BJPsych | The British Journal of Psychiatry (2024)
225, 311–320. doi: 10.1192/bjp.2024.69

Original Article

Global, regional and national burdens of depression in adolescents and young adults aged 10–24 years, from 1990 to 2019: findings from the 2019 Global Burden of Disease study

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Background

Depression is a significant mental health concern affecting the overall well-being of adolescents and young adults. Recently, the prevalence of depression has increased among young people. Nonetheless, there is little research delving into the longitudinal epidemiology of adolescent depression over time.

Aims

To investigate the longitudinal epidemiology of depression among adolescents and young adults aged 10–24 years.

Method

Our research focused on young people (aged 10–24 years) with depression, using data from the Global Burden of Diseases, Injuries, and Risk Factors Study 2019. We explored the age-standardised prevalence, incidence and disability-adjusted life-years (DALYs) of depression in different groups, including various regions, ages, genders and sociodemographic indices, from 1990 to 2019.

Results

The prevalence, incidence and DALYs of depression in young people increased globally between 1990 and 2019. Regionally, higher-income regions like High-Income North America and Australasia recorded rising age-standardised prevalence and incidence rates, whereas low- or middle-income regions mostly saw reductions. Nationally, countries such as Greenland, the USA and Palestine reported the highest age-standardised prevalence and incidence rates in 2019, whereas Qatar witnessed the largest growth over time. The burden disproportionately affected females across age groups and world regions. The most prominent age effect on incidence and prevalence rates was in those aged 20–24 years. The depression burden showed an unfavourable trend in younger cohorts born after 1980, with females reporting a higher cohort risk than males.

Conclusions

Between 1990 and 2019, the general pattern of depression among adolescents varied according to age, gender, time period and generational cohort, across regions and nations.

Keywords

Depressive disorders; mental health services; health informatics; childhood experience; epidemiology.

Depression in adolescents and young adults is a growing public health concern worldwide. The prevalence of depression among adolescents and young adults has been rising over the past few decades.[1,2] However, high-quality evidence tracking and comparing the burden of adolescent depression longitudinally across multiple global regions is lacking. The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) offers a unique opportunity to characterise the epidemiology of health loss globally across age groups, in a standardised approach, over time.[3] Building on the annual GBD study, this research provides an up-to-date and expanded analysis of the burden (prevalence, incidence and disability-adjusted life-years (DALYs)) and trends of depressive disorders specifically among young people aged 10–24 years, from 1990 to 2019.[4] The age period of 10–24 years is a high-risk window for the emergence of mood disorders like depression. This period also represents a sensitive developmental phase that shapes long-term mental health trajectories.[5]

Tracking burden patterns throughout these formative years is crucial for informing tailored early interventions to effectively support at-risk youth before chronic disorders persist into adulthood. By offering insight into the trajectory of disease burden across different world regions, findings from this study will enable an improved understanding of the evolving landscape of adolescent and early adult depression globally and in specific geographical locations. Such information can help inform policy decisions and resource prioritisation regarding this significant, yet underaddressed mental health condition.

Method

Data source and definitions

In our research, we utilised the extensive data-set from the GBD study, which is publicly accessible at http://ghdx.healthdata.org/gbd-results-tool.[6] The scope of this data is elaborated in the published material associated with the study.[7] In our study, we accessed and analysed repeated cross-sectional data spanning three decades, encompassing the incidence, prevalence and DALYs of depression. This data was differentiated by gender, age, region and country, and included numbers and age-standardised rates, each accompanied by a 95% uncertainty interval.

The age-standardised rate was computed per 100 000 individuals, using the subsequent formula:

$$\mathrm{ASR} = \frac{\sum_{i=1}^{A} a_i w_i}{\sum_{i=1}^{A} w_i} \times 100\,000,$$

– with ASR being the age-standardised rate, a_i being the age-specific rate in the ith age group, w being the number of people in the corresponding ith age group among the standard population and A being the number of age groups.

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https://doi.org/10.1192/bjp.2024.69 Published online by Cambridge University Press

To clarify, the age-standardised incidence rate (ASIR) represents the number of new cases per 100 000 individuals. Similarly, the age-standardised prevalence rate (ASPR) indicates the number of existing cases per 100 000 individuals, adjusted for age. The age-standardised DALY rate (ASDR) reflects the impact of living with disability, expressed as the number of years lived with disability per 100 000 individuals, after age adjustment. The 95% uncertainty interval is a range of values that reflect the certainty of an estimate based on the 25th and 75th ordered values of 1000 draws of the posterior distribution.

To analyse the changes over time in incidence, prevalence and DALYs, we computed the estimated annual percentage change (EAPC) rates. The EAPC is widely used in epidemiological research to track changes in age-standardised rates of diseases. This coefficient, symbolised as β, is calculated from the natural logarithm of the age-standardised rates. In this context, 'y' refers to ln(ASR), and 'x' represents the calendar years. We determined the EAPC, along with its 95% confidence interval, by employing the following linear regression model:

$$y = \alpha + \beta x + \varepsilon,$$

$$\text{EAPC} = 100 \times (\exp(\beta)\text{-}1).$$

The direction of the age-standardised rate trend is determined by examining the EAPC and its 95% confidence interval. An upward trend in the age-standardised rate is indicated when both the EAPC value and the lower limit of its 95% confidence interval are positive. On the other hand, a downward trend in the age-standardised rate is suggested if the EAPC value and the upper limit of the 95% confidence interval are both negative.

Central to our analysis was the categorisation of depression, as defined in the ICD-10. Here, depression is bifurcated into two main types: major depressive disorder (MDD) and dysthymia. The GBD study comprehensively includes both MDD, an episodic mood disorder characterised by one or more major depressive episodes, and dysthymia, a chronic form of depression with symptoms that are less severe, but more enduring than MDD.[8]

Sociodemographic Index

We also gathered information regarding the Sociodemographic Index (SDI) for each country or territory. The SDI is a composite metric derived from a combination of three key factors: per capita income, average education level among individuals aged ≥15 years and the total fertility rate among females aged <25 years.[8] In the 2019 GBD study, countries and territories were stratified into five SDI categories: low (<0.46), low-middle (0.46–0.60), middle (0.61–0.69), high-middle (0.70–0.81) and high (>0.81).

Decomposition analysis

Our study conducted decomposition analyses to understand the factors affecting the depression burden from 1990 to 2019. This involved examining changes in population size, age distribution and epidemiological trends.[9] The methodologies for these analyses are detailed in a previously published article, which provides an in-depth reference for the techniques used.[9]

Age-period-cohort analysis

The age-period-cohort (APC) model enabled us to analyse disease burden across different time periods, focusing specifically on the effects of age, time periods and birth cohorts. The age effect represents the social and biological processes of ageing.[10] The period effect reflects events and alterations across time that affect the incidence, prevalence and DALY rates of depression in all age groups.[10] The cohort effects refer to changes in disease burden that are attributable to varying degrees of risk factor exposure among different generations of the population.[10] To ensure precision, we organised the data into 5-year age intervals that corresponded with 5-year periods, spanning from 1990 to 2019. This time frame was divided into six distinct segments: 1990–1994, 1995–1999, 2000–2004, 2005–2009, 2010–2014 and 2015–2019. Additionally, we constructed eight partially overlapping 10-year birth cohorts, ranging from those born in 1965 to those born in 2009. This structure allowed for a thorough examination of the impact of age, period and birth cohort factors on depression trends. We used the Wald χ^2-test to assess the statistical significance of these trends. In the APC model, age effects are observed through age-specific rates across different birth cohorts, adjusted for period influences, whereas period and cohort effects are demonstrated as relative risks of disease burden, comparing age-specific rates across different periods or cohorts to a selected reference point. This reference is arbitrarily chosen and does not alter the interpretability of the findings.

Ethical approval

Ethical approval and consent to participate was not necessary for this study. All participants in this study consented to publication.

Results

Global trends

Overall, there were 37 806 849 estimated prevalent cases of depression in adolescents (95% uncertainty interval 30 467 107–47 172 034.4) in 1990 and 46 000 700 prevalent cases (95% uncertainty interval 36 577 549.4–57 783 698.7) in 2019, with an increase of 21.67% from 1990 to 2019 (Table 1, Fig. 1). No remarkable change was observed in the ASPR between 1990 and 2019 (EAPC = −0.01, 95% CI −0.06 to 0.04). Although the ASPR of depression in females remained higher than that in males, the trend of the EAPC was decreasing for females (EAPC = −0.05, 95% CI −0.1 to −0.01), but increasing for males (EAPC = 0.07, 95% CI 0.02–0.12).

Additionally, depression accounted for 47 466 225 estimated incident cases (95% uncertainty interval 36 724 096–61 398 878) in 1990 and 56 512 649 cases (95% uncertainty interval 43 691 014–73 723 822) in 2019 (Table 1, Fig. 1). The ASIR decreased between 1990 and 2019, with an EAPC of −0.15 (95% CI −0.23 to −0.08). The ASIR showed an decreasing trend in females (EAPC = −0.22, 95% CI −0.29 to −0.14) and males (EAPC = 0.149, 95% CI 0.133–0.165). No remarkable change was observed in the male ASIR between 1990 and 2019 (EAPC = −0.03, 95% CI −0.11 to 0.05).

The number of DALYs increased from 6 980 046 (95% uncertainty interval 4 494 581–10 326 307) in 1990 to 8 426 534 (95% uncertainty interval 5 457 664–12 502 675) in 2019 (Table 1, Fig. 1). Notably, in 1990 and 2019, the ASDR for females (1990: 574.86 per 100 000; 2019: 566.35 per 100 000) was consistently higher than that for males (1990: 330.39 per 100 000; 2019: 344.2 per 100 000). It is worth noting that females showed a decline in ASDR, whereas males showed an upward trend.

SDI region level

Compared with 1990, in 2019, the prevalence, incidence and DALYs of high SDI had increased significantly in 2019 (Fig. 1). Among the five regions, only the prevalence, incidence and DALYs of high SDI were positive, whereas the EAPC of the other four regions were negative. In 2019, middle SDI had the lowest ASPR (2120.45 per

https://doi.org/10.1192/bjp.2024.69 Published online by Cambridge University Press

Table 1 Prevalence, incidence and disability-adjusted life years of depression in adolescents aged 10–24 years, from 1990 to 2019

	1990		2019		
Type	Number ×10^2 (95% uncertainty interval)	ASPR per 100 000 (95% uncertainty interval)	Number ×10^2 (95% uncertainty interval)	ASPR per 100 000 (95% uncertainty interval)	EAPC (95% CI)
Prevalence					
Overall	378 068.49 [304 671.07–471 720.34]	2440.78 [1966.93–3045.38]	460 007 [365 775.49–577 836.99]	2470.67 [1964.56–3103.53]	−0.01 [−0.06 to 0.04]
Female	235 537.58 [188 810.67–293 521.62]	3091.8 [2478.43–3852.93]	279 844.1 [222 838.57–351 366.11]	3080.67 [2453.12–3868.02]	−0.05 [−0.1 to −0.01]
Male	142 530.9 [115 031.72–177 523.04]	1810.71 [1461.36–2255.25]	180 162.9 [143 314.32–226 143.48]	1889.52 [1503.06–2371.76]	0.07 [0.02–0.12]
High SDI	58 495.19 [47 922.75–71 416.89]	3190.19 [2613.6–3894.91]	66 516.98 [54 055.13–81 766.39]	3789.32 [3079.4–4658.04]	0.67 [0.58–0.77]
High-middle SDI	71 428.34 [58 083.26–87 984.42]	2360.46 [1919.45–2907.58]	58 370.95 [46 908.41–72 792.65]	2300.33 [1848.6–2868.67]	−0.08 [−0.13 to −0.03]
Middle SDI	118 335.92 [94 692.64–147 902.12]	2173.64 [1739.35–2716.73]	116 526.62 [93 115.5–145 725.19]	2120.45 [1694.44–2651.79]	−0.07 [−0.14 to 0]
Low-middle SDI	85 677.64 [68 487.7–107 576.68]	2421.06 [1935.31–3039.87]	120 411.97 [95 667.02–151 492.74]	2359.05 [1874.26–2967.97]	−0.29 [−0.39 to −0.19]
Low SDI	43 889.81 [34 262.96–55 658.95]	2678.66 [2091.12–3396.95]	97 876.91 [76 100.45–123 942.77]	2634.75 [2048.55–3336.41]	−0.22 [−0.32 to −0.13]
Andean Latin America	2561.72 [1993.07–3313.48]	2082.61 [1620.31–2693.77]	3465.4 [2705.62–4448.85]	2058.78 [1607.4–2643.04]	−0.11 [−0.16 to −0.05]
Australasia	2237.76 [1795.73–2824.06]	4650.44 [3731.84–5868.87]	2609.54 [2024.85–3322.26]	4809.45 [3731.85–6123]	0.25 [0.14–0.36]
The Caribbean	3463.15 [2672.77–4482.93]	3251.99 [2509.8–4209.6]	3229.04 [2474.24–4202.05]	2818.83 [2159.92–3668.23]	−0.52 [−0.64 to −0.39]
Central Asia	4340.96 [3371.27–5592.97]	2188.27 [1699.45–2819.41]	4988.47 [3897.96–6413.03]	2205.98 [1723.74–2835.94]	0.27 [0.18–0.36]
Central Europe	5243.7 [4128.24–6651]	1826.57 [1438.01–2316.78]	3133.78 [2456.62–3976.92]	1743.12 [1366.46–2212.1]	−0.2 [−0.26 to −0.14]
Central Latin America	10 830.73 [8626.87–13 688.64]	2001.6 [1594.31–2529.77]	15 198.58 [12 164.26–19 264.39]	2309.9 [1848.74–2927.83]	0.49 [0.44–0.54]
Central Sub-Saharan Africa	6869.54 [5242.86–9021.56]	3967.62 [3028.11–5210.56]	16 206.14 [12 341.75–21 497.58]	3770.71 [2871.57–5001.87]	−0.17 [−0.18 to −0.16]
East Asia	73 695.74 [58 927.71–91 303.26]	1974.16 [1578.56–2445.83]	33 671.63 [27 140.7–41 633.91]	1421.17 [1145.52–1757.23]	−1.15 [−1.34 to −0.96]
Eastern Europe	10 135.04 [7936.36–12 681.68]	2144.06 [1678.93–2682.79]	6537.07 [5112.35–8188.89]	2022.15 [1581.43–2533.11]	0.05 [−0.14 to 0.25]
Eastern Sub-Saharan Africa	18 553.91 [14 453.07–23 353.48]	3001.46 [2338.07–3777.89]	40 830.3 [31 932.19–51 560.17]	2923.03 [2286.02–3691.18]	−0.32 [−0.42 to −0.22]
High-Income Asia Pacific	8253.33 [6702.6–10 163.43]	1957.59 [1589.78–2410.65]	5789.2 [4687.36–7140.19]	2149.3 [1740.24–2650.87]	0.37 [0.28–0.45]
High-Income North America	24 118.63 [19 849.52–29 327.09]	3956.88 [3256.49–4811.37]	36 059.87 [29 623.12–43 743.62]	5080.96 [4174–6163.62]	0.87 [0.66–1.09]
North Africa and Middle East	38 597.49 [29 981.05–49 828.98]	3494.95 [2714.75–4511.95]	57 862.78 [44 540.26–75 480.96]	3587.7 [2761.65–4680.09]	0.2 [0.15–0.24]
Oceania	472.91 [359.12–614.83]	2281.96 [1732.9–2966.78]	871.17 [660.28–1133.28]	2235.03 [1693.97–2907.48]	−0.09 [−0.12 to −0.06]
South Asia	75 077.65 [60 456.55–93 934.7]	2241.51 [1804.99–2804.51]	111 515.42 [89 887.71–138 896.73]	2120.86 [1709.53–2641.61]	−0.45 [−0.59 to −0.31]
South-East Asia	26 047.17 [20 527.11–32 933.69]	1758.04 [1385.47–2222.85]	29 905.38 [23 639.17–37 453.06]	1760.72 [1391.79–2205.11]	0.02 [−0.06 to 0.11]
Southern Latin America	3559.12 [2843.73–4467.83]	2688.17 [2147.85–3374.52]	4334.94 [3491.67–5430.1]	2850.2 [2295.76–3570.26]	0.26 [0.23–0.28]
Southern Sub-Saharan Africa	4459.75 [3590.17–5534.12]	2575.92 [2073.66–3196.47]	5620.29 [4505.26–6993.33]	2635.86 [2112.92–3279.8]	0.32 [0.23–0.41]
Tropical Latin America	14 839.16 [11 802.85–18 809.02]	3103.71 [2468.65–3934.03]	17 995.87 [14 512.16–22 117.56]	3448.52 [2780.94–4238.36]	0.4 [0.09–0.71]
Western Europe	29 691.14 [24 519.34–36 088.67]	3613.11 [2983.76–4391.63]	24 251.45 [19 166.09–30 701.7]	3387.95 [2677.52–4289.06]	−0.2 [−0.21 to −0.18]
Western Sub-Saharan Africa	15 019.88 [11 758.87–19 004.15]	2520.83 [1973.53–3189.52]	35 930.67 [28 152.88–45 423.33]	2382.41 [1866.7–3011.83]	−0.24 [−0.51 to 0.04]
Incidence					
Overall	474 662.25 [367 240.96–613 988.78]	3064.38 [2370.87–3963.86]	565 126.49 [436 910.14–737 238.22]	3035.26 [2346.62–3959.66]	−0.15 [−0.23 to −0.08]
Female	300 654.63 [231 984.95–388 748.7]	3946.56 [3045.16–5102.93]	347 420.55 [266 041.61–453 538.23]	3824.58 [2928.72–4992.78]	−0.22 [−0.29 to −0.14]
Male	174 007.62 [134 512.9–224 580.24]	2210.59 [1708.85–2853.06]	217 705.94 [167 805.27–284 629.18]	2283.27 [1759.92–2985.15]	−0.03 [−0.11 to 0.05]
High SDI	72 665.08 [57 633.06–92 361.31]	3962.99 [3143.17–5037.17]	87 601.94 [69 130.19–111 230.61]	4990.48 [3938.19–6336.55]	0.87 [0.71–1.03]
High-middle SDI	89 831.2 [70 214.62–114 896.88]	2968.61 [2320.35–3796.95]	71 727.69 [55 273.66–93 316.53]	2826.7 [2178.27–3677.49]	−0.24 [−0.29 to −0.18]
Middle SDI	148 835.64 [114 295.67–193 081.11]	2733.88 [2099.43–3546.6]	141 033.69 [108 463.09–184 218.35]	2566.41 [1973.72–3352.25]	−0.27 [−0.35 to −0.2]
Low-middle SDI	108 548.11 [83 075.58–142 833.19]	3067.32 [2347.53–4036.14]	145 152.37 [110 710.14–190 930.5]	2843.75 [2168.98–3740.61]	−0.57 [−0.72 to −0.42]
Low SDI	54 465.64 [40 859.67–72 384.88]	3324.12 [2493.73–4417.76]	119 222.53 [88 826.44–159 501.54]	3209.35 [2391.12–4293.62]	−0.35 [−0.48 to −0.22]
Andean Latin America	3201.51 [2398.72–4307.25]	2602.74 [1950.1–3501.68]	4214.19 [3147.59–5582.3]	2503.63 [1869.97–3316.42]	−0.22 [−0.29 to −0.16]
Australasia	3017.48 [2338.13–3909.57]	6270.85 [4859.03–8124.76]	3555.79 [2686.18–4702.01]	6553.41 [4950.7–8665.92]	0.29 [0.18–0.39]
The Caribbean	4706.25 [3516.61–6331.67]	4419.3 [3302.19–5945.62]	4245.14 [3101.02–5735.58]	3705.85 [2707.08–5006.95]	−0.64 [−0.77 to −0.52]
Central Asia	5209.9 [3948.83–6911.99]	2626.3 [1990.6–3484.33]	5914.62 [4461.11–7967.42]	2615.54 [1972.78–3523.32]	0.18 [0.11–0.25]
Central Europe	5922.21 [4541.47–7740.33]	2062.92 [1581.96–2696.23]	3373.61 [2532.9–4445.61]	1876.52 [1408.88–2472.8]	−0.45 [−0.5 to −0.4]
Central Latin America	13 681.64 [10 453.22–17 984]	2528.47 [1931.84–3323.58]	19 585.14 [14 932.25–25 600.29]	2976.58 [2269.43–3890.77]	0.57 [0.52–0.63]

(*Continued*)

https://doi.org/10.1192/bjp.2024.69 Published online by Cambridge University Press

Table 1 (*Continued*)

Type	1990 Number ×10^2 (95% uncertainty interval)	1990 ASPR per 100 000 (95% uncertainty interval)	2019 Number ×10^2 (95% uncertainty interval)	2019 ASPR per 100 000 (95% uncertainty interval)	EAPC (95% CI)
Central Sub-Saharan Africa	9373.91 [6877.3–12 781.9]	5414.06 [3972.1–7382.41]	21 897.55 [15 831.11–29 847.1]	5094.94 [3683.45–6944.57]	−0.22 [−0.24 to −0.21]
East Asia	92 571.52 [70 301.81–119 605.74]	2479.81 [1883.25–3204]	37 848.44 [29 178.85–48 717.9]	1597.46 [1231.54–2056.22]	−1.69 [−1.87 to −1.5]
Eastern Europe	12 306.23 [9132.56–16 158.96]	2603.37 [1931.98–3418.41]	7807.5 [5798.62–10 270.19]	2415.14 [1793.72–3176.93]	−0.1 [−0.27 to 0.07]
Eastern Sub-Saharan Africa	22 659 [16 962.02–29 898.98]	3665.54 [2743.94–4836.76]	48 931.68 [36 198.98–64 966.2]	3503.01 [2591.48–4650.92]	−0.44 [−0.56 to −0.32]
High-Income Asia Pacific	10 135.61 [7986.32–12 976.9]	2404.05 [1894.26–3077.97]	7271.78 [5722.93–9337.13]	2699.73 [2124.7–3466.51]	0.54 [0.44–0.64]
High-Income North America	29 860.63 [23 808.13–38 153.66]	4898.9 [3905.94–6259.45]	49 578.27 [39 648.55–62 089.4]	6985.75 [5586.62–8748.61]	1.19 [0.85–1.54]
North Africa and Middle East	51 701.65 [38 332.89–69 533.89]	4681.52 [3471–6296.21]	76 424.6 [55 720.92–104 588.88]	4738.6 [3454.9–6484.88]	0.14 [0.1–0.17]
Oceania	620.29 [451.51–834.49]	2993.14 [2178.7–4026.7]	1125.69 [827.65–1522.76]	2887.99 [2123.37–3906.69]	−0.15 [−0.18 to −0.12]
South Asia	92 594.53 [70 799.01–121 799.52]	2764.49 [2113.77–3636.44]	128 826.31 [98 661.09–168 210.19]	2450.08 [1876.39–3199.1]	−0.86 [−1.08 to −0.64]
South-East Asia	31 501.47 [23 680.8–41 487.05]	2126.18 [1598.33–2800.15]	35 473.64 [26 645.32–46 263.54]	2088.56 [1568.78–2723.84]	−0.06 [−0.17 to 0.05]
Southern Latin America	4734.37 [3705.02–6143.43]	3575.83 [2798.37–4640.08]	5820.79 [4524.38–7455.97]	3827.14 [2974.75–4902.26]	0.31 [0.28–0.33]
Southern Sub-Saharan Africa	5378.01 [4124.83–6897.2]	3106.3 [2382.47–3983.77]	6723.86 [5166.66–8673.29]	3153.42 [2423.11–4067.69]	0.33 [0.22–0.44]
Tropical Latin America	20 419.05 [15 717.08–26 688.06]	4270.78 [3287.34–5581.99]	24 046.94 [19 035.06–30 768.55]	4608.08 [3647.66–5896.13]	0.25 [−0.11 to 0.62]
Western Europe	36 997.13 [29 470.87–46 546.25]	4502.18 [3586.31–5664.21]	30 272.31 [22 934.82–40 378.2]	4229.07 [3204.02–5640.87]	−0.2 [−0.22 to −0.19]
Western Sub-Saharan Africa	18 069.85 [13 419.94–23 943.8]	3032.72 [2252.31–4018.56]	42 188.64 [31 392.95–56 099.61]	2797.35 [2081.54–3719.73]	−0.34 [−0.69 to 0.02]
Disability-adjusted life-years					
Overall	69 800.46 [44 945.81–103 263.07]	450.63 [290.17–666.66]	84 265.34 [54 576.64–125 026.75]	452.58 [293.13–671.51]	−0.06 [−0.12 to 0]
Female	43 794 [28 256.23–64 984.72]	574.86 [370.91–853.03]	51 446.72 [33 190.72–76 662.5]	566.35 [365.38–843.94]	−0.11 [−0.17 to −0.05]
Male	26 006.47 [16 810.35–38 489.48]	330.39 [213.56–488.97]	32 818.61 [21 118.5–48 576.26]	344.2 [221.49–509.46]	0.04 [−0.02 to 0.11]
High SDI	10 855.96 [7164.21–15 779.27]	592.06 [390.72–860.56]	12 735.5 [8313.2–18 662.7]	725.51 [473.58–1063.17]	0.79 [0.66–0.93]
High-middle SDI	13 308.26 [8700.37–19 455.89]	439.79 [287.52–642.95]	10 823.24 [6970.84–16 012.41]	426.53 [274.71–631.03]	−0.12 [−0.17 to −0.07]
Middle SDI	21 937.21 [14 125.34–32 470.22]	402.95 [259.46–596.43]	21 255.24 [13 651.09–31 596.84]	386.79 [248.41–574.97]	−0.15 [−0.22 to −0.08]
Low-middle SDI	15 729.78 [10 036.66–23 648.26]	444.49 [283.61–668.25]	21 733.75 [13 876.84–32 281.99]	425.8 [271.87–632.45]	−0.39 [−0.52 to −0.27]
Low SDI	7923.31 [5016.08–11 839.69]	483.57 [306.14–722.59]	17 660.55 [11 103.65–26 500.53]	475.4 [298.9–713.37]	−0.25 [−0.37 to −0.14]
Andean Latin America	472.59 [294.18–717.97]	384.2 [239.16–583.69]	635.17 [393.68–956.19]	377.35 [233.88–568.07]	−0.14 [−0.2 to −0.08]
Australasia	433.74 [274.81–644.2]	901.39 [571.09–1338.75]	509.33 [320.84–772.46]	938.7 [591.31–1423.67]	0.29 [0.17–0.4]
The Caribbean	674.5 [420.59–1024.89]	633.38 [394.95–962.4]	616.71 [383.53–947.28]	538.36 [334.81–826.94]	−0.59 [−0.72 to −0.46]
Central Asia	784.23 [488.89–1184.63]	395.33 [246.45–597.17]	899.33 [569.4–1377.35]	397.7 [251.8–609.09]	0.26 [0.17–0.34]
Central Europe	913.53 [589.54–1352.53]	318.22 [205.36–471.13]	534.99 [340.92–797.64]	297.58 [189.63–443.68]	−0.31 [−0.36 to −0.25]
Central Latin America	2009.62 [1278.77–3003.43]	371.39 [236.33–555.06]	2866.71 [1821.24–4316.19]	435.69 [276.79–655.98]	0.55 [0.49–0.6]
Central Sub-Saharan Africa	1305.41 [791.37–2005.17]	753.96 [457.07–1158.12]	3088.42 [1872.41–4798.13]	718.59 [435.66–1116.39]	−0.16 [−0.18 to −0.15]
East Asia	13 734.93 [8923.93–20 614.7]	367.93 [239.05–552.23]	5953.7 [3897.83–8767.47]	251.29 [164.51–370.05]	−1.39 [−1.58 to −1.2]
Eastern Europe	1833.69 [1168.76–2745.62]	387.91 [247.25–580.83]	1173.42 [746.97–1751.84]	362.98 [231.06–541.9]	0 [−0.18 to 0.19]
Eastern Sub-Saharan Africa	3331.23 [2119.96–4967.95]	538.89 [342.95–803.66]	7323.5 [4632.52–11 037.17]	524.29 [331.64–790.15]	−0.35 [−0.46 to −0.24]
High-Income Asia Pacific	1519.84 [982.28–2262.83]	360.49 [232.99–536.72]	1086.27 [706.19–1617.05]	403.29 [262.18–600.35]	0.48 [0.38–0.58]
High-Income North America	4461.33 [2921.76–6508.12]	731.92 [479.34–1067.72]	7053.46 [4587.75–10 292.31]	993.86 [646.43–1450.22]	1.07 [0.78–1.36]
North Africa and Middle East	7435.9 [4645.97–11 261.9]	673.31 [420.69–1019.75]	11 133.41 [6926.61–16 793.83]	690.31 [429.47–1041.28]	0.2 [0.15–0.24]
Oceania	89.12 [54.85–134.88]	430.05 [264.68–650.83]	163.41 [100.78–252.68]	419.24 [258.56–648.26]	−0.11 [−0.14 to −0.08]
South Asia	13 473.87 [8672.32–20 031.63]	402.27 [258.92–598.06]	19 554.26 [12 616.7–29 057.99]	371.89 [239.95–552.64]	−0.61 [−0.79 to −0.44]
South-East Asia	4729.78 [3020.83–7072.5]	319.23 [203.89–477.36]	5417.33 [3465.88–8001.37]	318.95 [204.06–471.09]	0.01 [−0.09 to 0.11]
Southern Latin America	685.89 [437.48–1019.37]	518.04 [330.42–769.92]	844.49 [542.75–1264.92]	555.25 [356.86–831.68]	0.31 [0.28–0.33]
Southern Sub-Saharan Africa	798.8 [516.63–1180.45]	461.38 [298.4–681.82]	1006.34 [647.01–1499.35]	471.96 [303.44–703.18]	0.35 [0.24–0.46]
Tropical Latin America	2887.25 [1827.29–4306.55]	603.89 [382.19–900.74]	3520.75 [2286.61–5205.91]	674.68 [438.18–997.6]	0.42 [0.08–0.76]
Western Europe	5548.26 [3646.23–8025.21]	675.17 [443.71–976.59]	4524.52 [2899.49–6736.48]	632.08 [405.06–941.09]	−0.2 [−0.21 to −0.19]
Western Sub-Saharan Africa	2676.95 [1696.12–4003.61]	449.28 [284.67–671.94]	6359.82 [4023.59–9533.01]	421.69 [266.79–632.09]	−0.26 [−0.59 to 0.06]

EAPC, estimated annual percentage change; ASPR, age-standardised prevalence rate; SDI, Sociodemographic Index.

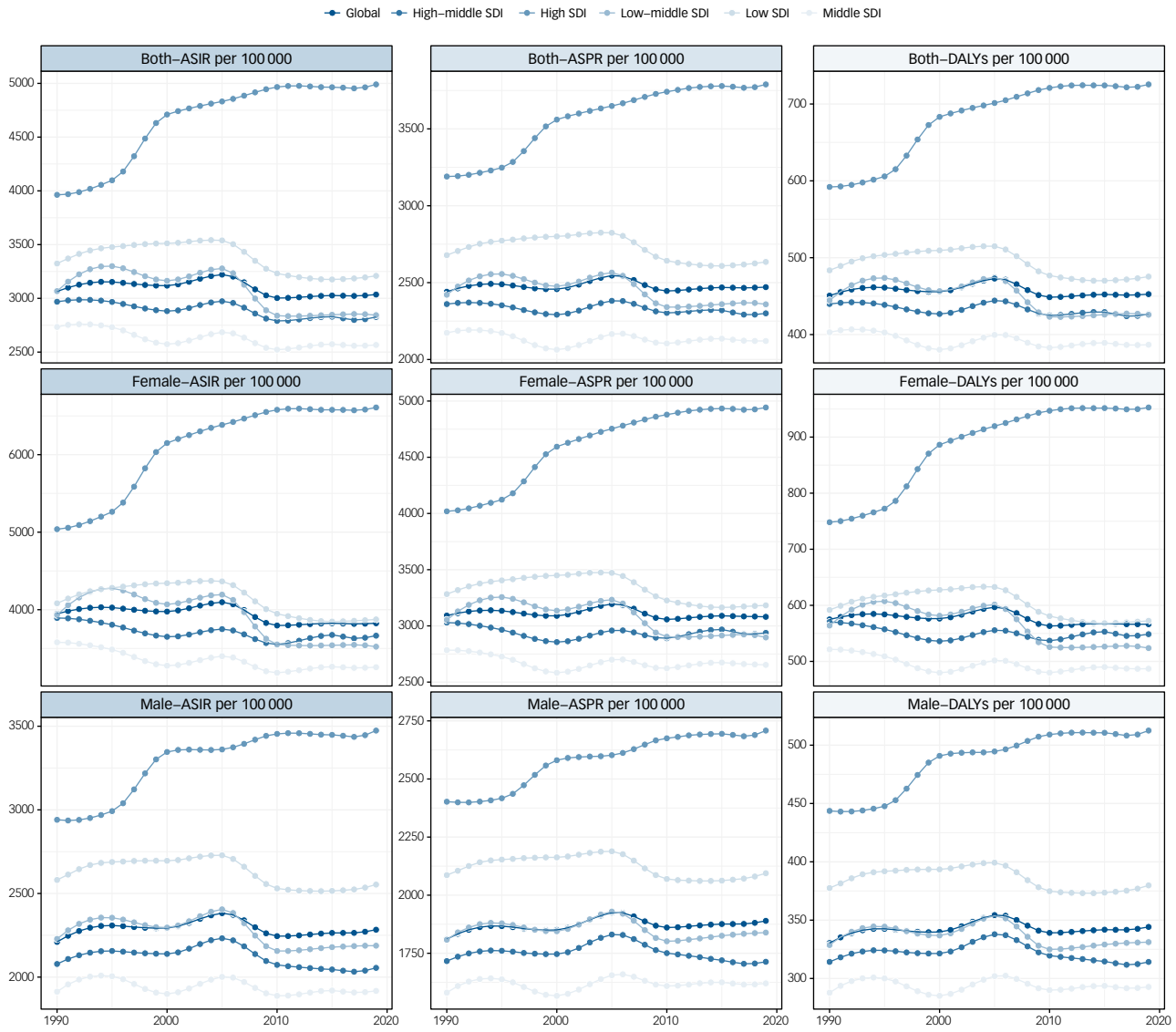

Fig. 1 Burden of depression trends in global and five SDI regions for adolescents aged 10–24 years, from 1990 to 2019. SDI, Sociodemographic Index; ASIR, age-standardised incidence rate; ASPR, age-standardised prevalence rate; DALYs, disability-adjusted life-years.

100 000, 95% uncertainty interval 1694.44–2651.79), ASIR (2566.41 per 100 000, 95% uncertainty interval 1973.72–3352.25) and ASDR (386.79 per 100 000, 95% uncertainty interval 248.41–574.97). In addition, we found that the ASPR (Supplementary Fig. 1 available at https://doi.org/10.1192/bjp.2024.69), ASIR (Supplementary Fig. 2) and ASDR (Supplementary Fig. 3) of male/female ratio in all age groups in the five regions showed a gradual increase with age, and the ratio of male and female was always <1. Similarly, we found that in the five SDI regions, the 20–24 year age group accounted for the largest proportion in ASPR (Supplementary Fig. 4), ASIR (Supplementary Fig. 5) and ASDR (Supplementary Fig. 6), whereas the 10–14 year age group accounted for the smallest proportion.

Regional trends

The GBD regional classification system, which encompasses 204 countries and territories segmented into 21 regions, revealed a significant disparity in adolescent depression prevalence and incidence across these regions in 2019. Notably, South Asia reported remarkably high numbers, with 11 151 542 prevalence cases (95% uncertainty interval 8 988 771–13 889 673) and 12 882 631 incidence cases (95% uncertainty interval 9 866 109–16 821 019). From 1990 to 2019, both the ASPR and ASIR showed a declining trend, evidenced by EAPC of −0.45 (95% CI −0.59 to −0.31) and −0.86 (95% CI −1.08 to −0.64), respectively.

In contrast, regions such as High-Income North America and Australasia exhibited significantly higher ASPR, ASIR and ASDR compared with other areas. Specifically, High-Income North America saw the most rapid increase in ASPR (EAPC = 0.87, 95% CI 0.66–1.08; Supplementary Fig. 7) and ASIR (EAPC = 1.19, 95% CI 0.87–1.52; Supplementary Fig. 8). Conversely, slight decreases in these rates were observed in several regions, including Andean Latin America, Central and Eastern Sub-Saharan Africa, Western Europe, Central Europe, the Caribbean and South Asia for ASPR (Supplementary Fig. 7); and Oceania, Western Europe, Central and Eastern Sub-Saharan Africa, Andean Latin America, Central Europe, the Caribbean and South Asia for ASIR (Supplementary Fig. 8).

National trends

In 2019, India, the USA and China recorded the highest prevalence of adolescent depression cases among all countries, with India

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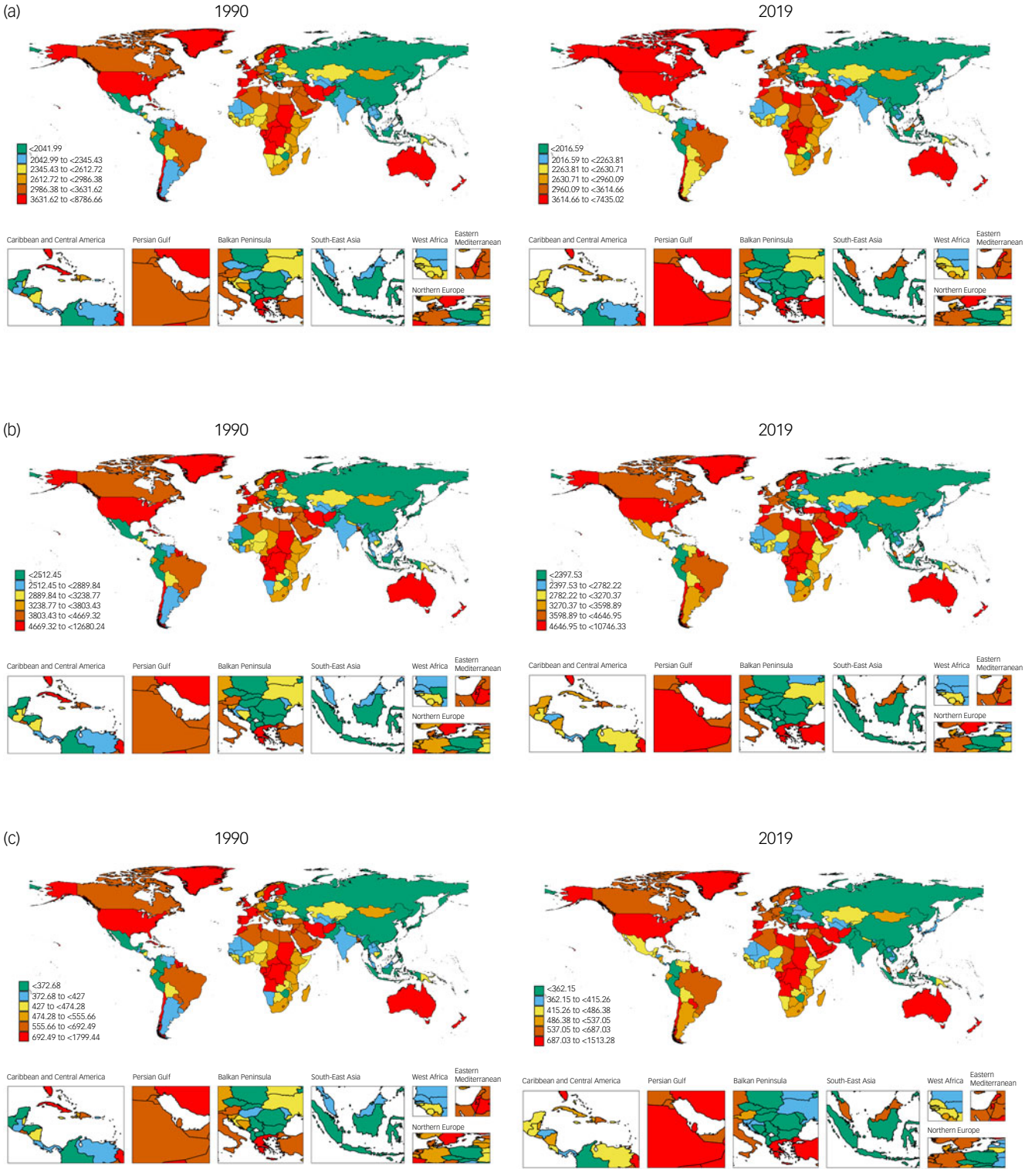

Fig. 2 Maps showing (a) age-standardised prevalence rate, (b) age-standardised incidence rate and (c) age-standardised disability-adjusted life-years rate of depression among adolescents aged 10–24 years, in 204 countries and territories, between 1990 and 2019.

leading at 8 184 198.5 cases (95% uncertainty interval 6 628 594.2–10 137 073.6), followed by the USA with 3 373 994.3 cases (95% uncertainty interval 2 770 722.1–4 088 034.2) and China with 3 230 286.8 cases (95% uncertainty interval 2 600 840.4–3 978 929.2), as shown in Supplementary Table 1. In terms of ASPR, Greenland reported the highest rate with 7435 cases per 100 000 individuals (95% uncertainty interval 5773–9620.3), closely followed by the USA (5220.1 per 100 000, 95% uncertainty interval 4286.7–6324.8) and Palestine (5,109.7 per 100 000, 95% uncertainty interval 3839.9–6943) (Supplementary Table 1, Fig. 2(a)). Qatar experienced the most significant increase in prevalence cases, surging by 438.5% from 3477.3 cases in 1990 to 18 725.9 in 2019 (Fig. 3(a)). Similarly, in 2019, India, the USA and China also had the highest incidence of adolescent depression cases. India reported

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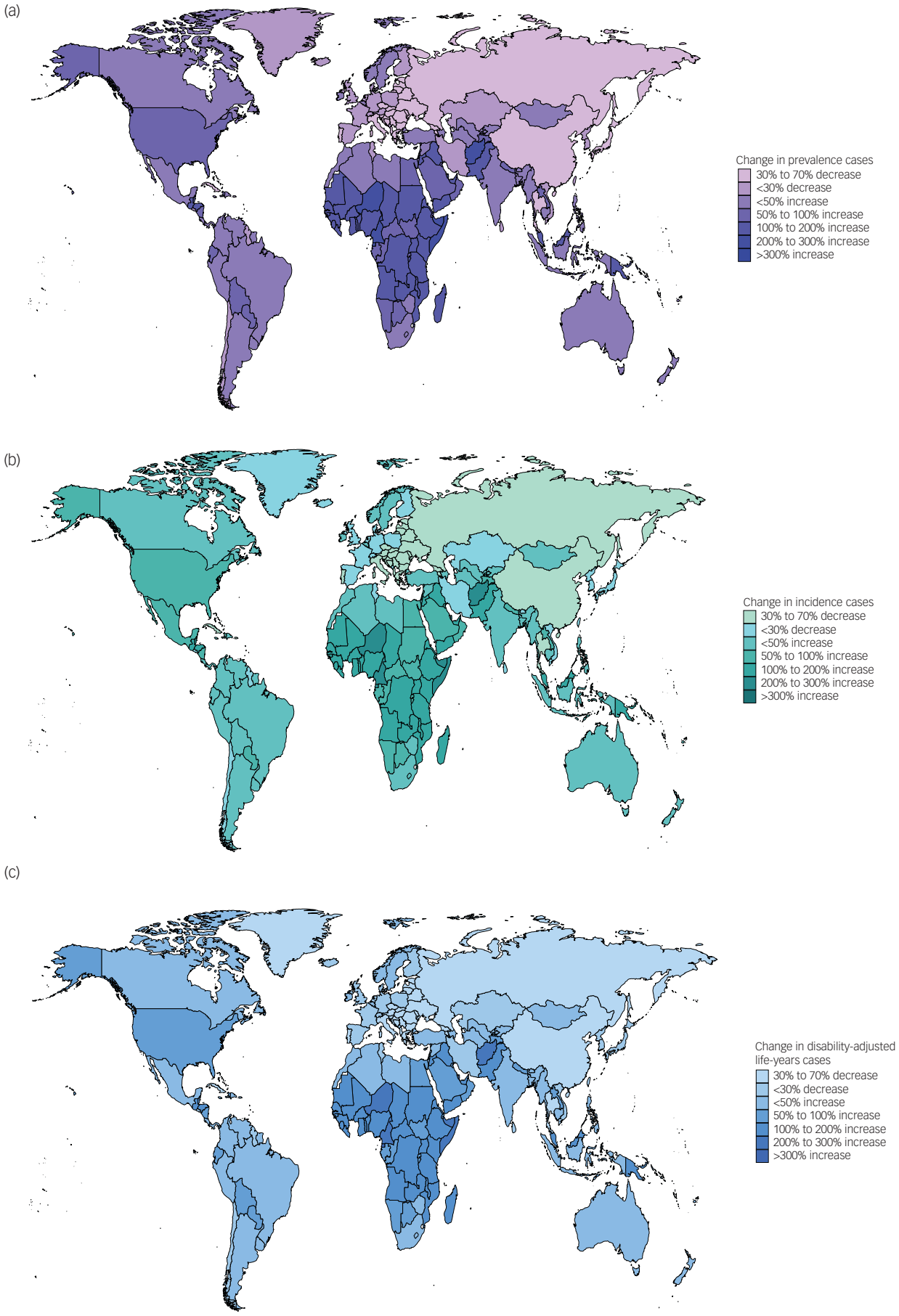

Fig. 3 Change in cases of depression among adolescents aged 10–24 years for both genders, in 204 countries and territories. (a) Change in prevalence cases. (b) Change in incidence cases. (c) Change in disability-adjusted life-years cases.

https://doi.org/10.1192/bjp.2024.69 Published online by Cambridge University Press

9 293 169.5 cases (95% uncertainty interval 7 176 098.1–12 073 202.7), the USA had 4 662 775.5 cases (95% uncertainty interval 3 729 349.5–5 835 022.3) and China recorded 3 632 341 cases (95% uncertainty interval 2 800 958.7–4 670 280.6), as indicated in Supplementary Table 1. For the ASIR, Greenland had the highest rate with 10 746.3 per 100 000 individuals (95% uncertainty interval 8148–14 324.2), followed by the USA (7214 per 100 000, 95% uncertainty interval 5769.9–9027.6) and Palestine (7182.8 per 100 000, 95% uncertainty interval 5195.9–10 036.5) (Supplementary Table 1, Fig. 2(b)). Qatar witnessed the most significant increase in incident cases, a 417.9% rise from 4582.2 in 1990 to 23 733.5 in 2019 (Fig. 3(b)). In contrast, Bosnia and Herzegovina, Cuba and Latvia saw a notable reduction in incidence cases of more than 60% over the 30-year period (Supplementary Table 2, Fig. 3(b)). The DALYs of adolescents with depression in China dropped from 1 343 240.9 in 1990 to 571 316.7 in 2019 (EAPC = −1.42 95% CI−1.61 to −1.24), and India had the largest DALYs at 1 422 404.5 in 2019 (Supplementary Table 1, Fig. 2(c)). Over a 30-year period, Qatar and Equatorial Guinea both experienced DALY growth rates of more than 300% (Supplementary Table 2, Fig. 3(c)).

Age, period and cohort effects on the global trend

Between 1990 and 2019, there was a decreasing incidence risk with age in females (net drift −0.13, 95% CI −0.24 to −0.01; Supplementary Table 3), but not in males (net drift 0.007, 95% CI −0.07 to 0.08; Supplementary Table 3). Regardless of gender, the annual change increased in those aged 10–14 years, but decreased in those aged 15–24 years (Supplementary Fig. 9(a), Supplementary Table 4). The risk of depression incidence was highest in those aged 20–24 years for both females and males (Supplementary Fig. 9, Supplementary Table 5). The risk of prevalence and DALYs also increased with age overall in both genders (Supplementary Figs 10 and 11, Supplementary Tables 6 and 7).

Period effects generally shows a trend of first rising and then falling risk of depression incidence, prevalence and DALYs over the period and in both genders (Supplementary Figs 9–11). Compared with the reference period of 2000–2004, the period 1990–1994 had the lowest period risk for incidence, prevalence and DALY rates regardless of gender (Supplementary Table 8).

In the eight consecutive 10-year birth cohorts from 1965 to 2009, the cohort risk for the depression incidence, prevalence and DALY rates showed a decline followed by an increase, and increased in the successive cohorts since 1980–1989 (Supplementary Figs 9–11).

Compared with the 1980–1994 birth cohort, the late cohorts (after 1994) showed a higher risk for incidence, prevalence and DALY rates (Supplementary Table 9).

Decomposition analysis and projection from 2020 to 2040

Six regions with declining demographically adjusted epidemiological change – East Asia, Western Europe, Eastern Europe, High-Income Asia Pacific, Central Europe and the Caribbean – had a decrease in total depression prevalence between 1990 and 2019, regardless of gender (Supplementary Fig. 12). Conversely, global had an increase in depression prevalence, primarily driven by population (Supplementary Fig. 12). Similar trends were shown across 21 GBD regions in terms of incidence and DALYs (Supplementary Figs 13 and 14). Between 1990 and 2019, high SDI areas experienced an increase in total depression incidence, prevalence and DALYs primarily due to epidemiological changes (Supplementary Figs 12–14). In middle SDI, notable disparities emerge between genders: from 1990 to 2019, males experienced an increase in overall depression incidence, prevalence and DALYs, primarily attributed to population factors; conversely, females saw a decrease in total depression incidence, prevalence and DALYs during the same period, mainly because of changes in epidemiology (Supplementary Figs 12–14). Depression prevalence cases were projected to continue increasing among both females and males globally and in all SDI regions. However, we also note that ASPR globally and in the five SDI regions will remain relatively stable (Supplementary Fig. 15).

Discussion

Globally, depression in adolescents and young adults receives a significant amount of attention in the field of psychiatry, but it is not adequately addressed in public health and epidemiological research. Our findings underscore a steady global rise in the burden of depression among adolescents and young adults over the past three decades, as evidenced by increases in prevalence cases, incidence cases and DALYs. The number of adolescents worldwide affected by depression surged from 37 806 849 cases in 1990 to 46 000 700 in 2019, revealing geographical imbalances, sociodemographic disparities and age structure heterogeneity. In comparison with 1990, the number of adolescent depression cases in 2019 surged by 21.67%, incidence cases increased by 19.05% and DALYs increased by 20.67%. The age group of 20–24 years accounted for the largest proportion of prevalence cases. Although ASIR for depression has remained largely consistent globally for 30 years, there is an upward trend for ASPR and ASDR, indicating a continued growth in the disease burden.

Regionally, most lower-income regions showed declining prevalence and incidence rates, whereas trends were mixed among high-income regions: North America and Australasia exhibited rising rates over 30 years, whereas Western Europe displayed declining rates. This pattern aligns with previous evidence that depression prevalence differs substantially between geographic regions.[11] The declines in lower-income regions may additionally stem from lower detection rates and barriers accessing mental health services in these settings. Disparities likely also reflect differences across areas regarding resources, socioeconomic conditions, awareness and stigma related to mental illness.[12] Nationally, countries like Greenland, the USA and Palestine had the highest rates in 2019. Qatar saw the greatest increase over time. These cross-national differences may stem from factors like population growth, ageing, economic variables, healthcare policies and access.[13,14] Among SDI index regions, higher-income areas saw climbing rates but lower-income regions saw declining rates, highlighting the probable role of financial means in shaping population mental health.

Our analysis revealed two major findings regarding gender differences in adolescent depression burden. First, across all regions and age groups, the burden disproportionately affected among females. Second, the gap between males and females slowly narrowed from 1990 to 2019. The heavier burden seen in young women aligns with ample evidence that females have a higher lifetime risk of depression.[15] Both biological and social factors are believed to contribute to this difference emerging after puberty.[16] Potential biological factors include hormonal changes related to puberty, menstruation and childbirth. Sociocultural variables like gender-based violence, discrimination, role conflicts and economic disparities may also confer risk.[17]

The declining male–female disparity could reflect improving social gender equality in some nations. However, it may also involve influences like males' greater reluctance to disclose mental health struggles because of stigma, leading to underdiagnosis.[18]

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The narrowing gap may additionally stem from increased detection of psychiatric disorders among male youth in recent decades, resulting from growing mental health literacy and awareness campaigns targeting boys and men. Achieving more balanced mental health outcomes across genders will require comprehensive strategies unpacking complex social dynamics and dismantling systemic barriers underlying current disparities.

Our APC analysis revealed two major findings. First, we found that ASIR increased in early adolescence, peaking at 20–24 years of age, but incidence annual change declined in later adolescence into young adulthood. This pattern emerged consistently regardless of gender. Second, more unfavourable cohort effects emerged in younger generations after 1980, indicating rising depression prevalence in youth. The heightened incidence in older adolescents likely stems from accumulating biological, psychological and social stressors over time that confer vulnerability. Puberty brings hormonal fluctuations, body image issues and self-concept changes that can challenge mental health.[19] Academically, upper secondary school and university prompt achievement pressures, information overload and comparison with peers, which can elevate distress. Transitioning toward independent living also strains resources and confers added responsibilities.[20] Consequently, depression manifests more by a person's early 20 s, compared with younger teens who are still largely sheltered within family units.

The projected continued increase in future cases of adolescent depression globally may potentially reflect the enduring mental health consequences of the COVID-19 pandemic. A growing body of evidence has demonstrated that the COVID-19 pandemic has substantially affected mental health, especially among young people.[21] Studies indicate that adolescents and youth have faced heightened vulnerabilities to the psychosocial disruptions of the pandemic, including challenges like social isolation, bereavement, economic effects and uncertainty about the future.[22] These pandemic-related stressors are thought to have contributed to observed rises in depressive disorders among youth over the past three years. Therefore, the forecasted growth in adolescent depression burden could stem, at least partially, from the psychological distress burdens imposed on young populations by the traumatic COVID-19 crisis across regions.

Although ASIR for depression has remained largely consistent globally for 30 years, there is an upward trend for ASPR and ASDR, indicating a continued growth in the disease burden. The slight rise in global age-standardised prevalence and DALY rates aligns with some recent evidence of gradual increases in adolescent depression over the past decade, especially in high-income settings. Data from the USA documented a 37% climb in adolescent major depressive episodes between 2005 and 2014.[1] Studies from the UK and Netherlands have similarly found slowly escalating lifetime rates of depressive disorder diagnoses and symptoms among youth cohorts in recent years.[23] Multiple influences could be driving these trends, including shifting youth exposures to economic adversity, educational pressures, technology overuse, nutrition shifts and built environments modulating risk in evolutionarily unprecedented ways across generations.[24] More research is required validating and clarifying these trajectories across cultural settings, but present indications of rising prevalence and burden suggest preventative strategies and monitoring of youth mental health require ongoing prioritisation to reverse adverse patterns.

Decomposition analysis from 1990–2019 showed that changes in population demographics, rather than epidemiological trends, primarily drove growth in total adolescent depression prevalence over time. This was true globally and in most regions. The predominant role of population expansion and ageing suggests that absolute disease counts will likely escalate, exerting greater societal impacts. But the unchanged age-standardised estimates imply that the increase partly involves more individuals at risk rather than substantially worse outcomes among already vulnerable groups. Still, the current high burden warrants expanded services to meet both existing and future mental health needs.

The strength of this study is providing an up-to-date epidemiological analysis of global trends in adolescent depression burden based on GBD 2019 data. It not only includes three key measures (incidence, prevalence, DALYs) and their changes across global, regional and national levels from 1990–2019, but also utilises APC modelling to estimate the independent effects of age, time period and generational cohorts on disease burden. This enables a clear, multidimensional picture of shifting patterns over the past three decades.

Certain limitations inherent to GBD studies warrant consideration when examining a specific condition like depression. For instance, diagnostic criteria predominantly aligned with DSM-IV-TR and ICD-10 classifications, but their consistency across cultural contexts is unsure. The impact of emerging classifications on GBD estimates also requires assessment. Potential data source biases and variable instrumentation affecting case ascertainment also pose challenges. Additionally, not providing subtype-specific burden data limits tailored insights, as does lacking comorbidity information with related illnesses like cardiovascular disease, which could inform integrated care needs. Still, by compiling such an extensive array of data sources, the GBD study makes great strides in quantifying global disease burden.

In conclusion, this analysis of long-term data underscored shifting global landscapes and inequities in adolescent depression burden from 1990 to 2019. We found that the burden was concentrated among females and youth entering early adulthood, and there were socio-geographic disparities in rates and trajectories. Ongoing population changes appeared to drive growth in absolute disease counts more than epidemiological decline. These insights highlight the need for targeted monitoring and care innovations focusing on high-risk demographic groups. Overall, sustained commitments coordinating evidence-based and equity-oriented policies are required to alleviate this expanding threat worldwide. Comprehensive strategies promoting adolescent mental well-being warrant ongoing prioritisation amid persistent indications of need.

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First received 29 Dec 2023, final revision 21 Feb 2024, accepted 11 Mar 2024

Supplementary material

Supplementary material is available online at https://doi.org/10.1192/bjp.2024.69

Data availability

GBD study 2019 data resources are available online from the Global Health Data Exchange (GHDx) query tool (http://ghdx.healthdata.org/gbd-results-tool).

https://doi.org/10.1192/bjp.2024.69 Published online by Cambridge University Press

Author contributions

All authors made substantial contributions to conception and design, acquisition of data or analysis and interpretation of data, took part in drafting the article or revising it critically for important intellectual content, agreed to submit to the current journal, gave final approval of the version to be published and agree to be accountable for all aspects of the work.

Funding

None.

Declaration of interest

None.

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https://doi.org/10.1192/bjp.2024.69 Published online by Cambridge University Press