.85)	0 (–0.04–0.04)
Africa	175398362 (152166992– 201049302)	28851.96 (25420.83– 32672.85)	402823988 (348744272– 458982458)	28927.95 (25414.87– 32549.82)	0 (–0.01–0)
African Region	137664596 (119198102– 158130162)	28286.93 (24954.71–32053.7)	330368722 (285886535– 376686843)	28424.61 (25033.2– 32133.14)	0.01 (0–0.02)
America	236221402 (204576826– 266444945)	32253.86 (28089.71– 36357.09)	332618029 (295310714– 373527077)	32007.59 (28127.22– 35972.74)	0.01 (–0.03–0.05)
Andean Latin America	11422358 (9738319– 13378413)	30057.45 (25809.49– 35224.58)	20612023 (17847968– 24012910)	30428.82 (26375.99– 35415.01)	0.1 (0.08–0.12)
Asia	859943533 (738216412– 992929374)	26180.71 (22784.97– 29977.27)	1377369158 (1217900124– 1551064542)	29203.89 (25718.77– 32956.87)	0.41 (0.37–0.45)
Australasia	5537911 (4884894–6314576)	26089.96 (23042.65– 29717.65)	8935335 (7731234–10359671)	29326.35 (25154.78– 33967.29)	0.49 (0.44–0.54)
Basic Health System	609756172 (522190468– 704421627)	25192.82 (21737.08– 28988.38)	908265113 (801008253– 1029075774)	28936.78 (25264.29– 32868.35)	0.6 (0.5–0.71)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Caribbean	11576085 (10039559– 13195466)	32306.77 (28118.52– 36763.99)	15723375 (14098738– 17416276)	32776.95 (29399.94– 36352.97)	0.05 (0.04–0.07)
Central Africa	17431785 (14282598– 21040669)	27893.94 (23379.45– 33110.73)	46342262 (38016362– 55189979)	27969.26 (23655.54– 32816.36)	0.01 (–0.01–0.03)
Central Asia	21603889 (18320452– 25052847)	31431.9 (26902.51– 36171.96)	30600881 (26283869– 35355328)	31938.39 (27490.82– 36708.29)	0.05 (0.03–0.07)
Central Europe	39224725 (34563010– 44135808)	30953.38 (27066.75– 34794.29)	36233922 (32321389– 40767206)	32337.43 (28381.99– 36187.34)	0.15 (0.14–0.16)
Central Latin America	51245827 (43369765– 59733846)	30753.36 (26477.45– 35165.96)	80572384 (70351726– 92025642)	30652.14 (26663.65– 35143.77)	–0.04 (–0.07–0.02)
Central Sub- Saharan Africa	14516280 (11898078– 17521056)	27965.16 (23449.19– 33017.44)	38137314 (31332985– 45565264)	28039.29 (23456.45– 32874.64)	0 (–0.01–0.02)
Commonwealth High Income	33690553 (29958376– 37472519)	29775.84 (26370.22– 33188.13)	42356311 (37767857– 47237375)	30258.25 (26671.92– 33927.29)	0.08 (0.06–0.09)
Commonwealth Low Income	53093245 (4445751– 62823580)	26809.29 (22951.38– 31135.01)	110282014 (93046508– 128962680)	27607.11 (23439.78–32139.1)	0.02 (0–0.04)
Commonwealth Middle Income	359779076 (311773089– 409614823)	30929.02 (27119.15– 34973.79)	691564235 (610829712– 772347901)	31221.57 (27676.23–34873.5)	–0.06 (–0.16–0.03)
East Asia	236801798 (194684621– 285550049)	17834.57 (14643.46– 21452.69)	323692711 (282149935– 374427839)	23398.84 (20107.29– 27254.18)	1.27 (1–1.55)
East Asia & Pacific—WB	458631818 (393196928– 534226008)	23109.1 (19859.38– 26805.34)	627765709 (555683784– 711382135)	27153.48 (23661.55– 30866.29)	0.76 (0.6–0.91)
Eastern Africa	48051407 (42024473– 54610809)	28800.67 (25629.94– 32473.62)	115758613 (101414911– 131731262)	29154.56 (25748.54– 32803.81)	0.02 (0.01–0.03)
Eastern Europe	77185222 (67474757– 87383015)	33949.74 (29643.94– 38296.11)	68014273 (59764859– 76357341)	33777.23 (29488.46– 38087.77)	–0.01 (–0.03–0.01)
Eastern Mediter- ranean Region	115992165 (99433030– 131951795)	31710.75 (27672.35–35769.1)	245487700 (211314405– 278252336)	31636.91 (27459.84– 35784.18)	–0.01 (–0.03–0.01)
Eastern Sub- Saharan Africa	51283540 (44937664– 58260723)	28227.99 (25224.66– 31789.07)	125253490 (109269034– 142515019)	28721.28 (25373.71– 32337.82)	0.03 (0.01–0.04)
Europe	253158434 (225144959– 283971729)	31396.5 (27902.79– 35096.34)	254380352 (226391514– 284696462)	31571.77 (27896.28–35346.1)	0.04 (0.02–0.06)
Europe & Central Asia—WB	268196304 (238313211– 300823075)	31367.91 (27832.92– 35096.32)	277568765 (246881265– 311199171)	31549.47 (27843.49–35414.1)	0.04 (0.02–0.06)
European Region	270537794 (240340724– 303469525)	31373.07 (27835.68– 35103.78)	281541033 (250479328– 315670373)	31573.76 (27872.22– 35444.18)	0.04 (0.02–0.06)
High-income Asia Pacific	57156163 (50711786– 63608032)	31494.6 (27707.48– 35385.67)	47155095 (42059380– 52278109)	28451.18 (25056.24– 31636.16)	–0.33 (–0.4–0.27)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
High-income North America	91714847 (80175149– 103093689)	31848.63 (27596.8– 35912.45)	111272043 (97364953– 125022962)	30898.22 (26814.08– 34828.49)	0.01 (–0.09–0.12)
Latin America & Caribbean—WB	145765908 (124852106– 166408728)	32626.76 (28336.93– 37168.06)	222494463 (196155670– 252243747)	32765.73 (28704.71– 37094.82)	0.02 (0.01–0.04)
Limited Health System	463824506 (401494627– 529620466)	30244.72 (26588.57– 34243.41)	917638374 (808290499– 1029716401)	30592.45 (27066.35– 34314.03)	–0.04 (–0.11–0.03)
Middle East & North Africa—WB	81581936 (70263439– 93255314)	31961.84 (27915.51– 36290.83)	158120598 (138188127– 179424038)	32169.18 (28252.22– 36378.71)	0.03 (0.01–0.04)
Minimal Health System	34729366 (28932558– 41391001)	27692.7 (23697.62– 32575.34)	92384515 (76947321– 109738690)	28190.77 (24045.48– 33048.53)	0.04 (0.03–0.06)
North Africa and Middle East	106426719 (91183653– 122008711)	31592.38 (27499.44– 35933.27)	204990376 (177919912– 233769636)	31920.12 (27848.93– 36314.86)	0.05 (0.03–0.07)
North America	91715993 (80176785– 103095404)	31849.63 (27598.06– 35913.15)	111275852 (97368778– 125027728)	30899.29 (26815.48–34829.5)	0.01 (–0.09–0.12)
Northern Africa	37931288 (32472950– 43272489)	31355.9 (27262.94– 35405.81)	67426315 (58666799– 76111638)	31591.01 (27582.39– 35576.24)	0.01 (0–0.02)
Oceania	1837448 (1525180–2209102)	27627.61 (23259.61– 32988.56)	3911098 (3219170–4637583)	27635.38 (22847.53– 32571.56)	0 (–0.02–0.01)
Region of the Americas	236221402 (204576826– 266444945)	32253.86 (28089.71– 36357.09)	332618029 (295310714– 373527077)	32007.59 (28127.22– 35972.74)	0.01 (–0.03–0.05)
South-East Asia Region	411484558 (355813066– 470154068)	31529.69 (27651.91– 35800.51)	703183382 (621977393– 787897071)	32113.61 (28381.97– 36037.29)	–0.02 (–0.12–0.08)
South Asia	332888724 (286601635– 381592312)	30880.64 (26918.38–35088.5)	617008020 (540954812– 693310573)	31398.81 (27644.28– 35248.05)	–0.06 (–0.16–0.04)
South Asia—WB	341666351 (294346102– 391745907)	30915.1 (26968.49– 35143.21)	634257706 (555645253– 713054588)	31436 (27669.55– 35330.27)	–0.06 (–0.15–0.04)
Southeast Asia	163386026 (141193084– 185122003)	34487.73 (30005.87– 38966.91)	251719025 (222051346– 283438580)	34776.97 (30584.21– 39145.79)	0.08 (0.03–0.14)
Southern Africa	24832207 (21405856– 28893267)	26884.34 (23586.01– 30880.32)	52115737 (44607190– 60342049)	27926.12 (24297.97– 31923.65)	0.12 (0.11–0.14)
Southern Latin America	15132665 (12739405– 17624645)	30289.97 (25546.19– 35317.27)	20726146 (18295171– 23744186)	30254.87 (26673.86– 34580.95)	0.02 (–0.04–0.09)
Southern Sub- Saharan Africa	14096469 (12086725– 16491157)	26634.42 (23217.48– 30801.76)	23212833 (20181175– 26689599)	27538.17 (23935.06– 31619.38)	0.15 (0.13–0.17)
Sub-Saharan Africa—WB	137875440 (119459360– 158285140)	28242.38 (24987.8– 31996.82)	336238125 (290474512– 384003403)	28365.98 (25002.06– 32033.97)	0.01 (0–0.01)
Tropical Latin America	56801906 (48975225– 64633480)	36093.49 (31280.87– 41000.71)	85414444 (74738421– 96551908)	36541.09 (31903.79– 41303.27)	0.07 (0.04–0.1)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Western Africa	47151675 (40992383– 53649031)	28619.93 (25218.34– 32124.66)	121181061 (105414531– 137183583)	28058.48 (24904.81– 31302.35)	−0.06 (−0.08–0.04)
Western Europe	115917670 (104686506– 128791649)	30341.19 (27244.68– 33773.27)	121534480 (108941434– 134792631)	30501.87 (27074.64– 33938.98)	0.05 (0.03–0.08)
Western Pacific Region	349775396 (296111904– 410639982)	21204.88 (17966.46– 24840.59)	470936234 (414059305– 537271117)	25721.06 (22424.58– 29449.65)	0.91 (0.71–1.1)
Western Sub- Saharan Africa	51862113 (44802418– 59219498)	28528.64 (25014.32– 32116.93)	135694764 (117385625– 154500800)	28028.66 (24756.07– 31354.85)	−0.05 (−0.07–0.03)
World Bank High Income	320889388 (287779622– 355971985)	30656.5 (27256.59– 34083.93)	354537560 (319589155– 393203894)	30302.51 (26888.48– 33777.46)	0.02 (−0.03–0.06)
World Bank Low Income	81161239 (69927439– 93838525)	27525.63 (24190.22– 31405.66)	197230488 (169527265– 227743665)	28302.82 (24777.52– 32234.86)	0.1 (0.09–0.11)
World Bank Lower Middle Income	623229358 (541403656– 708991857)	31673.47 (27740.92– 35867.43)	1131452007 (996644266– 1267302754)	31773.64 (28035.78– 35667.85)	−0.04 (−0.11–0.02)
World Bank Upper Middle Income	500764366 (428874454– 581591136)	23844.16 (20530.64– 27574.87)	685190267 (602262102– 780597826)	27499.85 (23847.47– 31494.17)	0.65 (0.52–0.78)
Country					
Afghanistan	2790901.12 (2353268.373254192.77)	30216.71 (25815.2635376.63)	9552431.12 (7941740.5311278648.13)	31130.86 (26565.0336275.6)	0.324(0.2870.361)
American Samoa	13881.25 (11517.2316401.59)	28255.27 (23723.0333100.34)	14385.32 (12044.9216608.82)	28299.09 (23876.0132869.76)	0.002 (−0.0110.016)
Angola	2748941.18 (2246033.343297144.86)	28290.39 (23682.2233169.09)	8852796.52 (7204090.6710741356.23)	28394.21 (23428.1533237.63)	−0.039 (−0.070- 0.008)
Antigua and Bar- buda	20062.57 (17196.0723256.96)	32561.84 (27865.3137472.93)	30528.8 (26285.5135052.36)	32990.74 (28163.9637928.91)	0.148 (0.1270.168)
Arab Republic of Egypt	17024356.11 (13984950.3320115964.17)	31164.09 (26405.5536604.7)	33839785.51 (28378767.2539234591.49)	31727.7 (27034.1836366.38)	0.081 (0.0150.148)
Argentina Republic	10086260.09 (8490160.2911795986.6)	30484.24 (25587.1635646.45)	14083087.78 (12073673.8316539672.52)	30429.52 (26020.3235644.62)	−0.003 (−0.0410.035)
Australia	4446080.28 (3889540.25154614.38)	25160.72 (22082.8829058.35)	7285048.85 (6286994.868482010.14)	28787.79 (24571.2533522.34)	0.318 (0.2610.375)
Bangladesh	27944651 (22813881.7633458890.77)	26993.22 (22745.7431567.64)	47816769.27 (39797072.756019996.02)	27569.79 (22938.632113.78)	0.294 (0.2510.337)
Barbados	85446.77 (72024.3198965.83)	32517.88 (27692.2637571.99)	100133.86 (86220.47117014.13)	33008.84 (28274.2338850.85)	−0.001 (−0.0210.020)
Belize	59112.4 (52318.1166313.52)	31605.43 (28037.6135024.47)	147822.55 (129715.18169816.09)	31819.52 (28005.4636370.44)	0.240 (0.2220.259)
Benin	1190604 (983495.71460636.11)	27535.27 (23245.1532504.99)	3575355.97 (2918996.094292567.38)	27511.14 (23287.0332278.41)	0.264 (0.2490.279)
Bermuda	20235.26 (17199.4323569.74)	32921.17 (27796.8238025.53)	20669.23 (17608.2624228.73)	33282.16 (28262.9638916.35)	−0.099 (−0.115- 0.082)
Bhutan	171480.42 (140702.89204623.16)	26955.54 (22416.1431285.26)	228271.07 (189834.29270532.17)	27476.04 (22835.232611.1)	0.343 (0.3120.374)
Bolivarian Repub- lic of Venezuela	6727851.38 (5786959.017673226.72)	35718.64 (31005.9440506.99)	9650213.73 (8435440.3410892298.56)	36163.4 (31573.5840974.71)	0.146 (0.0830.210)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Bosnia and Her- zegovina	1380645.38 (1191696.691601491.5)	29877.84 (25946.3134506.69)	1028370.81 (895499.871181577.93)	31735.72 (27378.1536433.02)	0.154 (0.1010.208)
Botswana	313867.04 (252226.59389254.79)	24454.69 (20156.1529523.34)	623733.39 (524659.48756008.15)	24282.53 (20505.9529450.75)	0.335 (0.2680.402)
Brunei Darus- salam	87921.16 (74080.37101916.11)	31846.23 (26789.4736826.62)	160126.99 (134657.98184712.56)	32250.07 (27198.3237510.49)	0.173 (0.1380.208)
Burkina Faso	2353001.33 (1919629.322848271.07)	27688.68 (23179.8532535.74)	5972207.66 (4873384.457261041.86)	27771.59 (23468.6133306.19)	0.152 (0.0550.248)
Burundi	1484747.97 (1213352.691817462.49)	28611.72 (24029.4434242.46)	3743277.56 (3037732.84549754.58)	28842.49 (23929.4734603.44)	0.191 (0.1690.212)
Cabo Verde	91621.56 (74965.79109487.93)	27740.15 (23379.0432662.95)	167381.07 (141345.61196637.51)	27703.35 (23452.4432246.73)	0.585 (0.5310.639)
Cameroon	2668507.4 (2183227.433217356.43)	27725.26 (23287.5732511.09)	8780093.53 (7207889.1410367442.44)	27846.1 (23586.3832348.99)	0.209 (0.1940.223)
Canada	7947702.06 (6632529.639224813.79)	28011.8 (23326.9532426.58)	9747196.16 (8158536.3911263496.62)	27334.54 (22563.7332029.89)	−0.344 (−0.388- 0.301)
Central African Republic	730623.7 (603465.96875457.63)	28156.94 (23569.9233087.06)	1522683.98 (1243505.961820600.58)	27728.33 (23069.6332603.99)	0.151 (0.1350.167)
Chad	1480395.79 (1196652.991784490.89)	27520.36 (22726.6232936.76)	4471803.84 (3669585.455395514.2)	27733.86 (23424.6132588.94)	0.075 (0.0370.113)
Commonwealth of Dominica	23582.37 (19797.8327686.24)	32292.7 (27430.6937886.75)	22889.68 (19706.9226097.44)	32670.95 (28070.8637298.86)	0.237 (0.2130.261)
Commonwealth of the Bahamas	87604.79 (74875.48103080.59)	32695.47 (28179.7738048.64)	132689.99 (113758.37154346.03)	32470.58 (27807.9538019.17)	0.143 (0.1040.182)
Comoros	125159.96 (105862.51146885.78)	26256.95 (22557.2230662.51)	211229.07 (182099.99245226.41)	26495.3 (22996.2430582.58)	0.151 (0.1400.162)
Congo	660670.34 (541376.27790712.34)	28038.09 (23544.0232816.63)	1570010.64 (1290223.281867089.56)	28131.23 (23354.3633161.16)	0.084 (0.0470.122)
Cook Islands	5461.48 (4587.756347.62)	27997.03 (23562.7332296.31)	4949.37 (4147.795779.59)	28471.56 (23614.6433374.64)	−0.157 (−0.190- 0.125)
Czech Republic	3204634.03 (2761041.323697390.75)	30628.78 (26122.8935363.51)	3276847.41 (2865933.973785509.74)	31921.16 (27630.7536808.72)	−0.043 (−0.075- 0.011)
Democratic People's Republic of Korea	2871498.88 (2219972.193574084.68)	13382.92 (10379.4416644.22)	3899100.16 (3051242.634784341.74)	14287.89 (10984.117839.22)	0.098 (0.0560.139)
Demo- cratic Republic of the Congo	10000978.17 (8200510.5712091105.82)	27857.57 (23305.433141.19)	25204039.15 (20737772.9629993692.42)	27934.03 (23451.8832713.34)	0.421 (0.3060.536)
Democratic Republic of Timor- Leste	239118.07 (201208.48280687.04)	31721.78 (27127.2836891.56)	459965.25 (397488.48525384.14)	32664.54 (28419.5237183.76)	0.180 (0.1530.207)
Democratic Socialist Republic of Sri Lanka	5918311.57 (5024365.926801293.92)	33164.31 (28261.3137967.08)	7501673.33 (6414159.28677233.08)	33232.35 (28221.3338482.93)	0.253 (0.1870.320)
Djibouti	120662.45 (103776.13141300.46)	26541.55 (23107.7230945.8)	357200.44 (306080.37424565.14)	26415.32 (22721.9631213.63)	−0.084 (−0.107- 0.062)
Dominican Republic	2312911.26 (1941835.962672356.03)	32152.1 (27392.4536592.96)	3679394.38 (3169522.124277295.26)	32709.88 (28110.1937983.93)	−0.098 (−0.132- 0.064)
Eastern Republic of Uruguay	936290.85 (817509.151075544.64)	30061.52 (26087.934719.81)	1025647.71 (884721.851178739.8)	30476.72 (26099.3835227.12)	0.210 (0.1750.245)
Equatorial Guinea	108772.61 (89164.84130392.14)	27891.19 (23520.4332721.74)	458849.83 (378746.69538847.74)	28194.14 (23710.8532668.99)	0.027 (0.0120.041)
Eritrea	918308.82 (754359.651102911.6)	28027.38 (23618.833720.55)	1909260.63 (1585629.942256374.33)	28423.32 (23951.4933537.65)	0.486 (0.4510.521)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Eswatini	185880.56 (150246.41233999.96)	24371.52 (20360.2829141.11)	296794.67 (245478.98359820.11)	24364.45 (20382.5229065.95)	0.210 (0.1940.225)
Ethiopia	15224397.6 (13552013.1816981688.75)	31155.69 (27902.4634456.76)	35843519.66 (32053289.239939266.81)	31059.37 (28131.0234296.87)	0.374 (0.3430.405)
Federal Republic of Germany	21846204.2 (19454806.4824349307.16)	28149.89 (25311.3731092.03)	19436721.98 (16852454.2222345344.61)	27588.79 (24063.5332168.3)	0.305 (0.2830.326)
Federated States of Micronesia	28885.8 (24331.1934033.42)	27623.89 (23371.2132105.1)	29777.39 (24497.4335444.05)	27624.03 (22859.1132844.84)	−0.410 (−0.503- 0.317)
Federative Republic of Brazil	55622448.71 (47914093.7163249226.18)	36255.16 (31387.0441183.67)	83268309.12 (72800391.7294037784.77)	36800.64 (32044.0741659.97)	0.114 (0.0950.133)
French Republic	19451227.8 (17166584.6121932483.9)	33943.56 (30180.3238213.27)	21245929.75 (18657158.2324135470.25)	33660.89 (29093.4338621.45)	0.074 (0.0410.107)
Gabon	266294.21 (220412.53320262.81)	27909.82 (23389.1732914.41)	528933.62 (438119.03631437.29)	28184.4 (23698.6433324.27)	−0.171 (−0.193- 0.149)
Gambia	252487.55 (206866.29305864.11)	27268.32 (22842.6732428.14)	668737.06 (552414.76802217.98)	27676.83 (23135.232615.55)	0.196 (0.1740.218)
Georgia	1753187.51 (1461364.722038618.08)	31490.85 (26227.3836594.52)	1115648.54 (959293.251301283.51)	32025.61 (27266.9137285.17)	0.210 (0.1820.239)
Ghana	3917104.72 (3279083.684619530.36)	27627.91 (23569.6332101.79)	9607738.12 (7982554.7711491632.42)	27578.61 (23081.2232515.68)	−0.132 (−0.169- 0.095)
Grand Duchy of Luxembourg	115672.96 (98946.06134971.1)	30175.19 (25591.9835125.84)	194886.13 (167267.83228561.89)	31012.06 (26160.1736543.24)	0.242 (0.2180.266)
Greenland	16985.97 (14486.3519612.48)	27392.62 (23079.2231906.72)	15115.49 (12900.8117644.72)	26966.69 (23004.6932115.35)	−0.014 (−0.0320.004)
Grenada	27495.16 (23384.732007.16)	32338.91 (27669.9637622.89)	35260.23 (30375.8540342.99)	33053.76 (28289.5937844.95)	−0.264 (−0.334- 0.194)
Guam	40674.28 (33554.9447998.79)	28146.24 (23465.532851.93)	44180.57 (37162.2352740.39)	28418.55 (23807.3734104.6)	0.266 (0.2290.303)
Guinea	1484638.4 (1228300.621767022.3)	27649.68 (23143.2832385.83)	3567236.83 (2912687.544325936.11)	27654.75 (23166.9532923.18)	−0.212 (−0.228- 0.196)
Guinea-Bissau	255211.57 (214910.94308267.12)	26989.75 (23012.1131786.92)	551547 (459912.91663529.42)	26959.49 (22745.9431598.48)	0.206 (0.1790.232)
Hashemite King- dom of Jordan	1148770.37 (955835.971367405.56)	30855.61 (26109.3935987.92)	4064311.63 (3398012.434832234.66)	31040.71 (25993.4136640.58)	0.172 (0.1600.185)
Hellenic Republic	3058998.56 (2688705.553543380.94)	29487.78 (25872.2234016.81)	2909713.37 (2505876.243370947.09)	31085.17 (26279.6536426.44)	0.264 (0.2510.276)
Hungary	3288087.22 (2819994.713798093.85)	31216.77 (26539.0835920.15)	2994481.97 (2597892.853399228.76)	32283.09 (27576.5136819.86)	−0.256 (−0.326- 0.186)
Independent State of Papua New Guinea	1144159.07 (947010.041399831.7)	27572.63 (23074.0333242.6)	2930414.22 (2387971.223507873.94)	27559.04 (22619.7332759.11)	−0.012 (−0.0460.022)
Independent State of Samoa	47680.49 (39722.3756944.51)	27825.4 (23505.9933025.62)	59403.23 (49705.1370636.01)	27845.34 (23493.532982.09)	0.031 (0.0020.060)
India	266713865.12 (230196534.76304917223.81)	31361.98 (27439.2335573.34)	484909328.35 (430904507.85541892748.56)	32009.86 (28378.8935843.75)	−0.055 (−0.066- 0.043)
Ireland	1118880.8 (966283.41309207.36)	30482.86 (26259.3535772.7)	1487803.61 (1276791.851734046.47)	31181.63 (26470.2236483.36)	0.146 (−0.0010.294)
Islamic Republic of Iran	19352960.76 (17046984.3821678995.86)	34459.88 (30709.0838071.63)	30519541.68 (27273820.7533924033.99)	34568.83 (30959.8938333.71)	−0.214 (−0.251- 0.177)
Ivoire	3177265.68 (2601327.523811974.17)	27633.65 (23218.8832664.11)	7571579.51 (6213044.748895117.55)	27521.13 (22957.2731770.96)	0.075 (−0.0060.155)
Jamaica	768982.72 (639788.67902222.03)	31978.14 (26998.5337255.61)	962352.12 (829459.751119478.24)	32712.95 (27986.4238422.99)	0.236 (0.2150.257)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Japan	38066101.68 (33777811.9742635469.41)	29746.37 (26250.9933760.38)	26156578.48 (23265025.9129385561.27)	24611.78 (21570.2927745.67)	−1.269 (−1.401- 1.137)
Kenya	6819762.84 (5876207.637786892.82)	30397.39 (26716.4634028.7)	15873136.05 (13790474.217725760.14)	29713.7 (26235.5133101.45)	0.217 (0.1980.236)
Kingdom of Bah- rain	169896.06 (141009.88205442.27)	31357.5 (26571.8736761.06)	532755.7 (446007.15623326.14)	31822.09 (26593.1936899.86)	0.211 (0.1350.287)
Kingdom of Bel- gium	2747619.57 (2345112.893190088.63)	27651.49 (23492.5932703.79)	3047106.07 (2503213.993508826.42)	28396.83 (23337.9233393.95)	−0.158 (−0.253- 0.063)
Kingdom of Cam- bodia	3511163.93 (2999251.854009486.52)	36364.14 (31815.5740885.08)	6578429.91 (5666830.797489903.51)	37688.44 (32668.0542766.89)	0.538 (0.4870.589)
Kingdom of Den- mark	1175668.71 (1034362.441343971.73)	23265.07 (20604.9826593.97)	1259976.21 (1085596.481446002.11)	24983.51 (21445.129015.02)	−0.198 (−0.234- 0.161)
Kingdom of Nor- way	1400389.01 (1232305.161571346.48)	32821.54 (28727.4637010.74)	1750672.17 (1558122.451963645.15)	33319.43 (29265.2937375.24)	−0.090 (−0.117- 0.062)
Kingdom of Spain	12328055.89 (10914990.3313970173.98)	31368.85 (27726.5635529.25)	13662220.41 (11767038.8715861487.44)	32142.49 (27146.1437244.91)	−0.300 (−0.355- 0.245)
Kingdom of Swe- den	2155780.45 (1810616.292547482)	26144.96 (21761.7831283.04)	2824211.62 (2421196.443262886.64)	29425.05 (24847.3734210.06)	0.330 (0.2220.438)
Kingdom of Thai- land	19916003.34 (16829561.5622901851.75)	32790.45 (27888.8337598.73)	22612897.21 (19570840.2226101296.77)	33760.98 (29048.3739156.15)	−0.158 (−0.196- 0.120)
Kingdom of the Netherlands	4157070.71 (3692981.324653671.14)	27668.69 (24486.730759.4)	3703841.36 (3196697.384226220.7)	25301.26 (21661.4629195.9)	−0.557 (−0.692- 0.422)
Kingdom of Tonga	27412.79 (22766.2832762.05)	27822 (23159.5332432.31)	29299.08 (24596.134530.69)	27816.31 (23428.932972.43)	−0.066 (−0.092- 0.040)
Kyrgyz Republic	1382109.52 (1174132.581593735.55)	31479.27 (27048.436006.41)	2182136.29 (1869887.992541266.64)	31706.85 (27311.1336709.15)	0.063 (0.0030.124)
Lao People's Democratic Republic	1303807.17 (1089189.61516515.11)	33067.25 (27951.8937939.27)	2568697.01 (2181480.892921028.21)	33588.75 (28606.5738143.53)	0.441 (0.3990.482)
Lebanon	913016.34 (761538.051063074.13)	30781.42 (25985.1436011.85)	1796409.43 (1531250.662081991.27)	31342.16 (26850.936008.68)	0.248 (0.2230.274)
Lesotho	349820.57 (287263.04424975.75)	24368.09 (20560.2628778.68)	485753.91 (401021.76580015.59)	24290.52 (20204.1728917.64)	0.401 (0.3760.427)
Liberia	623028.1 (510809.01746374.44)	27380.5 (22700.9232264.59)	1529982.76 (1261544.061820309.69)	27569.91 (23104.9332200.89)	0.367 (0.3430.390)
Libya	1305307 (1088368.841521310.21)	31086.02 (26699.4335869.88)	2337662.79 (1963190.22725901.37)	31649.45 (26568.9836897.99)	0.310 (0.2490.371)
Madagascar	3311551.81 (2811304.373882880.66)	29479.37 (25014.1834419.31)	8980779.39 (7605552.9510558753.07)	31305.71 (26756.8236327.56)	0.327 (0.2990.355)
Malawi	2662413.9 (2190407.553223735.13)	28771.95 (24322.6933814.52)	5717621.41 (4650664.116956265.98)	28782.99 (23960.334497.44)	0.217 (0.1620.273)
Malaysia	4594387.71 (3783262.325610186.23)	25273.73 (21069.2430257.86)	8638384.47 (7017142.5810181957.6)	25382.12 (20531.6130047.15)	0.130 (−0.0210.281)
Mali	2128954.49 (1756953.712575139.71)	27389.91 (23222.8432516.49)	6201379.79 (5036257.317451890.76)	27562.92 (22958.7832905.6)	0.137 (0.1050.170)
Mauritania	529028.42 (433794.35640298.99)	27503.27 (22980.4932775.56)	1197652.46 (992462.851414648.59)	27756.38 (23419.1332489.46)	0.115 (0.0920.138)
Mauritius	385233.94 (327883.71446559.38)	33161.31 (28585.4238094.83)	439354.69 (379786.19501088.46)	33697 (28770.338594.57)	−0.025 (−0.037- 0.012)
Monaco	8769.24 (7578.510163.5)	30686.64 (25869.8935836.18)	10556 (9003.6911982.22)	31383.52 (26562.7536085.59)	−0.130 (−0.167- 0.094)
Mongolia	669564.87 (548231.31785597.42)	31305.01 (26109.2936521.8)	1057824.91 (902523.151231575.05)	32104.62 (27665.5337063.08)	0.017 (−0.0880.123)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Montenegro	189235.88 (162906.31218197.17)	29708.99 (25460.5734160.29)	190697.88 (165218.26219835.88)	31119.24 (26762.1436008.35)	0.072 (0.0590.084)
Morocco	8716241.67 (7589393.899961115.58)	33060.97 (28510.8437626.76)	12407219.25 (10776584.4914031553.81)	32602.52 (28310.6736905.12)	−0.278 (−0.395- 0.161)
Mozambique	3153326.56 (2640089.393785016.25)	24918.57 (21372.3429414.04)	8678734.99 (7089820.3910506989.19)	28609.71 (23998.9733647.09)	0.289 (0.2060.371)
Namibia	314511.25 (261630.6381157.12)	23111.19 (19580.4927401.26)	632392.6 (518430.34763331.83)	24771.71 (20519.0629617.91)	0.373 (0.2850.461)
Nauru	2858.41 (2360.863386.95)	28004.03 (23436.0333002.38)	3196.61 (2675.833772.17)	27866.49 (23428.3532793.45)	0.063 (0.0420.083)
Nepal	4902367.16 (4030975.885852668.16)	26629.29 (22255.3631270.27)	8810104.66 (7288335.1410423696.55)	26643.43 (22092.5731209.58)	0.429 (0.2340.625)
New Zealand	1091830.31 (955407.31255061.86)	30593.14 (26678.6135362.43)	1650286.06 (1397743.261906860.74)	31968.69 (26947.3337198.46)	−0.032 (−0.1150.051)
Niger	1957451.61 (1598293.62349758.92)	27272.85 (22678.3431888.83)	6261403.89 (5057765.167627672.58)	27316.12 (22874.2532455.9)	0.015 (−0.0310.061)
Nigeria	25679303.84 (22691862.828842851.05)	29706.48 (26394.3733076.78)	65985199.02 (58136117.4373870823.83)	28644.91 (25650.8231666.74)	−0.064 (−0.110- 0.018)
Niue	634.14 (527.26743.79)	27734.95 (23253.7832442.53)	465.94 (390.17535.22)	28206.85 (23484.4532501.16)	−0.033 (−0.056- 0.010)
North Macedonia	610599.73 (527270.56704757.19)	30084.09 (26069.6534661.99)	689104.52 (589359.43797956.41)	31521.72 (26989.9635904.57)	0.159 (0.1110.206)
Northern Mariana Islands	14097.3 (11785.9716494.58)	28426.98 (23714.6132743.08)	13749.34 (11550.5616096.96)	28228.77 (23586.1533055.92)	−0.319 (−0.383- 0.255)
Oman	603150.82 (495967.44712963.19)	30733.05 (25873.2735481.45)	1583028.21 (1333455.51891090.15)	31271.05 (26250.236177.28)	0.504 (0.4060.602)
Pakistan	33156359.87 (28085047.5838280272.94)	31691.42 (27235.0235889.96)	75243546.86 (63778687.7587016245.14)	31147 (26629.4535636.6)	0.221 (0.1980.245)
Palau	4518.59 (3793.735316.77)	27809.41 (23531.5732679.44)	5039.87 (4278.185964.98)	28105.55 (23829.9133537.81)	−0.239 (−0.294- 0.185)
Palestine	603793.58 (497900.52714586.55)	31170.7 (26731.9235703.14)	1685974.11 (1418807.061955010.01)	31609.81 (27043.6936256.99)	0.413 (0.3770.449)
People's Demo- cratic Republic of Algeria	7777477.75 (6405395.289163313.62)	30825.79 (25722.736062.14)	13914734.83 (11516606.6816284615.53)	31325.11 (26088.9636455.89)	0.035 (−0.0620.133)
People's Republic of China	230901904.01 (190042711.77278380603.17)	17990.76 (14777.3821629.84)	316752689.04 (276805596.9366305223.18)	23759.62 (20403.0627675.83)	0.802 (0.4331.173)
Plurinational State of Bolivia	1854145.52 (1575044.282188171.03)	29764.56 (25361.0735167.59)	3640595.62 (3102812.424303462.99)	30093.41 (25729.6435485.99)	0.228 (0.2040.251)
Portuguese Republic	3059381.61 (2564480.273585697.99)	29552.68 (24702.4134700.24)	3007830.08 (2497404.583477387.61)	30587.65 (25298.135711.41)	−0.379 (−0.425- 0.332)
Principality of Andorra	17945.41 (15130.1220805.25)	30496.01 (25450.4235383.71)	25458.83 (21948.1829965.14)	30896.3 (26348.5136424.36)	−0.387 (−0.438- 0.336)
Puerto Rico	1205146.57 (1024567.321391821.37)	32611.66 (27708.3437629.17)	1103556.7 (942536.251271475.29)	33173.58 (28194.4638311.65)	0.049 (0.0300.069)
Qatar	149928.62 (123970.27175164.97)	31122.66 (26255.435598.34)	1095125.59 (909613.361284266.55)	32265.01 (27272.4536774.77)	0.464 (0.3780.550)
Republic of Alba- nia	1008127.85 (846091.011186275.62)	30168.18 (25534.234964.12)	841279 (720029.13968538.33)	31548.76 (26745.5436166.1)	0.224 (0.1740.274)
Republic of Armenia	1083348.55 (905529.731261824.69)	31439.57 (26497.1636405.42)	944991.75 (816947.291107637.19)	31738.77 (27266.5236953.28)	−0.017 (−0.0700.037)
Republic of Aus- tria	2309680.22 (1984491.282684425.11)	29246.57 (24740.2234171.79)	2575008.97 (2201577.752968216.95)	30292.98 (25554.0735239.63)	−0.170 (−0.192- 0.148)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Republic of Azerbaijan	2336261.48 (1991397.952681465.59)	31445.6 (26893.5635962.59)	3478201.24 (2956852.934066262.7)	32142.44 (27262.4337206.91)	0.133 (0.0750.191)
Republic of Belarus	3275408.58 (2779976.313773131.85)	31380.05 (26593.3336066.36)	2824281.02 (2393036.723267973.98)	31503.49 (26713.7836311.45)	−0.134 (−0.208- 0.061)
Republic of Bulgaria	2928044.01 (2542544.063355707.23)	33671.5 (29258.7938560.45)	2273668.05 (1988200.332601408.3)	33937.11 (29324.7638714.16)	0.003 (−0.0070.013)
Republic of Chile	4109395.73 (3425440.914773406.69)	29894.63 (24964.3534634.65)	5616266.99 (5022867.486190892.39)	29833.67 (26155.0133092.35)	0.071 (−0.2100.354)
Republic of Colombia	9070987.22 (7358920.3211138553.81)	26857.62 (22152.232667.66)	14136966.09 (12011536.7916525363.57)	27631.87 (23281.0132599.97)	−0.311 (−0.488- 0.134)
Republic of Costa Rica	958089.45 (803849.861126201.45)	31151.01 (26581.1635969.12)	1573332.58 (1335948.921849874.8)	31975.92 (27006.0237465.32)	0.161 (0.1170.205)
Republic of Croatia	1460832.69 (1245283.351717696.5)	29623.87 (25297.5534782.18)	1269434.53 (1106288.721454610.61)	30987.55 (26747.7135581.31)	0.056 (0.0320.080)
Republic of Cuba	3696107.42 (3153610.164336902.22)	32489.58 (27709.237842.18)	3713684.07 (3190703.594284971.47)	32981.35 (28087.2237873.2)	−0.214 (−0.276- 0.152)
Republic of Cyprus	239459.94 (201844.32278844.72)	30110.07 (25375.4835101.11)	413323.73 (356044.52482503.29)	30897.25 (26296.2536171.3)	−0.030 (−0.0970.036)
Republic of Ecuador	3027345.14 (2536051.473508925.03)	30149.75 (25549.6634856.56)	5636070.92 (4850071.776501067.22)	30459.22 (26209.8834986.07)	0.255 (0.1890.322)
Republic of El Salvador	1650242.03 (1369927.261955997.34)	31317.54 (26348.1937215.38)	2088731.07 (1775734.712428479.93)	31578.38 (26852.7636664.82)	0.240 (0.2000.281)
Republic of Estonia	428004.36 (359072.52499433.52)	27676.71 (23048.932356.65)	329465.56 (273028.25392189.06)	27381.02 (22539.4433017.33)	−0.294 (−0.364- 0.223)
Republic of Fiji	219999.23 (182663.73259751.3)	27695.67 (23399.3432563.97)	265503.92 (221332.11309514.46)	28225.06 (23586.3832885.13)	−0.161 (−0.232- 0.090)
Republic of Finland	1083589.56 (906183.191282417.74)	21995.52 (18381.8326570.47)	1130872.4 (942475.291338122.63)	22482.22 (18513.5927495.03)	−0.182 (−0.6420.280)
Republic of Guatemala	2452690.43 (2012272.812900153.15)	31209.94 (26325.7336535.05)	5234107.42 (4475359.876203651.59)	31651.47 (27086.9737308.21)	0.479 (0.4540.504)
Republic of Guyana	250083.79 (209677.16290310.84)	31955.98 (27196.1736740.56)	255275.27 (218081.66294664.37)	32621.35 (27993.0537435.61)	0.242 (0.2030.280)
Republic of Haiti	1974720.03 (1733779.142202272.53)	31589.43 (28260.835016.96)	4221135.77 (3692253.254835259.94)	31187.35 (27244.0135578.22)	0.200 (0.1610.239)
Republic of Honduras	1386494.63 (1151924.941661631.39)	30829.29 (26164.2336355.25)	3334744.48 (2821515.173883701.73)	31582.85 (26893.6936917)	0.400 (0.3800.420)
Republic of Iceland	73774.07 (66108.7482007.35)	28543.58 (25565.1231735.24)	85180.57 (74131.7898445.6)	26499.7 (23133.5230847)	−0.143 (−0.2970.011)
Republic of Indonesia	69024636.88 (59439925.0478379172.53)	36621.33 (31825.8441414.33)	107767679.63 (94432770.18121309355.75)	36825.74 (32315.2341419.18)	0.180 (0.0600.300)
Republic of Iraq	5512863.44 (4524564.056433895.56)	30818 (26136.2935436.83)	13602079.84 (11457848.9415845831.29)	31601.14 (26878.3636770.81)	0.307 (0.2980.315)
Republic of Italy	17706161.96 (15305815.0220094211.98)	30791.09 (26279.5135201.41)	16367600.53 (14327238.6518610818.91)	30602.88 (26501.934852.53)	−0.453 (−0.481- 0.426)
Republic of Kazakhstan	5213989.95 (4424475.266030655.84)	31531.99 (2687136312.48)	6061566.41 (5125557.796994183.69)	32382.07 (27538.2637453.63)	−0.045 (−0.1080.017)
Republic of Kiribati	20505.57 (16860.7424490.3)	27374.94 (22532.9132442.11)	34688.88 (28946.1540364.97)	27723.2 (23220.7432076.91)	0.134 (0.1060.162)
Republic of Korea	17870168.38 (15420466.9320283927.31)	36782.38 (31485.6742269.31)	18998165.21 (16684044.6921390853.31)	36406.89 (31923.0940694.05)	−0.413 (−0.459- 0.368)
Republic of Latvia	829515.61 (709894.68958407.65)	31595.8 (26694.4136456.51)	554201.16 (473681.75645410.41)	31760.33 (26795.9436881.28)	−0.193 (−0.256- 0.131)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Republic of Lithuania	1213471.16 (1068590.961389471.69)	32789.73 (28843.3837392.46)	878306.44 (760351.2995501.56)	33525.8 (28574.2338377.64)	−0.042 (−0.079- 0.005)
Republic of Maldives	68414.81 (56751.2279830.02)	33130.99 (28254.1938153.86)	195580.93 (167496.72226946.32)	33896.63 (29174.5138648.99)	0.704 (0.6360.773)
Republic of Malta	113056.8 (96297.32131493.13)	30381.81 (25698.5935417.73)	126697.28 (110085.71147364.52)	30934.31 (2613835641.65)	−0.180 (−0.234- 0.126)
Republic of Moldova	1406429.08 (1204241.341588824.96)	31589.29 (27008.2535800.8)	1112648.27 (955538.281287854.79)	31414.11 (26436.6436314.8)	−0.055 (−0.1270.016)
Republic of Nicaragua	1162699.18 (959004.81379552.91)	30926.16 (26309.1535873.79)	2193810.89 (1878757.662553062.85)	31619.31 (27173.7836618.81)	0.322 (0.2750.370)
Republic of Panama	759930.99 (656481.96868095.32)	31294.21 (27293.8835723.91)	1428495.1 (1235389.851663567.75)	32741.92 (28321.1838133.81)	0.153 (0.1290.176)
Republic of Paraguay	1179457.46 (979168.111371128.68)	29656.23 (25046.2634540.13)	2146135.32 (1827127.312552016.54)	28899.44 (24559.6734322.04)	0.045 (0.0050.085)
Republic of Peru	6540867.69 (5575962.497706120.83)	30094.83 (25729.5535169.74)	11335356.14 (9744707.1513339124.97)	30517.88 (26267.4735728.82)	0.145 (0.1110.179)
Republic of Poland	12473258.03 (11116408.3813769344.33)	32462.59 (28887.1635860.96)	12299827.23 (11057006.5913544723.53)	33484.03 (29867.1136910.99)	−0.104 (−0.182- 0.026)
Republic of Serbia	2684620.58 (2319666.983115914.4)	27723.99 (23884.7132306.6)	2497131.31 (2161235.262871832.73)	28302.71 (24378.7932441.22)	−0.321 (−0.576- 0.065)
Republic of Singapore	1131972.07 (980691.951291699.17)	32658.01 (27963.4137575.25)	1840224.62 (1541725.692143658.34)	32333.86 (27692.6737440.22)	−0.427 (−0.528- 0.326)
Republic of Slovenia	689555.42 (603597.41791210.48)	34366.61 (29989.3439377.36)	685551.58 (596104.4783826.41)	34224.12 (29377.5139119.92)	−0.297 (−0.335- 0.258)
Republic of Suriname	130628 (110086.23152059.99)	32968.59 (27839.4438421.37)	195494.86 (165848.15225692)	33092.67 (27936.0838381.85)	−0.018 (−0.0490.012)
Republic of Tajikistan	1623948.55 (1364186.211914453.93)	31577.83 (27004.6436814.03)	3222949.25 (2731911.643789664.09)	31728.06 (27169.337076.45)	0.190 (0.1310.249)
Republic of the Marshall Islands	12555.85 (10462.314807.39)	27344.9 (23272.9531888.72)	16449.88 (13559.2719606.63)	27841.88 (23002.4932855.71)	0.101 (0.0740.129)
Republic of the Philippines	21869119.27 (19432791.9724400337.27)	34650.45 (30935.0138343.35)	41405638.36 (37247842.1145526593.31)	35100.14 (31652.9338527.56)	0.187 (0.1540.220)
Republic of the Union of Myanmar	13714211.27 (11678252.9115825498.51)	33310.87 (28776.1138331.15)	18982011.63 (16203214.1721702764.93)	32608.33 (27817.2437380.08)	−0.033 (−0.060- 0.007)
Republic of Trinidad and Tobago	395948.29 (333888.38471815.15)	32443.48 (27645.4338650.7)	424420.84 (368660.03487499.15)	31570.36 (27609.2336288.4)	−0.309 (−0.392- 0.227)
Republic of Uzbekistan	6408200.95 (5375370.47511634.52)	31354.24 (26633.836259.71)	10849931.57 (9231416.8912648953.49)	31694.2 (26909.836683.25)	0.166 (0.0790.253)
Republic of Vanuatu	41506.32 (34263.5949442.96)	27646.59 (23472.3632504.47)	88800.99 (73269.85103913.4)	27825.41 (23075.8632378.55)	0.080 (0.0630.096)
Romania	7025872.08 (6099490.848006292.06)	29678.76 (25713.933793.72)	5979317.12 (5242909.126935070.21)	32151.46 (27999.2137419.26)	0.134 (0.0790.190)
Russian Federation	52019682 (45393179.1458730759.82)	34232.02 (29684.4938541.98)	47825366.96 (42266098.2653785609.39)	33962.8 (29717.0138227.61)	−0.222 (−0.285- 0.158)
Rwanda	1946684.76 (1557669.522361870.36)	28739.63 (24046.8433978.46)	3904275.07 (3198235.624662444.65)	28741.37 (23924.9933724.24)	0.298 (0.2710.325)
Saint Kitts and Nevis	13694.83 (11540.7216255.88)	32640.94 (27724.9538790.97)	20268.48 (17327.5623117.52)	33224.26 (28239.2438060.46)	0.224 (0.1880.260)
Saint Lucia	44669.17 (37544.1851922.09)	32474.07 (27708.9137737.03)	60212.38 (52581.7868444.07)	32860.22 (28480.737574.98)	0.173 (0.1330.212)
Saint Vincent and the Grenadines	32555.48 (27937.8838006.74)	29654.92 (25673.5334635.07)	37428.91 (32507.142934.77)	32049.77 (27817.7536854.39)	0.387 (0.2960.477)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
San Marino	7449.41 (6403.698586.42)	30311.63 (25668.5735126.05)	9459.23 (8046.9910956.76)	31081.01 (26047.5736536.12)	−0.365 (−0.401- 0.328)
Sao Tome and Principe	30795.07 (25216.5136926.65)	27229.82 (22983.2231514.47)	62569.55 (52162.6774035.07)	27770.95 (23554.5432371.28)	0.377 (0.3460.407)
Saudi Arabia	5475920.23 (4628305.296337458.9)	35001.73 (3031940209.59)	14713356.34 (12474552.4916926529.87)	35861.51 (30967.7740787.9)	0.484 (0.4340.535)
Senegal	2035156.3 (1734154.662406074.51)	26711.79 (22975.3931080.68)	4544657.14 (3933658.345322331.55)	26660.95 (22964.9931266.54)	0.168 (0.1410.195)
Seychelles	25027.29 (21280.7728998.33)	33536.72 (28864.838901.77)	36272.36 (31437.3840903.92)	33817.03 (29422.8838266.09)	0.028 (−0.0340.089)
Sierra Leone	1028906.35 (921936.261161823.25)	25781.1 (23124.5428837.52)	2596485.06 (2256907.862997750.72)	27100.39 (23629.1230966.53)	0.606 (0.5470.664)
Slovak Republic	1653935.19 (1414261.641900027.26)	30765.53 (26247.8335339.27)	1680813.38 (1455510.391954794.92)	31688.69 (27266.6636557.75)	−0.001 (−0.0550.053)
Socialist Republic of Viet Nam	22580238.11 (18945522.6526075279.35)	33289.72 (28132.6238190.38)	34181345.29 (29040885.5139761757.05)	33401.19 (28354.5738688.23)	0.107 (−0.0200.235)
Solomon Islands	92404.58 (77475.69109892.79)	27471.98 (23230.1932471.03)	191311.82 (159641.83227931.54)	27421.74 (23044.1232699.62)	0.085 (0.0780.092)
Somalia	2122520.42 (1719222.52562702.68)	28507.22 (23826.6433861.49)	5852212.47 (4756692.857056014.96)	28263.45 (2354633845.18)	0.038 (0.0190.057)
South Africa	10536888.13 (9152702.3912128284.36)	27589.07 (24161.5231551.82)	17443557.27 (15311180.6719774380.92)	29034.48 (25457.7432894.36)	0.297 (0.2320.362)
South Sudan	1648795.96 (1364334.481991741.08)	29067.24 (24499.0134374.86)	2724455.41 (2236933.663234913.68)	29042.18 (24351.233865.87)	0.005 (−0.0150.025)
State of Israel	1634819.11 (14070221901185.53)	32738.56 (28185.2538062.85)	3171581.52 (2770062.373626685.1)	33877.63 (29544.7138748.98)	−0.020 (−0.0570.017)
State of Kuwait	578056.3 (479851.15673906.11)	31509.41 (26607.4736088.13)	1607959.27 (1342757.461882523.68)	31797.6 (26504.2537121.99)	0.136 (0.1040.168)
Sudan	5865801.44 (4831870.16800745.28)	30371.67 (25605.6135384.99)	13931925.33 (11675920.3116180918.72)	31217.21 (26434.5935943.47)	0.285 (0.2570.314)
Swiss Confedera- tion	2007998.04 (1702018.412340713.89)	29534.29 (25451.8134175.39)	2591728.93 (2250515.582923965.54)	30926.73 (26745.2735184.92)	−0.028 (−0.0810.026)
Syrian Arab Republic	3777845.42 (3113168.554443860.97)	30581.68 (26040.735366.16)	4439559.94 (3772417.335203006.85)	30867.99 (26251.6336053.93)	0.254 (0.1990.310)
Taiwan (Province of China)	3028395.49 (2380864.913798365.39)	13545.75 (10638.6216938.92)	3040921.68 (2428448.993633126.85)	13329.27 (10258.6316272.28)	−0.332 (−0.416- 0.248)
Togo	976939.6 (857099.131112905.63)	27408.43 (24347.9530903.61)	2380170.22 (2081368.832769313.62)	26758.76 (23492.6130861.31)	0.102 (0.0770.126)
Tokelau	438.02 (365.02515.41)	27578.01 (23166.3632321.56)	390.65 (326.5453.51)	27893.45 (23297.5632488.83)	0.087 (0.0560.119)
Tunisia	2578877.08 (2153380.083015282.41)	30422.05 (25551.7735454.39)	3729260.52 (3217271.24240119.15)	31266.58 (26957.6335629.54)	0.027 (−0.0420.096)
Turkey	17998399.43 (1509357821281515.79)	30670.22 (25956.4836152.45)	26849705.36 (22637078.730838309.84)	31286.85 (26240.0236020.46)	0.125 (0.0810.170)
Turkmenistan	1133277.63 (954973.341335776.3)	31072.56 (26578.2935974.49)	1687631.25 (1441059.141914439.37)	32238.97 (27706.6136584.77)	0.206 (0.1700.243)
Tuvalu	2555.18 (2136.813011.8)	27780.93 (23257.7132669.04)	3493.16 (2917.644181.1)	27614.75 (23053.3232795.58)	0.168 (0.1470.190)
Uganda	4549959.19 (3731489.025603133.84)	28946.61 (24173.7933896.32)	12075380.54 (9768794.9214800844.05)	28906.15 (23808.6834463.86)	0.188 (0.1370.239)
Ukraine	18012711.28 (15663677.8520686385.24)	34218.8 (29644.0739319.49)	14490003.51 (12610643.9116420587.51)	34097.11 (29311.0738751.83)	−0.078 (−0.150- 0.007)

Table 1 (continued)

	Number of incidence cases (95% UI) in 1990	The age- standardized incidence rate/100000 (95% UI) in 1990	Number of incidence cases (95% UI) in 2021	The age- standardized incidence rate/100000 (95% UI) in 2021	EAPC (95% CI)
United Arab Emirates	636124.4 (528140.69751469.52)	31712.78 (26681.0236844.45)	3199827.79 (2644240.043866375.61)	31432.54 (26620.2636584.71)	0.134 (−0.0740.343)
United Kingdom of Great Britain and Northern Ireland	18004745.9 (16092139.1820006300.21)	31921.11 (28444.0835529.57)	20389092.54 (18474169.5822436033.9)	32000.49 (28730.2235382.81)	−0.137 (−0.158-0.117)
United Mexican States	27076842.15 (22825282.5331385284.53)	31035.09 (26594.8535305.88)	40931982.67 (35415668.0346383946.61)	30231.54 (26119.2434396.02)	−0.023 (−0.0620.017)
United Republic of Tanzania	4987540.12 (4195489.796013410.34)	21113.39 (17963.7925266.55)	13619612.1 (10857183.4917128633.21)	23097.07 (18919.6728281.79)	0.152 (−0.0160.321)
United States of America	83748055.96 (73482646.8693841115.29)	32268.24 (28022.736310.08)	101507986.65 (89016022.09114045089.76)	31288.5 (27299.1235234.37)	−0.147 (−0.243-0.051)
United States Virgin Islands	35118.15 (30104.9340361.58)	32901.14 (28179.6237864.49)	28060.47 (24296.7531882.05)	33397.41 (28520.9837981.15)	0.029 (0.0060.051)
Yemen	3388811.38 (2650506.824132489.6)	26633.22 (21810.8932488.95)	9396526.68 (7453457.6311445659.96)	27264.43 (22389.9332435.34)	0.522 (0.3150.729)
Zambia	2171056.94 (1864487.982505523.46)	26284.79 (22807.7530305.41)	5653750.83 (4846226.976677009.55)	26607.99 (23131.6130968.93)	0.149 (0.1180.181)
Zimbabwe	2395501.11 (1942660.772990960.13)	24042.32 (20126.2428729.55)	3730601.17 (3092410.934553541.82)	23749.74 (19829.7328432.77)	0.032 (−0.0170.080)

(Figure S11 and S12, Table 4). These statistical trends highlight a concerning upward trajectory in the global burden of dental caries. However, it is crucial to interpret these trends within the context of broader systemic factors and public health interventions, as they provide a comprehensive view of the oral health landscape.

Frontier analysis for ASRs of caries of permanent teeth

Figure 5 presents the unrealized health advancements in the ASRs of caries of permanent teeth, stratified by sociodemographic development levels across various countries and regions from 1990 to 2021. Our analysis uncovered distinct patterns and disparities in the effectiveness of oral health interventions across these strata. Notably, as sociodemographic development progresses, the disparities in caries burden generally widen, indicating a greater potential for improvement among higher SDI nations or regions in 2021. This finding underscores the complex interplay between societal advancement and oral health outcomes, emphasizing the need for targeted interventions tailored to the unique challenges faced by each developmental tier.

Discussion

As far as we know, this was the first study to systematically examine and quantify the global disease burden of caries in permanent teeth. In 2021, it generated a substantial global burden, with considerable disparities

across sexes, ages, SDI regions, GBD regions, and countries. Despite global improvements between 1990 and 2021, our forecasted results indicated that the disease burden would rise over the next 25 years. Notably, countries or regions with higher SDIs have greater potential for further improvement in reducing this burden.

Our findings are consistent with previous studies that have documented the global burden of dental caries and emphasized the need for continued efforts to address this prevalent oral health issue [13, 14]. The observed variations in ASIR, ASPR, and ASR of DALYs highlight the complexity of dental caries epidemiology and underscore the importance of considering multiple metrics when assessing disease burden. Future research endeavors should focus on identifying the underlying factors driving these trends, including socioeconomic status [15], access to oral healthcare [16], and lifestyle habits [17]. Specifically, studies could explore innovative approaches such as the use of teledentistry to improve access to care in underserved areas [18], or the development of new materials and technologies for preventive and restorative treatments [19]. Additionally, future research should evaluate the efficacy of current prevention and treatment strategies, such as fluoride varnishes [20], sealants [21], and community-based oral health programs [5]. By investigating these and other potential areas, researchers can further diminish the burden of caries affecting permanent teeth globally.

Table 2 The number of prevalence cases and the age-standardized prevalence rate attributable to caries of permanent teeth in 1990 and 2021 and its trends from 1990 to 2021 globally

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Global	1466379652 (1255303081–1731120376)	28331.49 (24315.34–33176.93)	2242874758 (1957579677–2599622169)	27543.34 (23976–32018.09)	–0.03 (–0.09–0.02)
Sex					
Female	739208373 (635939946–870333401)	28608.32 (24676.38–33424.08)	1131593062 (987306930–1307857024)	27791.06 (24168.74–32248.26)	–0.04 (–0.09–0.02)
Male	727171279 (618718834–861119940)	28074.42 (24020.35–32950.07)	1111281696 (969787614–1294372241)	27300.85 (23802.34–31795.78)	–0.03 (–0.09–0.02)
Age					
5–9 years	55416038 (28021830–93384444)	9496.68 (4802.12–16003.35)	55379924 (27717494–92230407)	8060.5 (4034.26–13424.05)	–0.31 (–0.41–0.21)
10–14 years	140958095 (89958536–202288610)	26313.73 (16793.25–37762.77)	159921741 (104132819–227775562)	23989.37 (15620.64–34167.91)	–0.17 (–0.25–0.1)
15–19 years	159711515 (107820398–224195102)	30747.84 (20757.71–43162.3)	191675831 (133141672–261959958)	30718.27 (21337.49–41982.12)	0.06 (–0.01–0.13)
20–24 years	193867942 (139170619–253450448)	39397.01 (28281.66–51505.12)	227158647 (171124875–291991568)	38039.95 (28656.54–48896.86)	–0.1 (–0.14–0.06)
25–29 years	168638646 (117310984–243886546)	38100.13 (26503.79–55100.7)	222643418 (163275553–312496950)	37842.44 (27751.75–53114.74)	0.03 (–0.03–0.09)
30–34 years	136863076 (99229572–193310540)	35509.88 (25745.66–50155.49)	212736036 (157293774–292579430)	35193.22 (26021.33–48401.82)	0.08 (0.01–0.15)
35–39 years	125051896 (81023358–171405486)	35501.45 (23002.02–48660.94)	203269766 (138829361–272800884)	36242.12 (24752.67–48639.22)	0.1 (0.06–0.14)
40–44 years	102668400 (67696732–139434387)	35837.69 (23630.39–48671.32)	182511550 (124569447–245436967)	36484.01 (24901.4–49062.78)	0.05 (0–0.1)
45–49 years	82854572 (57720108–110221346)	35683.11 (24858.41–47469.2)	166093147 (117776761–218822172)	35077.41 (24873.41–46213.31)	–0.03 (–0.1–0.04)
50–54 years	75486159 (48573311–101360977)	35510.96 (22850.34–47683.25)	150592841 (101561982–201238711)	33846.95 (22826.87–45230.01)	–0.08 (–0.14–0.02)
55–59 years	64686143 (44785636–86993622)	34927.73 (24182.31–46972.81)	131690603 (93240164–175095035)	33278.06 (23561.68–44246.31)	–0.09 (–0.13–0.05)
60–64 years	55693880 (41859014–73643584)	34676.64 (26062.64–45852.65)	107647898 (81097596–141060948)	33634.94 (25339.21–44074.96)	–0.12 (–0.16–0.07)
65–69 years	42235053 (31580269–52514909)	34168.14 (25548.42–42484.54)	89463085 (67985743–110428254)	32432.71 (24646.61–40033.13)	–0.13 (–0.19–0.07)
70–74 years	28042675 (19438484–35155855)	33123.43 (22960.33–41525.37)	65332724 (47108018–81027531)	31739.69 (22885.83–39364.48)	–0.09 (–0.14–0.03)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
75–79 years	19114009 (14447893–24105659)	31051.66 (23471.32–39160.84)	38820745 (30584007–48419386)	29435.43 (23190.01–36713.5)	–0.09 (–0.14–0.03)
80–84 years	10185393 (7226910–13528889)	28791.88 (20428.89–38243.21)	23307466 (16985304–30296495)	26611.84 (19393.37–34591.73)	–0.15 (–0.2–0.1)
85–89 years	3851605 (2582027–5308873)	25488.63 (17086.99–35132.34)	10523631 (7255281–14034347)	23016.66 (15868.32–30695.1)	–0.26 (–0.3–0.22)
90–94 years	902099 (533970–1334568)	21051.57 (12460.82–31143.74)	3372581 (2115080–4791980)	18852.43 (11823.11–26786.74)	–0.34 (–0.4–0.28)
95 + years	152456 (85501–238909)	14974.78 (8398.16–23466.51)	733124 (439842–1108716)	13451.05 (8070.03–20342.27)	–0.27 (–0.39–0.15)
SDI region					
High-middle SDI	310012322 (261811414–366835272)	28281.67 (24070.1–33146.27)	379284830 (328955920–436467219)	26691.98 (23040.41–31381.8)	–0.2 (–0.21–0.18)
High SDI	237447100 (207466051–273319204)	25313.92 (22122.01–29368.4)	278799405 (248570842–314093138)	23472.19 (20786.3–26991.46)	–0.22 (–0.27–0.17)
Low-middle SDI	321852938 (272830206–382011614)	31661.78 (27493.71–36853.24)	566930051 (488469072–668027835)	29891.17 (25921.28–34837.22)	–0.06 (–0.17–0.06)
Low SDI	136548862 (117999590–157470597)	33092.46 (29245.6–37734.65)	310714532 (267852988–360694838)	31719.14 (27960.28–36261.48)	–0.1 (–0.16–0.04)
Middle SDI	458696797 (384654425–549466408)	27336.24 (23133–32332.31)	704937398 (607791505–824675289)	27257.52 (23565–31966.2)	0.06 (–0.01–0.13)
GBD region					
Advanced Health System	404607923 (353344981–465780912)	29023.38 (25368.27–33549.78)	450153393 (399506202–508283296)	26974.56 (23784.11–30944.28)	–0.23 (–0.25–0.2)
Africa	165668688 (141358584–193880123)	30838.27 (26727.14–35688.91)	362229796 (308949982–425098891)	29042.81 (25212.74–33603.47)	–0.2 (–0.22–0.19)
African Region	128730956 (109801308–150025438)	30135.59 (26124.61–34637.86)	293881006 (250731936–344987376)	28669.68 (24920.45–33124.78)	–0.18 (–0.19–0.16)
America	197589762 (168834757–233618101)	27779.64 (23839.07–32646.74)	303443907 (264694605–348233396)	27878.84 (24286.85–32259.84)	0.07 (0.05–0.08)
Andean Latin America	15119429 (12855413–17574944)	43349.54 (37668.29–49452.77)	28568864 (24766242–32587080)	42661.55 (37126.88–48436.02)	–0.13 (–0.16–0.1)
Asia	803597282 (675398143–964893376)	26031.66 (22095.47–30843.75)	1267510559 (1095430104–1489872130)	26093.39 (22560.27–30756.11)	0.09 (0–0.19)
Australasia	6477118 (5717186–7408125)	29940.94 (26492.07–34316.49)	8820199 (7359582–10407446)	25919.86 (21527.97–31390.2)	–0.16 (–0.38–0.06)
Basic Health System	591513973 (491611309–711549438)	25834.81 (21714.66–30740.94)	856411433 (736410947–1005012163)	25818.45 (22195.54–30512.93)	–0.02 (–0.05–0.02)
Caribbean	12792002 (11071594–14738717)	37368.53 (32435.18–42702.97)	17228511 (15485915–19169056)	34955.75 (31393.59–39072.76)	–0.16 (–0.19–0.13)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Central Africa	17556528 (14466778–21111561)	32385.96 (27194.18–38198.78)	47303640 (38442176–57193750)	32921 (27152.85–38931.03)	0.02 (–0.02–0.06)
Central Asia	23824101 (20056646–27778380)	36806.86 (31322.32–42521.73)	34920647 (29814943–40866997)	36158.48 (30985.72–42091.57)	–0.09 (–0.12–0.05)
Central Europe	50944530 (44755445–57424167)	39100.51 (34287.27–44110.93)	44314432 (38624122–49622538)	35601.05 (31052.06–40315.69)	–0.25 (–0.29–0.21)
Central Latin America	44896537 (37651773–53315893)	30308.39 (25882.66–35428.98)	76711304 (65441629–90046727)	29071.05 (24810.54–34084.22)	0.08 (0–0.17)
Central Sub-Saharan Africa	14150377 (11707079–17138145)	31647.57 (26593.44–37448.66)	37667625 (30735781–45913529)	32084.16 (26431.21–38158.94)	0.01 (–0.04–0.05)
Commonwealth High Income	34730355 (30772648–39599763)	28781.6 (25375.24–33110.8)	42287598 (37404050–47821657)	25900.16 (22693.41–29919.01)	–0.27 (–0.36–0.19)
Commonwealth Low Income	56027959 (46381406–67434405)	32670 (27820.52–38259.82)	112099598 (94369940–133829476)	30917.09 (26148.19–36488.18)	–0.22 (–0.25–0.2)
Commonwealth Middle Income	325466984 (279017759–382929490)	31516.35 (27551.07–36451.61)	614787840 (535419460–716985402)	29537.13 (25873.12–34175.15)	0.02 (–0.16–0.21)
East Asia	252554877 (198509122–315053570)	19592.17 (15554.4–24115.63)	303804945 (257882732–364722705)	19407.08 (16361.51–23723.11)	–0.05 (–0.08–0.01)
East Asia & Pacific—WB	424621162 (346937614–515954480)	22047.51 (18338.18–26623.23)	552809117 (471216557–654986662)	21994.08 (18719.16–26396.13)	–0.03 (–0.07–0.01)
Eastern Africa	47977490 (41649016–55012773)	33325.21 (29356.96–37630.33)	109691600 (95124747–126892560)	31767.23 (27939.66–36132.44)	–0.23 (–0.26–0.2)
Eastern Europe	74128899 (63053026–86128432)	31120.81 (26487.25–36349.45)	69442629 (59343333–79717456)	30409.55 (26109.31–35460.72)	–0.09 (–0.12–0.06)
Eastern Mediter-ranean Region	104803782 (88906685–123587380)	31977.4 (27579.08–37214.18)	226523986 (192862706–268615266)	31056.84 (26860.97–36230.62)	–0.11 (–0.12–0.09)
Eastern Sub-Saharan Africa	53047531 (46226799–60417960)	34007.05 (30162.54–38151.75)	119153742 (102701543–137891892)	31658.72 (27830.96–36022.36)	–0.25 (–0.27–0.23)
Europe	296266968 (261012522–336488401)	34785.08 (30518.52–39693.76)	306094853 (272316471–341647095)	32455.27 (28679.51–37043.14)	–0.22 (–0.23–0.21)
Europe & Central Asia—WB	312440452 (275418551–355615853)	34884.66 (30577.04–39858.36)	332133940 (294949658–371114419)	32800.49 (28920.18–37508.71)	–0.19 (–0.2–0.19)
European Region	315502664 (278162026–359080458)	34944.58 (30618.87–39928.57)	337077234 (299492610–376696923)	32870.14 (28987.7–37574.65)	–0.19 (–0.2–0.18)
High-income Asia Pacific	30828511 (26231030–36628219)	16799.84 (14260.9–19941.81)	25622355 (22442103–29246795)	14590.94 (12662.87–17035.46)	–0.41 (–0.48–0.34)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
High-income North America	60110740 (50211957–72376313)	20321.2 (16925.02–24447.62)	76334637 (65609274–87749990)	19279.64 (16329.48–22885.58)	−0.06 (−0.15–0.03)
Latin America & Caribbean—WB	138822203 (118561077–162384573)	33924 (29435.42–39162.93)	228388465 (199799420–261604229)	32945.69 (28802.12–37747.23)	−0.04 (−0.06–0.01)
Limited Health System	429009714 (364531626–505382486)	31642.43 (27619.65–36589.36)	836042203 (727030966–975954838)	30003.74 (26205.04–34676.92)	−0.01 (−0.15–0.14)
Middle East & North Africa—WB	78251396 (66525104–91773941)	34328.16 (29869.69–39523.13)	157740959 (135426950–184557845)	32869.22 (28639.06–38019.24)	−0.15 (−0.17–0.13)
Minimal Health System	39426410 (33188372–46210232)	35779.63 (30712.82–41267.3)	98059186 (81460543–116203876)	34741.78 (29637.32–40507.06)	−0.1 (−0.11–0.08)
North Africa and Middle East	107433971 (91433928–125961996)	35477.31 (30514.88–40783.05)	211987205 (182573238–248322004)	33924.85 (29422.72–39163)	−0.18 (−0.22–0.14)
North America	60120719 (50221598–72386632)	20324.7 (16928.09–24451.62)	76345757 (65619994–87762209)	19282.21 (16331.55–22888.47)	−0.06 (−0.15–0.03)
Northern Africa	36263392 (30625722–43081197)	33034.03 (28293.3–38667.95)	62679948 (53510600–74110736)	30247.58 (26035.17–35379.12)	−0.27 (−0.32–0.23)
Oceania	2393696 (2024953–2819214)	40302.13 (34541.53–46891.24)	5210674 (4426925–6204793)	39790.6 (33924.14–46817.45)	−0.03 (−0.05–0.01)
Region of the Americas	197589762 (168834757–233618101)	27779.64 (23839.07–32646.74)	303443907 (264694605–348233396)	27878.84 (24286.85–32259.84)	0.07 (0.05–0.08)
South-East Asia Region	379281702 (322039232–447906409)	32505.23 (28291.43–37651.5)	656690887 (568776195–765137758)	30699.64 (26711.91–35550.97)	0.01 (−0.18–0.19)
South Asia	310442858 (264458609–366002107)	32579.46 (28395.36–37753.52)	574075748 (497715820–671059371)	30710.95 (26737.41–35651.64)	0.05 (−0.15–0.24)
South Asia—WB	319556990 (272150428–376842892)	32647.91 (28474.79–37825.55)	591882420 (513492638–692002568)	30834.61 (26878.83–35796.73)	0.04 (−0.15–0.24)
Southeast Asia	138113503 (115912644–163825104)	31837.48 (27196.44–37118.2)	216616958 (184944503–253360017)	29770.01 (25477.06–34652.21)	−0.31 (−0.42–0.21)
Southern Africa	25512200 (21723525–29832160)	31460.83 (27120.43–36223.13)	49170273 (41405969–58058377)	29023.55 (24873.41–33857.23)	−0.12 (−0.17–0.08)
Southern Latin America	20229204 (17600581–23335394)	41401.82 (36063.88–47631.91)	30610301 (27568459–33619972)	41968.62 (37634.39–46385.41)	0.04 (−0.04–0.12)
Southern Sub-Saharan Africa	12381387 (10323122–14858195)	26565.18 (22329.16–31459.36)	20271625 (17089338–24542143)	25097.02 (21334.22–29965.67)	−0.06 (−0.1–0.03)
Sub-Saharan Africa—WB	129837959 (110580836–151245727)	30310.97 (26280.48–34919.79)	300406127 (256140792–352088234)	28850.76 (25047.38–33308.83)	−0.17 (−0.19–0.16)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Tropical Latin America	46241724 (39027956–54788001)	31755.44 (27076.58–37097.08)	75877389 (65469946–87924720)	31305.59 (26932.19–36281.54)	–0.08 (–0.12–0.03)
Western Africa	38359079 (32664068–45282958)	26039.79 (16940.46–30460.25)	93384336 (80351676–109427859)	24544.54 (21282.78–28363.23)	–0.22 (–0.23–0.2)
Western Europe	147020642 (131014898–165909044)	34683.64 (30754.37–39461.56)	157664938 (141786027–175170206)	31592.48 (28227.43–35779.98)	–0.29 (–0.35–0.24)
Western Pacific Region	334336277 (270028233–408105311)	20730.65 (16940.46–25177.56)	418399970 (357762610–497292046)	20704.97 (17583.17–24999.72)	–0.03 (–0.06–0)
Western Sub-Saharan Africa	43248016 (36587101–51152340)	26638.41 (22793.55–31148.44)	107970027 (92376764–127107051)	25347.7 (21995.91–29425.88)	–0.19 (–0.2–0.18)
World Bank High Income	304829637 (267874801–349934208)	27805.61 (24431.37–32194.15)	346069178 (308734862–388902139)	25607.78 (22710.94–29368.79)	–0.24 (–0.29–0.2)
World Bank Low Income	86221913 (73968234–99678691)	33209.26 (28930.63–38044.79)	197621702 (169063074–230050949)	32322.46 (28052.73–37091.16)	–0.08 (–0.08–0.07)
World Bank Lower Middle Income	561262913 (477700893–664189104)	31757.46 (27583.85–36770.72)	1020909829 (883714754–1191980280)	30029.47 (26136.6–34682.23)	–0.08 (–0.2–0.05)
World Bank Upper Middle Income	512235189 (423297000–615561123)	25314.6 (21187.14–30227.6)	676057402 (579586103–792838237)	25005.34 (21357.4–29692.81)	–0.03 (–0.05–0)
Country					
Afghanistan	3386219.98 (2828103.663960871.9)	39326.45 (33897.1145311.93)	10369914.3 (8691178.5912275814.95)	39316.36 (34146.3345080.81)	–0.040 (–0.0910.011)
American Samoa	16582.2 (13626.6519852.58)	37352.29 (30942.3144087.63)	19310.33 (16168.3822745.04)	37996.76 (31911.4844492.06)	0.388 (0.3520.424)
Angola	2606839.98 (2139972.573203684.83)	31067.53 (26163.9837056.27)	7986372.11 (6320808.849815398.79)	29948.14 (24026.7736139.01)	–0.262 (–0.302–0.222)
Antigua and Barbuda	21639.97 (18435.8525197.7)	36270.33 (31008.8741946.69)	34191.24 (29372.7939690.75)	34820.8 (29758.9240454.01)	0.242 (0.2280.256)
Arab Republic of Egypt	16244706.95 (13258350.6519822667.44)	32423.84 (26833.7238929.01)	31015607.63 (25405005.5438035079)	30753.4 (25620.0737026.87)	–0.148 (–0.215–0.082)
Argentina	13425984.93 (11511339.1515510125.9)	41132.79 (35400.9247499.49)	20237458.9 (17514650.6122998002.2)	41729.71 (35948.8147651.76)	0.347 (0.3230.370)
Australia	5633045.16 (4989428.536411667.66)	31277.64 (27782.3835580.12)	7494548.21 (6229075.938873101.35)	26407.12 (21843.2531996.39)	–0.176 (–0.4700.119)
Bangladesh	28869577.31 (23476343.9535826780.71)	32243.75 (26477.4938855.32)	51687448.67 (43013506.7862365339.82)	30972.14 (25880.4537235.72)	0.540 (0.5260.555)
Barbados	94919.17 (81268.43110656.14)	36127.01 (3072041984.73)	117672.46 (102060.51133165.13)	35806.79 (30961.7841017.79)	0.118 (0.0940.143)
Belize	61339.95 (52313.3871470.48)	38156.72 (32757.6543758.77)	137308.77 (115474.49160860.19)	31241.15 (26383.8236460.94)	0.088 (–0.0100.185)
Benin	1249373.82 (1011341.531520852.89)	33077.83 (27521.9139186.34)	3652170.25 (2929564.094437289.72)	32222.68 (26462.1538277.1)	0.098 (0.0700.125)
Bermuda	22579.65 (19000.3426194.97)	34810.15 (29263.0639968.69)	23183.1 (19768.9826840.1)	33294.85 (28382.3538740.69)	–0.159 (–0.176–0.142)
Bhutan	170784.36 (138363.97208825.3)	31583.23 (26183.2237791.89)	231823.14 (185366.92282321.05)	29379 (23718.7935192.63)	0.417 (0.4000.435)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Bolivarian Republic of Venezuela	6600932.11 (5609343.137676402.06)	38963.42 (33898.444307.27)	10875687.11 (9340578.9912302470.13)	38881.19 (33495.2744206.22)	0.430 (0.4020.458)
Bosnia and Herzegovina	2122982.01 (1825747.582409406.92)	45111.46 (38838.6751117.75)	1383461.84 (1188623.31565645.82)	38620.96 (33298.5644245.48)	−0.402 (−0.421-0.383)
Botswana	308062.55 (246411.55380581.47)	27564.49 (22289.4333180.63)	636390.74 (509374.58769839.91)	25922.29 (20946.2230879.1)	0.433 (0.4020.464)
Brunei Darussalam	43615.72 (3591253355.76)	16275.32 (13568.9419506.86)	82289.21 (66191.8101518.84)	16520.26 (13486.0220024.69)	0.284 (0.2610.306)
Burkina Faso	2428345.64 (1982137.852927932.64)	32346.16 (27085.2538267.61)	5909581.7 (4776132.57206475.57)	31315.96 (25958.8437183.51)	−0.207 (−0.300-0.113)
Burundi	1677639.43 (1372657.32012099.57)	37118.56 (31448.8443367.69)	4249004.46 (3468863.715107441.07)	37711.16 (31437.9543909.96)	0.165 (0.1350.195)
Cabo Verde	96729.66 (80131.3115859.5)	32732.69 (27377.2938856.8)	178620.51 (146568.41216920.41)	30460.93 (25308.3136553)	0.546 (0.5190.573)
Cameroon	2702336.76 (2158983.083323552.82)	31764.22 (25652.2238037.42)	8855152.05 (6961375.7310682360.73)	31890.91 (25853.737607.86)	0.115 (0.0690.161)
Canada	5778177.02 (4573791.947193766.43)	19588.81 (15631.524218.45)	7667165.06 (6343672.529161869.36)	18819.02 (15577.3722936.73)	−0.109 (−0.134-0.084)
Central African Republic	740440.46 (608398.71889675.14)	32841.12 (27291.8338703.28)	1583917.03 (1308950.321916890.98)	33191.02 (28191.8439250.16)	0.196 (0.1790.213)
Chad	1600648.8 (1320318.361929853.7)	33607.91 (28270.4239591.21)	4452794 (3608227.775417322.42)	32487.2 (26942.7938229.96)	−0.262 (−0.295-0.229)
Commonwealth of Dominica	25637.18 (21894.229564.03)	37436.81 (32053.1242864.6)	26095.19 (22122.7729788.29)	35974.1 (30605.8441169.57)	0.339 (0.3160.361)
Commonwealth of the Bahamas	99076.02 (84751.57115229.52)	38843.13 (33646.9744393.91)	160517.26 (137858.74182388.34)	37926.24 (32575.0543103.15)	0.048 (−0.0260.121)
Comoros	127657.28 (111592.17146748.54)	32720.27 (28810.6337144.47)	215978.76 (183385.18257797.97)	29147.38 (24818.5734529.1)	0.340 (0.2760.404)
Congo	620029.78 (491807.5755296.99)	30562.51 (24638.1236466.51)	1533744.91 (1220297.441876748.78)	30180.41 (24424.635981.78)	0.182 (0.1360.228)
Cook Islands	6911.45 (5797.68270.95)	37944.64 (32325.5744902.99)	6890.52 (5860.558056.51)	36688.94 (30796.2543222.71)	0.210 (0.1930.228)
Czech Republic	4265253.28 (3606712.54884745.34)	39271.61 (33343.9145452.2)	4222924.38 (3580117.364797782.4)	37490.68 (32084.3543251.99)	−0.205 (−0.272-0.138)
Democratic People's Republic of Korea	2658293.82 (2044915.633514183.94)	12621.53 (9862.2216488.28)	3937900.91 (3081990.825001842.43)	13769.05 (10691.1117708.05)	0.112 (0.0410.184)
Democratic Republic of the Congo	9833120.55 (8124122.3911876020.29)	31886.19 (26683.6837673.38)	25691316.75 (21117321.1631254458.91)	33031.73 (27228.5439036.15)	0.739 (0.6300.848)
Democratic Republic of Timor-Leste	266267.67 (223390.81311294.91)	39739.37 (34255.0745634.94)	480957.64 (404566.72562681.18)	37281.08 (31757.5243133.59)	0.262 (0.2190.305)
Democratic Socialist Republic of Sri Lanka	5666932.43 (4734122.086802278.64)	33772.28 (28401.9739601.5)	7262153.29 (6114808.448549570.06)	30817.4 (25771.136557.61)	0.228 (0.1170.340)
Djibouti	119495.95 (104179.72138822.52)	32233.08 (28307.8136637.3)	354770.08 (295154427223.67)	28031.58 (23745.8133367.5)	−0.101 (−0.135-0.067)
Dominican Republic	2484411.19 (2104272.632904026.56)	37640.98 (32253.6143262.96)	3997043.61 (3482238.854640176.93)	35365.64 (30765.540789.81)	0.076 (0.0160.136)
Eastern Republic of Uruguay	1336171.82 (1174978.071518991.91)	41424.02 (36296.247280.14)	1511757.38 (1342747.371717169.38)	40711.53 (35714.3546536.93)	0.183 (0.1590.207)
Equatorial Guinea	108705.44 (89637.18130039.3)	31991.3 (26648.5137575.06)	385777.23 (309550.96475912.87)	27748.07 (22708.733321.47)	0.150 (0.1340.165)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Eritrea	1154313.06 (983954.111367810.87)	41047.54 (36136.4947189.12)	2517723.89 (2126340.342979959.78)	41494.85 (35788.3247683.06)	−0.235 (−0.392-0.077)
Eswatini	182940.9 (144323.94226074.52)	27957.42 (22764.533627.2)	297198.33 (240127.48364392.2)	26918.35 (22136.1332510.06)	0.417 (0.3770.458)
Ethiopia	12359263.62 (10926036.2514068323.73)	30348.39 (27129.6834199.96)	27344701.77 (23981618.5931489877)	28174.73 (24905.5132125.63)	0.441 (0.4290.453)
Federal Republic of Germany	29917235.65 (25829889.0534854379.9)	32912.81 (28352.1438381.56)	26111218.34 (21767391.4530519240.02)	28270.29 (24108.0933301.22)	0.072 (0.0610.082)
Federated States of Micronesia	37503.77 (31757.0244461.01)	40843.43 (35474.4647322.13)	41454.56 (35688.848968.98)	40132.67 (34835.4347078.21)	−0.607 (−0.664-0.551)
Federative Republic of Brazil	44800723.82 (37727485.5553171396)	31552.07 (26864.1136926.15)	72853873.4 (62665716.0984492498.21)	30940.85 (26571.0535900.69)	0.384 (0.3680.399)
French Republic	26608082.47 (24188833.3429442917.26)	42606.59 (38868.2547126.04)	29886842.27 (26444980.0133384097.96)	39059.83 (33723.7344577.86)	0.264 (0.2130.315)
Gabon	241240.68 (195003.84297142.37)	28290.41 (22903.6434197.33)	486497.19 (397404.34593530.86)	28314.39 (23653.8234066.75)	−0.035 (−0.062-0.008)
Gambia	259482.87 (205006.92318147.34)	32262.88 (26128.9438503.96)	683960.8 (554142.02823950.37)	32348.48 (2632238249.44)	0.241 (0.2150.266)
Georgia	2072322.4 (1759563.992410893.03)	36208.54 (30605.5742347.13)	1384534.9 (1173468.411587062.15)	36155.7 (30402.8442138.42)	0.145 (0.1090.182)
Ghana	3554177.71 (2859985.044398435.82)	28131.49 (22959.4734123.49)	8572845.4 (6872457.1510464275.39)	26905.24 (22058.3432426.84)	−0.017 (−0.1140.081)
Grand Duchy of Luxembourg	151323.08 (129366.86173139.48)	35046.08 (29681.0340638.96)	248675.99 (211532.75285096.38)	33273.07 (28133.6738678.75)	0.076 (0.0250.128)
Greenland	11221.69 (8995.1314098.38)	18830.39 (15379.5323112.02)	10865.3 (8752.8213043.73)	18125.08 (14618.7221972.12)	−0.071 (−0.115-0.027)
Grenada	29645.45 (25447.3334197.77)	37840.66 (32487.8243273.47)	39557.03 (34289.245403.61)	35811.33 (31015.1441182.79)	−0.060 (−0.095-0.025)
Guam	48814.69 (40433.0458651.97)	35868.69 (30142.5942457.53)	58732.49 (48202.1868721.71)	35551 (29011.8441788.11)	0.392 (0.3430.442)
Guinea	1600176.89 (1308615.031929249.75)	32707.3 (27236.4338905.54)	3676878.38 (3018413.134486229.02)	32540.05 (27182.2338776.58)	0.116 (0.0980.134)
Guinea-Bissau	335993.57 (286462.89402003.38)	40579.82 (35137.1946900.98)	697536.14 (589029.74826106.62)	39349.69 (34156.9345730.24)	0.021 (−0.0050.047)
Hashemite Kingdom of Jordan	1223300.36 (1013417.291462510.6)	37599.61 (32122.343925.27)	4515034.11 (3793226.725359143.81)	36380.86 (30706.3242528.71)	0.089 (0.0610.118)
Hellenic Republic	4881208.26 (4425735.015400391.69)	43280.26 (39179.0247841.58)	4547904.1 (3962818.455121709.83)	37619.27 (32253.643327.99)	0.274 (0.2260.322)
Hungary	4112494.49 (3506667.524740633.85)	37470.63 (31591.3343299.53)	3569974.34 (3000598.974125068.75)	34910.22 (29659.6841093.14)	−0.133 (−0.202-0.064)
Independent State of Papua New Guinea	1501700.44 (1268059.891778725.52)	40655.59 (34964.8147464.21)	3887172.78 (3288325.524658225.66)	39925.45 (34099.6947082.73)	−0.232 (−0.265-0.198)
Independent State of Samoa	61122.28 (51214.0972153.48)	40214.6 (34295.8247007.49)	78833.96 (67933.9492462.55)	39651.5 (34213.3146073.58)	0.101 (0.0760.126)
India	252092740.7 (216680467.29295774383.1)	33443.05 (29295.3638509.09)	457442136.97 (400192193.1529122514.21)	31414.86 (27600.636238.98)	0.045 (0.0340.056)
Ireland	1379325.7 (1181568.41607522.31)	37517.01 (32040.643638)	1885154.4 (1598315.072182485.02)	34152.95 (28680.8939859.54)	0.585 (0.3430.828)
Islamic Republic of Iran	15701574.1 (13550378.0618146124.31)	32059.87 (28112.7336505.73)	28067972.48 (24281032.4532187568.32)	31184.5 (27490.5935341.85)	−0.076 (−0.113-0.039)
Ivoire	3179483.42 (2547948.753934150.73)	31777.57 (26196.2838107.38)	7619289.16 (6093190.389269910.06)	31096.54 (25622.0636752.21)	0.512 (0.2830.741)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Jamaica	834151.95 (715711.9966781.41)	37432.11 (32253.3842952.36)	1101422.43 (946276.531262459.31)	36344.06 (31249.3341647.75)	0.378 (0.3660.391)
Japan	19599797.2 (16638127.0523335189.4)	15088.81 (12752.7217872.64)	13027573.81 (11394520.9614802488.82)	11763.65 (10209.3713635.36)	-1.358 (-1.539-1.177)
Kenya	5105739.84 (4348573.026013889.79)	27073.76 (23436.7631121.97)	11992831.14 (10321755.3814051272.16)	25546.42 (22322.3129262.63)	0.279 (0.2500.309)
Kingdom of Bahrain	174399.16 (142337.86211420.68)	35267.62 (29888.7941345.49)	574424.89 (475774.43682234.03)	34221.43 (28787.640281.77)	0.312 (0.2780.346)
Kingdom of Belgium	3094500.18 (2561872.923690728.54)	27827.3 (22824.8733715.14)	3467386.95 (2867974.124080781.53)	26678.42 (21774.532456.76)	-0.124 (-0.177-0.072)
Kingdom of Cambodia	3399725.64 (2853951.513998209.24)	39329.24 (34010.4445078.76)	6207864.42 (5217005.097277496.26)	36943.78 (31237.0242446.64)	0.441 (0.3500.533)
Kingdom of Denmark	1153778.37 (911075.321416328.33)	19901.65 (15721.6124475.84)	1353441.22 (1088632.261607299.75)	21993.88 (18074.5726277.64)	-0.137 (-0.215-0.059)
Kingdom of Norway	1421480.4 (1237020.341614607.27)	30245.91 (25901.2434857.38)	1806219.64 (1568779.782029873.73)	29152.31 (25053.4533707.75)	0.503 (0.3080.698)
Kingdom of Spain	16788311.77 (14705348.9819136534.13)	39770.37 (34583.8645360)	19355675.9 (16751823.621727790.65)	35675.2 (30731.1140904.96)	-0.151 (-0.290-0.012)
Kingdom of Sweden	2638885.33 (2173829.743202245.27)	28388.74 (23445.3634786.94)	3600711.54 (3039589.984197322.77)	30714.64 (25671.9736407.77)	0.444 (0.3060.583)
Kingdom of Thailand	18721483.33 (15446916.5622591493.04)	32805.67 (27452.0838680.68)	23081133.41 (19118337.427176226.86)	30733.79 (25497.4236682.94)	0.125 (0.1040.146)
Kingdom of the Netherlands	4898221.59 (4324715.365558472.81)	30052.52 (26415.2134108.94)	4097254.31 (3380827.784863030.38)	22548.32 (18625.3627171.23)	-0.615 (-0.815-0.414)
Kingdom of Tonga	35563.1 (29777.2542463.8)	40227.16 (34395.4647264.3)	38968.97 (33441.8245765.54)	39288.14 (33967.7645821.09)	0.054 (0.0330.074)
Kyrgyz Republic	1529423.15 (1278071.161792490.67)	37365.89 (31315.4143460.62)	2505551.45 (2129167.732926578.08)	37618.83 (32095.343647.27)	0.185 (0.0840.285)
Lao People's Democratic Republic	1191035.14 (982085.221426238.96)	33067.75 (27924.6938726.92)	2170654.46 (1741308.082656741.24)	29964.77 (24368.6335767.79)	0.201 (0.1480.255)
Lebanon	1045648.47 (873475.411231209.38)	37000.87 (31192.2543241.47)	2094604.69 (1760566.442453669.47)	35897.3 (30221.3642020.18)	0.209 (0.1940.224)
Lesotho	387093.73 (314229.4473055.43)	29988.14 (24734.6235912.37)	521021.96 (421831.02644102.11)	28559.32 (23148.4334803.06)	0.264 (0.2310.298)
Liberia	667254.07 (543554.56800315.29)	32992.99 (27229.5638790.62)	1642185.45 (1323924.041965636.68)	33362.96 (27871.439323.51)	0.189 (0.1350.243)
Libya	1296912.94 (1051740.971544295.7)	34688.35 (28872.2640812.29)	2719929.74 (2252723.923194260.34)	36795.29 (30873.6542936.79)	0.717 (0.6760.758)
Madagascar	5274085.68 (4572043.25975613.01)	50434.79 (44563.8756444.1)	11549218.24 (9927442.4913357905.2)	45951.54 (40298.8651554.54)	-0.317 (-0.466-0.167)
Malawi	3014988.17 (2540016.793583479.04)	37531.84 (32441.3943449.14)	6319517.79 (5257633.927596949.07)	36863.08 (31776.2642937.33)	0.086 (0.0340.138)
Malaysia	4453688.52 (3547057.525518681.19)	26752.28 (21579.7932497)	8208726.05 (6641796.4810200156.73)	24435.27 (19914.8930195.87)	0.092 (0.0390.146)
Mali	2340288.21 (1913099.542803160.97)	33686.95 (28094.1239858.59)	6292583.43 (5169055.267697430.29)	32446.19 (27005.8138621.83)	-0.191 (-0.219-0.163)
Mauritania	552159.11 (449298.21665502.23)	32228.43 (26587.4438098.04)	1211049.23 (977134.961471226.03)	31511.95 (26075.0837607.9)	-0.043 (-0.0860.001)
Mauritius	354553.92 (293423.44424268.72)	32283.48 (27074.4438159.91)	426765.75 (357248.65499286.79)	30193.28 (25004.9635938.66)	0.158 (0.1450.172)
Monaco	12088.62 (10169.3713953.44)	33001.79 (27722.6938829.35)	14173.42 (12001.8816531.02)	31265.84 (26374.3336894.72)	-0.216 (-0.256-0.176)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Mongolia	719157.15 (605901.71845841.06)	37681.2 (32223.4643600.85)	1175207.04 (978614.391383130.85)	35985.02 (30267.2441991.11)	0.181 (0.0410.322)
Montenegro	282605.99 (242772.63323657.18)	43866.17 (37693.8550224.49)	263821.8 (227936.58299737.21)	39720.3 (34254.0245563.97)	−0.154 (−0.185-0.122)
Morocco	7044689.68 (6219161.368179211.27)	29533.83 (26325.2633708.6)	7410678.33 (6133000.968889966.92)	19482.87 (16184.7323308.4)	−1.000 (−1.323-0.676)
Mozambique	5236610.96 (4519240.535918225.64)	47024.33 (41605.0552026.77)	9738967.41 (8006972.811682555.78)	37448.06 (31895.7943763.47)	−0.486 (−0.613-0.359)
Namibia	367006.34 (297673.54440688.99)	30729.75 (2517636567.38)	713596.25 (581050.99871085.85)	30384.81 (25259.8336494.37)	0.453 (0.3360.572)
Nauru	3433.15 (2841.664153.93)	37422.93 (31508.6844322.94)	4000.13 (3307.774768.23)	38090.6 (31823.9344824.63)	0.198 (0.1070.290)
Nepal	5075932.07 (4160816.996281345.15)	31057.05 (25628.5937814.74)	8823516.05 (7246888.9610770591.1)	28571.68 (23537.9834568.29)	0.222 (0.1200.325)
New Zealand	844073.12 (703737.571018285.18)	23299.18 (19367.6728127.32)	1325651.1 (1095055.21565699.5)	23480.5 (19329.9928253.23)	0.161 (−0.0080.330)
Niger	2219761.05 (1848980.072633504.34)	35761.42 (30399.7541843.52)	6833830.54 (5629709.88196053.9)	35394.97 (30111.1341035.08)	−0.431 (−0.566-0.295)
Nigeria	16306467.56 (13983934.5519230278.64)	20804.31 (17737.7224287.73)	39644079.14 (34308645.6946397455.61)	19271.23 (16702.0922428.2)	−0.276 (−0.327-0.224)
Niue	858.73 (723.941009.7)	39026.96 (32885.7346068.99)	668.28 (574.25777.66)	38182 (32959.3644670.57)	0.154 (0.1120.195)
North Macedonia	898771.12 (764223.941024289.55)	43821.89 (37270.4549930.99)	951327.11 (824885.931085149.34)	39380.79 (33867.7445331.8)	−0.008 (−0.0460.031)
Northern Mariana Islands	16763.61 (13491.1520487.76)	36092.86 (30281.2242835.63)	18743.41 (15724.7522125.34)	36578.43 (30648.9143271.08)	0.213 (0.1530.274)
Oman	663877.81 (550363.88792818.07)	37896.12 (32119.6943989.12)	1792700.42 (1486415.22136989.48)	36782.64 (31296.4742694.81)	0.268 (0.2060.331)
Pakistan	24233823.43 (19941558.1329635624.6)	25696.95 (21403.8130907.16)	55890823.61 (46619094.8568403069.49)	25988.02 (21892.4231138.37)	0.271 (0.1900.352)
Palau	5867.69 (4904.616975.3)	38321.55 (32357.7844925.45)	7499.6 (6180.298730.18)	37883.17 (31071.4344402.47)	0.208 (0.1750.242)
Palestine	570077.42 (463629.81687563.48)	33433.25 (27734.7439433.87)	1555550.1 (1275001.661904829.04)	31976.16 (26772.9238317.68)	0.401 (0.3250.477)
People's Democratic Republic of Algeria	8215595.44 (6834202.639929343.15)	36507.03 (30861.9142649.59)	15808777.49 (13427728.4718851833.02)	36017.33 (30782.2142684.35)	0.225 (0.1300.321)
People's Republic of China	247030844.32 (194257990.56307748803.28)	19827.23 (15730.4624395.1)	296616329.59 (252252744.17355044543.51)	19634.62 (16565.823954.9)	0.027 (−0.0650.119)
Plurinational State of Bolivia	2504919.59 (2120721.312918113.12)	44129.34 (38151.4650048.47)	5062261.32 (4386041.55833768.44)	43096.73 (37458.5949194.56)	0.309 (0.2930.325)
Portuguese Republic	3454607.34 (2882853.354077239.6)	31047.2 (25616.6636990)	3714960.76 (3110872.934358168.31)	29546.82 (24739.0135045.19)	−0.031 (−0.0750.013)
Principality of Andorra	21245.05 (17943.9924805.35)	34706.32 (29352.140572.67)	34958.88 (29218.1540132.41)	33502.38 (28146.7138966.23)	0.068 (0.0300.106)
Puerto Rico	1292773.59 (1114093.951491689.46)	35273.44 (30382.8440658.23)	1236171.13 (1069138.021405951.61)	34287.29 (29391.5539735.52)	0.145 (0.1360.153)
Qatar	150434.86 (120650.09184154.57)	33329.11 (28139.0139682.58)	1106161.97 (890241.61370201.74)	32817.68 (27459.1539201.29)	0.314 (0.2730.356)
Republic of Albania	1342776.71 (1147150.531541453.76)	41713.1 (35806.1347540.28)	1118736.04 (955628.181279072.14)	38834.79 (33232.1544724.81)	0.106 (0.0720.139)
Republic of Armenia	1258102.41 (1075524.951466823.27)	37213.59 (31942.443136.61)	1170526.45 (994774.51347257.05)	36157.29 (30853.8342060.87)	0.143 (0.0540.231)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Republic of Austria	2676225.86 (2292757.243112105.01)	30801.75 (26115.1636087.44)	3068331.72 (2610325.233554185.72)	29456.78 (25210.6934889.41)	−0.001 (−0.0460.044)
Republic of Azerbaijan	2555421.17 (2114690.643020212.63)	36213.94 (30261.8542267.74)	4020457.54 (3396880.24679183.97)	35523.67 (30041.2341354.73)	0.243 (0.1420.344)
Republic of Belarus	3479793.22 (2882645.984087455.24)	31850.52 (26556.2637699.74)	3169279.31 (2642714.623684309.52)	31334.27 (26238.2737015.17)	−0.001 (−0.0800.078)
Republic of Bulgaria	3937914.73 (3423204.154444849.73)	42760.19 (36818.448662.19)	2939438.9 (2518029.973312554.29)	39865.19 (34538.2745444.11)	−0.185 (−0.243-0.127)
Republic of Chile	5466086.21 (4834287.646331354.61)	42079.77 (37284.4848140.57)	8859394.89 (8604440.079139428.09)	42647.53 (40975.4544539.69)	0.279 (−0.0370.596)
Republic of Colombia	10133688.42 (8371113.4412044980.11)	33263.84 (27619.7738892.55)	16721462.38 (13743057.5920015015.38)	31798.07 (26033.0738040.02)	1.315 (0.9191.713)
Republic of Costa Rica	1015280.45 (844070.261199747.35)	36419.88 (30898.3242087.27)	1785896.15 (1522876.922061582.79)	34874.96 (29643.6840522.82)	0.395 (0.3620.428)
Republic of Croatia	2309665.57 (1997788.732605655.06)	44982.65 (38467.9950731.49)	1843251.45 (1573123.512082423.98)	40554.61 (34538.9846279.72)	−0.184 (−0.227-0.140)
Republic of Cuba	4230665.18 (3652562.684869300.37)	37122.36 (32193.1542330.93)	4444656.65 (3825200.715063540.37)	35857.49 (30879.9441454.52)	0.150 (0.0320.268)
Republic of Cyprus	294270.21 (251542.77342512.83)	36333.04 (30990.3442372.92)	543887.67 (461565.89624142.85)	34653.01 (29342.8640426.28)	0.225 (0.2090.241)
Republic of Ecuador	3958688.12 (3341755.924666969.85)	42963.18 (36750.849132.98)	7821355.85 (6728413.859023886.25)	42848.49 (36956.8149183.63)	−0.065 (−0.1890.060)
Republic of El Salvador	1755462 (1489568.542054338.15)	37630.21 (32408.3943101.9)	2326544.76 (1972681.642710321.13)	35944.49 (30252.4241605.09)	0.339 (0.3020.375)
Republic of Estonia	359791.09 (289570.88435558.08)	22177.89 (17803.4527091.1)	277939.73 (218308.5337440.1)	20798.57 (16449.1525974.74)	−0.320 (−0.386-0.253)
Republic of Fiji	284128.77 (237390.88337031.32)	39442.93 (33451.0146353.49)	359016.15 (304455.27423853.6)	38709.25 (32978.6645414.72)	0.055 (−0.0560.166)
Republic of Finland	1339007.45 (1106860.871602192.13)	24190.07 (20002.4529300.21)	1434408.31 (1187528.081686137.4)	22807.45 (18770.4227575.01)	−0.083 (−0.2840.119)
Republic of Guatemala	2504759.47 (2085248.742951376.12)	37228.8 (31846.2842959.76)	5537787.5 (4621022.346509759.74)	36054.19 (30191.7541771.9)	0.543 (0.5050.581)
Republic of Guyana	277315.77 (236634.48322222.04)	38488.51 (33067.5243928.37)	281530.3 (240560.61326965.72)	36233.22 (31095.741846.63)	0.177 (0.1500.203)
Republic of Haiti	2204450.43 (1884719.242556119.08)	39614.09 (34641.6945305.81)	4300779.18 (3645151.895020530.12)	34351.49 (29490.4539499.13)	0.068 (0.0020.133)
Republic of Honduras	1448843.66 (1214806.031700885.06)	37672.86 (32303.7843218.5)	3585246.68 (2999901.424220465.26)	36841.78 (31258.3842573.04)	0.447 (0.4390.454)
Republic of Iceland	108258.32 (98520.11118417.5)	41419.44 (37656.1945281.13)	128153.29 (110092.61146957.49)	34244.77 (29169.4239979.91)	−0.526 (−0.577-0.476)
Republic of Indonesia	55327423.04 (46525198.2465226282.47)	32234.37 (27516.6737429.65)	89851881.34 (76783390.74104871373.57)	30814.66 (26496.7735610.29)	0.111 (−0.0960.319)
Republic of Iraq	5835612.61 (4852518.677004895.92)	36902.47 (31257.3142960.21)	14449254.61 (12025144.3817117142.19)	35913.33 (30303.0442010.31)	0.205 (0.1710.240)
Republic of Italy	19636610.41 (16537615.0622991120.73)	30642.57 (25439.236615.39)	20343859.07 (17207344.7323311901.32)	28731.37 (24370.6534131.42)	−0.099 (−0.124-0.075)
Republic of Kazakhstan	5774148.35 (4818496.046762384.45)	35922.07 (30175.9141787.48)	6695959.57 (5659190.157800943.81)	34966.77 (29729.2440883.74)	0.051 (−0.0500.153)
Republic of Kiribati	27650.45 (23714.8532771.34)	40941.21 (35207.7448092.79)	48087.79 (41031.0256637)	41191.64 (35686.3348058.75)	0.245 (0.2220.269)
Republic of Korea	10587237.46 (8850382.1112712157.84)	22326.53 (18725.6326479.28)	11534001.16 (9789818.9713412164.89)	20631.46 (17625.3424172.05)	−0.283 (−0.301-0.265)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Republic of Latvia	885860.47 (742472.011031861.23)	31686.8 (26370.3637308.96)	610260.52 (508976707833.2)	30775.71 (25758.4436611.9)	−0.103 (−0.165-0.041)
Republic of Lithuania	1446817.32 (1265750.61640220.86)	37858.21 (33048.9542849.4)	1028637.33 (875867.681176420.04)	34671.35 (29665.3540306.46)	−0.223 (−0.307-0.138)
Republic of Maldives	60979.51 (50376.9573499.25)	33045.75 (27719.4638671.32)	174603.74 (140668.83212289.67)	30880.07 (25443.8236491.04)	0.677 (0.6210.732)
Republic of Malta	146842.13 (124111168714.93)	37117.79 (31493.0142733.83)	179507.08 (154164.46204826.22)	34519.75 (29000.0840111.88)	0.162 (0.1300.195)
Republic of Moldova	1507163.33 (1258719.031767791.7)	33383.82 (27879.5539132.76)	1331747.83 (1102818.351558580.76)	33134.94 (27442.1739403.69)	0.287 (0.1950.378)
Republic of Nicaragua	1197365.84 (994784.331410453.71)	37668.93 (32039.3843213.41)	2435539.71 (2058384.942827745.53)	36755.61 (31509.7642142.95)	0.534 (0.5010.568)
Republic of Panama	1021838.82 (889359.821167245.83)	45240.74 (39871.5950681.9)	1829550.37 (1582107.062064313.87)	41767.23 (36079.0647134.02)	−0.050 (−0.091-0.008)
Republic of Paraguay	1441000.49 (1218735.381689908.67)	39881.91 (34394.8245799.88)	3023516.09 (2587503.23458389.42)	41395.43 (35667.3947174.64)	0.630 (0.5880.672)
Republic of Peru	8655821.3 (7380147.7810058232.75)	43307.07 (37764.349366.66)	15685246.62 (13545247.218036371.62)	42434.49 (36825.5648595.21)	0.259 (0.2290.290)
Republic of Poland	12350296.47 (10756819.3514074981.59)	31242.84 (27240.0735568.67)	12347960.89 (10902713.5113769235.17)	29723.56 (26118.8933866.68)	0.016 (−0.0580.090)
Republic of Serbia	4315950.68 (3645516.674940583.92)	42988.45 (36210.6649412.46)	3631507.95 (3122073.124176008.57)	37484.85 (31754.1743407.59)	0.284 (−0.1250.695)
Republic of Singapore	597860.92 (493161.37730126.27)	17355.66 (14473.3320916.3)	978491.2 (786994.441177574.45)	16443.73 (13339.2719902.17)	−0.394 (−0.470-0.317)
Republic of Slovenia	784185.48 (679530.38888840.63)	37405.62 (32532.9242263.53)	769531.82 (646416.76877512.04)	35079.43 (29611.2840774.11)	−0.198 (−0.261-0.136)
Republic of Suriname	106658.12 (88697.54128744.52)	28246.23 (23367.8333816.49)	163350.77 (133317.46193505.46)	27155.74 (22299.9132465.41)	0.009 (−0.0290.047)
Republic of Tajikistan	1731252.37 (1456048.722028662.53)	37589.38 (31715.1943360.78)	3650545.08 (3135420.424253678.74)	37958.06 (33082.8543699.66)	0.392 (0.2990.485)
Republic of the Marshall Islands	15770.22 (13105.8918879.43)	40375.99 (34238.6147627.95)	22510.1 (19167.1326774.57)	40132.44 (34305.3647294.29)	0.437 (0.4090.464)
Republic of the Philippines	18206235.49 (15482060.6621337146.19)	32748.72 (28604.5937591.96)	35639298.18 (31347767.2540659804)	31952.1 (28304.0436132.1)	0.167 (0.0090.326)
Republic of the Union of Myanmar	10371288.19 (8458878.8112749054.99)	27008.57 (22323.8532581.45)	13717331.44 (11013599.5916709143.69)	23852.58 (19262.7628920.77)	−0.265 (−0.315-0.215)
Republic of Trinidad and Tobago	423818.51 (358810.5496925.82)	36329.19 (30822.6842212.55)	407691.45 (344694.65482001.72)	27646.31 (2337232809.12)	−0.673 (−0.733-0.612)
Republic of Uzbekistan	6990696.02 (5887813.438219994.78)	37712.31 (32033.0143358.58)	12505160.92 (10566697.7314719558.1)	36469.26 (31046.1642716.96)	0.357 (0.2440.471)
Republic of Vanuatu	53643.57 (44849.0363102.82)	40665.4 (34723.7947405.49)	119090.06 (101426.4140463.85)	40667.94 (34925.2347443.09)	0.219 (0.2030.236)
Romania	11220979.8 (9744485.5212604461.57)	46315.8 (40312.2252113.64)	8437494.65 (7277719.659463447.93)	41316.4 (35536.3546916.14)	−0.328 (−0.362-0.293)
Russian Federation	50881084.46 (43367381.8558944716.74)	32074.45 (27379.5737380.77)	49374922.77 (42642704.956430473.91)	30939.62 (26710.5535758.14)	−0.007 (−0.0740.061)
Rwanda	2193062.35 (1802080.82619915.61)	37380.46 (31865.5543560.95)	4362260.36 (3600658.775262021.86)	35668.16 (30003.9741639.66)	0.252 (0.2290.274)
Saint Kitts and Nevis	14344.78 (12281.5616644.62)	36610.59 (31352.2742237.35)	22777.63 (19327.8326341.98)	34676.18 (29260.8339946.32)	0.418 (0.4010.436)
Saint Lucia	46975.97 (40021.6654697.3)	37388.93 (31882.6843028.98)	70653.75 (61044.4980976.02)	35756.78 (30918.0941130.43)	0.529 (0.5040.554)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Saint Vincent and the Grenadines	50639.06 (44212.6257716.5)	47461.79 (41736.1553353.17)	49916.14 (43796.3456127.14)	41019.54 (3576346162.92)	−0.223 (−0.375-0.071)
San Marino	9377.86 (8061.9910769.77)	34986.03 (29514.7240637.76)	13264.97 (1146515235.3)	34061.24 (28982.4939689.81)	0.012 (−0.0400.064)
Sao Tome and Principe	32365.61 (26357.9139261.9)	32328.62 (26641.1238957.48)	65436.2 (53041.4978979.53)	31861.01 (26132.3537860.97)	0.272 (0.2280.315)
Saudi Arabia	5627156.44 (4668180.576646948.52)	40301.19 (34347.7346343.29)	15928216.65 (13402966.2118668143.07)	39279.33 (33844.2844915)	0.305 (0.2280.381)
Senegal	1765694.94 (1513638.132038012.24)	28467.32 (24722.3532571)	3560999.76 (2945415.484283126.52)	24454.05 (20518.3929020.89)	0.054 (−0.0110.118)
Seychelles	22368.25 (18634.1726776.98)	31613 (26366.0737482.11)	33515.25 (27932.5339861.17)	29946.26 (25137.2135576.08)	0.115 (0.0650.165)
Sierra Leone	1378533.93 (1248532.031524492)	37690.6 (34240.5441758.42)	2420148.26 (2067727.622860879.2)	30328.14 (25983.9135209.33)	−0.610 (−0.817-0.403)
Slovak Republic	2185955.36 (1865028.22506485.75)	39997.57 (34138.4446084.07)	2189989.31 (1874933.182519982.85)	37336.63 (31912.143283.13)	−0.126 (−0.201-0.050)
Socialist Republic of Viet Nam	19871728.04 (16430134.0523881755.86)	31842.5 (26534.537499.82)	29059937.68 (23188093.2334807069.18)	27864.27 (22549.2933331.27)	−0.319 (−0.565-0.073)
Solomon Islands	120453.71 (101655.99142795.4)	41258.79 (35267.7647897.76)	260301.93 (221072.89308386.64)	40936.04 (35152.1447921.3)	0.225 (0.2040.247)
Somalia	2530038.58 (2089411.242992588.63)	39636.11 (34069.0445910.08)	6991308.43 (5834918.648309094.69)	39988.6 (34477.9646218.26)	−0.022 (−0.0530.010)
South Africa	9106780.62 (7625359.6210880663.01)	26895.79 (22761.2531662.12)	14781698.34 (12548857.7917723960.49)	25047.02 (21447.4829675.65)	0.264 (0.1950.334)
South Sudan	1714905.16 (1402940.752072468.36)	34631.35 (28911.1340865.2)	2981511.09 (2458916.953591164.48)	36212.09 (30658.0942372.04)	0.087 (0.0280.147)
State of Israel	2027819.88 (1765012.882306433.73)	41847.85 (36461.4147546.66)	3823324.82 (3317070.844354863.41)	38993.23 (33912.7244631.79)	−0.039 (−0.069-0.009)
State of Kuwait	578835.35 (474392.07701974.37)	34400.7 (28973.6540523.41)	1738319.11 (1387565.182105395.61)	33614.18 (27747.7639856.11)	0.272 (0.2370.308)
Sudan	6792560.53 (5647283.377989631.41)	39420.46 (33022.0845687.22)	15342590.11 (12915097.318297899.34)	38272.86 (32833.5344500.75)	0.044 (−0.0070.096)
Swiss Confederation	3524799.14 (3203625.123869039.17)	45805.73 (41131.3150762.03)	4627113.06 (4217345.125036982.12)	44429.86 (39765.3350005.32)	0.051 (0.0250.076)
Syrian Arab Republic	4148101.81 (34702164910992.39)	38423.53 (33034.2244409.37)	5477835.75 (4587046.456394293.24)	37573.79 (31920.3543442.56)	0.534 (0.4660.601)
Taiwan (Province of China)	2865738.63 (2191120.743784546.28)	13232.68 (10277.1117228.65)	3250714.7 (2541245.134113545.68)	12679.47 (9754.9116611.84)	0.028 (−0.0240.081)
Togo	977315.48 (795619.161176453.23)	33323.99 (27761.4238954.44)	1999626.87 (1699366.182411359.54)	25785.4 (21488.7830619.14)	0.012 (−0.1360.160)
Tokelau	597.11 (509.37704.23)	40216.86 (34789.3847147.52)	545.32 (466.67632.82)	38978.21 (33397.8945564.28)	0.201 (0.1640.238)
Tunisia	2909327.69 (2437150.533425526.27)	37288.86 (31686.843226.16)	4513906.04 (3805192.395235647.07)	36187.06 (30406.2942228.32)	0.277 (0.2030.352)
Turkey	21239180.95 (17899212.5424881102.13)	39039.94 (33445.9345077.74)	32693622.45 (27668936.3837835038.22)	36687.5 (31102.4742631.25)	0.074 (−0.0740.223)
Turkmenistan	1193577.59 (1011090.961423805.6)	36150.75 (30810.242019)	1812704.39 (1519848.932134953.03)	35046.46 (29548.4541116.73)	0.262 (0.1810.344)
Tuvalu	3625.54 (3068.664235.45)	41371.4 (35286.1748072.19)	4903.1 (4162.975760)	39881.97 (33985.9946661.73)	0.180 (0.1630.197)
Uganda	3511768.43 (2797997.494384841.46)	25312.14 (20542.2431021.47)	8816416.88 (7082126.3211104277.51)	24008.29 (19210.4829470.77)	0.029 (−0.0290.087)

Table 2 (continued)

	Number of prevalence cases (95% UI) in 1990	The age-standardized prevalence rate/100000 (95% UI) in 1990	Number of prevalence cases (95% UI) in 2021	The age-standardized prevalence rate/100000 (95% UI) in 2021	EAPC (95% CI)
Ukraine	15568388.82 (12779161.7518219383.4)	27867.93 (22940.7332820.36)	13649841.92 (11317446.5616053697.22)	28270.7 (23847.1533748.53)	0.149 (0.0680.229)
United Arab Emirates	610660.97 (494843.9755853.14)	32990.76 (27770.2439142.71)	3729701.47 (2845809.64556536.41)	33294.66 (27549.2139528.38)	0.613 (0.5630.663)
United Kingdom of Great Britain and Northern Ireland	20716303.75 (18582080.4923172860.1)	32774.38 (29232.5337067.88)	23239693.21 (20997723.6225744201.97)	30296.17 (27062.5734150.95)	−0.166 (−0.248-0.085)
United Mexican States	19218366.44 (15990112.3723341197.7)	24755.35 (20606.6129677.84)	31613589.82 (26433121.6737573527.79)	23261.87 (19496.6727577.49)	0.190 (0.1380.242)
United Republic of Tanzania	6717677.51 (5598169.787984487.28)	32344.8 (27034.3538053.2)	16762007.85 (13514473.7420481623.83)	32322.78 (26384.8938333.56)	−0.493 (−0.793-0.192)
United States of America	54319962.3 (45472132.0365322973.35)	20396.57 (17026.6924562.88)	68655409.32 (59125324.9978946284.96)	19321.53 (16431.6522797.83)	−0.025 (−0.1120.063)
United States Virgin Islands	37807.04 (31957.1443601.86)	35625.3 (30394.4640784.56)	30960.77 (26526.9735545.69)	33765.11 (28771.539260.81)	0.065 (0.0230.106)
Yemen	3916326.46 (3224379.14749606.98)	35770.5 (30311.2142395.82)	10884681.54 (9058476.8512906420.36)	35591.65 (30068.0641974.16)	0.375 (0.2320.518)
Zambia	2272373.17 (2040610.932528257.21)	33565.39 (30281.5237408.93)	4853790.09 (4057080.865888997.53)	27032.79 (22700.2832374.68)	−0.250 (−0.367-0.133)
Zimbabwe	2029503.16 (1622715.912518744.48)	23262.35 (18773.127997.01)	3321719.63 (2619813.544272098.05)	23506.58 (18778.7729375.73)	0.242 (0.2130.270)

The observation that the disease burden of the studied condition in 2021 was predominantly higher in females than males, with the exception of incidence cases where the sex gap was minimal, is intriguing and warrants further exploration. This sex disparity in disease burden aligns with previous research that has emphasized the influence of biological, social, and behavioral factors on health outcomes, particularly in the context of chronic and non-communicable diseases [22, 23]. The consistency in trends between males and females, when analyzed separately, mirroring those of the overall population, underscores the uniformity of the disease's epidemiology across sexes. However, the subtle yet significant difference in burden allocation suggests potential sex-specific factors contributing to these disparities. To address these disparities, actionable implications must be considered. For instance, tailored interventions aimed at modifying healthcare-seeking behaviors, improving access to care, and addressing sociocultural norms related to health and illness may be crucial [24]. Furthermore, the negligible sex gap in incidence cases indicates comparable exposure to risk factors between males and females. Yet, the disparity in disease burden, particularly in terms of prevalence and severity, underscores the need for sex-sensitive approaches in disease prevention, diagnosis, and management strategies. By acknowledging

and addressing these sex-specific factors, we can strive to achieve more equitable health outcomes for both males and females.

The pattern of disease burden across age groups in 2021 reveals an intriguing trend. The initial increase in incidence, prevalence, and DALYs with age, peaking in the 20–24 age group, followed by a subsequent decline, presents a nuanced view that deserves further attention. While this finding contrasts with many existing studies that typically report a steady rise in disease burden with advancing age, particularly for non-communicable diseases [25], it is important to note that the peak in the 20–24 age group may reflect unique vulnerabilities within this demographic. Factors such as lifestyle choices, exposure to new risk factors, or a combination of biological and social transitions could contribute to this peak. Given this unique trend, it is crucial to consider potential interventions tailored to the needs of the 20–24 age group. Existing evidence suggests that interventions focused on promoting healthy lifestyles, such as regular physical activity, balanced nutrition, and avoiding harmful behaviors (like smoking, excessive alcohol consumption), could be beneficial in reducing disease burden in this population [26]. Additionally, targeted health promotion programs that address the specific risk factors and vulnerabilities of this age group may further enhance

Table 3 The number of DALYs cases and the age-standardized DALYs rate attributable to caries of permanent teeth in 1990 and 2021 and its trends from 1990 to 2021 globally

	Number of DALYs cases (95% UI) in 1990	The age-standardized DALYs rate/100000 (95% UI) in 1990	Number of DALYs cases (95% UI) in 2021	The age-standardized DALYs rate/100000 (95% UI) in 2021	EAPC (95% CI)
Global	1443191 (622669–2764557)	27.78 (12.3–53)	2198064 (988183–4174725)	27.02 (12.1–51.36)	–0.03 (–0.08–0.02)
Sex					
Female	724436 (313504–1383004)	27.95 (12.38–53.24)	1102864 (497296–2084214)	27.14 (12.15–51.39)	–0.03 (–0.09–0.02)
Male	718755 (309244–1381436)	27.62 (12.23–52.78)	1095201 (490402–2090511)	26.91 (12.02–51.33)	–0.03 (–0.08–0.02)
Age					
5–9 years	55853 (18303–131336)	9.57 (3.14–22.51)	55891 (18251–132352)	8.13 (2.66–19.26)	–0.31 (–0.41–0.21)
10–14 years	141166 (55276–301104)	26.35 (10.32–56.21)	160234 (61633–333641)	24.04 (9.25–50.05)	–0.17 (–0.24–0.09)
15–19 years	159969 (60144–335800)	30.8 (11.58–64.65)	192017 (72853–399324)	30.77 (11.68–64)	0.06 (–0.01–0.13)
20–24 years	193927 (73710–373123)	39.41 (14.98–75.82)	227353 (86741–444138)	38.07 (14.53–74.38)	–0.09 (–0.13–0.05)
25–29 years	166731 (67415–321046)	37.67 (15.23–72.53)	220414 (91562–418358)	37.46 (15.56–71.11)	0.04 (–0.02–0.1)
30–34 years	134997 (56018–261664)	35.03 (14.53–67.89)	210136 (87753–410865)	34.76 (14.52–67.97)	0.08 (0.01–0.15)
35–39 years	123454 (50523–246483)	35.05 (14.34–69.98)	200824 (81549–401372)	35.81 (14.54–71.56)	0.11 (0.06–0.15)
40–44 years	100636 (39181–196930)	35.13 (13.68–68.74)	179011 (71794–354066)	35.78 (14.35–70.78)	0.06 (0.01–0.11)
45–49 years	81014 (33387–166801)	34.89 (14.38–71.84)	162496 (67739–333485)	34.32 (14.31–70.43)	–0.03 (–0.1–0.04)
50–54 years	73394 (30171–154280)	34.53 (14.19–72.58)	146472 (60534–303201)	32.92 (13.61–68.15)	–0.08 (–0.14–0.02)
55–59 years	62372 (26836–133418)	33.68 (14.49–72.04)	127002 (54586–272450)	32.09 (13.79–68.85)	–0.08 (–0.13–0.04)
60–64 years	53060 (22141–107473)	33.04 (13.79–66.92)	102545 (43772–208753)	32.04 (13.68–65.23)	–0.11 (–0.16–0.07)
65–69 years	39781 (17896–76295)	32.18 (14.48–61.72)	84201 (37878–164251)	30.53 (13.73–59.55)	–0.13 (–0.19–0.06)
70–74 years	26027 (11669–48523)	30.74 (13.78–57.31)	60571 (26840–112519)	29.43 (13.04–54.66)	–0.09 (–0.15–0.03)
75–79 years	17405 (7805–32482)	28.28 (12.68–52.77)	35293 (16013–65348)	26.76 (12.14–49.55)	–0.09 (–0.14–0.03)
80–84 years	9102 (4015–17000)	25.73 (11.35–48.06)	20816 (9228–39364)	23.77 (10.54–44.94)	–0.15 (–0.21–0.1)
85–89 years	3393 (1465–6730)	22.45 (9.69–44.54)	9255 (4094–17727)	20.24 (8.95–38.77)	–0.26 (–0.3–0.22)
90–94 years	780 (317–1597)	18.2 (7.4–37.26)	2914 (1222–5926)	16.29 (6.83–33.12)	–0.34 (–0.39–0.28)
95 + years	128 (53–278)	12.62 (5.23–27.33)	619 (260–1321)	11.35 (4.76–24.23)	–0.27 (–0.39–0.15)
SDI region					
High-middle SDI	305219 (132610–581718)	27.81 (12.15–53.29)	371029 (167790–710273)	26.27 (11.65–49.92)	–0.19 (–0.2–0.18)
High SDI	232729 (104423–442471)	24.88 (11.09–47.23)	271471 (124443–518668)	23.06 (10.27–43.91)	–0.22 (–0.27–0.17)
Low-middle SDI	316030 (136928–605953)	30.84 (13.76–58.82)	555887 (246486–1059748)	29.18 (13.04–55.36)	–0.05 (–0.17–0.07)
Low SDI	133975 (58363–251648)	32.19 (14.47–59.74)	305981 (133494–574357)	30.97 (14.01–57.73)	–0.08 (–0.14–0.02)
Middle SDI	453446 (193127–862544)	26.86 (11.73–51.62)	691532 (311277–1329673)	26.77 (11.97–51.3)	0.06 (–0.01–0.13)
GBD region					
Advanced Health System	396361 (178393–750833)	28.51 (12.75–54.05)	438115 (199848–831430)	26.48 (11.85–50.34)	–0.22 (–0.25–0.2)
Africa	163137 (69389–309794)	30.14 (13.4–57.13)	357256 (154570–681420)	28.44 (12.78–53.93)	–0.19 (–0.21–0.18)
African Region	126636 (54036–241131)	29.43 (13.14–55.43)	289860 (125401–551103)	28.06 (12.64–52.96)	–0.16 (–0.18–0.15)
America	194309 (84850–369941)	27.26 (12.01–51.99)	296068 (133759–564408)	27.3 (12.15–52.05)	0.06 (0.05–0.08)
Andean Latin America	14953 (6650–27599)	42.59 (19–78.75)	28104 (12465–53214)	41.91 (18.6–79.06)	–0.13 (–0.16–0.1)
Asia	792751 (338172–1514882)	25.54 (11.16–49.02)	1243504 (557126–2364591)	25.63 (11.42–48.75)	0.1 (0.01–0.19)

Table 3 (continued)

	Number of DALYs cases (95% UI) in 1990	The age-standardized DALYs rate/100000 (95% UI) in 1990	Number of DALYs cases (95% UI) in 2021	The age-standardized DALYs rate/100000 (95% UI) in 2021	EAPC (95% CI)
Australasia	6322 (2784–12126)	29.26 (12.91–56.26)	8576 (3829–16539)	25.38 (11.24–48.41)	−0.15 (−0.37–0.07)
Basic Health System	585513 (251664–1116812)	25.44 (11.08–48.9)	841309 (378170–1629683)	25.43 (11.3–48.79)	−0.01 (−0.05–0.02)
Caribbean	12605 (5546–24147)	36.7 (16.25–70.09)	16883 (7615–32039)	34.3 (15.46–64.98)	−0.16 (−0.19–0.13)
Central Africa	17209 (7266–33426)	31.48 (13.82–59.92)	46627 (19909–88722)	32.17 (14.02–60.57)	0.04 (0–0.08)
Central Asia	23535 (10362–44426)	36.22 (16.11–68.83)	34400 (15253–65176)	35.58 (15.67–67.47)	−0.08 (−0.12–0.05)
Central Europe	50008 (22444–94367)	38.47 (17.19–72.29)	43207 (19820–82398)	35.05 (15.67–66.02)	−0.24 (−0.28–0.2)
Central Latin America	44329 (19189–83175)	29.71 (13.19–55.95)	75234 (33613–143277)	28.5 (12.73–54.11)	0.08 (0–0.17)
Central Sub-Saharan Africa	13849 (5837–26849)	30.71 (13.48–58.54)	37074 (15716–70220)	31.31 (13.62–58.83)	0.03 (−0.01–0.07)
Commonwealth High Income	33926 (15467–65086)	28.21 (12.79–54.19)	41138 (18770–78858)	25.4 (11.5–48.69)	−0.27 (−0.35–0.18)
Commonwealth Low Income	55109 (23503–104992)	31.86 (13.95–59.74)	110329 (47879–209204)	30.24 (13.31–56.86)	−0.21 (−0.23–0.19)
Commonwealth Middle Income	318854 (139314–605645)	30.62 (13.66–57.71)	601566 (267151–1136076)	28.76 (12.89–54.1)	0.03 (−0.16–0.22)
East Asia	250909 (105316–475098)	19.39 (8.36–36.81)	298908 (135110–582540)	19.21 (8.53–36.69)	−0.04 (−0.08–0)
East Asia & Pacific—WB	421091 (180130–798786)	21.78 (9.45–41.64)	544173 (243459–1064732)	21.75 (9.6–41.9)	−0.03 (−0.07–0.01)
Eastern Africa	47239 (20457–90034)	32.53 (14.64–61.6)	108333 (47174–205733)	31.12 (14.06–58.68)	−0.21 (−0.24–0.18)
Eastern Europe	72439 (32572–140967)	30.51 (13.65–58.91)	67486 (30226–131279)	29.82 (13.21–57.55)	−0.08 (−0.11–0.06)
Eastern Mediterranean Region	103454 (44472–198402)	31.32 (13.89–60.01)	222833 (96751–427831)	30.37 (13.52–57.93)	−0.11 (−0.12–0.1)
Eastern Sub-Saharan Africa	52181 (22646–98681)	33.17 (14.94–62.36)	117643 (51384–222922)	30.99 (14.01–58.31)	−0.23 (−0.25–0.21)
Europe	289789 (131002–549213)	34.14 (15.29–64.63)	297722 (135421–564142)	31.86 (14.33–60.52)	−0.22 (−0.23–0.21)
Europe & Central Asia—WB	305769 (137851–578990)	34.24 (15.32–64.84)	323401 (147097–612453)	32.2 (14.43–61.18)	−0.19 (−0.2–0.18)
European Region	308782 (139155–584622)	34.3 (15.34–64.95)	328233 (149325–621584)	32.27 (14.46–61.32)	−0.19 (−0.2–0.18)
High-income Asia Pacific	30523 (13438–60140)	16.65 (7.35–32.57)	25188 (11385–49313)	14.49 (6.49–28.15)	−0.4 (−0.48–0.33)
High-income North America	58934 (26265–114662)	19.98 (8.83–38.85)	73976 (33596–143321)	18.85 (8.43–36.61)	−0.07 (−0.16–0.02)
Latin America & Caribbean—WB	136697 (59481–261068)	33.21 (14.64–63.13)	223336 (99615–427004)	32.24 (14.32–61.57)	−0.04 (−0.06–0.01)
Limited Health System	420831 (182503–799656)	30.78 (13.77–58.05)	819805 (363621–1551755)	29.26 (13.12–55.12)	0 (−0.14–0.15)
Middle East & North Africa—WB	77329 (33124–148106)	33.66 (14.93–64.57)	155060 (68135–298839)	32.2 (14.31–62.11)	−0.15 (−0.17–0.13)
Minimal Health System	38694 (16413–73869)	34.84 (15.28–65.85)	96671 (40862–183230)	33.93 (14.81–63.44)	−0.08 (−0.1–0.07)
North Africa and Middle East	106153 (45221–203126)	34.79 (15.3–66.65)	208354 (90480–398422)	33.22 (14.66–63.7)	−0.18 (−0.22–0.14)
North America	58943 (26270–114681)	19.98 (8.83–38.86)	73986 (33601–143340)	18.85 (8.43–36.61)	−0.07 (−0.16–0.02)
Northern Africa	35854 (15180–68683)	32.44 (14.32–62.57)	61733 (27109–118829)	29.69 (13.16–57.39)	−0.28 (−0.32–0.23)
Oceania	2368 (1008–4504)	39.55 (17.07–73.66)	5151 (2201–9563)	39.08 (17.08–72.46)	−0.02 (−0.04–0)
Region of the Americas	194309 (84850–369941)	27.26 (12.01–51.99)	296068 (133759–564408)	27.3 (12.15–52.05)	0.06 (0.05–0.08)
South-East Asia Region	372199 (161669–710367)	31.63 (14.08–59.85)	642534 (286068–1221133)	29.96 (13.36–56.7)	0.02 (−0.17–0.2)

Table 3 (continued)

	Number of DALYs cases (95% UI) in 1990	The age-standardized DALYs rate/100000 (95% UI) in 1990	Number of DALYs cases (95% UI) in 2021	The age-standardized DALYs rate/100000 (95% UI) in 2021	EAPC (95% CI)
South Asia	303996 (132371–576696)	31.63 (14.08–59.52)	561162 (249820–1057274)	29.9 (13.39–56.12)	0.06 (–0.14–0.26)
South Asia—WB	312965 (136187–594064)	31.7 (14.12–59.68)	578636 (257732–1090734)	30.02 (13.45–56.38)	0.06 (–0.14–0.25)
Southeast Asia	136642 (59512–264319)	31.28 (13.74–60.31)	213451 (93488–420515)	29.3 (12.82–57.09)	–0.3 (–0.41–0.2)
Southern Africa	25089 (10735–47614)	30.72 (13.6–58.19)	48278 (20831–91915)	28.3 (12.63–53.71)	–0.12 (–0.17–0.07)
Southern Latin America	19860 (8709–37591)	40.61 (17.85–77.16)	29887 (13562–56603)	41.1 (18.54–78.13)	0.04 (–0.04–0.12)
Southern Sub-Saharan Africa	12189 (5267–23278)	25.98 (11.52–49.6)	19806 (8734–37942)	24.43 (10.9–46.77)	–0.08 (–0.12–0.04)
Sub-Saharan Africa—WB	127709 (54541–243096)	29.59 (13.22–55.8)	296370 (128045–563993)	28.24 (12.72–53.24)	–0.16 (–0.17–0.15)
Tropical Latin America	45401 (19695–88291)	30.97 (13.64–60.24)	73823 (32873–144478)	30.51 (13.45–59.27)	–0.07 (–0.12–0.03)
Western Africa	37746 (16285–71914)	25.46 (11.39–48.03)	92286 (40056–177088)	24.08 (10.8–45.47)	–0.2 (–0.21–0.19)
Western Europe	143434 (65036–272520)	34.01 (15.35–64.83)	153042 (70258–290905)	30.99 (14.07–59.26)	–0.29 (–0.34–0.24)
Western Pacific Region	331751 (141651–626456)	20.5 (8.89–38.9)	411822 (185734–798782)	20.49 (9.05–39.13)	–0.02 (–0.06–0.01)
Western Sub-Saharan Africa	42562 (18262–81406)	26.04 (11.66–49.01)	106709 (46121–204748)	24.87 (11.18–46.77)	–0.17 (–0.19–0.16)
World Bank High Income	291256 (130812–551055)	27.32 (12.24–51.66)	330466 (150965–628057)	25.15 (11.25–47.74)	–0.24 (–0.29–0.2)
World Bank Low Income	90915 (38947–173155)	32.42 (14.34–60.84)	206653 (88666–389952)	31.63 (14.09–59.51)	–0.07 (–0.07–0.06)
World Bank Lower Middle Income	533102 (231228–1019662)	30.97 (13.86–58.83)	969257 (430806–1845846)	29.34 (13.12–55.61)	–0.07 (–0.19–0.05)
World Bank Upper Middle Income	523819 (226148–993944)	24.92 (10.83–47.6)	686813 (309611–1324772)	24.62 (10.87–47.05)	–0.02 (–0.05–0)
Country					
Afghanistan	3313.24 (1377.16371.9)	38.21 (16.572.75)	10199.54 (4381.9219231.29)	38.1 (16.7271.02)	–0.014 (–0.0640.035)
American Samoa	16.45 (6.9331.28)	36.77 (16.1569.18)	18.93 (8.2235.85)	37.23 (16.3369.91)	0.355 (0.3210.388)
Angola	2564.6 (1061.785005.57)	30.31 (13.0858.01)	7869.8 (3215.215434.98)	29.24 (12.655.17)	–0.251 (–0.290–0.212)
Antigua and Barbuda	21.32 (9.3640.14)	35.67 (15.7267.49)	33.49 (14.6764.67)	34.18 (14.9565.8)	0.224 (0.2100.237)
Arab Republic of Egypt	16049.94 (6882.8131220.26)	31.82 (13.9961.63)	30625.6 (13266.2758508.82)	30.2 (13.2157.13)	–0.152 (–0.220–0.085)
Argentine Republic	13179.41 (5774.1324840.04)	40.36 (17.7176.36)	19777.4 (8792.637144.42)	40.88 (18.1276.52)	0.338 (0.3140.362)
Australia	5499.14 (2428.9710562.47)	30.58 (13.558.84)	7285.09 (3245.5613957.02)	25.86 (11.3949.35)	–0.188 (–0.4830.107)
Bangladesh	28428.34 (12015.1955560.55)	31.47 (13.7259.44)	50691.82 (22009.9296656.45)	30.29 (13.2657.52)	0.527 (0.5090.545)
Barbados	93.51 (41.27178.55)	35.61 (15.6868.19)	114.85 (51.86219.6)	35.19 (15.6367.16)	0.092 (0.0680.115)
Belize	60.76 (26.24115.56)	37.58 (16.5771.61)	135.71 (61.84266.06)	30.77 (14.0460.42)	0.079 (–0.0160.174)
Benin	1228.53 (510.262361.7)	32.27 (13.7960.91)	3608.39 (1532.937045.78)	31.57 (13.8460)	0.112 (0.0850.139)
Bermuda	22.26 (9.6242.71)	34.34 (14.8765.43)	22.62 (10.1442.71)	32.81 (14.3162.57)	–0.194 (–0.211–0.177)
Bhutan	168.77 (70.55329.74)	30.89 (13.2658.4)	227.92 (99.9440.33)	28.79 (12.6855.27)	0.403 (0.3840.423)
Bolivarian Republic of Venezuela	6510.89 (2890.2512525.54)	38.17 (17.2672.96)	10629.76 (4746.3820353.95)	38.07 (16.9473.26)	0.404 (0.3760.432)
Bosnia and Herzegovina	2094.09 (940.053947.89)	44.46 (19.9283.77)	1347.26 (602.12529.44)	38 (16.7370.69)	–0.434 (–0.452–0.416)
Botswana	304.34 (130.79586.4)	27.04 (11.7750.96)	623.95 (267.271182.47)	25.3 (11.0647.77)	0.414 (0.3850.443)

Table 3 (continued)

	Number of DALYs cases (95% UI) in 1990	The age-standardized DALYs rate/100000 (95% UI) in 1990	Number of DALYs cases (95% UI) in 2021	The age-standardized DALYs rate/100000 (95% UI) in 2021	EAPC (95% CI)
Brunei Darussalam	43.38 (18.7783.87)	16.1 (7.0231.36)	81.6 (35.62154.76)	16.35 (7.1831.02)	0.273 (0.2480.298)
Burkina Faso	2389.57 (1027.144669.87)	31.61 (13.7760.97)	5848.24 (2483.1811273.82)	30.77 (13.5557.99)	−0.185 (−0.278-0.092)
Burundi	1654.94 (698.823169.99)	36.33 (15.8268.42)	4198.99 (1799.917920.23)	36.95 (16.2369.36)	0.177 (0.1490.204)
Cabo Verde	95.54 (40.7183.56)	32.18 (14.0461.13)	176.13 (76.45339.91)	29.96 (13.1457.37)	0.543 (0.5140.571)
Cameroon	2660.79 (1130.855168.73)	31.04 (13.5159.5)	8757.12 (3679.2116802.79)	31.28 (13.5458.56)	0.132 (0.0860.177)
Canada	5677.35 (2502.8210994.11)	19.28 (8.4737.02)	7478.66 (3295.714569.35)	18.51 (8.1235.72)	−0.135 (−0.159-0.111)
Central African Republic	724.15 (305.261398.84)	31.83 (13.8460.29)	1554.43 (658.472949.63)	32.27 (14.0460.84)	0.215 (0.1990.230)
Chad	1576.83 (669.762965.48)	32.87 (14.4162.28)	4401.35 (1899.48603.01)	31.81 (14.2761.16)	−0.249 (−0.283-0.216)
Commonwealth of Dominica	25.3 (11.148.05)	36.84 (16.4269.77)	25.57 (11.350.02)	35.33 (15.569.17)	0.318 (0.2950.341)
Commonwealth of the Bahamas	97.95 (42.77186.1)	38.22 (16.7772.23)	157.45 (71.73297.28)	37.22 (16.9269.96)	0.021 (−0.0550.097)
Comoros	126.24 (58.04234.99)	32.13 (1560.77)	213.95 (95.25432.05)	28.78 (12.9457.5)	0.345 (0.2820.408)
Congo	609.61 (260.061178.71)	29.81 (13.1157.04)	1508.7 (634.942841.97)	29.49 (12.9454.95)	0.182 (0.1370.226)
Cook Islands	6.84 (2.8512.85)	37.35 (16.0669.25)	6.73 (2.9613.1)	36.06 (15.7569.84)	0.167 (0.1490.185)
Czech Republic	4180.15 (1855.077854.68)	38.63 (17.0572.21)	4106.23 (1874.657789.87)	36.87 (16.3369.93)	−0.228 (−0.297-0.160)
Democratic People's Republic of Korea	2640.14 (1076.175077.22)	12.51 (5.1524.36)	3890.78 (1697.997525.22)	13.63 (5.8726.86)	0.128 (0.0560.199)
Democratic Republic of the Congo	9608.07 (4052.1318633.84)	30.88 (13.5558.81)	25282.39 (10902.7248000)	32.23 (14.261.12)	0.731 (0.6190.843)
Democratic Republic of Timor-Leste	263.26 (113.21499.91)	38.93 (17.2373.9)	475.64 (202.86905.11)	36.61 (15.969.31)	0.289 (0.2490.329)
Democratic Socialist Republic of Sri Lanka	5595.37 (2389.4710653.71)	33.17 (14.3763.07)	7102.41 (3122.9313738.71)	30.22 (13.3458.11)	0.237 (0.1250.349)
Djibouti	118.7 (53.11227.12)	31.77 (14.3459.77)	351.84 (159.5679.91)	27.68 (12.6254.36)	−0.129 (−0.164-0.093)
Dominican Republic	2457.88 (1071.264676.57)	37.03 (16.2569.34)	3928.51 (1720.737555.95)	34.72 (15.1866.59)	0.073 (0.0130.134)
Eastern Republic of Uruguay	1308.74 (580.362444.7)	40.68 (17.9676.36)	1472.31 (670.742723.87)	39.9 (17.8973.87)	0.164 (0.1390.189)
Equatorial Guinea	106.05 (45.47198.76)	30.97 (13.6858.41)	380.54 (162.57741.47)	27.09 (11.8851.44)	0.132 (0.1170.147)
Eritrea	1134.64 (487.552168.06)	39.96 (17.6474.76)	2485.27 (1063.344698.93)	40.59 (17.7675.78)	−0.195 (−0.345-0.044)
Eswatini	181.07 (77350.25)	27.44 (11.8752.86)	291.35 (127.92570.16)	26.19 (11.4949.82)	0.436 (0.3970.476)
Ethiopia	12163.38 (5536.6623426.11)	29.6 (13.6356.87)	27002.33 (12255.0252168.2)	27.59 (12.5353.09)	0.410 (0.3990.421)
Federal Republic of Germany	29129.08 (12692.7956374.46)	32.23 (13.9462.07)	25405.38 (11432.9549370.04)	27.82 (12.5953.92)	0.090 (0.0800.099)
Federated States of Micronesia	37.17 (15.8870.33)	40.15 (17.774.73)	40.86 (17.577.41)	39.37 (17.2174.79)	−0.625 (−0.678-0.573)
Federative Republic of Brazil	43976.98 (19083.9285659.62)	30.76 (13.5559.92)	70853.11 (31633.8138987.16)	30.15 (13.3158.68)	0.371 (0.3550.387)
French Republic	25946.52 (11935.8448894.31)	41.75 (1979.35)	28891.45 (13319.1154683.03)	38.18 (17.0373.09)	0.238 (0.1870.290)
Gabon	236.6 (101.42447.47)	27.6 (12.1452.04)	478.45 (205901.94)	27.68 (12.1352.15)	−0.058 (−0.085-0.030)
Gambia	256.65 (109.04496.78)	31.66 (13.8759.94)	674.84 (283.111296.94)	31.65 (13.8759.92)	0.247 (0.2220.273)
Georgia	2037.67 (914.973847.39)	35.66 (15.9467.06)	1351.43 (608.832632.2)	35.57 (15.6367.58)	0.141 (0.1050.177)

Table 3 (continued)

	Number of DALYs cases (95% UI) in 1990	The age-standardized DALYs rate/100000 (95% UI) in 1990	Number of DALYs cases (95% UI) in 2021	The age-standardized DALYs rate/100000 (95% UI) in 2021	EAPC (95% CI)
Ghana	3501.54 (1484.776746.73)	27.52 (11.9252.74)	8451.96 (3606.3916651.56)	26.38 (11.5851.31)	−0.041 (−0.1420.059)
Grand Duchy of Luxembourg	147.49 (65.64281.73)	34.31 (15.0465.04)	242.65 (108.94461.22)	32.66 (14.661.77)	0.084 (0.0330.136)
Greenland	11.03 (4.7521.21)	18.44 (8.0935.9)	10.65 (4.6620.78)	17.8 (7.7334.19)	−0.068 (−0.112−0.024)
Grenada	29.2 (12.9555.2)	37.18 (16.3971.49)	38.76 (17.0474.67)	35.13 (15.3267.41)	−0.069 (−0.104−0.034)
Guam	48.51 (20.7691.83)	35.46 (15.4567.64)	57.73 (24.89105.38)	35.07 (15.0664.36)	0.373 (0.3200.426)
Guinea	1574.45 (663.483039.86)	32.02 (13.9560.71)	3630.57 (1517.056917.43)	31.89 (13.7959.69)	0.084 (0.0680.100)
Guinea-Bissau	331.04 (141.53629.2)	39.63 (17.2275.14)	688.92 (291.691326.22)	38.5 (17.0274.89)	0.036 (0.0100.061)
Hashemite Kingdom of Jordan	1214.05 (503.222373.55)	36.92 (16.0769.87)	4453.07 (1929.658414.09)	35.66 (15.7267.81)	0.102 (0.0720.132)
Hellenic Republic	4771.67 (2202.869130.42)	42.51 (19.5381.83)	4406.29 (1960.728257.85)	36.89 (16.3970.78)	0.255 (0.2080.302)
Hungary	4024.1 (1757.587807.2)	36.84 (16.0670.73)	3481.57 (1564.316646.32)	34.41 (15.3566.05)	−0.161 (−0.231−0.091)
Independent State of Papua New Guinea	1483.74 (632.182822.66)	39.84 (17.1173.83)	3845.39 (1641.557139.97)	39.2 (17.1772.47)	−0.240 (−0.275−0.206)
Independent State of Samoa	60.56 (25.54115.57)	39.55 (17.2173.17)	77.86 (33.23147.79)	38.97 (16.974.54)	0.106 (0.0790.132)
India	246550.85 (108263.21467242.06)	32.42 (14.4660.92)	446628.52 (199199.01841621.74)	30.56 (13.6957.41)	0.033 (0.0230.044)
Ireland	1351.13 (593.142589.51)	36.79 (16.171.09)	1835.57 (820.533412.58)	33.44 (14.8962.46)	0.583 (0.3380.827)
Islamic Republic of Iran	15501.48 (6839.1629842.94)	31.37 (14.1159.97)	27477.3 (12393.853128.67)	30.5 (13.758.85)	−0.092 (−0.130−0.055)
Ivoire	3122.73 (1332.656080.62)	30.9 (13.4158.83)	7523.32 (3135.4714359.37)	30.47 (13.2957.2)	0.483 (0.2480.718)
Jamaica	824.18 (362.221543.92)	36.86 (16.0368.89)	1082.31 (475.892039.03)	35.73 (15.867.51)	0.361 (0.3490.373)
Japan	19394.84 (8634.1737401.24)	14.97 (6.6928.78)	12817.24 (5755.4625239.56)	11.7 (5.2622.92)	−1.376 (−1.554−1.198)
Kenya	5049.55 (2202.599703.95)	26.51 (11.8750.65)	11844.2 (5243.122828.93)	25.03 (11.2647.77)	0.284 (0.2550.313)
Kingdom of Bahrain	172.92 (72.94338.41)	34.68 (15.1367.88)	565.43 (241.771086.35)	33.52 (14.4964.65)	0.297 (0.2610.332)
Kingdom of Belgium	3018.53 (1347.165701.2)	27.29 (12.0651.69)	3364.93 (1492.736357.34)	26.16 (11.5749.08)	−0.136 (−0.189−0.083)
Kingdom of Cambodia	3357.4 (1431.246389.4)	38.49 (16.7272.16)	6122.5 (2717.4111807.61)	36.27 (16.1869.94)	0.441 (0.3480.535)
Kingdom of Denmark	1123.62 (503.952157.6)	19.48 (8.7237.88)	1323.8 (596.52664.41)	21.68 (9.8143.75)	−0.128 (−0.211−0.046)
Kingdom of Norway	1383.14 (626.292637.12)	29.62 (13.2556.82)	1758.98 (802.243387.94)	28.62 (12.9155.37)	0.506 (0.3120.702)
Kingdom of Spain	16429.19 (7268.1830985.41)	39.07 (17.0874.09)	18798.07 (8508.0135749.59)	35.01 (15.5867.84)	−0.174 (−0.311−0.038)
Kingdom of Sweden	2580.13 (11254807.33)	27.95 (12.0552.38)	3502.8 (1566.616545.12)	30.18 (13.2357.35)	0.431 (0.2930.569)
Kingdom of Thailand	18516.95 (7979.1334994.13)	32.26 (13.9660.55)	22570.37 (9932.745220.95)	30.27 (13.1759.77)	0.093 (0.0710.116)
Kingdom of the Netherlands	4821.6 (2188.19302.12)	29.66 (13.4556.83)	4014.82 (1852.617924.88)	22.29 (10.1844.28)	−0.633 (−0.829−0.436)
Kingdom of Tonga	35.27 (15.2168.12)	39.63 (17.5374.45)	38.5 (16.4873.89)	38.68 (16.9373.83)	0.040 (0.0190.061)
Kyrgyz Republic	1510.71 (662.682864.57)	36.76 (16.2770.78)	2477.96 (1071.064643.37)	37.09 (16.1369.44)	0.189 (0.0860.292)
Lao People's Democratic Republic	1178.28 (504.332258.83)	32.48 (14.2962.14)	2151.25 (911.764133.72)	29.55 (12.7156.71)	0.210 (0.1550.264)
Lebanon	1028.27 (4451983.19)	36.23 (15.8468.87)	2043.29 (908.623838.44)	35.07 (15.4765.94)	0.188 (0.1730.203)
Lesotho	381.38 (163.61732.24)	29.38 (12.9355.53)	509.68 (214.25978.42)	27.73 (12.0152.99)	0.242 (0.2070.277)

Table 3 (continued)

	Number of DALYs cases (95% UI) in 1990	The age-standardized DALYs rate/100000 (95% UI) in 1990	Number of DALYs cases (95% UI) in 2021	The age-standardized DALYs rate/100000 (95% UI) in 2021	EAPC (95% CI)
Liberia	650.67 (266.951233.68)	31.95 (13.5259.08)	1608.69 (689.793089.72)	32.4 (14.1661.3)	0.214 (0.1610.267)
Libya	1285.33 (545.12499.52)	34.1 (14.8166.26)	2666.89 (1177.615041.52)	35.96 (15.9167.16)	0.685 (0.6460.724)
Madagascar	5203.23 (22589803.84)	49.34 (21.6692.77)	11409.27 (5015.8121364.85)	45 (19.9383.93)	−0.302 (−0.451-0.152)
Malawi	2962.56 (1258.245571.61)	36.56 (16.0869.13)	6246.34 (2669.7811969.58)	36.09 (15.8767.89)	0.118 (0.0690.167)
Malaysia	4412.44 (1855.428388.57)	26.34 (11.3750.91)	8107.25 (3502.3915675.34)	24.09 (10.4746.39)	0.078 (0.0240.132)
Mali	2300.33 (974.964354.6)	32.88 (14.4160.87)	6211.25 (2604.1811898.51)	31.75 (13.8459.69)	−0.172 (−0.199-0.145)
Mauritania	545.18 (233.681032.57)	31.61 (13.7859.34)	1198.11 (511.592320.92)	30.98 (13.559.69)	−0.037 (−0.0800.007)
Mauritius	350.1 (150.51670.95)	31.72 (13.761.49)	415.83 (185.15788.37)	29.58 (12.8855.6)	0.121 (0.1080.134)
Monaco	11.76 (5.2121.99)	32.44 (14.1460.3)	13.72 (6.1226.11)	30.66 (13.4458.87)	−0.225 (−0.266-0.184)
Mongolia	712.18 (309.11366.37)	37.07 (16.3671.55)	1158.52 (504.662276.45)	35.38 (15.6369.2)	0.167 (0.0240.310)
Montenegro	279.05 (125.91532.41)	43.32 (19.5582.4)	258.14 (112.7481.12)	39.13 (16.9472.93)	−0.178 (−0.210-0.147)
Morocco	6966.37 (3139.0613548.67)	29.04 (13.156.04)	7287.55 (3256.3314142.81)	19.15 (8.5437.4)	−1.013 (−1.332-0.693)
Mozambique	5130.82 (2217.399613.93)	45.74 (20.2985.52)	9563.2 (4096.4218149.25)	36.38 (15.7466.24)	−0.469 (−0.596-0.342)
Namibia	362 (158684.99)	30.11 (13.0656.46)	701.71 (301.891341.63)	29.71 (12.9356.72)	0.449 (0.3290.569)
Nauru	3.4 (1.456.5)	36.83 (16.0969.15)	3.96 (1.77.42)	37.41 (16.2768.96)	0.190 (0.1000.280)
Nepal	4972.18 (2081.379409.49)	30.16 (13.1256.8)	8636.4 (3762.8316181.06)	27.83 (12.2352.11)	0.221 (0.1160.326)
New Zealand	823.13 (361.641586.69)	22.75 (9.9943.8)	1290.95 (572.652519.58)	23.01 (10.1244.53)	0.154 (−0.0130.320)
Niger	2189.95 (919.874161.52)	34.99 (15.2565.53)	6765.09 (2847.6412957.93)	34.72 (15.3864.81)	−0.417 (−0.553-0.281)
Nigeria	16043.35 (6974.231228.86)	20.35 (9.0839.63)	39209.24 (17226.5177223.71)	18.93 (8.4836.94)	−0.253 (−0.302-0.203)
Niue	0.85 (0.371.59)	38.48 (16.7772.57)	0.65 (0.291.22)	37.49 (16.5869.61)	0.128 (0.0880.169)
North Macedonia	886.71 (391.211674.51)	43.21 (19.1481.58)	930.43 (416.551741.68)	38.77 (17.1173.05)	−0.028 (−0.0680.011)
Northern Mariana Islands	16.65 (732.21)	35.61 (15.3367.61)	18.44 (7.8335.17)	36.01 (15.4168.27)	0.185 (0.1250.245)
Oman	657.4 (283.231244.5)	37.17 (16.5170.2)	1771.74 (795.323362.78)	36.11 (16.3968.52)	0.258 (0.1920.323)
Pakistan	23876.24 (10306.7646196.06)	25.13 (11.1347.81)	54976.99 (23948.1104252.85)	25.35 (11.1747.86)	0.270 (0.1890.352)
Palau	5.81 (2.5110.84)	37.73 (16.4170.7)	7.34 (3.2414.04)	37.21 (16.3270.23)	0.171 (0.1340.208)
Palestine	564.79 (242.521105.93)	32.82 (14.3964.12)	1536.27 (655.233011.52)	31.32 (13.9561.03)	0.395 (0.3190.471)
People's Democratic Republic of Algeria	8131.93 (3383.0915625.39)	35.86 (15.6168.8)	15541.43 (6719.3530022.65)	35.34 (15.3468.33)	0.200 (0.1020.298)
People's Republic of China	245424.83 (103102.3464520.75)	19.62 (8.4637.24)	291828.69 (131906.61568107.54)	19.43 (8.6437.07)	0.000 (−0.0940.095)
Plurinational State of Bolivia	2474.39 (1084.964653.68)	43.27 (19.1981.15)	4981.07 (2197.039418.43)	42.27 (18.6479.79)	0.297 (0.2820.313)
Portuguese Republic	3367.11 (1518.166408.59)	30.36 (13.5557)	3600.42 (1610.347009.92)	28.95 (12.6154.97)	−0.051 (−0.096-0.005)
Principality of Andorra	20.84 (9.1939.86)	34.05 (15.0765.4)	34 (15.1565.3)	32.82 (14.6462.18)	0.047 (0.0110.084)
Puerto Rico	1271.98 (561.762406.32)	34.69 (15.3565.59)	1201.75 (540.522264.11)	33.69 (14.7764.31)	0.108 (0.1000.116)
Qatar	149.13 (64.2288.33)	32.77 (14.562.78)	1092.6 (467.82140.77)	32.17 (13.8562.7)	0.312 (0.2670.357)
Republic of Albania	1327.02 (584.242490.72)	41.04 (18.276.78)	1096.26 (487.822074.38)	38.29 (16.7671.52)	0.081 (0.0460.116)
Republic of Armenia	1241.77 (538.242356.58)	36.64 (15.8770.26)	1146.37 (512.752186.29)	35.59 (15.5367.5)	0.123 (0.0320.214)

Table 3 (continued)

	Number of DALYs cases (95% UI) in 1990	The age-standardized DALYs rate/100000 (95% UI) in 1990	Number of DALYs cases (95% UI) in 2021	The age-standardized DALYs rate/100000 (95% UI) in 2021	EAPC (95% CI)
Republic of Austria	2612.94 (1168.174926.13)	30.22 (13.2756.31)	2987.85 (1334.625811.59)	28.94 (12.8155.91)	−0.010 (−0.0540.034)
Republic of Azerbaijan	2531.76 (1106.624897.73)	35.74 (15.8469.34)	3960.39 (1769.937661.72)	35 (15.5967.74)	0.234 (0.1320.336)
Republic of Belarus	3411.42 (1488.076641.27)	31.31 (13.5860.26)	3089.43 (1346.645789.01)	30.8 (13.458.09)	−0.012 (−0.0920.068)
Republic of Bulgaria	3854.28 (1708.987226.6)	42.07 (18.4878.44)	2857.17 (12945430.72)	39.21 (17.474.1)	−0.204 (−0.261-0.146)
Republic of Chile	5370.71 (2337.4310245.37)	41.2 (18.0178.44)	8636.02 (4065.3416511.61)	41.74 (19.6779.63)	0.252 (−0.0670.572)
Republic of Colombia	10012.04 (4328.6218570.93)	32.66 (14.2860.55)	16431.36 (7277.1730999.78)	31.28 (13.8258.85)	1.298 (0.9011.696)
Republic of Costa Rica	1004.15 (439.151855.14)	35.81 (15.9367.34)	1749.78 (763.763278.1)	34.22 (14.9763.95)	0.364 (0.3300.398)
Republic of Croatia	2268.22 (1007.14336.04)	44.33 (19.6683.45)	1794.04 (813.073467.63)	39.94 (17.7875.4)	−0.205 (−0.249-0.160)
Republic of Cuba	4166.72 (1824.188064.71)	36.51 (15.9670.2)	4340.4 (1926.768326.08)	35.26 (15.3368.02)	0.128 (0.0080.247)
Republic of Cyprus	288.52 (128.81543.04)	35.64 (15.9867.35)	530.72 (240.431025.11)	33.99 (15.2265.95)	0.213 (0.1970.229)
Republic of Ecuador	3917.42 (1712.587304.82)	42.23 (18.5178.44)	7687.76 (3414.2914498.34)	42.06 (18.7779.37)	−0.089 (−0.2150.037)
Republic of El Salvador	1726.77 (736.083250.63)	36.8 (16.2169.15)	2280.65 (1007.154354.96)	35.2 (15.5267.14)	0.327 (0.2920.363)
Republic of Estonia	353.03 (154.38686.92)	21.84 (9.4842.38)	271.99 (119.67534.78)	20.55 (8.9239.81)	−0.323 (−0.390-0.255)
Republic of Fiji	281.59 (118.64534.53)	38.79 (16.8172.65)	353.21 (154.74647.42)	37.98 (16.769.66)	0.033 (−0.0790.146)
Republic of Finland	1306.44 (571.792414.55)	23.71 (10.444.27)	1390.03 (615.852654.85)	22.37 (9.6743.24)	−0.103 (−0.3080.103)
Republic of Guatemala	2463.56 (1076.454680.75)	36.3 (16.0867.53)	5436.95 (2327.1510313.97)	35.21 (15.4466.53)	0.538 (0.5010.574)
Republic of Guyana	273.02 (119.97520.68)	37.61 (16.8471.63)	275.24 (119.08528.9)	35.35 (15.3167.22)	0.157 (0.1300.183)
Republic of Haiti	2162.79 (980.294187.83)	38.63 (17.8374.91)	4226.11 (1954.988315.76)	33.58 (15.5266.27)	0.074 (0.0110.138)
Republic of Honduras	1432.51 (631.532698.68)	36.95 (16.4669.19)	3534.59 (1547.776675.01)	36.1 (15.8768.44)	0.438 (0.4300.445)
Republic of Iceland	106.45 (47.77201.95)	40.77 (18.1976.98)	125.69 (57.28246.51)	33.77 (15.3765.81)	−0.540 (−0.592-0.488)
Republic of Indonesia	54753.88 (23832.25106496.4)	31.66 (14.0561.24)	88589.14 (38541.35174436.19)	30.3 (13.2859.19)	0.106 (−0.1000.313)
Republic of Iraq	5757.1 (2460.7110966.76)	36.07 (16.1368.21)	14190.94 (6038.1427148.45)	35.01 (15.4365.49)	0.193 (0.1570.229)
Republic of Italy	19132.93 (8509.8636194.92)	30.03 (13.0756.74)	19701.25 (8889.0637014.69)	28.18 (12.5153.58)	−0.112 (−0.136-0.088)
Republic of Kazakhstan	5689.97 (2495.9110777.05)	35.3 (15.5167.06)	6578.88 (2873.1512691.89)	34.36 (15.0366.87)	0.052 (−0.0500.155)
Republic of Kiribati	27.31 (11.7350.91)	40.1 (17.4575.43)	47.46 (20.589.55)	40.4 (17.7575.74)	0.248 (0.2220.273)
Republic of Korea	10491.37 (4527.8420634.42)	22.03 (9.5943.49)	11321.99 (4939.7622028.49)	20.41 (8.9339.05)	−0.313 (−0.332-0.295)
Republic of Latvia	865.84 (379.611674.41)	31.11 (13.6359.58)	593.34 (265.491173.66)	30.28 (13.1958.87)	−0.111 (−0.175-0.047)
Republic of Lithuania	1418.28 (628.522770.48)	37.22 (16.3672.16)	999.18 (454.371912.24)	34.08 (15.1165.42)	−0.250 (−0.336-0.164)
Republic of Maldives	60.45 (25.66116.67)	32.5 (14.1463.36)	172.8 (74.86329.18)	30.46 (13.3359.1)	0.674 (0.6180.730)
Republic of Malta	144.02 (63.17279.2)	36.46 (15.9270.79)	174.3 (80.54327.38)	33.88 (15.2563.26)	0.132 (0.0990.166)
Republic of Moldova	1480.27 (660.722838.82)	32.8 (14.5162.96)	1302.21 (563.182510.39)	32.64 (13.9962.11)	0.275 (0.1810.370)
Republic of Nicaragua	1182.87 (507.352215.22)	36.9 (16.2369.64)	2394.92 (1067.974571.14)	36 (16.1668.31)	0.519 (0.4850.554)
Republic of Panama	1009.36 (439.871932.73)	44.45 (19.5884.74)	1795.02 (805.493424.79)	40.99 (18.3978.07)	−0.075 (−0.117-0.032)
Republic of Paraguay	1423.58 (613.882663.57)	39.15 (17.273.42)	2970.32 (1277.185609.15)	40.56 (17.4976.82)	0.620 (0.5760.664)

Table 3 (continued)

	Number of DALYs cases (95% UI) in 1990	The age-standardized DALYs rate/100000 (95% UI) in 1990	Number of DALYs cases (95% UI) in 2021	The age-standardized DALYs rate/100000 (95% UI) in 2021	EAPC (95% CI)
Republic of Peru	8560.92 (3791.1715763.23)	42.57 (19.0378.63)	15434.88 (6882.4829279.52)	41.72 (18.6978.82)	0.244 (0.2130.276)
Republic of Poland	12103.34 (5482.4123362.76)	30.68 (13.8459.33)	12042.02 (5496.0423437.4)	29.26 (13.2456.49)	0.004 (−0.0720.081)
Republic of Serbia	4250.48 (1882.058091.87)	42.44 (18.7580.17)	3546.47 (1605.816827.62)	36.93 (16.5769.89)	0.264 (−0.1450.675)
Republic of Singapore	593.64 (257.091143.28)	17.19 (7.4833.07)	967.29 (421.681880.09)	16.33 (7.0732.04)	−0.405 (−0.485-0.324)
Republic of Slovenia	768.76 (343.451490.76)	36.77 (16.5471.35)	749.98 (331.661460.98)	34.58 (14.967.41)	−0.215 (−0.276-0.154)
Republic of Suriname	105.27 (45.35200.6)	27.77 (12.1153.68)	160.15 (69.65312.16)	26.65 (11.6551.2)	−0.014 (−0.0530.026)
Republic of Tajikistan	1716.53 (758.033251.95)	37.05 (16.4870.23)	3613.94 (1559.956804.27)	37.41 (16.3270.36)	0.390 (0.2960.485)
Republic of the Marshall Islands	15.66 (6.5629.63)	39.69 (17.0675.24)	22.19 (9.4142.01)	39.32 (16.8373.73)	0.412 (0.3840.441)
Republic of the Philippines	17984.92 (7944.7734736.96)	32.07 (14.3661.43)	35137.91 (15703.4267016.23)	31.36 (14.0959.83)	0.161 (−0.0010.324)
Republic of the Union of Myanmar	10248.7 (4391.2619787.11)	26.53 (11.4152)	13548.27 (5823.426663.42)	23.51 (10.1746.22)	−0.263 (−0.312-0.213)
Republic of Trinidad and Tobago	417.8 (182.69796.93)	35.68 (15.8267.99)	399.06 (180.94796.64)	27.18 (12.1853.66)	−0.696 (−0.755-0.636)
Republic of Uzbekistan	6911.89 (3044.6813050)	37.09 (16.3570.24)	12323.97 (5414.4723700.54)	35.87 (15.8268.25)	0.353 (0.2360.469)
Republic of Vanuatu	53.16 (22.63101.98)	39.97 (17.5774.68)	117.79 (50.15222.6)	39.98 (17.4374.87)	0.214 (0.1960.232)
Romania	11025.78 (4844.9520867.33)	45.61 (20.185.94)	8228.22 (3785.1515402.9)	40.69 (18.2675.23)	−0.349 (−0.384-0.315)
Russian Federation	49705.37 (22453.7596772.43)	31.43 (13.9960.72)	47967.62 (21733.0793381.35)	30.32 (13.5858.61)	−0.019 (−0.0870.048)
Rwanda	2164.8 (925.574111.87)	36.58 (15.8769.06)	4309.91 (1827.098197.6)	34.99 (15.1266.37)	0.264 (0.2420.286)
Saint Kitts and Nevis	14.1 (6.2326.44)	35.91 (15.8468.98)	22.3 (9.8543.09)	34.04 (14.9264.28)	0.405 (0.3850.425)
Saint Lucia	46.33 (20.2488.45)	36.68 (16.2170.07)	69.02 (30.93135.05)	35.07 (15.4767.68)	0.499 (0.4720.527)
Saint Vincent and the Grenadines	50.15 (21.4992.7)	46.74 (20.2686.42)	48.76 (22.1292.44)	40.18 (18.0476.12)	−0.265 (−0.418-0.111)
San Marino	9.17 (4.117.88)	34.34 (15.0967.39)	12.86 (5.8724.75)	33.38 (14.9264.52)	−0.010 (−0.0630.042)
Sao Tome and Principe	32.03 (13.4661.58)	31.79 (14.0561.24)	64.75 (26.77123.97)	31.33 (13.5159.47)	0.273 (0.2290.317)
Saudi Arabia	5572.17 (2377.6110827.76)	39.46 (17.3275.26)	15667.26 (6798.2930186.85)	38.37 (16.873.05)	0.280 (0.2020.358)
Senegal	1739.82 (765.923288.72)	27.88 (12.3653.21)	3519.19 (1596.936743.66)	24.04 (10.9846.65)	0.067 (0.0040.131)
Seychelles	22.13 (9.542.45)	31.17 (13.4360.21)	32.89 (14.4463.52)	29.43 (12.8956.26)	0.100 (0.0480.152)
Sierra Leone	1357.99 (614.142581.38)	36.93 (16.7370.41)	2392.11 (1065.734654.1)	29.78 (13.6857.52)	−0.599 (−0.809-0.387)
Slovak Republic	2146.68 (953.094042.75)	39.34 (17.4374.05)	2140.28 (961.954044.45)	36.8 (16.2969.88)	−0.141 (−0.218-0.064)
Socialist Republic of Viet Nam	19700.39 (8471.4937676.11)	31.4 (13.7160.66)	28727.19 (12610.1455564.78)	27.54 (12.0853.42)	−0.325 (−0.569-0.081)
Solomon Islands	119.63 (49.72231.69)	40.61 (17.5677.38)	257.55 (108.77488.13)	40.22 (17.4374.92)	0.218 (0.1960.240)
Somalia	2492.48 (1061.714747.18)	38.68 (17.273.51)	6906.05 (2914.9313197.71)	39.06 (16.7374.13)	−0.010 (−0.0420.022)
South Africa	8955.57 (3873.1116996.24)	26.29 (11.7150.38)	14402.47 (6435.0327542.64)	24.35 (10.9246.56)	0.237 (0.1670.307)
South Sudan	1686.56 (737.013218.08)	33.76 (15.0164.57)	2935.43 (1217.635731.33)	35.3 (15.4366.25)	0.095 (0.0390.151)
State of Israel	1993.68 (878.623846.79)	41.12 (18.0679.2)	3738.43 (1697.057161.13)	38.24 (17.2373.7)	−0.050 (−0.081-0.019)

Table 3 (continued)

	Number of DALYs cases (95% UI) in 1990	The age-standardized DALYs rate/100000 (95% UI) in 1990	Number of DALYs cases (95% UI) in 2021	The age-standardized DALYs rate/100000 (95% UI) in 2021	EAPC (95% CI)
State of Kuwait	574.28 (245.581134.91)	33.87 (14.8265.86)	1711.99 (736.623344.07)	32.99 (14.2663.56)	0.249 (0.2150.283)
Sudan	6712.07 (2858.7512896.09)	38.63 (16.7573.45)	15144.72 (6529.4928779.39)	37.47 (16.4770.92)	0.047 (−0.0040.098)
Swiss Confederation	3430.52 (1543.236469.3)	44.84 (19.884.21)	4483.41 (2026.058466.08)	43.5 (19.3382.73)	0.043 (0.0170.070)
Syrian Arab Republic	4106.05 (1716.287895.96)	37.7 (16.3371.48)	5364.57 (2370.4910351.73)	36.71 (16.4469.77)	0.498 (0.4390.557)
Taiwan (Province of China)	2843.54 (1197.325367.79)	13.1 (5.625.01)	3188.91 (1386.916162.4)	12.54 (5.2823.99)	−0.008 (−0.0610.045)
Togo	963.91 (405.431815.79)	32.59 (14.1260.01)	1978.12 (894.63839.56)	25.38 (11.5948.64)	0.018 (−0.1290.165)
Tokelau	0.59 (0.251.1)	39.57 (17.2475.87)	0.54 (0.231.02)	38.28 (16.6872.66)	0.183 (0.1490.218)
Tunisia	2875.74 (1227.465516.24)	36.64 (15.9670.57)	4413.04 (1905.558351.67)	35.45 (15.3966.37)	0.244 (0.1660.321)
Turkey	20996.66 (8776.4939868.03)	38.37 (16.2973.08)	32020.63 (14100.960683.92)	35.99 (15.6968.14)	0.047 (−0.1010.195)
Turkmenistan	1182.15 (510.992245.61)	35.59 (15.6368.03)	1788.51 (782.363461.34)	34.51 (15.1466.52)	0.255 (0.1710.339)
Tuvalu	3.58 (1.526.69)	40.74 (17.576.03)	4.84 (2.119.06)	39.24 (17.3173.2)	0.189 (0.1710.207)
Uganda	3450.48 (1477.166721.16)	24.66 (10.7446.48)	8728.43 (3727.4517403.08)	23.56 (10.3345.86)	0.060 (0.0020.118)
Ukraine	15204.55 (6844.2429699.67)	27.35 (12.1853.01)	13262.23 (5666.5525855.56)	27.72 (11.9352.85)	0.141 (0.0610.221)
United Arab Emirates	605.79 (261.91166.61)	32.43 (14.3762.9)	3673.02 (1615.717250.64)	32.66 (14.5662.66)	0.595 (0.5390.652)
United Kingdom of Great Britain and Northern Ireland	20189.51 (9212.9838291.45)	32.12 (14.5361.12)	22569.46 (10433.3743166.77)	29.68 (13.4956.83)	−0.175 (−0.255-0.096)
United Mexican States	18986.87 (8294.5836185.53)	24.26 (10.7846.68)	30980.59 (13766.2760646.24)	22.78 (10.1444.35)	0.159 (0.1040.214)
United Republic of Tanzania	6564.14 (2780.4312533.95)	31.4 (13.6859.98)	16552.73 (7046.6130948.84)	31.69 (13.958.02)	−0.462 (−0.766-0.157)
United States of America	53243.81 (23761.75103396.21)	20.05 (8.8938.93)	66485.21 (30210.4128589.32)	18.88 (8.4236.56)	−0.054 (−0.1410.032)
United States Virgin Islands	37.31 (16.371.16)	35.1 (15.4766.63)	30.02 (13.6657.76)	33.13 (14.6264.28)	0.013 (−0.0270.053)
Yemen	3860.01 (1641.747335.88)	34.93 (15.4265.34)	10713.19 (4605.1520423.85)	34.73 (15.3964.51)	0.376 (0.2310.521)
Zambia	2241.51 (999.664241.54)	32.86 (14.8762.57)	4792.41 (2112.539542.39)	26.51 (12.0852.64)	−0.239 (−0.356-0.122)
Zimbabwe	2005.05 (857.53790.13)	22.81 (9.9643.9)	3276.83 (1387.676407.95)	23.01 (10.0744.65)	0.241 (0.2110.271)

Abbreviations: DALYs disability-adjusted life years

their effectiveness. For instance, programs that provide education on mental health, sexual health, and substance abuse prevention could be particularly relevant. While this observation challenges the conventional assumption of a monotonic relationship between age and disease burden, it aligns with emerging research that highlights the complexity of disease burden dynamics across different age groups [27]. The consistency of trends across most age groups further strengthens our understanding of the disease's epidemiology. However, the deviation from the

expected trend in the 20–24 age group underscores the importance of nuanced age-specific analysis and highlights the need for targeted interventions and health promotion programs aimed at this vulnerable population.

The disease burden across different SDI regions offers valuable insights into the intricate interplay between socioeconomic development and disease burden. Consistent with prior studies [28, 29], our findings reveal that the lowest-SDI regions face the highest ASIR, potentially due to inadequate healthcare infrastructure,

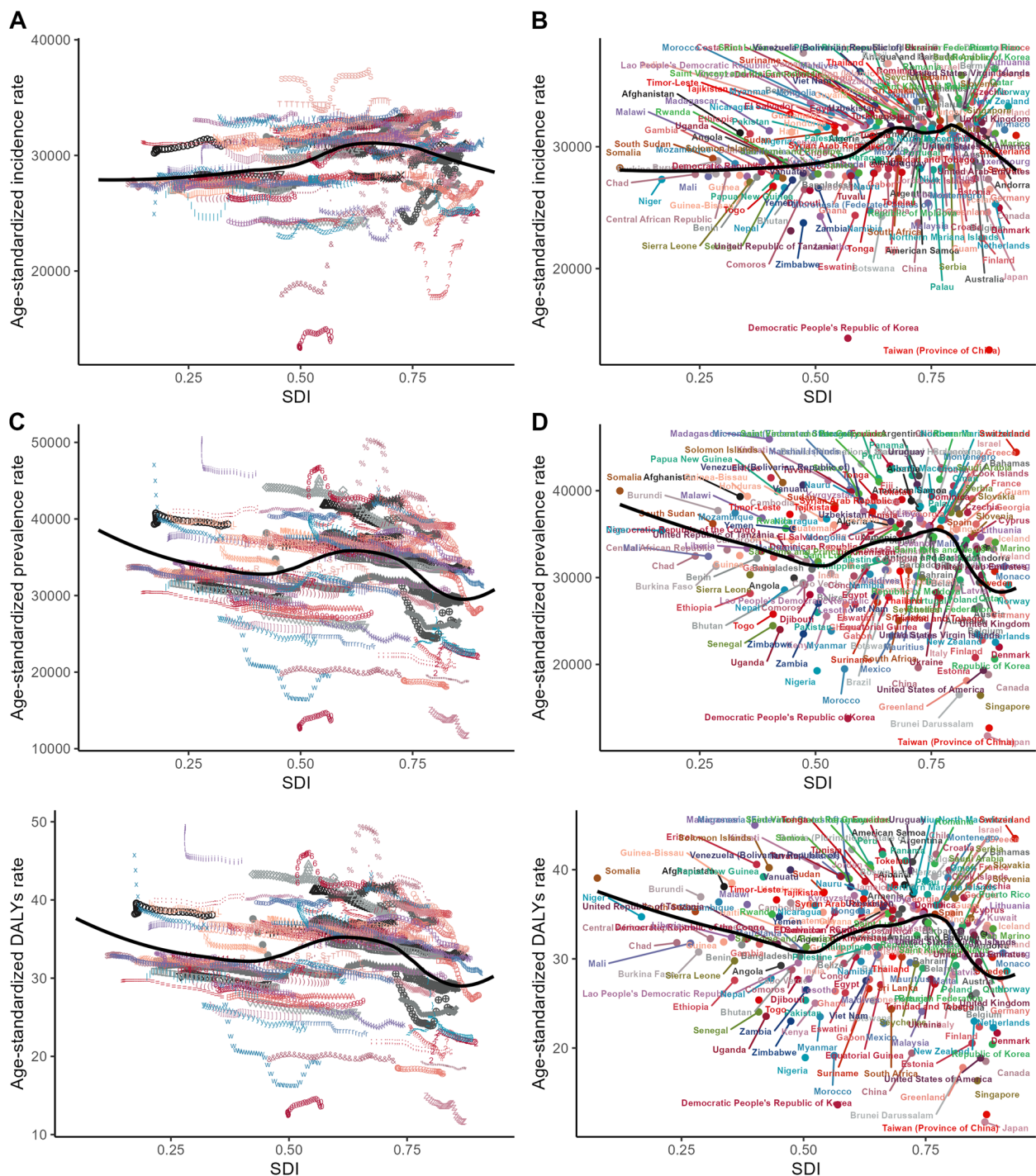


Fig. 1 Age-standardized rates of incidence, prevalence, and DALYs attributable to caries of permanent teeth across countries and territories by socio-demographic index for both sexes, 1990–2019. The black line was an adaptive association fitted with adaptive Loess regression based on all data points. Abbreviations: DALYs, disability-adjusted-life-years

limited access to preventive services, and higher exposure to risk factors. Conversely, the decline in ASIRs observed in high-middle SDI regions may be attributed to better healthcare systems, higher levels of awareness,

and improved living conditions. The inverse correlation between ASPR, ASDAR, and SDI levels suggests that as countries progress socioeconomically, they become better equipped to manage the disease, resulting in lower

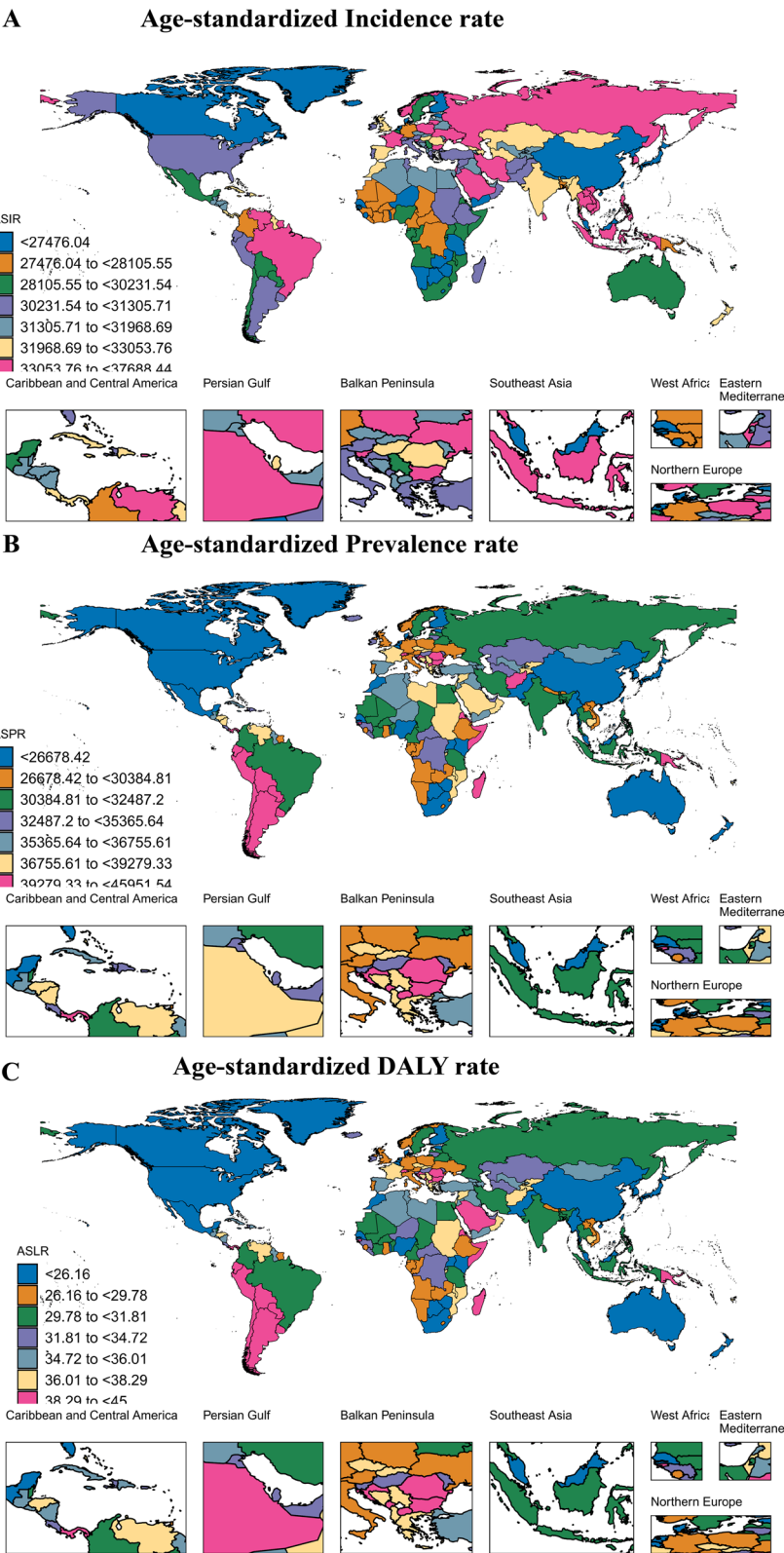


Fig. 2 Age-standardized rates of caries of permanent teeth-related incidence, prevalence, and DALYs across countries and territories in 2021. Abbreviations: DALYs, disability-adjusted life years

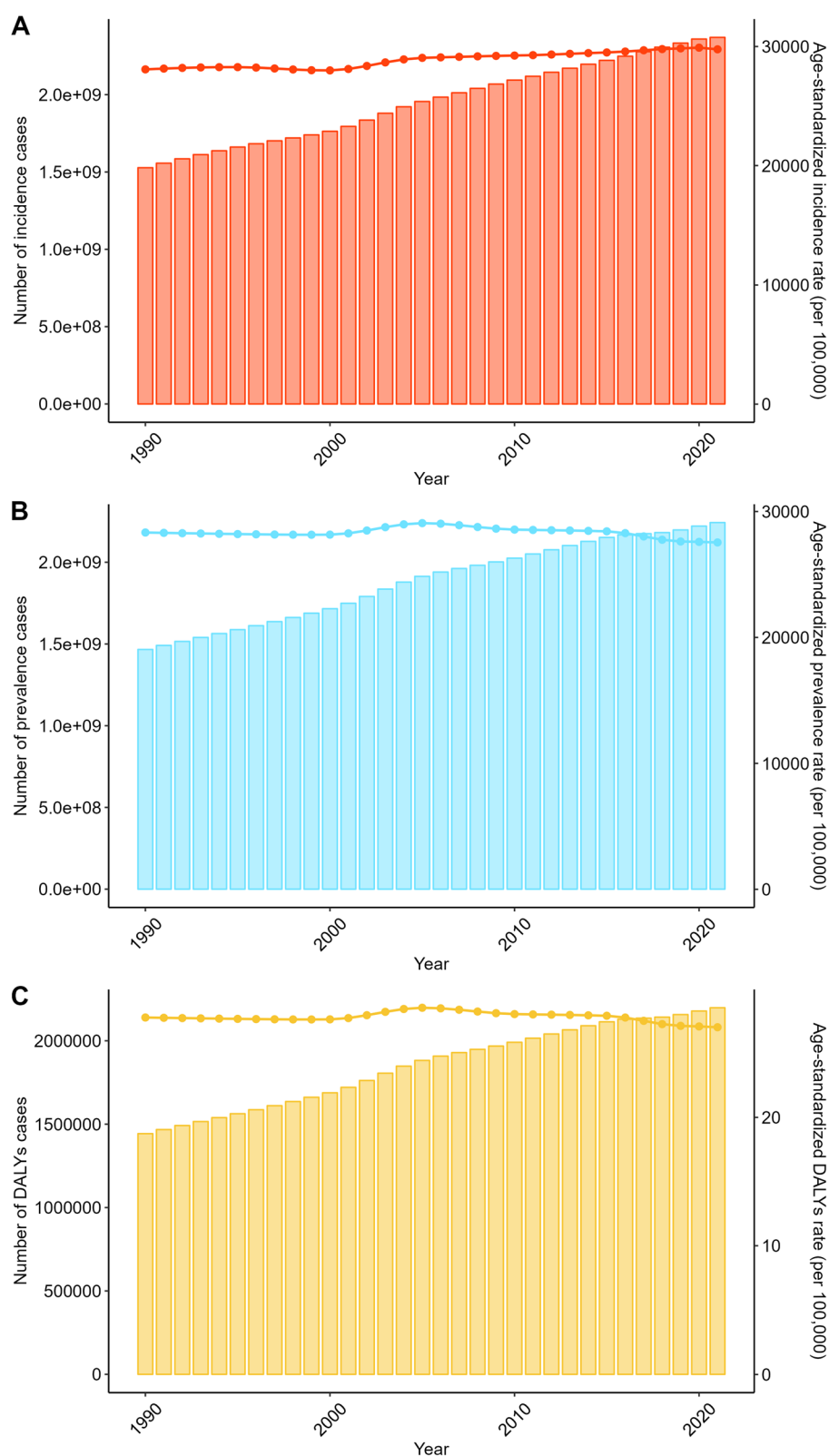


Fig. 3 Trends in the numbers and age-standardized rates of caries of permanent teeth-related incidence, prevalence, and DALYs globally from 1990 to 2021. Abbreviations: DALYs, disability-adjusted-life-years

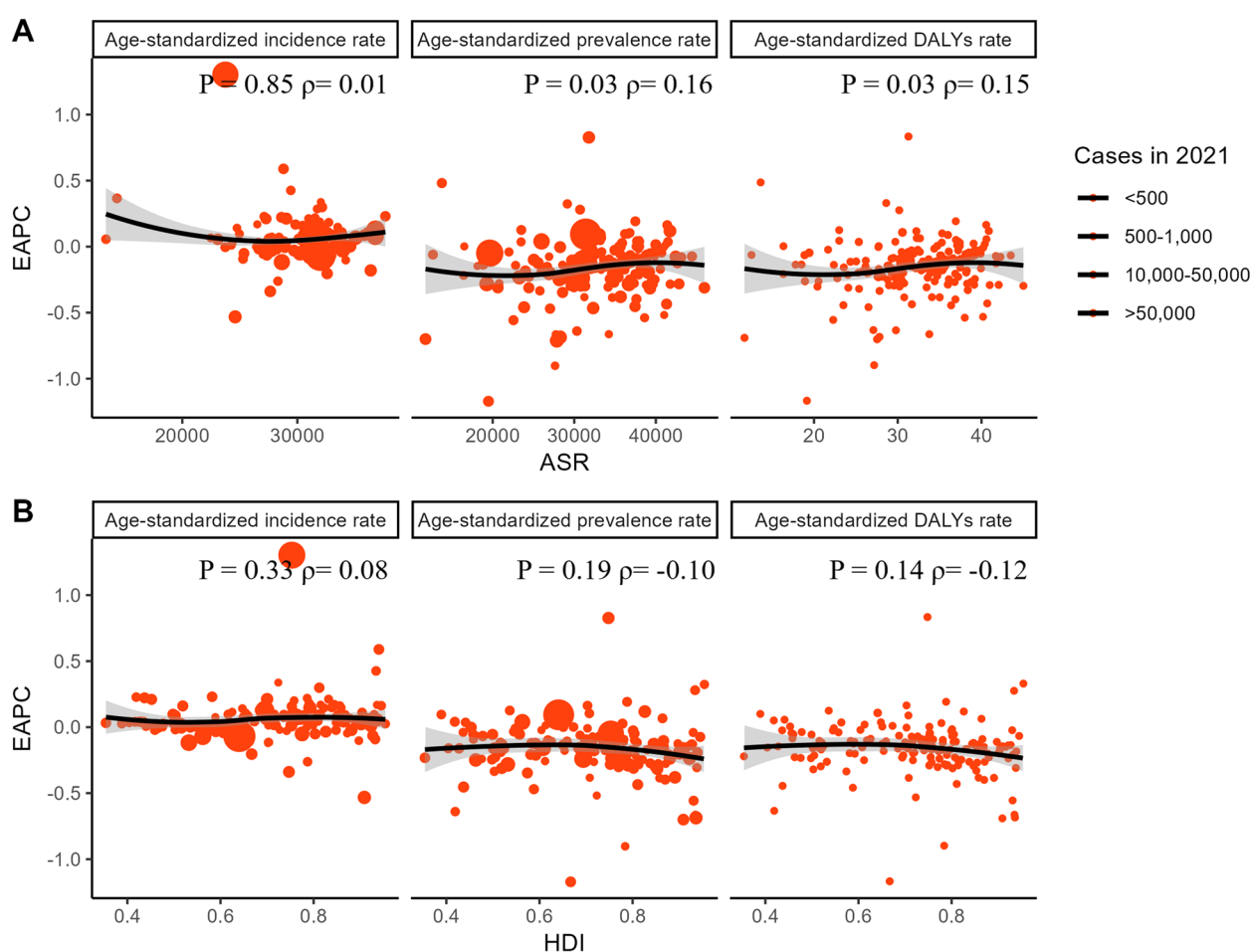


Fig. 4 The association between EAPCs and caries of permanent teeth-related ASRs in 1990 and HDIs in 2021. The circles represent countries that were available on HDI data. The size of the circle is increased with the cases of caries of permanent teeth. The ρ indices and p values presented were derived from Spearman correlation analysis. Abbreviations: EAPC, estimated annual percentage change; ASR, age-standardized rate; HDI, human development index

rates of prevalence and DALYs. However, our analysis also uncovers a complex 'w-shaped relationship' between ASRs and SDI, with a notable peak around an SDI of 0.75. This finding challenges the simplistic narrative that socioeconomic advancement inevitably leads to reduced disease burden. Instead, it underscores the importance of a nuanced understanding of the transition phases, where middle-SDI regions may experience a surge in disease burden due to rapid urbanization, lifestyle changes, and emerging risk factors. Given this consistent pattern, where disease burden first increases and then decreases with SDI, peaking in middle-SDI regions, it is crucial to implement tailored interventions specifically targeting these critical developmental stages. For middle-SDI regions undergoing rapid urbanization, strategies such as public-private oral health partnerships could be particularly effective in addressing the surge in disease burden. These partnerships can leverage the resources

and expertise of both the public and private sectors to enhance access to oral health care services, improve preventive measures, and raise awareness about risk factors. While all SDI regions exhibited an upward trend in the number of cases, indicating an overall increase in global disease burden, the varying trends in ASRs across different SDI regions highlight the importance of context-specific strategies to effectively address this issue. By considering the unique challenges and opportunities presented by different SDI regions, we can develop more targeted and effective interventions to reduce disease burden globally.

The findings underscore the disproportionate distribution of this disease, highlighting the need for targeted interventions in high-burden regions. The observed disparities in caries burden align with previous studies that have emphasized the role of socioeconomic factors, oral hygiene practices, and access to dental care in shaping

Table 4 The predicted results in the caries of permanent teeth-related numbers and age-standardized rates of incidence prevalence and DALYs by sex globally from 2022 to 2046 of the BAPC model

year	sex	Age-standardized incidence rate	Numer of incidence cases	Age-standardized prevalence rate	Numer of prevalence cases	Age-standardized DALYs rate	Numer of DALYs cases
2022	Female	53188.04	2.14E + 09	55264.86	2.18E + 09	53.81832	2168354
2023	Female	53344.26	2.17E + 09	55310.72	2.2E + 09	53.85238	2191887
2024	Female	53514.43	2.2E + 09	55371.25	2.22E + 09	53.89748	2215531
2025	Female	53691.82	2.23E + 09	55440.26	2.24E + 09	53.94964	2239059
2026	Female	53863.96	2.26E + 09	55500.63	2.25E + 09	53.99466	2261730
2027	Female	54038.71	2.29E + 09	55549.82	2.27E + 09	54.03093	2283587
2028	Female	54226.02	2.32E + 09	55606.35	2.29E + 09	54.07156	2305216
2029	Female	54424.92	2.35E + 09	55676.76	2.3E + 09	54.12269	2326876
2030	Female	54629.94	2.38E + 09	55755.12	2.32E + 09	54.18033	2348366
2031	Female	54830.98	2.41E + 09	55825.14	2.34E + 09	54.23099	2368996
2032	Female	55034.41	2.44E + 09	55884.56	2.35E + 09	54.27315	2388806
2033	Female	55248.14	2.48E + 09	55950.58	2.36E + 09	54.31925	2408344
2034	Female	55471.41	2.51E + 09	56029.41	2.38E + 09	54.37504	2427877
2035	Female	55699.85	2.54E + 09	56115.79	2.39E + 09	54.43697	2447247
2036	Female	55925.47	2.57E + 09	56194.61	2.41E + 09	54.49258	2465815
2037	Female	56153.27	2.59E + 09	56263.83	2.42E + 09	54.54045	2483605
2038	Female	56389.47	2.62E + 09	56338.92	2.43E + 09	54.59191	2501121
2039	Female	56633.43	2.65E + 09	56425.54	2.45E + 09	54.65206	2518587
2040	Female	56881.73	2.68E + 09	56518.92	2.46E + 09	54.71764	2535848
2041	Female	57128.16	2.71E + 09	56605.36	2.47E + 09	54.77741	2552323
2042	Female	57376.59	2.74E + 09	56683.03	2.48E + 09	54.83004	2568018
2043	Female	57631.82	2.77E + 09	56765.56	2.49E + 09	54.8856	2583371
2044	Female	57893.36	2.8E + 09	56858.05	2.5E + 09	54.94866	2598562
2045	Female	58158.63	2.83E + 09	56956.48	2.51E + 09	55.01638	2613446
2046	Female	58422.86	2.85E + 09	57048.98	2.52E + 09	55.07914	2627521
2022	Male	52949.52	2.13E + 09	54010.69	2.22E + 09	53.7195	2157543
2023	Male	53209.05	2.16E + 09	53953.73	2.24E + 09	53.79016	2179897
2024	Male	53479.45	2.19E + 09	53912.81	2.26E + 09	53.87247	2202364
2025	Male	53755.91	2.21E + 09	53880.49	2.29E + 09	53.96179	2224744
2026	Male	54030.8	2.24E + 09	53839.54	2.31E + 09	54.04086	2246431
2027	Male	54308.27	2.27E + 09	53788.8	2.33E + 09	54.11099	2267345
2028	Male	54595.39	2.29E + 09	53746.55	2.35E + 09	54.18577	2288045
2029	Male	54891.69	2.32E + 09	53718.59	2.38E + 09	54.27138	2308782
2030	Male	55193.29	2.35E + 09	53698.3	2.4E + 09	54.36334	2329374
2031	Male	55493.93	2.38E + 09	53670.31	2.42E + 09	54.44565	2349244
2032	Male	55797.17	2.4E + 09	53633.63	2.44E + 09	54.5194	2368310
2033	Male	56108.59	2.43E + 09	53604.25	2.46E + 09	54.59723	2387098
2034	Male	56427.83	2.45E + 09	53587.32	2.48E + 09	54.68482	2405863
2035	Male	56751.8	2.48E + 09	53577.23	2.5E + 09	54.77825	2424456
2036	Male	57075.46	2.51E + 09	53560.68	2.52E + 09	54.86327	2442315
2037	Male	57401.76	2.53E + 09	53536.76	2.54E + 09	54.94061	2459363
2038	Male	57735.02	2.56E + 09	53519.03	2.56E + 09	55.0216	2476096
2039	Male	58074.93	2.58E + 09	53511.86	2.57E + 09	55.11117	2492741
2040	Male	58419.04	2.61E + 09	53510.47	2.59E + 09	55.20578	2509152
2041	Male	58763.39	2.63E + 09	53503.54	2.61E + 09	55.29296	2524805
2042	Male	59110.34	2.66E + 09	53490.21	2.63E + 09	55.37312	2539627
2043	Male	59463.17	2.68E + 09	53481.72	2.64E + 09	55.45613	2554062
2044	Male	59821.69	2.71E + 09	53481.81	2.66E + 09	55.54626	2568304
2045	Male	60184.03	2.73E + 09	53486.67	2.67E + 09	55.64059	2582219
2046	Male	60547.12	2.75E + 09	53487.1	2.69E + 09	55.72876	2595344

Abbreviations: DALYs disability-adjusted life years, BAPC Bayesian age-period-cohort

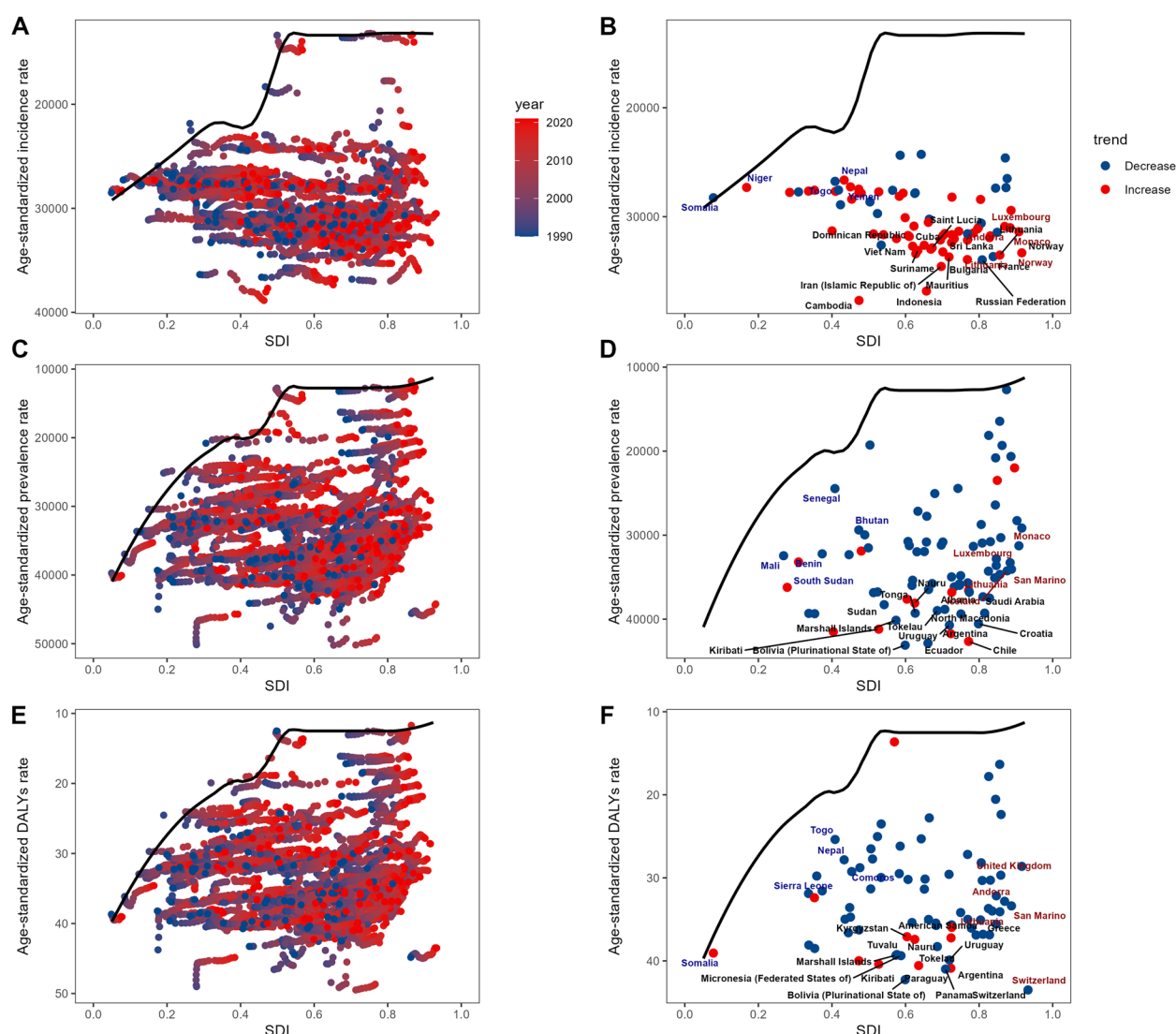


Fig. 5 Frontier analysis based on SDI and ASRs of the caries of permanent teeth in 2021. The frontier is delineated in solid black color; countries and territories are represented as dots. The top 15 countries with the largest effective difference (largest ASRs gap from the frontier) are labeled in black; examples of frontier countries with low SDI (< 0.5) and low effective difference are labeled in blue, and examples of countries and territories with high SDI (> 0.85) and relatively high effective difference for their level of development are labeled in red. Red dots indicate an increase in age-standardized ASRs from 1990 to 2021; blue dots indicate a decrease in ASRs between 1990 and 2021. Abbreviations: ASRs: Age-Standardized Rates; SDI: Socio-demographic index

disease patterns [4]. For instance, the high burden in Tropical and Andean Latin America could be attributed to limited access to preventive services, inadequate oral health education, and barriers to care related to poverty, such as financial constraints, lack of transportation, and unavailability of dental services in rural or underserved areas [30]. Conversely, the relatively low burden in East Asia, particularly in countries like Japan and Taiwan, could be linked to robust public health systems, widespread use of fluoride, and cultural norms favoring oral hygiene [31]. Our analysis further reveals

that within countries, the burden of caries has evolved dynamically over time. The notable increase in ASIR in China, for example, underscores the need for continued efforts to improve oral health education and access to dental services, despite recent improvements in overall health indicators [32]. Similarly, the substantial decrease in caries burden in Japan and Morocco highlights the effectiveness of targeted interventions, such as school-based oral health programs and fluoridation policies, in reducing disease prevalence [33, 34]. The hierarchical clustering analysis conducted in this study provides

valuable insights into the spatial patterns of caries burden, identifying regions with similar trends in disease burden. This information can inform the development of region-specific strategies for caries prevention and control, leveraging shared challenges and opportunities across neighboring countries. For instance, the observed increase in ASRs across multiple regions, including Eastern Africa and Southeast Asia, suggests a need for intensified efforts to improve oral health infrastructure and access to care in these areas. Moreover, our findings emphasize the importance of considering both incidence and prevalence when assessing the burden of caries. While high incidence rates indicate a need for preventive measures, high prevalence rates underscore the urgency of implementing restorative and rehabilitative services to mitigate the long-term consequences of untreated caries. The substantial number of DALYs attributed to caries in India, for instance, underscores the significant impact of this disease on individual well-being and societal productivity, necessitating a multi-faceted approach to address both prevention and treatment needs.

The observed associations between EAPCs and ASRs in 1990 emphasize the intricate interplay between disease burden and its subsequent trends. Our findings align with previous studies that have emphasized the baseline disease burden as a crucial determinant of future health trajectories [35, 36]. Notably, the positive correlation between EAPCs and ASRs suggests that countries with higher initial caries burdens experienced more pronounced improvements or deteriorations over time, potentially due to variations in health policies, interventions, and resource allocations. While socioeconomic development, as indicated by HDIs, is often considered a key factor in health outcomes, our analysis in 2021 revealed no significant association between EAPCs and HDIs. This divergence challenges the notion that economic progress automatically translates into improved oral health outcomes and underscores the need to consider a broader range of factors. In this context, the importance of targeted interventions and equitable access to oral healthcare services becomes even more evident [37, 38]. Moreover, our results highlight the potential role of other determinants, such as cultural practices, dietary habits, and oral health literacy, in shaping caries trends [39, 40]. The discrepancy between the significant associations with ASRs and the non-significant link to HDIs further underscores the complexity of oral health determinants and emphasizes the need for multi-faceted strategies to address the global burden of caries. In light of these findings, future research should delve deeper into the contextual factors modulating these relationships, including but not limited to the impact of COVID-19 on oral health services, changing lifestyles,

and the effectiveness of public health interventions [41, 42]. We believe that a comprehensive understanding of these factors will be crucial in developing effective strategies to improve oral health worldwide.

The projected trends from our BAPC model, predicting a steady rise in incidence, prevalence, and DALYs for both sexes over the next two decades (2022–2046), underscore the pressing need for urgent and sustained interventions. These findings amplify the growing concern voiced in recent literature about the ongoing challenge posed by non-communicable diseases (NCDs) globally [43, 44]. Our projections exceed the anticipated burdens reported in previous studies, highlighting the need for re-evaluation of current strategies and intensification of preventive measures [45, 46]. Demographic shifts, including population aging and lifestyle changes, may exacerbate these trends, necessitating a holistic approach. This approach should address not only clinical management but also behavioral modifications and public health policies aimed at mitigating risk factors [47, 48]. Ultimately, these predictions emphasize the importance of ongoing surveillance, timely adaptation of healthcare systems, and increased investment in research to identify innovative solutions for managing and potentially reversing these distressing trends.

Figure 5 illuminates a complex narrative of unrealized health advancements in ASRs of caries in permanent teeth, stratified by sociodemographic development levels. Our findings resonate with yet challenge the conventional wisdom that societal progress inherently leads to improved oral health. Instead, they underscore a paradox: as sociodemographic indices rise, the gap in caries burden efficacy widens, suggesting that disparities increase with development. This divergence mirrors similar trends reported in global health literature [5, 49], where advancements in certain health metrics do not uniformly translate across socioeconomic strata. Our results emphasize the need for nuanced, tiered approaches to oral health interventions, recognizing that the challenges and opportunities for improvement vary substantially based on a country's or region's developmental status. Such insights underscore the importance of contextualized policies and strategies, tailored to address the specific barriers and facilitators of oral health within each sociodemographic stratum [30].

This study, reliant on the GBD database, encounters limitations primarily stemming from data. The absence of detailed county/province-level data, exemplified by China's vast territory, restricts in-depth analyses [50]. Furthermore, the reliance on secondary data estimated by DisMod-MR introduces uncertainty, particularly in data-scarce countries where estimates may be borrowed from others [51]. To address these limitations in future

iterations of the GBD study, we suggest incorporating more primary data sources to enhance the accuracy and robustness of findings. This would involve investing in data collection efforts at more granular geographical levels and improving the methodologies for estimating missing data, particularly in regions with limited data availability.

Conclusion

In conclusion, caries of permanent teeth posed a significant disease burden over the world, particularly in low-income countries. Furthermore, our findings indicated that young adults were at greater risk. We also discovered that the disease burden will continue to rise over the next 25 years, indicating that caries in permanent teeth remained a significant public health issue that needed to be addressed. Countries or areas with a higher SDI have more room to improve their burdens. Stricter mitigation and adaption techniques should be applied and developed to safeguard persons and control caries in permanent teeth.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-025-06086-z>.

Supplementary Material 1.

Supplementary Material 2.

Acknowledgements

We are grateful for the work of the Global Burden of Disease study 2021 collaborators.

Clinical trial number

Not applicable.

Authors' contributions

Zhiyuan Li: Formal analysis, Investigation, Methodology, Data curation, Software, Investigation, Writing. Chenhang Yu: Conceptualization, Resources, Data curation, Writing, review & editing, Supervision, Project administration. Huan Chen: review & editing.

Funding

None.

Data availability

Data for this study were sourced from the GBD 2021 database. The GBD employs a systematic and standardized approach to estimate health outcomes, including the use of DisMod-MR 2.1, a Bayesian meta-regression tool, to ensure consistency and comparability across locations and time. Data is provided within the manuscript or supplementary information files.

Declarations

Ethics approval and consent to participate

The study was conducted using publicly available data and did not involve any human subjects or interventions that required direct interaction or manipulation. Therefore, according to the guidelines of our institution's ethics committee, no further ethics approval was required for this type of research. In accordance with the ethical principles outlined in the Declaration of Helsinki, all participants provided informed consent before participating in the study. The anonymity and confidentiality of the participants were guaranteed, and participation was completely voluntary.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Received: 23 November 2024 Accepted: 30 April 2025

Published online: 13 May 2025

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