

Global Trends in the Epidemiologic Burden of Anxiety Disorders Among Women of Childbearing Age (1990–2021): Associations with Sociodemographic Index

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Background: Anxiety disorders have become a severe global public health issue, especially pronounced among women of childbearing age (WCBA). However, comprehensive studies on the global burden and temporal trends of anxiety disorders in this demographic remain scarce.

Methods: Data on the prevalence, incidence, and disability-adjusted life years (DALYs) associated with anxiety disorders among WCBA from 1990 to 2021 were extracted from the Global Burden of Disease (GBD) database. The estimated annual percentage change (EAPC) was calculated to assess trends in the burden of anxiety disorders, with 95% uncertainty intervals provided for point estimates.

Results: As of 2021, the global prevalence, incidence, and DALYs of anxiety disorders among WCBA were 138.3 million, 18.96 million, and 16.45 million cases, respectively—reflecting increases of 77%, 77%, and 76% since 1990. The global burden of the three indicators of prevalence, incidence and DALYs for anxiety disorders showed a significant upward trend, with EAPCs of 0.18 (95% CI: 0.02–0.33), 0.21 (95% CI: 0.06–0.36) and 0.17 (95% CI: 0.02–0.32), respectively. Countries with a middle sociodemographic index (SDI) had the highest burden, while low-middle SDI countries experienced the fastest growth rate. Among the 21 global regions, most displayed an upward trend in all three metrics, with Mexico exhibiting the most significant increase, despite decreases in some countries.

Conclusion: Over the past 32 years, the global burden of anxiety disorders among WCBA has significantly increased, particularly in middle SDI countries and among women aged 45–49.

Keywords: anxiety disorders, women of childbearing age, global burden of disease, Sociodemographic Index, DALYs

Introduction

Anxiety disorders are prevalent worldwide, ranging from mild emotional fluctuations to severe impairments in social and occupational functioning, and may co-occur with depression and suicidal ideation.¹ Women of childbearing age (WCBA; 15–49 years) are particularly vulnerable due to physiological changes, hormonal fluctuations, and the psychological stresses of pregnancy and parenting.^{2–4} Anxiety can disrupt menstrual cycles, affect reproductive health, and complicate conception. During pregnancy, it increases the risk of preterm labor and low birth weight.⁵ Additionally, anxiety can worsen conditions like high blood pressure and diabetes, complicating their management during reproductive years.

Anxiety manifestations in WCBA vary widely, ranging from brief anxious episodes to chronic anxiety disorders. Physiological and psychological adaptations during pregnancy may obscure or exacerbate anxiety symptoms,



complicating early identification.^{6,7} Research has shown that hormonal changes during pregnancy and postpartum—such as sudden fluctuations in estrogen and prolactin—can heighten psychological vulnerability in women, thereby increasing the risk of anxiety disorders and potentially impacting maternal and neonatal health outcomes. Furthermore, neuroendocrine pathways, such as dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, play a critical role in the onset and persistence of anxiety symptoms.^{8,9} The overactivation of the HPA axis, resulting from prolonged stress, may contribute to the heightened vulnerability of WCBA to anxiety disorders.^{10,11} Anxiety can disrupt the daily lives of pregnant women and may also have adverse effects on fetal development, pregnancy safety, and overall maternal and infant health.^{12,13}

Anxiety disorders in WCBA result from multiple factors, including genetic predisposition, psychosocial stressors, and familial environments. Structural determinants such as gender inequality, healthcare access, and social stigma may exacerbate the burden of anxiety in WCBA, especially in low and low-middle SDI regions. Perinatal stress, hormonal shifts, and lack of social support interact to make WCBA particularly susceptible to anxiety. Recent studies indicate that women with untreated anxiety are more likely to develop chronic mental health conditions, such as depression or post-traumatic stress disorder (PTSD), underscoring the necessity and urgency of early screening and intervention for this group.¹⁴

The COVID-19 pandemic has further intensified the burden of anxiety disorders among WCBA. Pandemic-related stressors such as isolation, caregiving burdens, and health-related fears have contributed to the rise in anxiety symptoms. These factors, combined with the disruption of normal social and healthcare systems, have made it even more challenging for WCBA to access timely mental health care.

A robust understanding of the global burden of anxiety disorders in WCBA is essential for improving early diagnosis and clinical management strategies, which are critical to preventing long-term mental health issues. The Global Burden of Disease (GBD) research platform provides multilayered data on disease burden, allowing a detailed analysis of the prevalence, distribution, and impact of anxiety disorders at global, regional, and national levels. The GBD estimates the incidence and disability-adjusted life years (DALYs) for various diseases and health states, utilizing data across time periods to reveal dynamic shifts in disease prevalence across populations and regions.^{15,16}

This study is the first to systematically quantify the global burden and temporal trends of anxiety disorders in WCBA. Through an in-depth analysis based on the GBD database, we aim to elucidate the geographic and temporal variations of anxiety disorders in this population, emphasizing the importance of early screening and intervention. The results of this study will provide critical data to inform future research on anxiety disorders in WCBA, highlight the necessity of early detection in high-risk groups such as perimenopausal women, and guide public health strategies to mitigate the growing mental health burden in low and middle-Sociodemographic index (SDI) regions. Ultimately, this study aims to support clinical practices aimed at alleviating the burden of anxiety in this demographic worldwide.

Methods

Data Source and Disease Definition

The data on anxiety disorders among WCBA analyzed in this study were sourced from the Global Burden of Disease Study 2021 (GBD 2021).¹⁷ GBD 2021 provides the latest epidemiological burden estimates for over 369 diseases and injuries across 21 GBD regions and 204 countries and territories from 1990 to 2021.¹⁸ All data are accessible through the Global Health Data Exchange platform (<https://ghdx.healthdata.org/gbd-2021/sources>).¹⁹ The diagnosis of anxiety disorders in GBD is classified according to the criteria set out in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) and the International Classification of Diseases and Related Health Problems (ICD-10) (World Health Organization, 1993; American Psychiatric Association, 2000; COVID-19 Mental Disorders collaborator, 2021). Among them, the term anxiety disorders include generalized anxiety disorder, agoraphobia and panic disorder, social phobia, specific phobia, and other unspecified anxiety disorders.

Notably, GBD 2021's disease classification structure encompasses hierarchical levels from primary categories (eg, infectious diseases, maternal and neonatal conditions) to fourth-level subcategories (eg, specific types of infectious diseases). Anxiety disorder is classified as a Level-3 cause and is not further subdivided into Level-4 subtypes.

In this study, we used the prevalence, incidence and DALYs estimates provided by GBD 2021 to quantify the burden of disease for anxiety disorders among women of reproductive age. These were calculated based on detailed national and regional level population data, ensuring the accuracy and comparability of the measurements.

SDI

The SDI was developed by the Institute for Health Metrics and Evaluation (IHME) in 2015 as a composite measure to assess levels of socioeconomic development across countries and regions and their impact on population health. SDI is calculated as the geometric mean of three key indicators: total fertility rate in women under age 25, mean educational attainment in those aged 15 and older, and lag-distributed income per capita.

DALYs

DALYs is a standard metric for quantifying the burden of disease, calculated by combining years of life lost (YLLs) due to premature mortality with years lived with disability (YLDs) due to illness. The formula is: $DALYs = YLLs + YLDs$. YLLs is a significant component of the burden of anxiety disorders, contributing to the overall high disease burden. In GBD 2021, estimates of YLLs and YLDs are calculated based on detailed population-level data. To estimate the burden of anxiety disorders, the model conducted 1,000 simulation draws to generate the distribution of estimates. The final DALYs estimates represent the mean of the 500 draws, with 95% uncertainty intervals (UIs) defined by the values at the 2.5th and 97.5th percentiles. Uncertainty is propagated at each step in the estimation process.

Estimated Annual Percentage Change and Percentage Change

Estimated Annual Percentage Change (EAPC) is a commonly used metric to track trends in prevalence, incidence, and other indicators over a specified period. In this study, the EAPC method was applied to analyze the dynamic trends in the prevalence, incidence, and DALYs of anxiety disorders among WCBA from 1990 to 2021.²⁰ The calculation of EAPC is based on fitting a linear regression model to the natural logarithm of the rates over time, with the model formulated as follows: $\ln(y) = \alpha + \beta x + \epsilon$, where x represents the year, y denotes the rate (eg, prevalence or incidence), α is the intercept, β is the slope, and ϵ is the random error term. The EAPC value is derived from the slope β using a specific formula, and the 95% confidence interval (CI) for EAPC is also based on this model's results.²¹

Data Analysis

Data cleaning, calculations, and visual analyses were conducted using R software (version 4.3.1), with plots generated using the ggplot2 package and final edits made in Adobe Illustrator (version CS5).

Results

Global Level

At the global level, the prevalence, incidence, and DALYs cases of anxiety disorders among WCBA have significantly increased. The prevalence cases increased from 78.1 million in 1990 to 138.3 million in 2021, representing a 77% increase; incidence cases increased from 10.73 million in 1990 to 18.96 million in 2021, also a 77% increase; DALYs cases increased from 9.33 million in 1990 to 16.45 million in 2021, marking a 76% increase (Table 1, Supplementary Tables 1, 2, and Figure 1A). Meanwhile, the prevalence, incidence, and DALYs rates of WCBA anxiety disorders worldwide have shown upward trends, with EAPCs of 0.18 (95% CI: 0.02–0.33), 0.21 (95% CI: 0.06–0.36), and 0.17 (95% CI: 0.02–0.32), respectively (Table 1, Supplementary Tables 1, 2, and Figure 1B).

SDI Regional Level

From 1990 to 2021, the cases of prevalence, incidence, and DALYs cases of WCBA anxiety disorders was highest in middle-SDI regions, reaching 45.43 million, 6.2 million, and 5.42 million cases in 2021, with increases of 80%, 76%, and 79%, respectively. In contrast, the largest increase in cases, though with the lowest absolute total, occurred in low-SDI regions, with 15.91 million, 2.34 million, and 1.89 million cases in 2021, representing increases of 184%, 185%, and

Table 1 The Prevalence of Anxiety Disorders Cases and Rates Among WCBA in 1990 and 2021, and the Trends From 1990 to 2021

Location	Prevalent Cases			Prevalent Rates		
	1990 Million (95%UI)	2021 Million (95%UI)	Percentage Change (100%)	1990 per (95%)	2021 per (95%UI)	EAPC (95% CI)
Andean Latin America	0.81 (0.61–1.07)	2.12 (1.52–2.93)	1.62	8501.65 (6428.58–11301.78)	12159.24 (8686.41–16799.21)	0.48 (0.19–0.78)
Australasia	0.56 (0.43–0.73)	0.82 (0.59–1.08)	0.46	10409.93 (7990.86–13621.3)	11308 (8179.07–15029.56)	0.23 (0.14–0.32)
Caribbean	0.65 (0.49–0.85)	1.04 (0.78–1.41)	0.6	6920.14 (5241.45–9086.37)	8645.95 (6511.67–11713.94)	0.27 (0.12–0.42)
Central Asia	0.54 (0.42–0.72)	0.96 (0.73–1.27)	0.78	3215.71 (2486.64–4303.29)	3975.14 (2990.44–5252.02)	0.18 (0.01–0.35)
Central Europe	1.57 (1.24–1.97)	1.77 (1.4–2.27)	0.13	5104.66 (4034.36–6425.98)	6869.13 (5445.2–8830.16)	0.29 (0.08–0.5)
Central Latin America	2.32 (1.85–2.92)	5.52 (4.36–6.94)	1.38	5540.89 (4424.3–6966.73)	8099.51 (6395.58–10,178.11)	0.74 (0.49–0.99)
Central Sub-Saharan Africa	0.65 (0.5–0.87)	1.91 (1.39–2.64)	1.94	5277.43 (4033.14–7011.76)	5858.25 (4270.68–8084.96)	0.13 (0.02–0.24)
East Asia	16.58 (13.7–20.19)	16.43 (13.45–19.91)	–0.01	4973.67 (4110.36–6055.28)	4965.08 (4065.43–6017.17)	–0.64 (–0.81–0.48)
Eastern Europe	2.77 (2.3–3.37)	3.25 (2.67–3.91)	0.17	5010.85 (4159.98–6093.7)	6732.69 (5539.68–8110.92)	0.28 (0.06–0.5)
Eastern Sub-Saharan Africa	2.46 (1.95–3.15)	7.12 (5.47–9.06)	1.89	5702.94 (4511.87–7302.25)	6647.14 (5104.09–8458.1)	0.09 (–0.05–0.23)
Global	78.1 (64.39–97.27)	138.31 (112.66–170.65)	0.77	5840.22 (4814.82–7273.4)	7097.14 (5780.74–8756.62)	0.18 (0.02–0.33)
High-income Asia Pacific	2.07 (1.69–2.55)	2.01 (1.59–2.51)	–0.03	4522.62 (3688.45–5568.8)	5286.94 (4167.47–6608.63)	–0.17 (–0.33–0.01)
High-income North America	6.76 (5.64–8.07)	10.2 (8.39–12.29)	0.51	9093.63 (7581.55–10847.09)	12143.89 (9985.35–14628.95)	0.13 (–0.23–0.49)
High-middle SDI	16.03 (13.28–19.63)	20.77 (16.78–25.75)	0.3	5769.91 (4781.64–7067.04)	6808.23 (5499.25–8438.74)	0 (–0.16–0.17)
High SDI	17.15 (14.04–21.12)	23.21 (19.1–28.7)	0.35	7564.36 (6194.77–9316.46)	9546.35 (7856.62–11802.74)	0.12 (–0.1–0.34)
Low-middle SDI	14.05 (11.46–17.78)	32.87 (26.87–40.72)	1.34	5149.92 (4197.84–6516.17)	6491.66 (5308.28–8043.48)	0.47 (0.33–0.62)
Low SDI	5.6 (4.46–7.13)	15.91 (12.56–20.22)	1.84	5012.72 (3991.74–6384.63)	5800.54 (4578.89–7371.19)	0.2 (0.07–0.32)
Middle SDI	25.2 (20.8–31.1)	45.43 (37.38–55.21)	0.8	5637.29 (4651.68–6956.39)	7345.81 (6043.27–8927.01)	0.37 (0.2–0.53)
North Africa and Middle East	6.5 (5.19–8.24)	15.91 (12.26–20.63)	1.45	8325.21 (6643–10552.76)	9985.72 (7695.7–12949.81)	0.3 (0.17–0.43)
Oceania	0.09 (0.07–0.12)	0.22 (0.15–0.3)	1.44	5566.38 (4246.61–7449.42)	6242.65 (4457.83–8622.02)	0.1 (0.02–0.18)
South Asia	11.52 (9.47–14.23)	27.7 (22.66–33.33)	1.4	4518.35 (3716.34–5581.28)	5606.74 (4586.66–6745.54)	0.49 (0.29–0.7)
Southeast Asia	6.2 (4.99–7.87)	12.34 (9.99–15.19)	0.99	5154.69 (4151.8–6544.99)	6735.72 (5454.33–8291.61)	0.32 (0.15–0.49)
Southern Latin America	1.17 (0.95–1.44)	2.03 (1.48–2.72)	0.74	9423.21 (7677.42–11621.19)	11628.33 (8489.44–15579.73)	0.04 (–0.17–0.25)
Southern Sub-Saharan Africa	0.71 (0.58–0.88)	1.55 (1.24–1.91)	1.18	5321.73 (4362.85–6589.16)	7140.76 (5709.16–8785.09)	0.3 (0.1–0.5)
Tropical Latin America	3.69 (3.1–4.4)	9.73 (7.9–11.7)	1.64	9239.57 (7771.11–11034.82)	16057.67 (13026.4–19310.09)	1.47 (0.95–2)
Western Europe	8.67 (6.79–10.89)	10.19 (8.05–12.95)	0.18	9068.85 (7104.98–11400.79)	10939.02 (8640.46–13902.45)	0.23 (0.07–0.39)
Western Sub-Saharan Africa	1.84 (1.48–2.32)	5.48 (4.37–6.92)	1.98	4218.74 (3383.47–5325.81)	4568.04 (3643.66–5773.89)	0.15 (0.05–0.25)

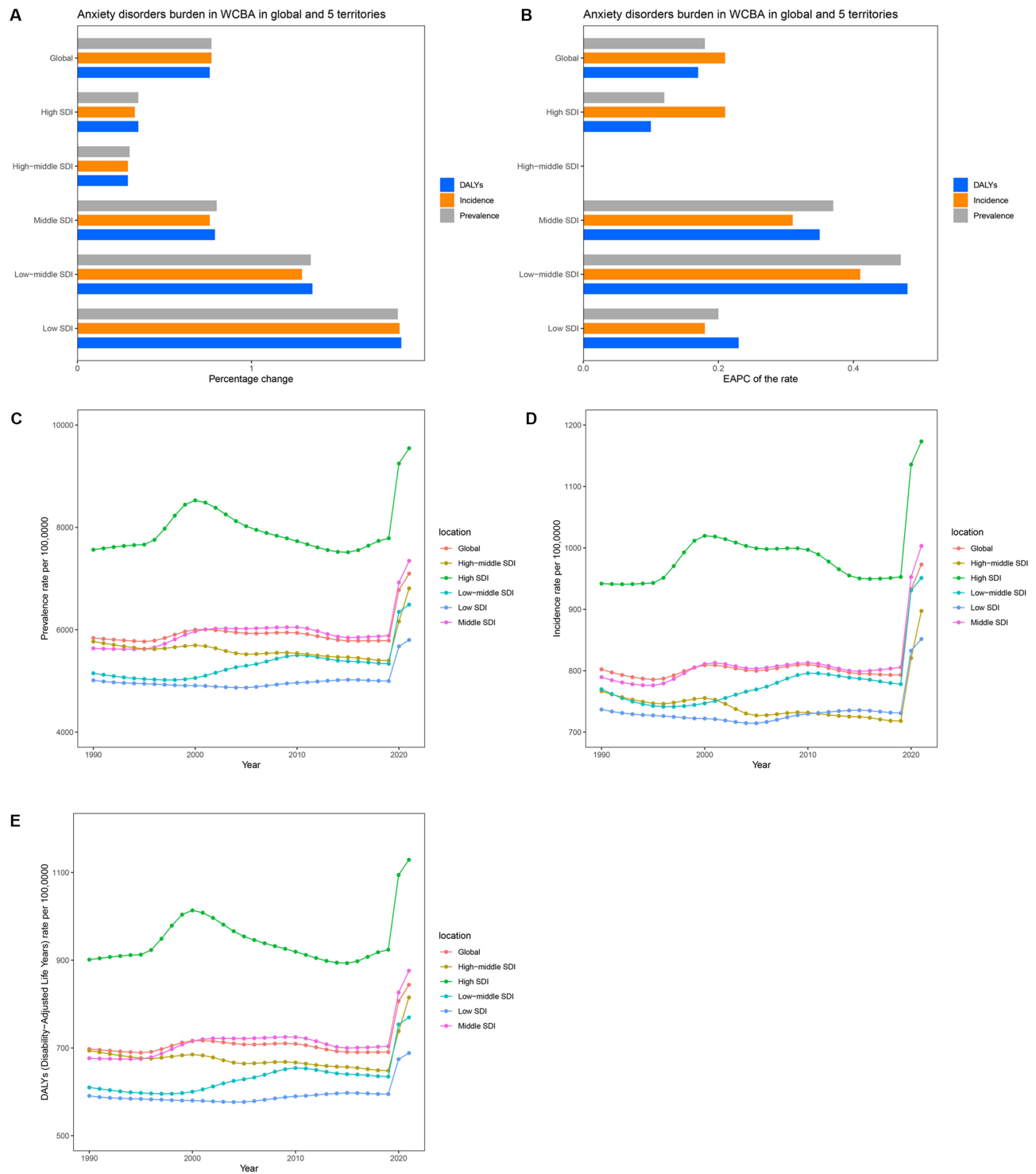


Figure 1 Temporal trend of anxiety disorders burden in WCBA in global and 5 territories. **(A)** Percentage change in cases of prevalence, incidence, and DALYs in 1990 and 2021. **(B)** The EAPC of prevalence, incidence, and DALYs in 1990 and 2021. **(C–E)** The rates of prevalence, incidence, and DALYs in 1990 and 2021.

186%. Low-middle SDI regions saw the most significant increases in prevalence, incidence, and DALYs rates, with EAPCs of 0.47 (95% CI: 0.33–0.62), 0.41 (95% CI: 0.25–0.56), and 0.48 (95% CI: 0.34–0.63). In high-middle SDI regions, the growth was the slowest, with EAPCs close to zero (Table 1, Supplementary Tables 1, 2, and Figure 1C–E).

GBD Regional Level

From 1990 to 2021, most of the 21 regions saw an upward trend in the number of incidence cases of WCBA anxiety disorders, with the most significant increase in Eastern Sub-Saharan Africa, showing a 194% change. Only the High-income Asia Pacific region showed a decrease in prevalence cases, with a percentage change of -3%. Most regions experienced increases over time in the prevalence and DALY case numbers of WCBA anxiety disorders, with Western Sub-Saharan Africa showing the most substantial growth, with percentage changes of 198% and 195%, respectively. Notably, East Asia and High-income Asia Pacific regions showed declines, with percentage changes of -1% and -3% for prevalence and -1% and -4% for DALYs (Table 1, [Supplementary Tables 1, 2](#), and [Figure 2A–C](#)).

Among the 21 regions, most exhibited upward trends in prevalence, incidence, and DALYs rates. Tropical Latin America showed the most significant growth in prevalence rates, with an EAPC of 1.47 (95% CI: 0.95–2), while Central Latin America had the most notable increases in incidence and DALYs rates, with EAPCs of 0.71 (95% CI: 0.5–0.92) and 0.73 (95% CI: 0.48–0.97), respectively. Both East Asia and High-income Asia Pacific regions showed declines in prevalence, incidence, and DALYs rates. For prevalence, EAPCs were -0.64 (95% CI: -0.81 to -0.48) for East Asia and -0.17 (95% CI: -0.33 to -0.01) for High-income Asia Pacific. For incidence, EAPCs were -0.52 (95% CI: -0.67 to -0.36) and -0.17 (95% CI: -0.06 to 0.22), respectively, and for DALYs, EAPCs were -0.64 (95% CI: -0.8 to -0.48) and -0.17 (95% CI: -0.33 to 0.01) (Table 1, [Supplementary Tables 1, 2](#), and [Figure 2D–E](#)).

Countries Level

Between 1990 and 2021, most countries showed upward trends in prevalence, incidence, and DALYs cases of WCBA anxiety disorders. Qatar showed the most significant increases in prevalence, incidence, and DALYs cases, with percentage changes of 659%, 636%, and 654%, respectively. However, in 13 countries, the prevalence cases declined, with Niue experiencing the most substantial decrease at -33%. Twelve countries showed declines in incidence cases, with the United States Virgin Islands showing the most significant decrease at -26%. Fourteen countries saw reductions in DALYs cases, with the United States Virgin Islands also experiencing the largest decline at -25% ([Supplementary Tables 3–5](#) and [Figure 3A–C](#)).

Over the past 32 years, the prevalence, incidence, and DALYs rates increased in most countries or regions, with Mexico showing the most significant increases across all three indicators, with EAPCs of 1.53 (95% CI: 1.21 to 1.85), 1.33 (95% CI: 1.08 to 1.59), and 1.5 (95% CI: 1.19 to 1.82), respectively. Notably, nine countries or regions showed decreases in both prevalence and DALYs rates. China had the most significant declines in prevalence and DALYs rates, with EAPCs of -0.67 (95% CI: -0.83 to -0.5) and -0.66 (95% CI: -0.83 to -0.5), respectively. Six countries or regions showed declines in incidence rates, with Japan experiencing the most significant decrease, with an EAPC of -0.56 (95% CI: -0.83 to -0.29) ([Supplementary Tables 3–5](#) and [Figure 3D–F](#)).

Age Patterns

From 1990 to 2021, the 45–49 age group of WCBA showed the most significant increases in prevalence, incidence, and DALYs cases globally, with percentage changes of 140%, 139%, and 141%, respectively. In the five SDI groups, only the Low SDI group showed the most significant increase in prevalence cases in the 40–45 age group, with a 202% change. Other SDI groups showed the highest growth in the 45–49 age group, with changes of 179%, 194%, 115%, and 66% (Table 2, [Supplementary Tables 6, 7](#), and [Figure 4A](#)). The Middle SDI group had the highest increase in prevalence cases, with a 620% change. The Low, Low-middle, and Middle SDI groups showed the most significant increases in the 15–19 age group, with changes of 55%, 85%, and 95%, respectively. In the High-middle SDI group, the most notable increase in prevalence cases was seen in the 30–34 age group, with a 45% change. For the High SDI group, the most significant increases in prevalence cases were in the 15–19 and 20–24 age groups, both with a 45% change. Only the High-middle SDI group showed decreases in DALYs cases in the 15–19 and 20–24 age groups, with percentage changes of 8% and 6%, respectively (Table 2, [Supplementary Tables 6, 7](#), and [Figure 4B](#)).

Over the past 32 years, prevalence rates in the 30–34 and 35–39 age groups in the Low-middle and Middle SDI groups showed the most substantial growth, with EAPCs of 0.49 (95% CI: 0.34 to 0.63) and 0.49 (95% CI: 0.34 to 0.63), respectively. The High-middle SDI group showed declines in prevalence rates for the 25–29, 30–34, and 45–49 age

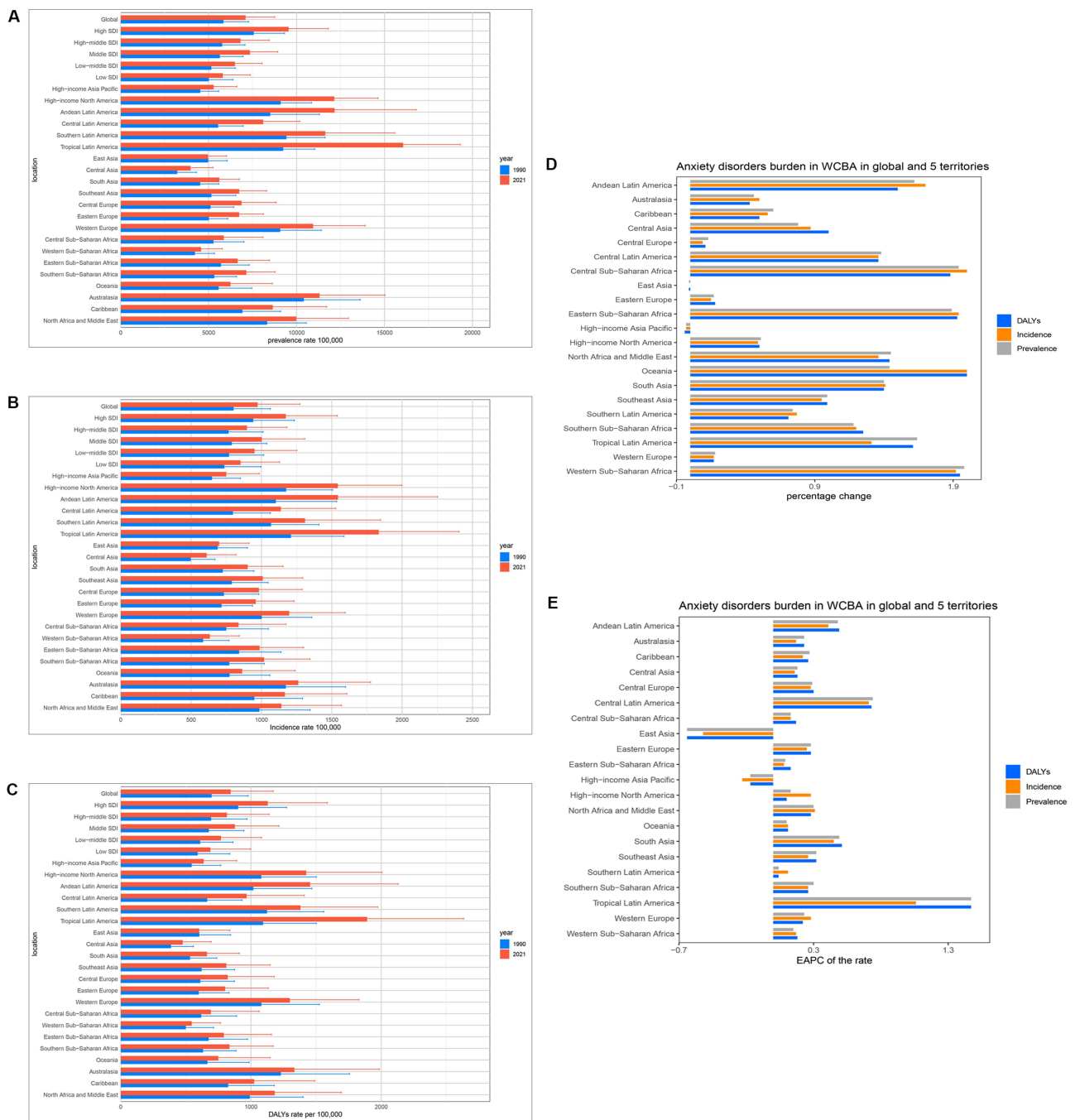


Figure 2 Temporal trends of anxiety disorders burden in WCBA in regions. **(A)** Prevalence rate per 100,000 population in 1990 and 2021. **(B)** Percentage change in cases of incidence in 1990 and 2021. **(C)** Percentage change in cases of DALYs in 1990 and 2021. **(D)** Percentage change in cases of prevalence, incidence, and DALYs in 21 countries or territories. **(E)** EAPC of rates of prevalence, incidence, and DALYs in 21 countries or territories.

groups, with EAPCs of -0.05 (95% CI: -0.27 to 0.17), -0.04 (95% CI: -0.21 to 0.13), and -0.06 (95% CI: -0.18 to 0.06). The High SDI group showed decreases in prevalence rates for the 25–29, 35–39, and 40–44 age groups, with EAPCs of -0.04 (95% CI: -0.29 to 0.21), -0.05 (95% CI: -0.31 to 0.2), and -0.04 (95% CI: -0.29 to 0.21). Meanwhile, incidence rates showed upward trends across most age groups in all five SDI groups, with the most notable increases in the 35–39 age group in Low, Low-middle, and Middle SDI groups, with EAPCs of 0.26 (95% CI: 0.16 to 0.37), 0.47 (95% CI: 0.34 to 0.6), and 0.41 (95% CI: 0.28 to 0.55), respectively. The High-middle and High SDI groups showed the most significant increases in the 15–19 age group, with EAPCs of 0.2 (95% CI: -0.03 to 0.43) and 0.52 (95% CI: 0.31 to 0.73), respectively.

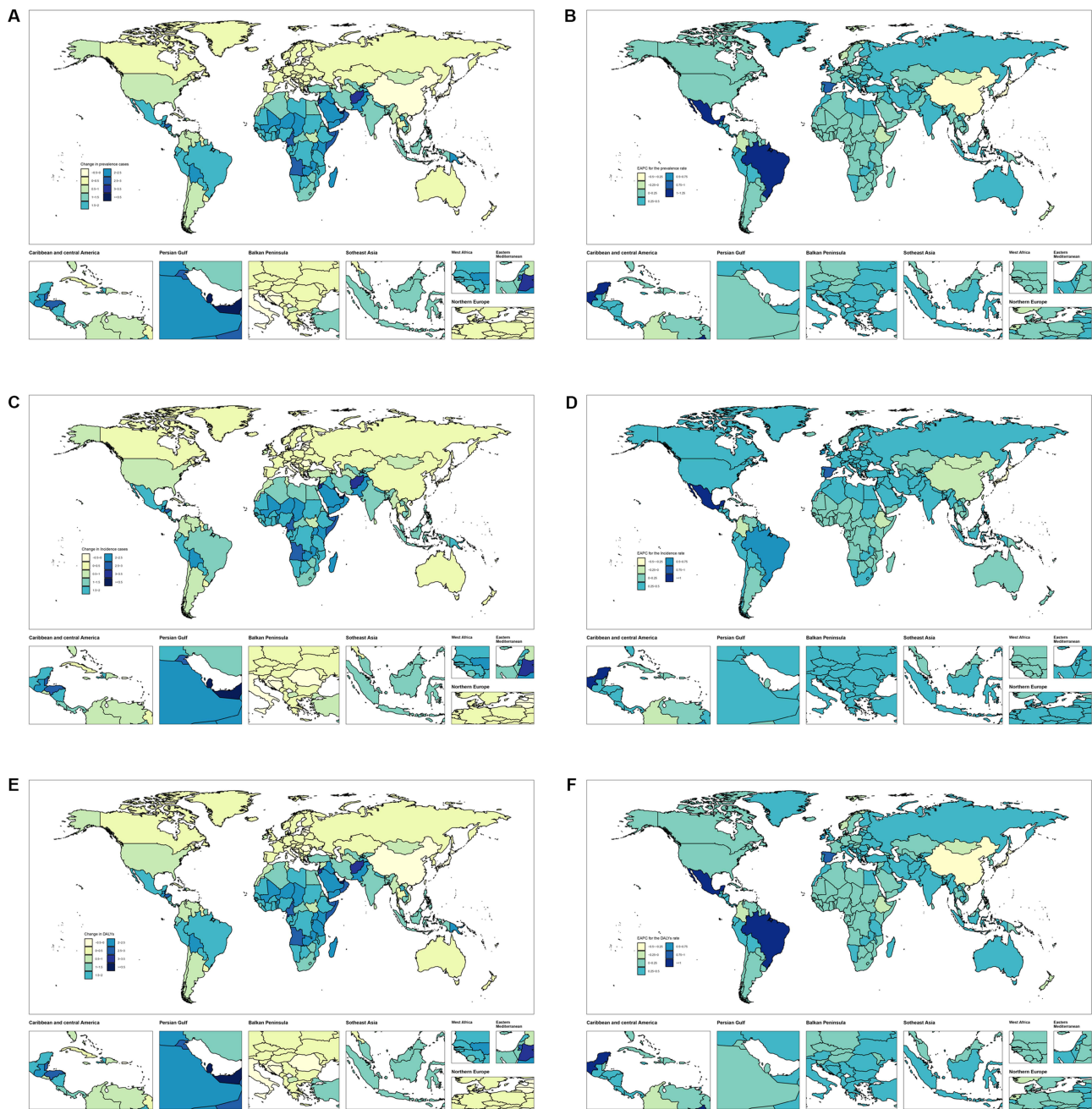


Figure 3 Temporal trends of anxiety disorders burden in WCBA globally. **(A and B)** Percentage change in prevalence cases and EAPC in prevalence rates across 204 countries in 1990 and 2021. **(C and D)** Percentage change in incidence cases and EAPC in incidence rates across 204 countries in 1990 and 2021. **(E and F)** Percentage change in DALYs cases and EAPC in DALYs rates across 204 countries in 1990 and 2021.

0.74). Notably, the 20–24 and 25–29 age groups in the High-middle SDI group showed decreases in incidence rates, with EAPCs of -0.02 (95% CI: -0.31 to 0.28) and -0.02 (95% CI: -0.23 to 0.19). DALYs rates showed the most substantial increases in the 15–19 age group in Low, High-middle, and High SDI groups, with EAPCs of 0.31 (95% CI: 0.17 to 0.44), 0.24 (95% CI: 0.08 to 0.4), and 0.44 (95% CI: 0.24 to 0.63). In Low-middle and Middle SDI groups, the most significant increases in DALYs rates were in the 30–34 and 35–39 age groups, with EAPCs of 0.51 (95% CI: 0.36 to 0.65) and 0.49 (95% CI: 0.34 to 0.63) (Table 2, Supplementary Tables 6, 7, Figure 4C and D).

Table 2 The Prevalence of Anxiety Disorders Cases and Rates Among WCBA in 1990 and 2021, and the Trends in Age Patterns From 1990 to 2021

Location	Age (year)	Prevalence Cases			Prevalence Rates		
		1990 Million (95%UI)	2021 Million (95%UI)	Percentage Change (100%)	1990 per (95%)	2021 per (95%UI)	EAPC (95% CI)
Global	15-19 years	14.1 (10.91–17.97)	20.12 (15.32–25.92)	0.43 (0.4–0.44)	5516.49 (4268.11–7031.6)	6625.56 (5045.43–8535)	0.12 (–0.03–0.28)
Global	15-49 years	78.1 (64.39–97.27)	138.31 (112.66–170.65)	0.77 (0.75–0.75)	5840.22 (4814.82–7273.4)	7097.14 (5780.74–8756.62)	0.18 (0.02–0.33)
Global	20-24 years	14.09 (10.46–18.61)	20.95 (15.48–27.6)	0.49 (0.48–0.48)	5771.82 (4285.21–7623.16)	7132.57 (5270.13–9395.55)	0.18 (0.01–0.36)
Global	25-29 years	12.95 (9.63–17.22)	21.17 (15.69–28.27)	0.63 (0.63–0.64)	5883.61 (4375.88–7825.46)	7276.71 (5390.69–9716.47)	0.2 (0.03–0.38)
Global	30-34 years	11.35 (8.73–14.61)	21.58 (16.51–27.96)	0.9 (0.89–0.91)	5972.19 (4592.86–7687.15)	7219.21 (5523.09–9353.1)	0.18 (0.03–0.33)
Global	35-39 years	10.31 (8.1–12.85)	20.19 (15.77–25.32)	0.96 (0.95–0.97)	5944.76 (4667.42–7409.06)	7266 (5676.92–9115.7)	0.2 (0.05–0.35)
Global	40-44 years	8.48 (6.39–10.8)	17.96 (13.37–22.78)	1.12 (1.09–1.11)	6049.94 (4557.56–7702.57)	7238.08 (5389.12–9182.15)	0.14 (–0.02–0.31)
Global	45-49 years	6.82 (5.08–8.9)	16.35 (12.07–20.97)	1.4 (1.38–1.36)	5991.79 (4465.62–7820.45)	6936.62 (5122.28–8899.44)	0.07 (–0.08–0.23)
Low SDI	15-19 years	1.15 (0.85–1.53)	3.36 (2.49–4.59)	1.92 (1.93–2)	4567.14 (3363.55–6097.42)	5446.98 (4031.17–7437.14)	0.28 (0.14–0.41)
Low SDI	15-49 years	5.6 (4.46–7.13)	15.91 (12.56–20.22)	1.84 (1.82–1.84)	5012.72 (3991.74–6384.63)	5800.54 (4578.89–7371.19)	0.2 (0.07–0.32)
Low SDI	20-24 years	1.1 (0.78–1.5)	3.12 (2.22–4.19)	1.84 (1.85–1.79)	5072.82 (3606.46–6921.75)	5912.93 (4211.13–7952.34)	0.18 (0.04–0.32)
Low SDI	25-29 years	0.97 (0.69–1.34)	2.66 (1.9–3.67)	1.74 (1.75–1.74)	5231.32 (3748.62–7237.34)	6039.97 (4316.64–8328.2)	0.16 (0.03–0.3)
Low SDI	30-34 years	0.79 (0.59–1.06)	2.22 (1.67–2.94)	1.81 (1.83–1.77)	5222.16 (3900.68–6963.37)	5994.02 (4508.1–7924.67)	0.18 (0.05–0.3)
Low SDI	35-39 years	0.67 (0.51–0.86)	1.88 (1.45–2.4)	1.81 (1.84–1.79)	5192.71 (3978.43–6668.19)	5896.37 (4537.75–7539.63)	0.18 (0.07–0.3)
Low SDI	40-44 years	0.5 (0.35–0.67)	1.51 (1.09–2)	2.02 (2.11–1.99)	5090.06 (3574.65–6751.51)	5780.03 (4181.94–7659.02)	0.19 (0.08–0.29)
Low SDI	45-49 years	0.41 (0.29–0.55)	1.16 (0.83–1.57)	1.83 (1.86–1.85)	4961.02 (3455.91–6641.95)	5589.94 (3999.35–7572.31)	0.15 (0.06–0.25)
Low-middle SDI	15-19 years	2.6 (1.97–3.36)	5.07 (3.85–6.58)	0.95 (0.95–0.96)	4421.22 (3348.74–5715.84)	5606.81 (4260.85–7284)	0.37 (0.18–0.56)
Low-middle SDI	15-49 years	14.05 (11.46–17.78)	32.87 (26.87–40.72)	1.34 (1.34–1.29)	5149.92 (4197.84–6516.17)	6491.66 (5308.28–8043.48)	0.47 (0.33–0.62)
Low-middle SDI	20-24 years	2.6 (1.88–3.51)	5.4 (3.95–7.21)	1.08 (1.1–1.05)	4979.44 (3595.97–6738.85)	6208.3 (4534.61–8290.81)	0.41 (0.24–0.58)
Low-middle SDI	25-29 years	2.37 (1.74–3.2)	5.32 (3.91–7.13)	1.24 (1.25–1.23)	5271.04 (3870.32–7128.01)	6547.87 (4806.75–8774.92)	0.46 (0.29–0.62)
Low-middle SDI	30-34 years	2.04 (1.55–2.66)	5.01 (3.84–6.44)	1.46 (1.48–1.42)	5441.93 (4142.84–7091.67)	6783.19 (5196.88–8707.3)	0.49 (0.34–0.63)
Low-middle SDI	35-39 years	1.78 (1.38–2.25)	4.64 (3.66–5.83)	1.61 (1.65–1.59)	5560.43 (4320.7–7010.45)	6961.69 (5499.2–8750.77)	0.48 (0.35–0.62)
Low-middle SDI	40-44 years	1.46 (1.07–1.9)	4.05 (3.03–5.22)	1.77 (1.83–1.75)	5643.74 (4136.5–7308.79)	7023.07 (5248.23–9051.55)	0.46 (0.32–0.6)
Low-middle SDI	45-49 years	1.21 (0.89–1.58)	3.38 (2.47–4.37)	1.79 (1.78–1.77)	5581.66 (4078.86–7274.68)	6827.13 (5001.91–8839.26)	0.41 (0.27–0.55)
Middle SDI	15-19 years	5.15 (4.02–6.54)	6.18 (4.83–7.77)	0.2 (0.2–0.19)	5588.65 (4360.62–7087.94)	7041.17 (5493.55–8844.84)	0.21 (0.04–0.37)
Middle SDI	15-49 years	25.2 (20.8–31.1)	45.43 (37.38–55.21)	0.8 (0.8–0.78)	5637.29 (4651.68–6956.39)	7345.81 (6043.27–8927.01)	0.37 (0.2–0.53)
Middle SDI	20-24 years	4.96 (3.69–6.49)	6.49 (4.83–8.55)	0.31 (0.31–0.32)	5611.93 (4181.1–7344.44)	7489.29 (5568.24–9865.28)	0.33 (0.14–0.52)
Middle SDI	25-29 years	4.2 (3.13–5.62)	6.81 (5.04–9.07)	0.62 (0.61–0.61)	5602.07 (4182–7502.85)	7519.45 (5568.07–10010.72)	0.41 (0.21–0.61)
Middle SDI	30-34 years	3.41 (2.65–4.37)	7.26 (5.62–9.2)	1.13 (1.12–1.11)	5679.85 (4411.72–7280.25)	7353.29 (5692.23–9311.65)	0.44 (0.29–0.59)
Middle SDI	35-39 years	3.11 (2.44–3.87)	6.87 (5.38–8.56)	1.21 (1.2–1.21)	5613.83 (4401.09–6987.08)	7494.67 (5868.89–9336.24)	0.49 (0.34–0.64)
Middle SDI	40-44 years	2.43 (1.83–3.11)	6.11 (4.61–7.65)	1.51 (1.52–1.46)	5749.37 (4325.29–7365.23)	7465.05 (5629.28–9347.71)	0.38 (0.2–0.57)
Middle SDI	45-49 years	1.94 (1.46–2.5)	5.7 (4.28–7.26)	1.94 (1.93–1.9)	5736.79 (4295.87–7375.98)	7030.83 (5271.47–8955.31)	0.25 (0.07–0.43)

(Continued)

Table 2 (Continued).

Location	Age (year)	Prevalence Cases			Prevalence Rates		
		1990 Million (95%UI)	2021 Million (95%UI)	Percentage Change (100%)	1990 per (95%)	2021 per (95%UI)	EAPC (95% CI)
High-middle SDI	15-19 years	2.96 (2.31-3.73)	2.72 (2.06-3.52)	-0.08 (-0.11-0.06)	6245.88 (4883.31-7882.49)	7900.37 (5989.85-10231.11)	0.24 (0.08-0.4)
High-middle SDI	15-49 years	16.03 (13.28-19.63)	20.77 (16.78-25.75)	0.3 (0.26-0.31)	5769.91 (4781.64-7067.04)	6808.23 (5499.25-8438.74)	0 (-0.16-0.17)
High-middle SDI	20-24 years	2.86 (2.17-3.7)	2.7 (1.97-3.52)	-0.06 (-0.09-0.05)	5932.81 (4517.43-7676.75)	7595.77 (5527.41-9884.85)	0.06 (-0.17-0.29)
High-middle SDI	25-29 years	2.6 (1.96-3.44)	2.84 (2.05-3.79)	0.09 (0.05-0.1)	5683.96 (4273.74-7514.98)	7049.29 (5085.97-9409.13)	-0.05 (-0.27-0.17)
High-middle SDI	30-34 years	2.32 (1.81-2.96)	3.36 (2.52-4.4)	0.45 (0.39-0.49)	5560.86 (4339.5-7096.2)	6524.66 (4893.34-8550.02)	-0.04 (-0.21-0.13)
High-middle SDI	35-39 years	2.16 (1.7-2.7)	3.2 (2.47-4.03)	0.48 (0.45-0.49)	5478.43 (4314.89-6848.02)	6456.14 (4980.1-8133.5)	0.09 (-0.05-0.24)
High-middle SDI	40-44 years	1.73 (1.31-2.21)	2.94 (2.13-3.83)	0.7 (0.63-0.73)	5623.59 (4250.18-7184.42)	6461.88 (4681.08-8408.52)	0.09 (-0.06-0.23)
High-middle SDI	45-49 years	1.4 (1.03-1.82)	3.01 (2.15-3.91)	1.15 (1.09-1.15)	5700.01 (4219.32-7412.86)	6237.1 (4455.43-8111.27)	-0.06 (-0.18-0.06)
High SDI	15-19 years	2.23 (1.72-2.85)	2.77 (2.16-3.55)	0.24 (0.26-0.25)	6990.11 (5381.89-8949.14)	9516.68 (7407.87-12195.78)	0.45 (0.26-0.65)
High SDI	15-49 years	17.15 (14.04-21.12)	23.21 (19.1-28.7)	0.35 (0.36-0.36)	7564.36 (6194.77-9316.46)	9546.35 (7856.62-11802.74)	0.12 (-0.1-0.34)
High SDI	20-24 years	2.57 (1.92-3.4)	3.22 (2.41-4.23)	0.25 (0.26-0.24)	7642.96 (5719.76-10122.31)	10213.79 (7652.49-13409.5)	0.34 (0.12-0.56)
High SDI	25-29 years	2.81 (2.08-3.73)	3.52 (2.6-4.68)	0.25 (0.25-0.25)	7829.63 (5803.1-10395.27)	10190.93 (7520.88-13554.28)	0.18 (-0.05-0.41)
High SDI	30-34 years	2.78 (2.14-3.55)	3.7 (2.85-4.82)	0.33 (0.33-0.36)	7831.53 (6023.22-10015.25)	9892.65 (7608.11-12876.93)	0.04 (-0.2-0.28)
High SDI	35-39 years	2.58 (2-3.2)	3.59 (2.76-4.5)	0.39 (0.38-0.41)	7701.64 (5968.34-9564.26)	9453.44 (7283.27-11860.88)	-0.04 (-0.29-0.21)
High SDI	40-44 years	2.35 (1.78-2.97)	3.33 (2.46-4.26)	0.42 (0.38-0.43)	7518.66 (5686.31-9508.41)	9067.79 (6699.4-11612.94)	-0.05 (-0.31-0.2)
High SDI	45-49 years	1.85 (1.34-2.39)	3.08 (2.22-4.03)	0.66 (0.66-0.69)	7307.47 (5319.24-9475.33)	8590.41 (6179.84-11221.42)	0 (-0.22-0.22)

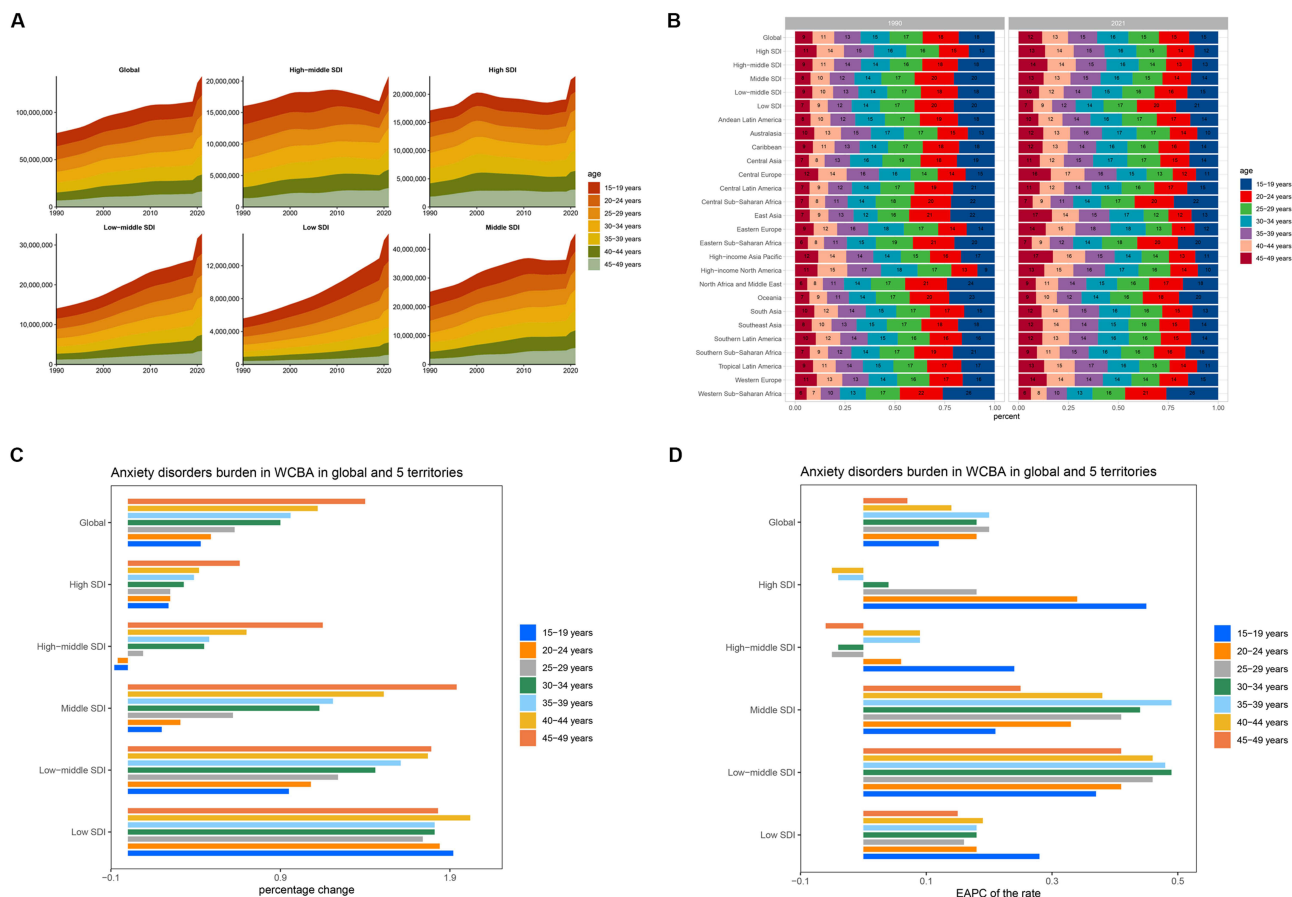


Figure 4 Temporal trends of anxiety disorders burden in WCBA by age pattern in different regions. **(A)** Prevalence cases of 7 age groups (15–49 years, 5 year intervals) from 1990 to 2021 globally and in 5 territories (low to high SDI). **(B)** The distribution of prevalence cases across 7 age groups as percentages globally, in 5 territories, and 21 GBD regions in 1990 and 2021. **(C and D)** Percentage change and EAPC of prevalence rates of 7 age groups globally and in 5 territories in 1990 and 2021.

The Association Between Anxiety Disorders Burden and SDI

The burden of anxiety disorders among WCBA varies significantly across regions with different sociodemographic levels. The prevalence of anxiety disorders shows a slight positive correlation with SDI. Globally, prevalence rates show a slight increase with SDI from low to high, with a correlation coefficient of $R=0.046$ (95% CI: -0.025 to 0.116) and statistical significance ($P<0.001$). Regional analyses indicate that prevalence is higher in regions such as High-income Asia Pacific and North America, and lower in areas such as Central Sub-Saharan Africa. Similarly, the incidence of anxiety disorders shows a slight correlation with SDI ($R=0.021$, 95% CI: -0.05 to 0.091) and is statistically significant ($P<0.001$) (Figure 5A). Globally, anxiety incidence rates range from approximately 2,500 to 12,500 per 100,000 people, with higher rates in low-resource regions such as South Asia and East Africa, and lower rates in high-income regions such as East Asia and High-income North America (Figure 5B). DALYs reflect the overall impact of anxiety disorders on health, and data indicate a slight positive correlation with SDI ($R=0.052$, 95% CI: -0.018 to 0.123), also statistically significant ($P<0.001$) (Figure 5C). Global and regional analyses show higher DALYs in regions such as East Asia and South Asia, while high-income regions exhibit relatively lower DALYs burdens. Across all regions, DALYs burdens range from approximately 300 to 1,500 per 100,000 people.

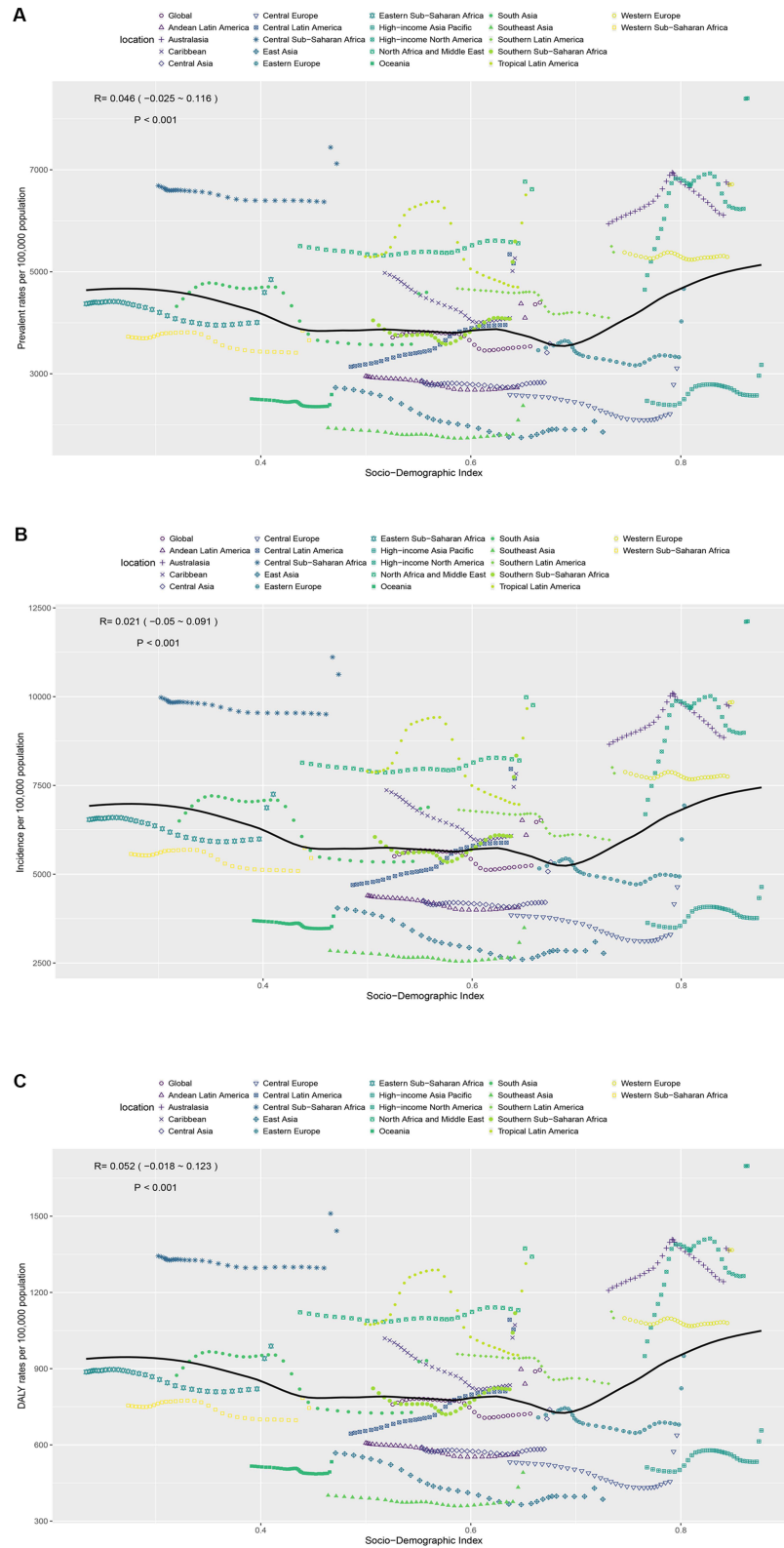


Figure 5 Relationship between SDI and WCBA anxiety disorders in 21 GBD. **(A)** The associations between the SDI and prevalence rates per 100,000 population of anxiety disorders in WCBA across 21 GBD regions. **(B)** The associations between the SDI and incidence rates per 100,000 population of anxiety disorders in WCBA across 21 GBD regions. **(C)** The associations between the SDI and DALYs rates per 100,000 population of anxiety disorders in WCBA across 21 GBD regions.

Discussion

This study found a significant increase in the number of anxiety disorder cases among WCBA globally from 1990 to 2021, indicating a growing mental health burden for this group over the past 30 years. Recent literature suggests that social factors such as socioeconomic development, accelerated pace of life, and the proliferation of social media may increase anxiety risk among women.^{22,23} Additionally, research shows that the etiology of anxiety is complex, potentially linked to genetics, hormonal fluctuations, and unique psychosocial stressors, particularly for perinatal women who experience sharp hormonal changes that elevate anxiety disorder incidence.^{24,25} The COVID-19 pandemic may have had a particular impact on women of childbearing age during this period. For example, the incidence of anxiety disorders in the female population may have increased during the pandemic, possibly due to factors such as unemployment, family stress, and health anxiety. In addition to these psychosocial factors, recent research suggests that the pandemic may have also exacerbated anxiety through immune system activation. Chronic stress, often heightened by the pandemic, can lead to inflammatory responses in the body, which have been shown to contribute to the onset and worsening of anxiety disorders. This highlights the complex interplay between psychological stress and immune system dysfunction in the context of anxiety.^{17,26} These findings underscore the need to further optimize mental health services globally to address the increasing mental health demands of WCBA.

SDI stratified analysis revealed that low and low-middle SDI regions have experienced the largest increases in anxiety prevalence and incidence, possibly reflecting shortages in healthcare resources and low public mental health awareness. Studies indicate that mental health resource scarcity and insufficient social support in low-SDI regions exacerbate the rising burden of anxiety disorders.^{27,28} Furthermore, recent research highlights the direct impact of socioeconomic stress and a lack of health education on women's mental health in low-SDI regions.²⁹ Therefore, public health interventions should be prioritized in low-SDI regions, with an emphasis on investing in mental health infrastructure and strengthening community health education to improve women's mental health outcomes.

Results showed that anxiety disorder cases have continued to rise in the majority of the 21 GBD regions, with the greatest percentage increase (194%) observed in Eastern Sub-Saharan Africa. This trend may be related to social instability, slow economic development, and limited public health resources in this region. In contrast, the prevalence of anxiety disorders in the High-income Asia Pacific region has decreased, likely due to its comprehensive healthcare system and proactive mental health interventions. These findings indicate the need for region-specific mental health intervention strategies to reduce disparities in anxiety disorder burdens across regions.

Among WCBA, the burden of anxiety disorders has increased most significantly in the 45–49 age group, which may be due to the increased pressure on women in this age group to balance family and work responsibilities with the added stress of caring for their parents. Additionally, young women (15–19 years) in low-SDI regions have shown notable increases in anxiety burden, likely due to limited educational opportunities, socioeconomic constraints, and insufficient psychological support.³⁰ These findings suggest that prevention and management strategies for anxiety disorders should be tailored according to socioeconomic conditions and psychological needs across different age groups to provide effective mental health support and intervention.

In this study, the prevalence, incidence, and DALYs of anxiety disorders all slightly increased with SDI levels. Literature indicates that women in high-SDI regions have greater access to mental health resources, leading to relatively higher rates of diagnosis and reporting of anxiety disorders.³¹ In addition, the increased mental health awareness in high-SDI regions means that women are more proactive in seeking mental health services, thus raising diagnosis rates. In contrast, anxiety issues are severe in low-SDI regions, but early diagnosis and intervention are challenging due to a lack of mental health services and social stigma. To address this issue, public health institutions in low-SDI regions should strengthen mental health education, reduce societal stigma, and promote the accessibility of mental health services.

By stratifying SDI, this study identifies significant differences in the burden of anxiety disorders across regions with varying levels of socioeconomic development, providing a basis for targeted intervention measures. Using data from GBD 2021, this study provides a global perspective on the prevalence, incidence trends, and regional disparities in anxiety disorders among WCBA, carrying substantial public health implications.

However, this study has several limitations. First, the data included were derived from the GBD 2021 database, which does not distinguish between the severity levels of anxiety disorders, potentially impacting accurate burden estimates for varying levels of disorder severity. Second, the heterogeneity in data collection methods and regional disparities may introduce biases, limiting the generalizability of the results. Additionally, this study lacks an in-depth exploration of the biological mechanisms of anxiety disorders, making it challenging to uncover specific etiological factors in different socioeconomic contexts.

Conclusion

This study analyzed global trends in anxiety disorders and disease burden among WCBA from 1990 to 2021, revealing a significant increase in mental health burden. The rise in anxiety disorders was particularly notable in Low and Low-middle SDI regions, possibly linked to limited resources and lower mental health awareness. The study also found the greatest increase in anxiety burden among women aged 45–49, with younger women in low SDI areas also at higher risk. These findings underscore the need for region- and age-specific mental health interventions.

Data Sharing Statement

All data are accessible through the Global Health Data Exchange platform (<https://ghdx.healthdata.org/gbd-2021/sources>).

Ethics Approval and Consent to Participate

The data used in this study was obtained from the GBD database, which is publicly available and does not require additional ethical approval. The GBD database has undergone ethical review, and the original data collectors obtained informed consent from the patients. Therefore, this study was granted an exemption by the Ethics Committee of the Affiliated Hospital of Xuzhou Medical University. We confirm that this study was conducted in accordance with the principles outlined in the Declaration of Helsinki.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no competing interests in this work.

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