

# Global Burden, Temporal Trends, and Long-Term Projections of Mental Disorders Among Women of Childbearing Age: A GBD 2021 Analysis Using BAPC Modeling

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**Purpose:** Mental disorders represent a major public health challenge among women of childbearing age (WCBA, 15–49 years), yet comprehensive evidence on long-term trends, socioeconomic disparities, and future trajectories remains limited. Using data from the Global Burden of Disease (GBD) 2021, this study aimed to quantify the burden of mental disorders among WCBA from 1990 to 2021 and to project future trends.

**Methods:** Incidence, prevalence, and disability-adjusted life years (DALYs) of mental disorders among WCBA were obtained from GBD 2021. Temporal trends from 1990 to 2021 were assessed using joinpoint regression analysis. Bayesian age–period–cohort (BAPC) modeling was applied to forecast the burden of ten major mental disorders for the next 15 years. Analyses were stratified by age group, geographic region, country, and socio-demographic index (SDI).

**Results:** In 2021, mental disorders imposed a substantial global burden among WCBA, with depressive and anxiety disorders accounting for the majority of cases. Marked geographic and socioeconomic disparities were observed, with consistently higher burdens in high-SDI regions. Age-specific patterns differed by disorder, with anxiety disorders peaking in younger women and depressive disorders peaking in midlife. Trend analyses revealed a decline in burden indicators between 2005 and 2010, followed by a pronounced rebound after 2019. Projections indicate that the incidence and prevalence of depressive and anxiety disorders will continue to rise, whereas the burden of bipolar disorder and schizophrenia is expected to stabilize or decline.

**Conclusion:** The burden of mental disorders among WCBA shows substantial inequalities across regions and SDI levels and is projected to increase further for common disorders. These findings highlight the need for forward-looking, equity-oriented mental health policies, with targeted prevention, early intervention, and resource allocation strategies tailored to high-risk populations and regions.

**Keywords:** mental disorders, women of reproductive age, global burden of disease, Bayesian age-period-cohort model, socio-demographic index

## Introduction

Mental disorders constitute a major and growing global public health challenge. According to the Global Burden of Disease (GBD) Study 2021, mental disorders affect a substantial proportion of the global population and are among the leading causes of disability worldwide, placing a considerable burden on health systems, social functioning, and economic development.<sup>1–4</sup> Unlike many somatic diseases, mental disorders primarily contribute to nonfatal health loss, making disability-adjusted life years (DALYs) a particularly relevant metric for assessing their population-level impact.<sup>1,5</sup>

Women of childbearing age (WCBA, 15–49 years) represent a distinct and critical population in the epidemiology of mental disorders. This life-course period encompasses major biological and psychosocial transitions, including puberty, pregnancy, childbirth, and the perimenopausal transition, all of which are associated with hormonal fluctuations and increased vulnerability to mental health conditions such as depression and anxiety.<sup>6</sup> Beyond biological factors, women in this age range often face heightened social and economic pressures related to education, employment, caregiving responsibilities, and family roles.<sup>7</sup> Mental disorders during this stage may therefore have broader consequences for maternal health,<sup>8</sup> child development,<sup>6</sup> family stability,<sup>9</sup> and workforce participation,<sup>10</sup> contributing to intergenerational and socioeconomic impacts.<sup>11</sup>

Despite the recognized importance of mental health among WCBA, existing evidence remains fragmented. Previous studies have largely focused on the overall population or on specific subgroups, such as pregnant or postpartum women, and often examined only one or two major mental disorder categories.<sup>12–14</sup> Comprehensive assessments covering multiple mental disorder subtypes within WCBA are limited. Moreover, systematic comparisons across socio-demographic index (SDI) levels—essential for understanding global health inequalities—have been insufficiently explored in this population.<sup>15</sup> Importantly, most prior analyses have concentrated on historical burden estimates, with limited attention to long-term projections needed for anticipating future mental health demands and informing sustainable policy planning.<sup>1</sup>

The release of GBD 2021 provides an updated opportunity to address these gaps. Incorporation of data through 2021 allows reassessment of long-term trends while capturing recent global disruptions that may have influenced mental health patterns.<sup>8</sup> In addition, advanced modeling approaches such as Bayesian age–period–cohort (BAPC) analysis enable forecasting of disease burden by disentangling age, period, and cohort effects, offering insights into future trajectories across populations and regions.<sup>16</sup>

Against this background, the present study aims to comprehensively assess the burden of mental disorders among women of childbearing age from 1990 to 2021 using GBD 2021 data. We examine temporal trends in incidence, prevalence, and DALYs using Joinpoint regression analysis, investigate geographic and socioeconomic disparities across SDI levels, and project the future burden of major mental disorders using BAPC modeling. By integrating past trends, current inequalities, and future projections, this study seeks to inform evidence-based, equity-oriented mental health policies and guide targeted prevention and resource allocation strategies for women in this pivotal life stage.

## Methods

### Data Sources and Collection

This study used publicly available data from the Global Burden of Disease (GBD) 2021 study to assess the burden of mental disorders among women of childbearing age (15–49 years) across 204 countries and territories from 1990 to 2021. Country- and year-specific estimates of incidence, prevalence, and disability-adjusted life years (DALYs) were extracted from the Institute for Health Metrics and Evaluation (IHME) GBD Results Tool. All estimates were generated using standardized GBD protocols that integrate multiple data sources, including population-based surveys, administrative records, systematic reviews, and governmental health reports.<sup>17</sup> All data were anonymized and publicly available by University of Washington.

DALYs were defined as the sum of years of life lost (YLLs) and years lived with disability (YLDs).<sup>18</sup> The socio-demographic index (SDI), a composite indicator reflecting fertility rate among women under 25 years, lag-distributed income per capita (purchasing power parity-adjusted), and average educational attainment, was scaled from 0 to 1. Countries and territories were stratified into five SDI quintiles (low, low-middle, middle, high-middle, and high) using established GBD thresholds.<sup>19</sup>

Mental disorder categories followed the GBD 2021 cause definitions and hierarchical classification. Detailed mappings to DSM and ICD diagnostic codes are provided in the Supplementary, while a concise description of each disorder category is retained in the main text for clarity.

## Data Processing and Quality Control

Data extraction was restricted to women aged 15–49 years. All estimates were harmonized by country, calendar year, and outcome metric. Age-standardized rates were calculated using the GBD standard population to ensure comparability across countries and over time. Country identifiers, year labels, and metric units were checked for internal consistency. As a basic quality-control procedure, a subset of extracted estimates was cross-validated against values reported in the GBD online visualization platform, and temporal trends were screened to identify implausible discontinuities. Missing or sparse country-level data were handled within the GBD estimation framework, which uses model-based approaches to synthesize available information and generate complete time series with associated uncertainty. No additional post hoc imputation was performed in this study.

## Trend Analysis

Temporal trends in the burden of mental disorders from 1990 to 2021 were assessed using Joinpoint regression analysis. This method identifies statistically significant inflection points in long-term trends and estimates the annual percentage change (APC) for each segment. The overall temporal trend for the study period was summarized using the average annual percentage change (AAPC).<sup>20</sup> The maximum number of joinpoints was predefined based on the length of the time series, and model selection was conducted using standard statistical criteria (eg, permutation testing and/or information criteria), with statistical significance evaluated at a two-sided  $\alpha$  level of 0.05. In parallel, estimated annual percentage change (EAPC) was calculated by fitting a linear regression model to the natural logarithm of age-standardized rates over calendar years. Trends were classified as increasing, decreasing, or stable based on the 95% confidence interval of the EAPC.<sup>21</sup>

## Future Forecasting

A Bayesian Age–Period–Cohort (BAPC) modeling framework was employed to project long-term trends in the disease burden of mental disorders from 2022 to 2036. This model decomposes temporal variation into three independent dimensions: age effects, reflecting age-related physiological risk across the life course; period effects, capturing population-wide influences from social and historical contexts; and cohort effects, representing cumulative exposure differences across birth cohorts. Together, these components form an epidemiologically interpretable structure for burden projection.<sup>22</sup> To ensure appropriate model specification, descriptive analyses of each disease metric were first conducted using the Age–Period–Cohort Analysis Web Tool. Visual inspection was used to identify characteristic trajectories of age, period, and cohort effects ([Methods Supplementary information 1, 2](#) and [Figures S1–S11](#)). Based on these observed patterns, smoothing priors were selectively assigned within the Bayesian framework. A first-order random walk prior (RW1) was applied to dimensions exhibiting approximately linear trends or distinct inflection points, penalizing excessive variation between adjacent parameters. In contrast, a second-order random walk prior (RW2) was used for dimensions displaying smoothly varying nonlinear trajectories, allowing flexible curvature while mitigating the risk of overfitting.<sup>23</sup> To fully ensure reproducibility, the specific combination of model parameters applied to each disease outcome and metric, for example, depressive disorders incidence modeled with age = RW2, period = RW1, and cohort = RW1, is detailed in [Methods Supplementary Table S1](#). Model inference was performed using Markov chain Monte Carlo (MCMC) simulation techniques. Posterior sampling of model parameters enabled the generation of projected estimates for future time points, along with corresponding 95% uncertainty intervals (UIs), thereby fully accounting for both inherent data variability and uncertainty in model estimation.

## Statistical Analysis Workflow

The overall analytical workflow consisted of the following steps: (1) extraction of GBD 2021 estimates for incidence, prevalence, and DALYs among women aged 15–49 years; (2) calculation of age-standardized incidence, prevalence, and DALYs rates using the GBD standard population; (3) assessment of temporal trends using EAPC and Joinpoint regression;

and (4) projection of future burden using the BAPC model. All estimates are reported with corresponding 95% uncertainty intervals unless otherwise specified.

## Results

### Global Levels

In 2021, the global burden of mental disorders among women of childbearing age (WCBA) remained substantial across incidence, prevalence, and DALYs (Table 1). Depressive disorders and anxiety disorders consistently accounted for the largest share of the burden worldwide, dominating age-standardized incidence, prevalence, and DALYs rates.

A clear SDI-related gradient was observed. High-SDI regions exhibited the highest age-standardized incidence, prevalence, and DALYs rates, whereas lower-SDI regions generally showed lower levels (Table S2). Across global and SDI-stratified analyses, depressive and anxiety disorders ranked first and second in incidence, respectively. In contrast, ADHD, ASD, and other mental disorders consistently contributed the smallest shares. Disorder rankings varied by SDI: anxiety disorders predominated in prevalence in high and middle SDI regions, while depressive disorders ranked highest in low and low-middle SDI regions. Eating disorders showed marked SDI-related variation, ranking higher in high-SDI regions than in lower-SDI settings (Figure 1).

### Regional and National Heterogeneity

Substantial geographical heterogeneity was observed across GBD regions and countries. Among the 21 GBD regions, high-income North America exhibited the highest DALYs burden for mental disorders among WCBA, while anxiety disorders reached particularly high prevalence and DALYs rates in Tropical Latin America (Figure S12).

At the national level, wide disparities were evident across 204 countries and territories (Figure 2). Countries such as Greenland, Greece, and the United States exhibited the highest age-standardized incidence rates, whereas substantially lower rates were observed in several low-SDI countries. Greenland also demonstrated the highest prevalence and DALYs burden, while China showed comparatively lower prevalence and DALYs levels.

Overall, mental disorder burden increased with rising SDI, forming a positive socioeconomic gradient. However, deviations from SDI-based expectations were observed. Several high-SDI countries (eg, Greenland, the United States, Sweden, and Australia) showed burdens exceeding predicted levels, whereas some low-SDI countries exhibited lower-than-expected burdens, likely reflecting under-ascertainment and data limitations (Figure S13).

### Burden of Mental Disorders by Age

Distinct age-related patterns were observed across disorder categories (Figure 3). Anxiety disorders showed the highest incidence in late adolescence, while prevalence and DALYs peaked in early adulthood. In contrast, depressive disorders demonstrated increasing burden with age, with incidence and DALYs peaking in the 40–44 age group and prevalence peaking in the 45–49 age group.

Conduct disorder burden was largely confined to adolescence, with sharp declines after age 20 and minimal burden observed beyond age 25. Conversely, residual mental disorders displayed a progressive age-dependent increase in both prevalence and DALYs, indicating cumulative disability impact with advancing age.

### Temporal Trends

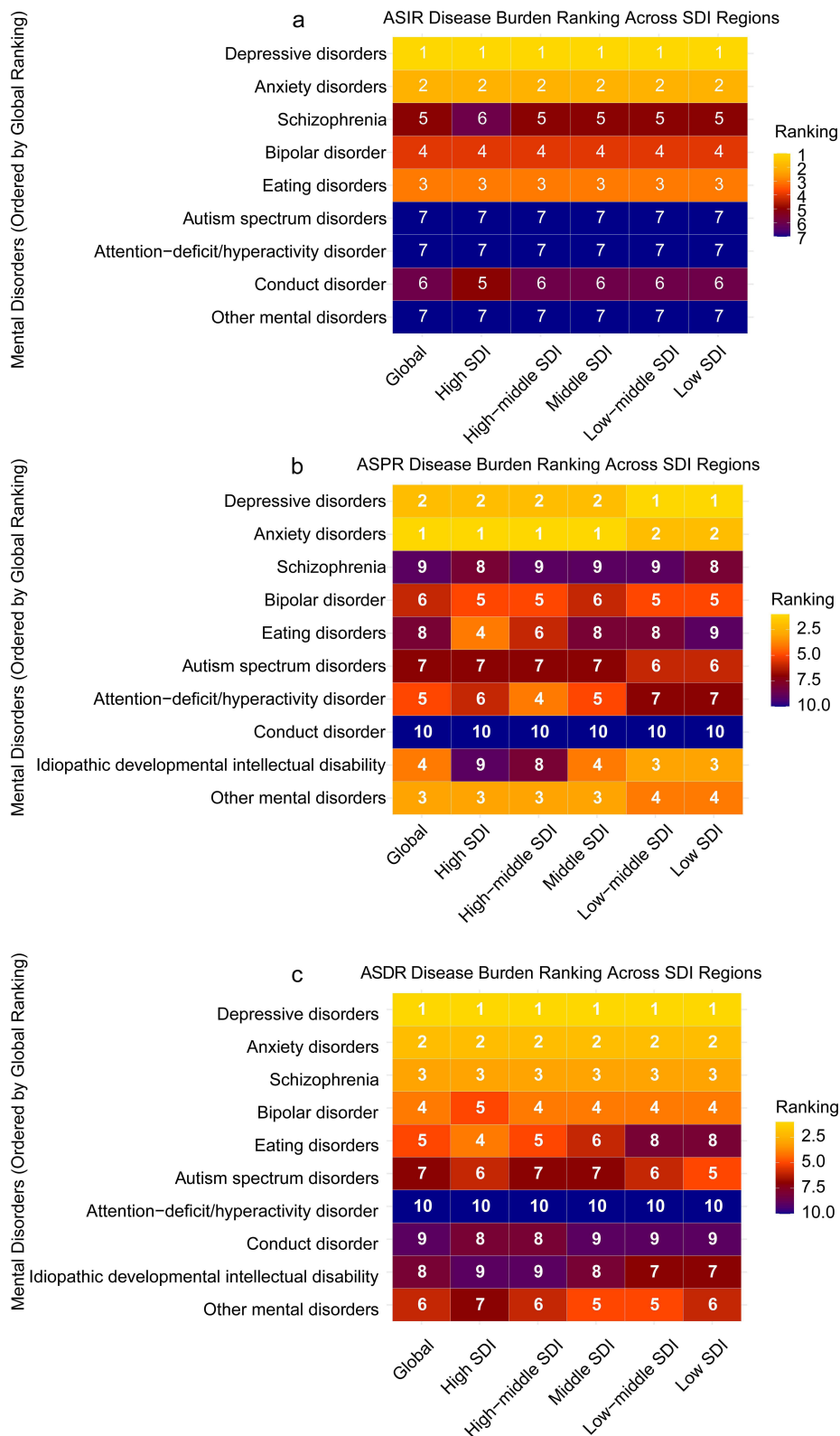
Joinpoint regression revealed complex, non-linear temporal trends across disorder categories (Figures S14–S16 and Tables S3–S6). Depressive disorders showed a significant decline between 2005 and 2010, followed by a marked increase during 2019–2021. Anxiety disorders exhibited long-term declines in prevalence and DALYs prior to 2019, with a pronounced rebound during 2019–2021. ADHD demonstrated a sustained long-term decline, whereas eating disorders increased steadily until 2019 before shifting toward a declining trend thereafter.

Overall, from 1990 to 2021, depressive and anxiety disorders showed net upward long-term trends, while ADHD exhibited a persistent decline, highlighting divergent temporal trajectories across mental disorder categories.

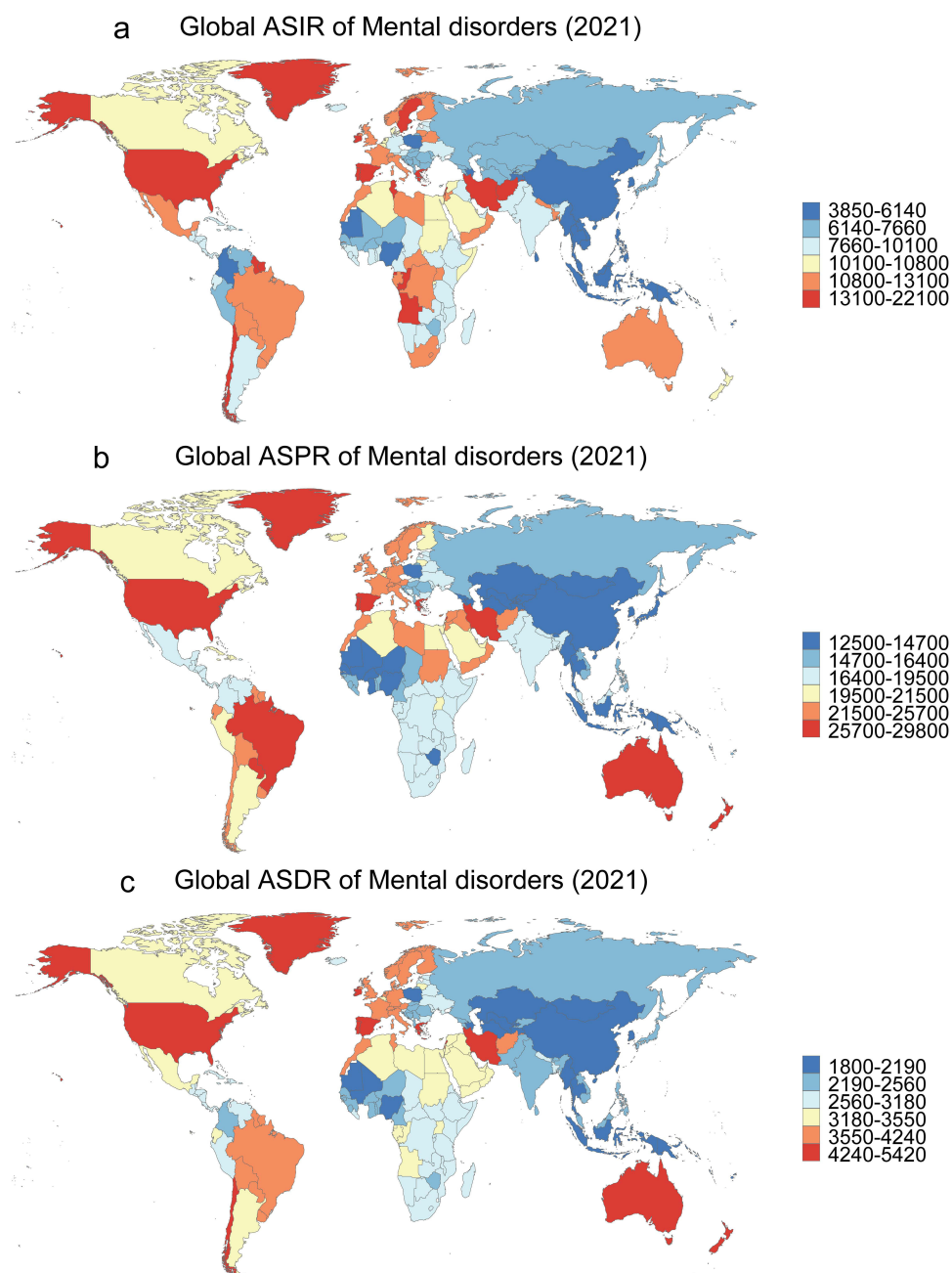
**Table 1** ASIR, ASPR, and ASDR of Mental Disorders Among WCBA Globally in 1990 and 2021, and the EAPC from 1990 to 2021

Cause	Incidence					Prevalence					DALYs				
	Number		ASR		EAPC (1990–2021)	Number		ASR		EAPC (1990–2021)	Number		ASR		EAPC (1990–2021)
	1990	2021	1990	2021		1990	2021	1990	2021		1990	2021	1990	2021	
Anxiety disorders	10728548 (7058385 14938651)	18962131 (12660029 26295396)	797.87 (527.91, 1108.47)	976.31 (650.09, 1355.43)	0.26 (0.2, 0.32)	78104901 (59299648 100969001)	138313034 (104208797 178823705)	5858.36 (4447.95, 7566.82)	7092.09 (5342.5, 9174.36)	0.24 (0.16, 0.32)	9328956 (5917676 13620685)	16448344 (10383333 24009992)	698.28 (442.59, 1018.68)	844.07 (532.79, 1232.66)	0.25 (0.17, 0.33)
Attention-deficit /hyperactivity disorder	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	11493498 (7829952 19265896)	13617747 (9156214 19265896)	815.86 (554.66, 1154.65)	712.86 (479.74, 1008.12)	0 (−0.14, 0.15)	138476 (71818 227873)	163587 (85239 271351)	9.82 (5.09, 16.16)	8.57 (4.47, 14.21)	0.01 (−0.12, 0.14)
Autism spectrum disorders	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	6813092 (5682218 8106864)	10115875 (8448791 12029202)	508.73 (424.2, 605.35)	520.11 (434.43, 618.45)	0.01 (−0.03, 0.06)	1265116 (870363 1784237)	1873488 (1283040 2636606)	94.31 (64.9, 132.97)	96.39 (66.01, 135.68)	0.02 (−0.02, 0.06)
Bipolar disorder	575625 (344082 875035)	826397 (484408 1270443)	41.66 (24.7, 63.49)	43.19 (25.45, 66.27)	0.01 (−0.09, 0.1)	8750596 (6590397 11534268)	13049345 (9767993 17288217)	660.02 (498.48, 866.65)	667.88 (499.39, 886.26)	0 (−0.12, 0.12)	1890347 (1181247 2850106)	2806894 (1740129 4226051)	142.29 (88.88, 214.06)	143.78 (89.11, 216.64)	0.01 (−0.11, 0.12)
Conduct disorder	322561 (131495 651561)	399652 (164952 829752)	21.18 (8.63, 42.78)	22.08 (9.11, 45.85)	0 (−0.04, 0.05)	3140098 (2080523 4768295)	3942582 (2593938 6008370)	206.1 (136.57, 312.94)	217.67 (143.26, 331.68)	0.01 (−0.03, 0.04)	375521 (188976 629552)	471672 (235766 788474)	24.65 (12.4, 41.32)	26.04 (13.02, 43.53)	0.02 (−0.02, 0.05)
Depressive disorders	77722841 (58860491 102539344)	133248593 (99032450 177876463)	5896.76 (4484.83, 7739.34)	6806.28 (5048.24, 9105.82)	−0.05 (−0.15, 0.05)	72345829 (57791969 89932616)	121237941 (96047914 152522485)	5542.4 (4444.77, 6856.32)	6170.74 (4880.73, 7779.6)	−0.04 (−0.11, 0.04)	12445336 (8084219 18023437)	21042424 (13468194 30593481)	948.49 (616.81, 1369.51)	1073.16 (686.5, 1562.09)	−0.04 (−0.12, 0.05)
Eating disorders	2240543 (1329750 3587968)	3232634 (1919443 5160966)	150.51 (89.55, 240.45)	174.21 (103.3, 278.49)	0.4 (0.3, 0.5)	6180205 (4123992 8882113)	9656107 (6387002 13963913)	442.55 (295.95, 634.46)	503.49 (332.63, 729.25)	0.62 (0.46, 0.78)	1307570 (742744 2100578)	2035736 (1148142 3294663)	93.56 (53.27, 150.04)	106.19 (59.83, 172.02)	0.63 (0.46, 0.79)
Idiopathic developmental intellectual disability	NA	NA	NA	NA	NA	18656266 (10457377 26557751)	24196445 (13866285 34345779)	1366.47 (763.33, 1949.03)	1255.61 (721.08, 1780.59)	−0.88 (−1.06, −0.71)	730585 (348995 1251154)	1018035 (498303 1689536)	53.55 (25.55, 91.76)	52.82 (25.88, 87.64)	−0.69 (−0.85, −0.54)
Other mental disorders	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	0 (0, 0)	17284431 (12765149 22598363)	27302263 (20334688 35525035)	1371.81 (1020.15, 1784.88)	1368.6 (1016.96, 1783.74)	0 (−0.01, 0.01)	1289681 (799963 1970542)	2031548 (1266763 3105145)	102.21 (63.68, 155.76)	101.88 (63.42, 155.83)	0.01 (−0.01, 0.02)
Schizophrenia	378287 (227553 559592)	513255 (302798 767916)	27.02 (16.21, 40.07)	26.74 (15.79, 40)	0.01 (−0.02, 0.05)	4840114 (3707813 6153282)	7541989 (5775873 9580441)	379.66 (293.07, 479.25)	378.97 (289.38, 482.74)	0.03 (0, 0.06)	3114984 (2138675 4238277)	4836703 (3318473 6567286)	243.85 (168.13, 329.61)	243.18 (166.57, 330.97)	0.04 (0.01, 0.07)

**Abbreviations:** ASIR, Age-standardized incidence rate; ASPR, Age-standardized prevalence rate; ASDR, Age-standardized DALYs rate; WCBA, Women of childbearing age; EAPC, Estimated annual percentage change; DALYs, Disability-adjusted life years; NA, not available.



**Figure 1** Ranking of 10 mental disorders in terms of disease burden among WCBA globally and in five SDI regions in 2021. (a) ASIR. (b) ASPR. (c) ASDR.



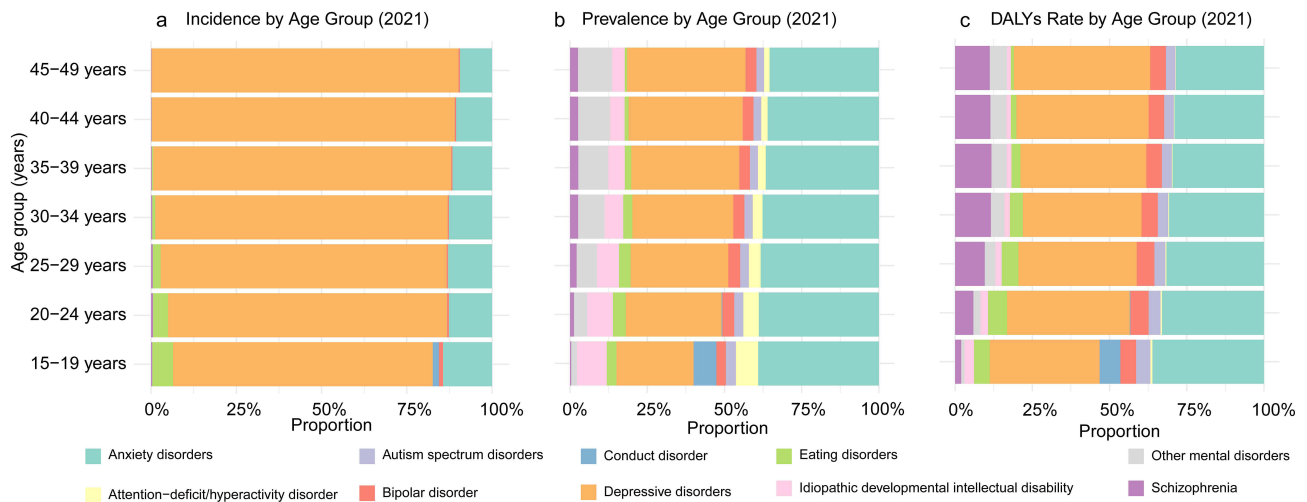
**Figure 2** The burden of mental disorders among WCBA in 204 countries and territories in 2021. (a) ASIR. (b) ASPR. (c) ASDR.

## Risk Factors

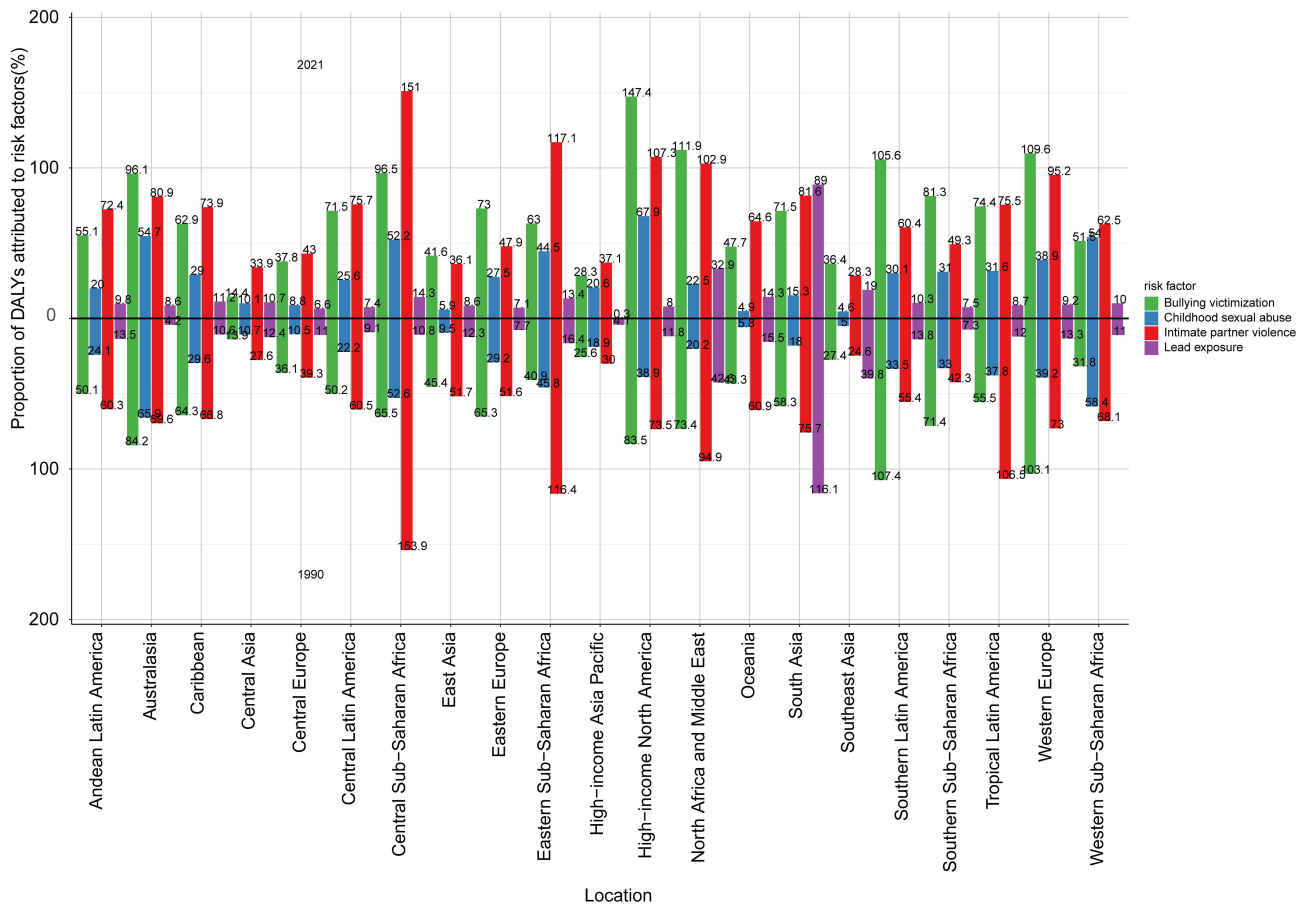
Attributable risk analyses identified bullying victimization and intimate partner violence as major contributors to mental disorder DALYs among WCBA (Figure 4). Pronounced regional disparities were observed: intimate partner violence accounted for a particularly large proportion of DALYs in Central Sub-Saharan Africa, while bullying victimization contributed substantially in South Latin America and high-income North America. Childhood sexual abuse exerted notable impacts in several high-income regions, whereas lead exposure remained a dominant contributor in South Asia.

## Future Projection

Projections derived from the BAPC model reveal heterogeneous trajectories in the burden of mental disorders among women of childbearing age through 2036. The burden of anxiety disorders, overall mental disorders, and depressive

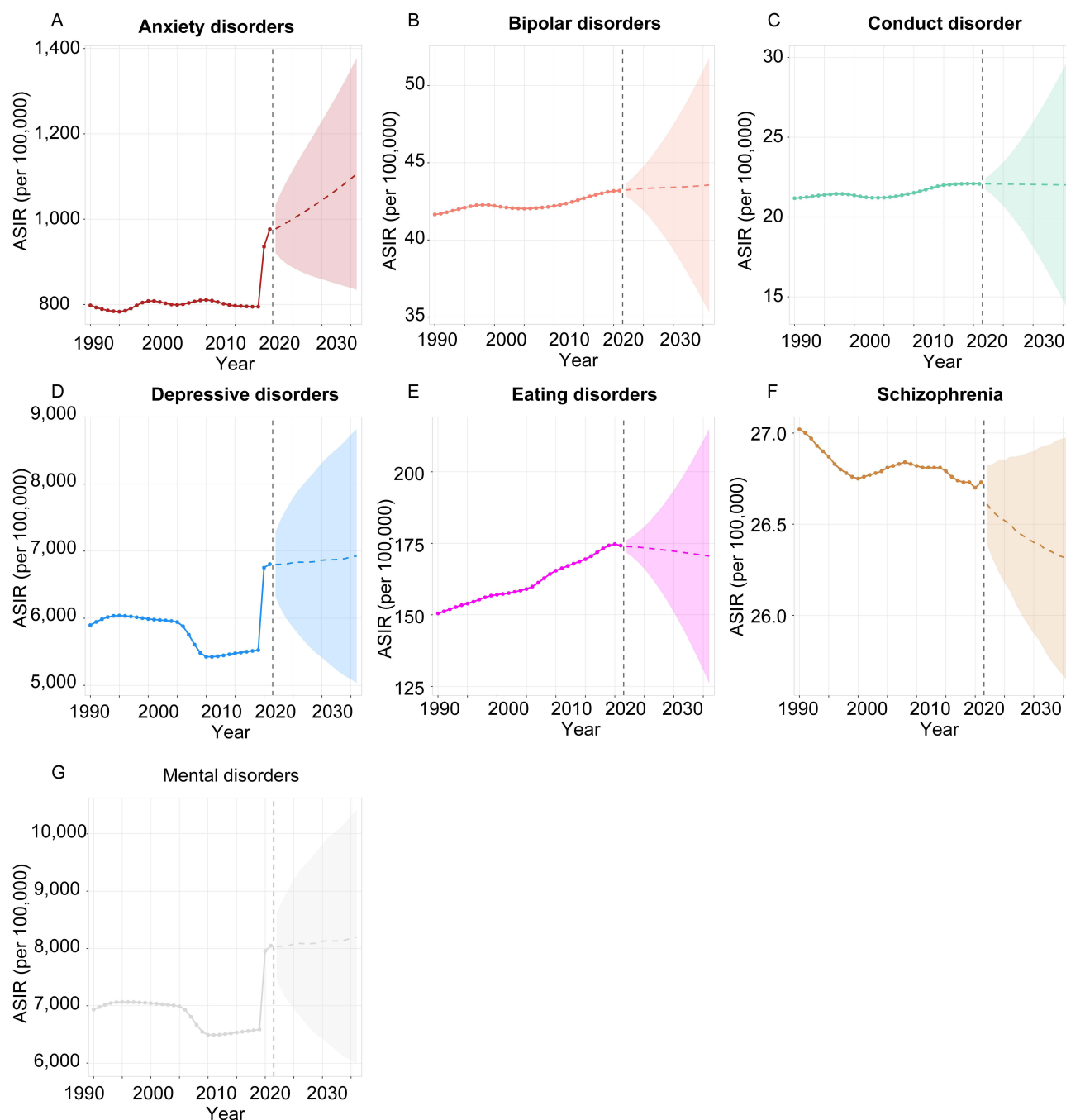


**Figure 3** Age-specific incidence (a), prevalence (b), and DALYs rates (c) of 10 mental disorders among women of reproductive age globally in 2021.



**Figure 4** Risk factors for ASDR for mental disorders in WCBA in 21 GBD regions, 1990 and 2021.

disorders is projected to increase over the study period. In contrast, schizophrenia, eating disorders, and ADHD are expected to exhibit declining trends. Notably, bipolar disorder demonstrates a divergent pattern across burden metrics, with the age-standardized prevalence rate (ASPR) projected to increase, while the age-standardized death rate (ASDR) is expected to decline (Figures 5, S17 and S18).



**Figure 5** Mental disorder among WCBA for ASIR for the next 15 years. (A) Anxiety disorders. (B) Bipolar disorders. (C) Conduct disorder. (D) Depressive disorders. (E) Eating disorders. (F) Schizophrenia. (G) Mental disorders.

## Discussion

Comprehensive analysis of data from the GBD Study revealed substantial global and regional variation in the burden of ten major mental disorders among WCBA from 1990 to 2021, with projections indicating sustained trends. Our analysis reveals that depressive and anxiety disorders remain the predominant contributors to the global mental health burden in this population. A distinct socioeconomic gradient was observed, with high-SDI regions showing the highest age-standardized incidence and prevalence rates. While this partly reflects better diagnostic capacity in developed nations, it likely also points to the “modernization paradox”, where rapid urbanization, work-life imbalance, and the erosion of traditional social support networks exert heightened psychological pressure on women. Conversely, the lower reported burden in low SDI regions

(eg, Sub-Saharan Africa) suggests significant under-diagnosis and stigma-driven under-reporting, masking a potentially substantial unmet need for care.

The findings of this study align closely with previous literature in terms of trend, confirming the “invisible growth” characteristic of the global mental health burden. The WHO Mental Health Report similarly indicates that anxiety disorders and depression are the most common mental illnesses among women.<sup>24</sup> The GBD 2019 report on mental disorders also documented a comparable disease burden in regions with high SDI.<sup>1</sup> Our study finds that anxiety disorders peaked between ages 15 and 19, while DALYs rates related to anxiety reached their maximum in the 25–29 age group, likely reflecting sustained symptomatology and delayed functional impairment.<sup>25</sup> Prior neurodevelopmental research has linked adolescent anxiety with altered brain connectivity and comorbid psychiatric traits, contributing to long-term functional decline.<sup>26</sup> Consistent with previous studies, depressive disorders exhibited a “midlife intensification” trend, with maximum burden observed in the 40–49 age group, an age associated with perimenopausal hormonal changes, psychosocial stress accumulation, and chronic comorbidities.<sup>27,28</sup> The “chronic inflammation-obesity-insulin resistance-depression syndrome” (COIDS) model offers one explanatory framework for the clustering of metabolic and affective disorders in middle-aged women.<sup>29</sup>

Despite inevitable stress and lifestyle disruptions brought about by modernization, greater access to medical resources, healthcare services, and social support systems in high SDI regions may facilitate more effective intervention and treatment of depressive disorders.<sup>30,31</sup> Stable social networks, particularly strong familial and community ties, may provide crucial emotional support that helps reduce depression risk among women in these regions.<sup>32</sup> Increasing prevalence rates of depression in high SDI countries may not necessarily reflect true deterioration in population mental health but could instead signal improved awareness and detection.<sup>33</sup> Tailored and context-sensitive interventions are urgently required for high-risk areas and populations, guided by prevailing social realities.

Noteworthy disparities were observed in countries such as Greenland and the United States, where mental disorder burdens exceeded SDI-based expectations. In Greenland, geographic isolation, circadian rhythm disturbances linked to high latitude, sparse population distribution, patriarchal social structures, and widespread alcohol consumption contribute significantly to elevated rates of depressive disorders.<sup>34–38</sup> In the United States, key drivers include mental health stigma, financial barriers to clinical services, and systemic racism.<sup>39</sup> In contrast, China reported the lowest ASPR and ASDR, potentially influenced by cultural stigma surrounding mental illness, somatization of psychological symptoms, and subsequent underestimation of prevalence.<sup>40,41</sup> Cultural influences such as these underscore the necessity of destigmatization initiatives and public education to promote help-seeking behavior.

Lower burdens of mental disorders among WCBA were concentrated in low SDI countries, notably in sub-Saharan Africa and South Asia. Limited coverage of epidemiological data in less developed regions, significant underdiagnosis due to inadequate resources, and insufficient reporting likely contribute to observed patterns.<sup>1,42</sup> Mental disorders in WCBA remain underrecognized in many of these settings; for instance, high rates of perinatal depression, often closely linked to antenatal depression, are frequently overshadowed by prioritization of obstetric mortality prevention. Inadequate access to mental health services, coupled with existing systems that fail to accommodate specific behavioral and support-seeking needs of WCBA, underscores the need for public awareness campaigns and mental health education tailored to this population in low SDI regions.<sup>43,44</sup>

Attributable risk factor analyses indicate that bullying victimization and intimate partner violence (IPV) serve as major contributors to DALYs for mental disorders, with particularly high burdens observed in high-income North America and sub-Saharan Africa. Alignment with the World Health Organization (WHO) (2021) global report on the mental health impact of gender-based violence is evident.<sup>45</sup> Approximately 30% of women globally have experienced violence, significantly elevating depression/anxiety risks.

Evidence from studies conducted in sub-Saharan Africa reveals that the risk of IPV-related female victimization is closely linked to mental health outcomes, including post-traumatic stress disorder (PTSD) and depression, as well as prior exposure to violence during childhood. In contrast, socioeconomic variables such as income, educational attainment, and employment status do not show significant associations with IPV risk in these populations.<sup>46</sup> Notably, witnessing male-to-female IPV between parents during childhood substantially increases the probability of experiencing IPV later in life for both males and females, suggesting a pattern of intergenerational transmission of violence.<sup>47</sup>

Childhood exposure to domestic violence thus constitutes a critical and modifiable risk factor, emphasizing the importance of targeted interventions to interrupt this cycle across generations.

Environmental exposures also play a significant role in psychiatric morbidity. Lead exposure, in particular, exerts a pronounced effect on mental health in South Asia, with India identified as a high-risk setting. Major environmental sources include lead-based paint, a primary global source of exposure, and traditional medicinal practices such as Ayurveda.<sup>48</sup> Neurotoxins like lead are linked to a wide spectrum of disorders, including depression, anxiety, and neurocognitive conditions.<sup>48–50</sup> Strengthened environmental policy enforcement is urgently needed, including stricter limits on allowable lead content in industrial products and reduced reliance on traditional lead-containing substances such as Ayurvedic formulations.

Temporal analysis revealed that while the burden of Eating Disorders has shifted toward a decline—possibly due to improved early detection and evolving public attitudes<sup>51,52</sup>—the burden of depression and anxiety has surged. The Joinpoint regression captured a profound “rebound” in these disorders post-2019, reflecting the impact of the COVID-19 pandemic. This surge was steepest in high-SDI countries but present globally, driven by isolation, economic instability, and the “shadow pandemic” of domestic violence.<sup>31,53,54</sup>

Looking forward, BAPC projections indicate these upward trends will persist. This “invisible growth” challenges the effectiveness of current policies. As noted in recent evaluations of the WHO Comprehensive Action Plan, structural challenges such as economic inequality and a lack of universal health coverage continue to compound psychological distress.<sup>24,55,56</sup>

## Strengths and Limitations

This study provides a WCBA-specific global assessment across multiple mental disorder categories and SDI strata, characterizes non-linear historical trends using Joinpoint regression, and applies BAPC modeling to generate long-horizon scenario-based projections. A key strength is the integration of novel risk factors (IPV, lead exposure) into the burden analysis.

However, several limitations must be acknowledged. First, GBD estimates are intrinsically model-based and rely on heterogeneous data sources of varying quality. In countries with sparse surveillance systems, particularly in low SDI regions, the true burden of mental disorders may be under- or overestimated. Second, while BAPC models are powerful, they assume the continuation of historical trends and cannot account for unforeseen future global disruptions (eg, new pandemics or conflicts). Third, as an ecological study, our risk factor analysis demonstrates population-level associations but cannot establish individual-level causality. Finally, the aggregation of disorder subtypes (eg, all anxiety disorders grouped together) may obscure specific trends relevant to particular conditions like PTSD or panic disorder.

## Conclusion

Our analysis confirms entrenched global disparities in mental disorders among women of reproductive age, driven largely by depression and anxiety. The relationship with SDI levels requires nuanced interpretation. High rates in developed regions point to the pressures of modernization, such as conflicting social roles, whereas the lower rates in developing regions likely reflect under-detection due to stigma rather than better health. While the overall trend is upward, the surge post-2019 clearly reflects the external shock of the COVID-19 “Shadow Pandemic.” It is important to interpret these findings with caution; the data are model-derived, not purely observational, particularly in countries with sparse records. Consequently, the wide uncertainty intervals imply that our projections are probabilistic possibilities, not definitive predictions. Effective intervention requires targeted strategies, including social-emotional learning curricula for youth, integrated screening in maternal health clinics, legal measures against intimate partner violence, and stricter environmental lead control. Better data collection in low-SDI settings remains a prerequisite for validating these models and assessing intervention success.

## Data Sharing Statement

This study was conducted using data from the Global Burden of Disease Study 2021, which is publicly available and anonymized.

## Ethical Approval

The study protocol was reviewed and approved by the Tsinghua University Science and Technology Ethics Committee (Humanities, Social Sciences and Engineering) (Approval No: THU-04-2025-1146). All procedures were performed in accordance with the ethical standards of the institutional research committee and with the principles of the Declaration of Helsinki.

## Consent for Publication

All authors have carefully reviewed and approved this manuscript. We all agree to submit it to “International Journal of Womens Health” for publication and are aware of and accept the journal’s publication policies.

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All authors made a significant contribution to the work reported, whether that is in conceptualizing, designing, acquisition of data, analysis and interpretation, or critically reviewing the article; gave final approval of the version to be published; and agreed to be accountable for all aspects of the work. This study is based on our initial analysis which was previously shared as a preprint. [https://www.researchgate.net/publication/394835300\\_Burden\\_and\\_Temporal\\_Trends\\_of\\_Mental\\_Disorders\\_Among\\_Women\\_of\\_Childbearing\\_Ag\\_Insights\\_from\\_the\\_Global\\_Burden\\_of\\_Disease\\_Study\\_2021](https://www.researchgate.net/publication/394835300_Burden_and_Temporal_Trends_of_Mental_Disorders_Among_Women_of_Childbearing_Ag_Insights_from_the_Global_Burden_of_Disease_Study_2021). The current manuscript represents a substantially extended and refined version, incorporating more detailed analyses, updated data interpretations, and comprehensive policy discussions.

## 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. The major contributions were demonstrated as follows. H-WP: Formal Analysis, Writing original draft. J-WP: Formal Analysis, Writing review & editing. X-WP: Formal Analysis, Writing review & editing. WC: Writing review & editing, Formal Analysis. J-YQ: Writing review & editing, Formal Analysis. K-YJ: Writing review & editing, Formal Analysis. HY-ST, H-ZW: Funding acquisition, Writing review & editing. Y-MS, J-HM: Writing original draft, Funding acquisition.

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## Disclosure

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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