

1 **The Burden of Mental Disorders in Nepal between 1990-2019: Findings from the Global**
2 **Burden of Disease Study 2019**

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20 **Abstract**

21 Mental disorders are the leading cause of disease burden, affecting 13% of all people globally
22 in 2019. However, there is scarce evidence on the burden of mental disorders in Nepal. This
23 study used the Global Burden of Disease Study 2019 to assess the prevalence and disability-
24 adjusted life-years (DALY) of mental disorders in Nepal between 1990 and 2019 . In 2019,
25 there were 3.9 million (95% UI: 3.6-4.3) people with mental disorders in Nepal. Major
26 depressive disorders (1.1 million; 95% UI: 0.9 -1.2 million) and anxiety disorders (0.9
27 million; 95% UI: 0.8-1.2 million) were the most prevalent mental disorders in 2019.
28 Attention deficit hyperactive disorder, conduct disorder, and autism spectrum disorders were
29 present twice as high in males than in females. The proportional contribution of mental
30 disorders to the total disease burden has tripled between 1990 (1.79% of all DALYs) and
31 2019 (5.5% of all DALYs). In conclusion, the proportional contribution of mental disorders
32 to total disease burden has increased significantly in the last three decades in Nepal, with
33 apparent sex and age differentials in prevalence and DALY rates. Effective program and
34 policy responses are required to prepare the health system for reducing the growing burden of
35 mental health disorders in Nepal.

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37

38 **Keywords:** Anxeity, Depression, Mental disorders, Nepal

39

40 Impact statement

41 Nepal, having endured a decade-long internal armed conflict, and grappling with the
42 aftermath of devastating events such as the 2015 earthquake, and other multitude of personal,
43 social, cultural, economic, political, and environmental adversities, lacks a systematic
44 analysis of the trend and burden of mental disorders. This study fills an important gap by
45 providing estimates of the prevalence and disability-adjusted life-years (DALY) associated
46 with mental disorders in Nepal between 1990 and 2019. The study emphasizes the increasing
47 burden of mental disorders in Nepal over the past three decades, with notable sex and age
48 differences in prevalence and DALY rates. The findings indicate that in 2019, Nepal had
49 approximately 3.9 million people with mental disorders, where major depressive disorders
50 and anxiety disorders were the most prevalent conditions. The proportional contribution of
51 mental disorders to the total disease burden has tripled between 1990 and 2019. The
52 significant findings indicate a need for effective program and policy responses to address the
53 growing burden of mental health disorders in Nepal. These findings may also inform the
54 stakeholders for preparing the health system to meet the challenges posed by mental
55 disorders.

56

57 **Introduction**

58 Mental disorders are the major cause of disease burden globally. The proportional
59 contribution of mental disorders to total disability-adjusted life years (DALYs) has increased
60 by 58% between 1990 and 2019 globally (Institute of Health Metrics and Evaluation 2019).
61 In 2019, mental disorders were the seventh leading cause of DALYs, affecting 970 million
62 people around the world (Institute of Health Metrics and Evaluation 2019). Mental disorders
63 are also responsible for a high economic burden resulting from increased healthcare
64 expenditure and productivity losses (Doran and Kinchin 2019). Low-income and middle-
65 income countries (LMICs) like Nepal are disproportionately affected by the burden of mental
66 disorders. In 2019, most of the people with mental disorders were from LMICs (Institute of
67 Health Metrics and Evaluation 2019).

68 Exposure to several personal, social, cultural, economic, political, and environmental
69 adversities including chronic health conditions, impoverishment, social exclusion, gender
70 disadvantage, conflict, disasters, and migration, among others, could determine the
71 development of mental disorders (Lund et al. 2018). Passing through the decade-long internal
72 armed conflict during 1996-2006 (Medeiros et al. 2020), experiencing massive disasters like
73 the earthquake in 2015 (Kane et al. 2018), unemployment rate and out-migration (Dhungana
74 et al. 2019), high incidence of domestic violence, high alcohol consumption rates, and the
75 pernicious problem of poverty could be predisposing factors for poor mental health in Nepal
76 (Luitel et al. 2013).

77 A recent national mental health survey reported that 10% of Nepalese adults had any
78 mental disorder in their lifetime (Nepal Health Research Council 2021). Other studies also
79 provided estimates of particular mental disorders such as anxiety and depression in Nepal
80 (Khattari and Nepal 2006; Kohrt et al. 2009; Risal et al. 2016; Simkhada et al. 2018;

81 Upadhyaya and Pol 2003). However, these studies were conducted in specific samples
82 (Clarke et al. 2014; Dhungana et al. 2019) or used different self-reported assessment tools
83 with limited validity (Khattari and Nepal 2006; Kohrt et al. 2009; Risal et al. 2016; Upadhyaya
84 and Pol 2003), which might have contributed to a wide variation in the reported rates of
85 mental health problems in Nepal (Steel et al. 2009). Most importantly, neither of the previous
86 studies attempted to estimate DALYs nor assessed the temporal trends in the prevalence of
87 mental disorders in Nepal.

88 Moving beyond the studies whatsoever available that provide a descriptive picture on
89 the prevalence of selected mental disorders in Nepal, and within the context of poor
90 availability of and access to mental health care, a systematic analysis of the trend and burden
91 of mental disorders can inform stakeholders about the magnitude and distribution of
92 comprehensive measures of the burden of mental disorders in Nepal. A clear understanding
93 of the extent of mental health problems in the population is crucial for planning and
94 implementing effective prevention and management strategies in Nepal. Therefore, this study
95 aimed to illustrate the trend and pattern of mental disorders in terms of their prevalence and
96 DALYs from 1990 to 2019 using the data from the Global Burden of Disease Study (GBD)
97 2019.

98

99 **Methods**

100 **Study design and data sources**

101 This study was based on the estimates provided by GBD 2019. We extracted the data from
102 the official website (<http://ghdx.healthdata.org/gbd-results-tool>) of the Institute for Health
103 Metrics and Evaluation (IHME) using the ‘GBD Compare’ data visualization tool (Institute
104 of Health Metrics and Evaluation 2020). GBD study collects a wide range of data from

105 various sources, including vital registration systems, health surveys, disease registries,
106 healthcare facilities, and more and analyzes those data using sophisticated statistical
107 techniques and modelling to estimate the incidence and prevalence, deaths and DALY
108 attributed to specific diseases. The GBD 2019 was a multinational collaborative study that
109 covered 204 countries and regions and provided a comprehensive assessment of health loss
110 for 369 diseases and injuries from 1990 to 2019 (Roth et al. 2020). The GBD 2019 used a
111 total of 281,577 data sources globally and 402 data sources from Nepal to estimate the
112 disease burden. The data input sources comprised household survey data, hospital
113 administrative data, and disease registries, among others.

114 **Study outcomes**

115 Outcome variables comprised of a list of mental disorders including major depressive
116 disorders (major depressive disorder and dysthymia), anxiety disorders (a combined estimate
117 of all subtypes), idiopathic developmental intellectual disability (estimated within the wider
118 scope of intellectual disability impairment, encompassing cases of intellectual disability
119 originating from unidentified sources once all other potential causes have been considered),
120 dysthymia, attention deficit hyperactivity disorder, conduct disorder, bipolar disorder (a
121 combined estimate of all subtypes), autism spectrum disorders, schizophrenia, bulimia
122 nervosa, anorexia nervosa, and other mental disorders. The mental disorders were defined
123 based on the Diagnostic and Statistical Manual of Mental Disorders or the International
124 Classification of Diseases-10 criteria (Vos et al. 2020).

125

126 **Data analysis**

127 A detailed description of the statistical modelling for mental disorders has been reported
128 elsewhere (Vos et al. 2020). In brief, Years Lived with Disability (YLDs) were calculated by

129 multiplying prevalence estimates across different degrees of severity by a relevant disability
130 weight. These disability weights were used to assess the level of health loss associated with
131 each subsequent consequence (due to an illness or accident). Years of Life Lost (YLLs) were
132 calculated by multiplying the number of deaths attributed to a specific cause by the predicted
133 remaining years of life at the time of death, as determined by a standard life expectancy
134 measurement. The combined sum of YLDs and YLLs was used to calculate DALYs. In cases
135 where mental diseases were not officially recognised as direct causes of mortality, YLL
136 computations were removed, and YLDs were employed as an approximation for DALYs.

137 We used the overall and sex-specific crude and age-standardized rates and the 95%
138 uncertainty interval (UI) from 1990 to 2019 to compare and depict the trends of prevalence
139 and DALYs associated with each mental disorder. We also plotted line graphs of every
140 mental disorder across the age groups ranging from less than one year to above 80 years.
141 STATA software version 16.1 (Stata Corporation, College Station, TX, USA) was used to
142 construct the graphs. The prevalence and DALY rates were presented per 100,000
143 population.

144 **Results**

145 In 2019, 3.9 million (95% UI: 3.6-4.3) Nepalese were estimated to have suffered from mental
146 disorders, comprising 13.5% of the total population. The overall prevalence of mental
147 disorders in 1990 was 12.4% (95%UI: 10.9-13.8). The prevalence rates did not differ
148 significantly between 1990 and 2019 (Fig 1).

149 **Prevalence of mental disorders**

150 The age-standardized prevalence of mental disorders per 100,000 population was 13372.2
151 (95% UI: 12144.4, 14565.75) in 2019 and 13819.75 (12444.59, 15140.57) in 1990,

152 respectively. In 2019, age standardised prevalence cases of mental disorders per 100,000
 153 population among males and females were 13023.79 (95% UI: 11777.42, 14245.63) and
 154 13617.99 (95% UI: 12372.86, 14886.33), respectively (Table 1).

155 Table 1. Prevalence of mental disorders (per 100,000)

	Both		Male		Female	
	All ages	Age-standardized	All ages	Age-standardized	All ages	Age-standardized
1990	12223.2 (10782.5, 13571.14)	13819.75 (12444.59, 15140.57)	12426.19 (10956.48, 13844.77)	13776.17 (12340.34, 15155.77)	12019.18 (10639.14, 13387.3)	13861.59 (12508.23, 15214.98)
1995	12064.11 (10714.06, 13366.86)	13593.67 (12299.91, 14912.97)	12283.4 (10864.85, 13643.94)	13571.47 (12204.15, 14895.13)	11844.05 (10553.44, 13169.67)	13610.84 (12329.9, 14974.64)
2000	12377.25 (11039.7, 13637.37)	13871.96 (12621.08, 15102.55)	12444.68 (11045.78, 13777.93)	13673.15 (12359.4, 14981.86)	12309.65 (11042.08, 13634.05)	14068.18 (12732.1, 15396)
2005	12580.71 (11252.63, 13853.11)	13831.49 (12585.77, 15095.36)	12539.22 (11155.82, 13840.08)	13568.92 (12256.05, 14871.02)	12621.44 (11380.77, 13932.44)	14080.45 (12818.85, 15395.19)
2010	12873.25 (11652.61, 14077.42)	13854.38 (12652.53, 15003.48)	12653.49 (11342.78, 13906.57)	13494.49 (12196.29, 14739.67)	13082.27 (11847.32, 14310.12)	14165.59 (12872.33, 15358.35)
2015	12814.23 (11596.87, 14011.1)	13410.21 (12186.09, 14596.8)	12545.45 (11299.25, 13794.76)	13126.49 (11875.24, 14343.81)	13063.05 (11774, 14410.75)	13618.11 (12325.36, 14918.14)
2019	13003.36 (11765.55, 14198.43)	13372.2 (12144.4, 14565.75)	12586.64 (11315.23, 13831.36)	13023.79 (11777.42, 14245.63)	13382.89 (12118.48, 14685.06)	13617.99 (12372.86, 14886.33)

156

157 Major depressive disorders (age-standardized prevalence rate: 3795.9, 95% UI:
 158 3265.67, 4408.13), anxiety disorder (age-standardized prevalence rate: 3277.32, 95% UI:
 159 2624.16, 4134.75), and idiopathic developmental intellectual disability (age-standardized
 160 prevalence rate: 2503.69, 95% UI: 1635.85, 3380.81) were the three most prevalent mental
 161 disorders in 2019 (Fig 2).

162 Major depressive disorders and anxiety disorders were more common in females than
 163 in males (Supplementary Table S1). Likewise, attention deficit hyperactivity disorder,
 164 conduct disorder, and autism spectrum disorders were more prevalent in children and
 165 adolescents (Fig 3).

166

167 Burden of mental disorders

168 All age DALYs per 100,000 population increased from 1421.66 (95% UI: 1036.74, 1870.04)
169 to 1691.08 (95% UI: 1244.47, 2224.51) in both sexes, 1375.63 (95% UI: 997.36, 1803.81) to
170 1545.37 (95% UI: 1129.01, 2027.12) in males and 1467.92 (95% UI: 1068.11, 1944.53) to
171 1823.78 (95% UI: 1330.85, 2413) in females between 1990 and 2019 (Supplementary Table
172 S2). The proportion of DALYs attributable to mental disorders has increased significantly
173 from 1990 to 2019 (Fig 1): from 1.79% of total DALYs (95% UI: 1.34, 2.32) to 5.53% of
174 total DALYs (95% UI: 4.22, 6.98) in both sex; 1.7% of total DALYs (95% UI: 1.26, 2.21) to
175 4.73% of total DALYs (95% UI: 3.58, 6) in males; and 1.89% of total DALYs (95% UI:
176 1.41, 2.44) to 6.37% of total DALYs (4.89, 7.96) in females (Supplementary Table S2).

177 The major share of DALYs attributable to mental disorders was due to major
178 depressive disorders and anxiety disorders (Fig 2). All age and age-standardised DALYs for
179 major depressive disorder were 687.86 (95% UI: 465.55, 953.1) and 754.62 (95% UI: 510.96,
180 1045.8) per 100,000 in 2019, respectively. Disaggregated by sex, both the overall and age-
181 standardised DALY rates were higher in females compared to males for major depressive
182 disorders. Age-standardised DALYs for major depressive disorders for 100,00 males and
183 females were 605.29 (95% UI: 403.62, 842.67) and 883.21 (95% UI: 598.08, 1228.91),
184 respectively. Similarly, age-standardised DALYs for anxiety disorders was 309.51 (95% UI:
185 205.76, 434.63) per 100,000 in both sexes (Supplementary Table S3).

186 Discussion

187 We found the proportional contribution of mental disorders to the total disease burden has
188 tripled between 1990 and 2019 in Nepal. Major depressive disorders and anxiety disorders,

189 which were also more prevalent in females than males, were the top two contributors for the
190 total prevalent cases and DALYs in 2019. Attention deficit hyperactive disorder, conduct
191 disorder, and autism spectrum disorders were present twice as high in males than in females.

192 Our study found that one among seven Nepalese had a mental disorder in 2019. The
193 rate is slightly greater than the prevalence of any mental disorder reported in the first national
194 Mental Health survey-2020 in Nepal (Nepal Health Research Council 2021) and consistent
195 with the prevalence reported in the study (based on GBD estimates) from a neighbouring
196 country, India (14.3%) (Sagar et al. 2020). Comparing the overall prevalence of mental
197 disorders within and across countries is still challenging due to inconsistencies in defining
198 and estimating the burden of mental disorders (Kohrt and Hruschka 2010; Whiteford et al.
199 2016). For example, GBD 2019 classified mental disorders, neurological disorders, and
200 suicide separately, while other studies grouped them to estimate the burden of mental
201 disorders (J. Rehm and K. D. Shield 2019; World Health Organization 2018). The national
202 Mental Health Survey also included substance use disorders to report the prevalence of any
203 mental disorder in Nepal (Nepal Health Research Council 2021). Regarding the major
204 depressive disorders, most of the South Asian counterparts including Bangladesh (4.4%),
205 India (3.9%), Pakistan (3.0%), and Bhutan (3.7%) have a similar rate like Nepal.

206 The age-standardized prevalence of most of the mental disorders was not found
207 identical by sex. Major depressive disorders and anxiety disorders were prevalent in females,
208 whereas attention deficit, hyperactive disorder, conduct disorder, and autism spectrum
209 disorders were manifested predominantly in males. Similar phenomena of sex-differential
210 distribution of mental disorders were observed in India and globally (Erskine et al. 2014;
211 Jürgen Rehm and Kevin D. Shield 2019; Sagar et al. 2020). Some of the previous studies
212 have indicated that the higher susceptibility of women to depressive and anxiety disorders

213 could be linked to gender discrimination, gender-based violence, antenatal and postnatal
214 stress, and adverse socio-cultural norms (Albert 2015; Beydoun et al. 2012; Sagar et al.
215 2020). Likewise, a striking male bias in the prevalence of autism spectrum disorders and
216 attention deficit hyperactive disorder could also be explained by sex-differential genetic and
217 hormonal factors (Werling and Geschwind 2013).

218 No evidence for an increased prevalence of overall mental disorders was found in
219 Nepal between 1990 and 2019. Although the crude number of cases slightly increased both in
220 males and females, the age-standardized prevalence of overall mental disorders decreased
221 from 13.8% to 13.4% in the same period. The discrepancy between crude and age-
222 standardized rates is mainly explained by population growth and changing age structures
223 (Baxter et al. 2014). This finding is also opposite to the general expectation that the
224 prevalence of mental disorders might have significantly increased during the last two decades
225 when psychological stressors including conflicts, natural disasters, and socio-economic
226 adversities were abundant in Nepal. That might be because of the underreporting of mental
227 disorders due to the stigma associated with mental illness in the community (Devkota et al.
228 2021; Luitel et al. 2013). The lack of trained health workers and accessible care might also
229 have partly hindered the detection of cases, thereby causing an underestimation of mental
230 disorders in Nepal (Upadhaya et al. 2017).

231 Unlike the prevalence, the DALYs for mental disorders marginally increased between
232 1990 and 2019. The DALYs due to mental disorders had a larger contribution to the total
233 burden of disease, which has tripled in the last three decades. The multiplication of
234 proportional contribution is caused by the decline in maternal and child mortality and deaths
235 due to other communicable diseases. The proportional contribution of communicable
236 maternal, neonatal, and nutritional diseases to total DALYs decreased from 70% to 29%

237 between 1990 and 2019 (Institute of Health Metrics and Evaluation 2019). The contribution
238 of mental disorders to total disease burden (5.5% of all DALYs in 2019) in Nepal is
239 comparable with that of India (4.7% of the total DALYs in 2017) (Sagar et al. 2020) and
240 Mediterranean regions (4.7% of the total DALYs in 2015) (Charara et al. 2018). Most of the
241 DALYs due to mental disorders are contributed by major depressive disorders, followed by
242 anxiety disorders, idiopathic developmental intellectual disability, and schizophrenia in Nepal
243 and globally (Charara et al. 2018; Jürgen Rehm and Kevin D. Shield 2019; Sagar et al. 2020).

244 Over the past few years, several initiatives have been taken to improve mental health
245 services in Nepal. Recently, the Ministry of Health and Population (MoHP) has developed a
246 range of evidence-based training packages in mental health care for primary and community
247 healthcare workers and has included six new psychotropic medicines in the list of free drugs
248 (Luitel et al. 2020). Four priority mental and neurological disorders including depression,
249 anxiety, psychosis, and epilepsy have also been included in the basic health care package
250 (Ministry of Health and Population 2018). Even though the government of Nepal has now
251 given much emphasis to making mental health services available (i.e., addressing supply-side
252 barriers) in the primary and community health care systems, evidence suggests that making
253 mental health services available does not necessarily improve the help-seeking behaviours of
254 people with mental health care. Effective implementation of mental health services in
255 primary care has been challenging due to limited mental health awareness, low perceived
256 need for mental health services, and high level of stigma in the wider Nepalese community
257 which could negatively affect help-seeking and hence in early detection and management of
258 people with mental health conditions (Devkota et al. 2021; Luitel et al. 2020). Therefore,
259 community-level interventions should be developed for the promotion of mental health and
260 prevention of mental disorders. The community-level intervention should target minimizing

261 demand-side barriers which are considered as major barriers to mental health care (Luitel et
262 al. 2020).

263 The major limitations of the current study are embedded with the GBD method of
264 estimating the burden of mental disorders. Some argue that the current method of estimating
265 mental disorders underestimates the burden of mental illness (Whiteford et al. 2016). The
266 reason is due to the overlap between psychiatric and neurological disorders and excluding
267 suicide and self-harm from the mental disorder category, among others (Whiteford et al.
268 2016). The GBD findings produced through modelling of a number of direct population data
269 and covariates from Nepal could introduce biases in the estimates. However, it is important to
270 note that this study provides the best possible estimates of the burden of mental disorders
271 using the available data in Nepal. Likewise, this is also the first study to report DALYs due to
272 mental disorders in Nepal. Our study findings are important in terms of illustrating the
273 growing burden of mental disorders in Nepal and informing policymaking and programme
274 design in the Nepalese context. A clear understanding of the magnitude and distribution of
275 the prevalence and burden of each mental disorder may help stakeholders tailor the
276 psychosocial and mental health interventions specific to the disease, age, and sex in Nepal.

277 **Conclusions**

278 The current study demonstrated that the proportional contribution of mental disorders to total
279 DALYs is growing in Nepal. The burden of mental disorders largely varies by sex and age.
280 To address the growing burden of mental disorders, there is a need for accelerating age, sex,
281 and disease-specific promotive, preventive, and curative mental health interventions in Nepal.

282

283 **Declarations**

284 **Acknowledgments**

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286 Washington for allowing access to the data.

287 **Authors' contributions**

288 RRD and ARP conceptualized and interpreted the findings of the study. RRD analysed the
289 data and prepared the first draft of the manuscript. ARP, SJ, NL, KM, KA, MD interpreted
290 the findings and reviewed the draft of the manuscript. All authors read and approved the final
291 manuscript.

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293 The authors received no specific grant from any funding agency for this work.

294 **Competing interest**

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

297 **Ethics statement**

298 This study used the GBD data from the Institute for Health Metrics and Evaluation,
299 University of Washington. No ethical approval is required.

300 **Data sharing statement**

301 Data used in the study are publicly available at the official website of the Institute for Health
302 Metrics and Evaluation.

303

304 **Supplementary files**

- 305 Supplementary Table S1. Prevalence of specific mental disorders in 2019
- 306 Supplementary Table S2. DALYs for mental disorders between 1990 and 2019
- 307 Supplementary Table S3. DALYs attributable to specific mental disorders

308

309 References

- 310 **Albert PR** (2015) Why is depression more prevalent in women? *Journal of psychiatry & neuroscience:*
 311 *JPN* **40**(4), 219.
- 312 **Baxter AJ, Scott KM, Ferrari AJ, Norman RE, Vos T and Whiteford HA** (2014) CHALLENGING THE
 313 MYTH OF AN “EPIDEMIC” OF COMMON MENTAL DISORDERS: TRENDS IN THE GLOBAL
 314 PREVALENCE OF ANXIETY AND DEPRESSION BETWEEN 1990 AND 2010. *Depression and*
 315 *Anxiety* **31**(6), 506-516. <https://doi.org/https://doi.org/10.1002/da.22230>.
- 316 **Beydoun HA, Beydoun MA, Kaufman JS, Lo B and Zonderman AB** (2012) Intimate partner violence
 317 against adult women and its association with major depressive disorder, depressive
 318 symptoms and postpartum depression: a systematic review and meta-analysis. *Social science*
 319 *& medicine* **75**(6), 959-975.
- 320 **Charara R, El Bcheraoui C, Khalil I, Moradi-Lakeh M, Afshin A, Kassebaum NJ, Collison M, Krohn KJ,**
 321 **Chew A, Daoud F, Charlson FJ, Colombara D, Degenhardt L, Ehrenkranz R, Erskine HE,**
 322 **Ferrari AJ, Kutz M, Leung J, Santomauro D, Wang H, Whiteford HA, Abajobir AA, Abd-Allah**
 323 **F, Abraha HN, Abu-Raddad LJ, Ahmad Kiadaliri A, Ahmadi A, Ahmed KY, Ahmed MB,**
 324 **Al Lami FH, Alam K, Alasfoor D, Alizadeh-Navaei R, Alkaabi JM, Al-Maskari F, Al-Raddadi R,**
 325 **Altirkawi KA, Anber N, Ansari H, Asayesh H, Asghar RJ, Atey TM, Awoke Ayele T,**
 326 **Bärnighausen T, Bacha U, Barac A, Barker-Collo SL, Baune BT, Bazargan-Hejazi S, Bedi N,**
 327 **Bensenor IM, Berhane A, Beyene AS, Bhutta ZA, Boneya DJ, Borschmann R, Breitborde**
 328 **NJK, Butt ZA, Catalá-López F, Ciobanu LG, Danawi H, Deribew A, Dharmaratne SD, Doyle**
 329 **KE, Endries AY, Faraon Emerito JA, Faro A, Farvid MS, Fekadu W, Fereshtehnejad S-M,**
 330 **Fischer F, Gebrehiwot TT, Giref AZ, Gishu Melkamu D, Goulart AC, Habtewold TD,**
 331 **Hamadeh RR, Hambisa MT, Hamidi S, Haro JM, Hassanvand MS, Horita N, Hsairi M, Huang**
 332 **H, Hussein A, Jakovljevic MB, James SL, Jonas JB, Kasaeian A, Khader YS, Khan EA, Khoja**
 333 **ATA, Khosravi A, Khubchandani J, Kim D, Kim YJ, Kokubo Y, Koyanagi A, Defo BK, Larson HJ,**
 334 **Latif AA, Lee PH, Leshargie CT, Leung R, Lo L-T, Lunevicius R, Magdy Abd El Razek H, Magdy**
 335 **Abd El Razek M, Majdzadeh R, Majeed A, Malekzadeh R, Martinez-Raga J, Masoudi Farid**
 336 **H, Mazidi M, McGrath JJ, Memish ZA, Mendoza W, Mengesha MM, Mengistie MA,**
 337 **Mezgebe HB, Miller TR, Mitchell PB, Mohammadi A, Mohammed S, Obermeyer CM, Ogbo**
 338 **FA, Palomares Castillo E, Papachristou C, Patten SB, Patton GC, Pervaiz A, Phillips MR,**
 339 **Pourmalek F, Qorbani M, Radfar A, Rafay A, Rahimi-Movaghar V, Rai RK, Rawaf DL, Rawaf**
 340 **S, Refaat AH, Rezaei S, Rezai MS, Roshandel G, Safdarian M, Safiabadi M, Safiri S, Sagar R,**
 341 **Sahraian MA, Salamati P, Samy AM, Sartorius B, Saylan MI, Seedat S, Sepanlou SG, Shaikh**
 342 **MA, Shamsizadeh M, Silva DAS, Singh JA, Sobaih BHA, Stein DJ, Suliankatchi Abdulkader R,**
 343 **Sykes BL, Tabarés-Seisdedos R, Tabb KM, Tehrani-Banihashemi A, Temsah M-H, Terkawi**
 344 **AS, Topor-Madry R, Ukwaja KN, Uthman OA, Vollset SE, Wakayo T, Wang Y-P, Werdecker**
 345 **A, Westerman R, Workicho A, Yaghoubi M, Yimam HH, Yonemoto N, Younis MZ, Yu C, Zaki**
 346 **MES, Zein B, Jumaan AO, Vos T, Hay SI, Naghavi M, Murray CJL, Mokdad AH and**
 347 **Collaborators GBDEMRRM** (2018) The burden of mental disorders in the Eastern
 348 Mediterranean region, 1990–2015: findings from the global burden of disease 2015 study.

- 349 *International Journal of Public Health* **63**(1), 25-37. [https://doi.org/10.1007/s00038-017-](https://doi.org/10.1007/s00038-017-1006-1)
 350 [1006-1](https://doi.org/10.1007/s00038-017-1006-1).
- 351 **Clarke K, Saville N, Shrestha B, Costello A, King M, Manandhar D, Osrin D and Prost A** (2014)
 352 Predictors of psychological distress among postnatal mothers in rural Nepal: a cross-
 353 sectional community-based study. *J Affect Disord* **156**, 76-86.
 354 <https://doi.org/10.1016/j.jad.2013.11.018>.
- 355 **Devkota G, Basnet P, Thapa B and Subedi M** (2021) Factors affecting utilization of mental health
 356 services from Primary Health Care (PHC) facilities of western hilly district of Nepal. *PLoS One*
 357 **16**(4), e0250694. <https://doi.org/10.1371/journal.pone.0250694>.
- 358 **Dhungana RR, Aryal N, Adhikary P, Kc RK, Regmi PR, Devkota B, Sharma GN, Wickramage K, van**
 359 **Teijlingen E and Simkhada P** (2019) Psychological morbidity in Nepali cross-border migrants
 360 in India: a community based cross-sectional study. *BMC Public Health* **19**(1), 1534.
 361 <https://doi.org/10.1186/s12889-019-7881-z>.
- 362 **Doran CM and Kinchin I** (2019) A review of the economic impact of mental illness. *Aust Health Rev*
 363 **43**(1), 43-48. <https://doi.org/10.1071/ah16115>.
- 364 **Erskine HE, Ferrari AJ, Polanczyk GV, Moffitt TE, Murray CJ, Vos T, Whiteford HA and Scott JG**
 365 (2014) The global burden of conduct disorder and attention-deficit/hyperactivity disorder in
 366 2010. *J Child Psychol Psychiatry* **55**(4), 328-336. <https://doi.org/10.1111/jcpp.12186>.
- 367 **Institute of Health Metrics and Evaluation** (2019) GBD compare data visualisation. Available at
 368 <https://vizhub.healthdata.org/gbd-compare/> (accessed 06/10 2021).
- 369 **Institute of Health Metrics and Evaluation** (2020) GBD Compare. Available at
 370 <https://vizhub.healthdata.org/gbd-compare/> (accessed 2021).
- 371 **Kane JC, Luitel NP, Jordans MJD, Kohrt BA, Weissbecker I and Tol WA** (2018) Mental health and
 372 psychosocial problems in the aftermath of the Nepal earthquakes: findings from a
 373 representative cluster sample survey. *Epidemiol Psychiatr Sci* **27**(3), 301-310.
 374 <https://doi.org/10.1017/S2045796016001104>.
- 375 **Khattri JB and Nepal MK** (2006) Study of depression among geriatric population in Nepal.
- 376 **Kohrt BA and Hruschka DJ** (2010) Nepali concepts of psychological trauma: the role of idioms of
 377 distress, ethnopsychology and ethnophysiology in alleviating suffering and preventing
 378 stigma. *Culture, Medicine, and Psychiatry* **34**(2), 322-352.
- 379 **Kohrt BA, Speckman RA, Kunz RD, Baldwin JL, Upadhaya N, Acharya NR, Sharma VD, Nepal MK and**
 380 **Worthman CM** (2009) Culture in psychiatric epidemiology: using ethnography and multiple
 381 mediator models to assess the relationship of caste with depression and anxiety in Nepal.
 382 *Ann Hum Biol* **36**(3), 261-280. <https://doi.org/10.1080/03014460902839194>.
- 383 **Luitel NP, Breuer E, Adhikari A, Kohrt BA, Lund C, Komproe IH and Jordans MJD** (2020) Process
 384 evaluation of a district mental healthcare plan in Nepal: a mixed-methods case study.
 385 *BJPsych Open* **6**(4), e77. <https://doi.org/10.1192/bjo.2020.60>.
- 386 **Luitel NP, Jordans MJ, Sapkota RP, Tol WA, Kohrt BA, Thapa SB, Komproe IH and Sharma B** (2013)
 387 Conflict and mental health: a cross-sectional epidemiological study in Nepal. *Soc Psychiatry*
 388 *Psychiatr Epidemiol* **48**(2), 183-193.
- 389 **Lund C, Brooke-Sumner C, Baingana F, Baron EC, Breuer E, Chandra P, Haushofer J, Herrman H,**
 390 **Jordans M, Kieling C, Medina-Mora ME, Morgan E, Omigbodun O, Tol W, Patel V and**
 391 **Saxena S** (2018) Social determinants of mental disorders and the Sustainable Development
 392 Goals: a systematic review of reviews. *The Lancet Psychiatry* **5**(4), 357-369.
 393 [https://doi.org/https://doi.org/10.1016/S2215-0366\(18\)30060-9](https://doi.org/https://doi.org/10.1016/S2215-0366(18)30060-9).
- 394 **Medeiros E, Shrestha PN, Gaire H and Orr DMR** (2020) Life after armed group involvement in Nepal:
 395 A clinical ethnography of psychological well-being of former "child soldiers" over time.
 396 *Transcult Psychiatry* **57**(1), 183-196. <https://doi.org/10.1177/1363461519850338>.
- 397 **Ministry of Health and Population** (2018) Basic health care package Available at
 398 https://drive.google.com/file/d/1NBHrLNamYs9Ned37JweCfig-f_5WNh_w/view (accessed
 399 2021 07/05).

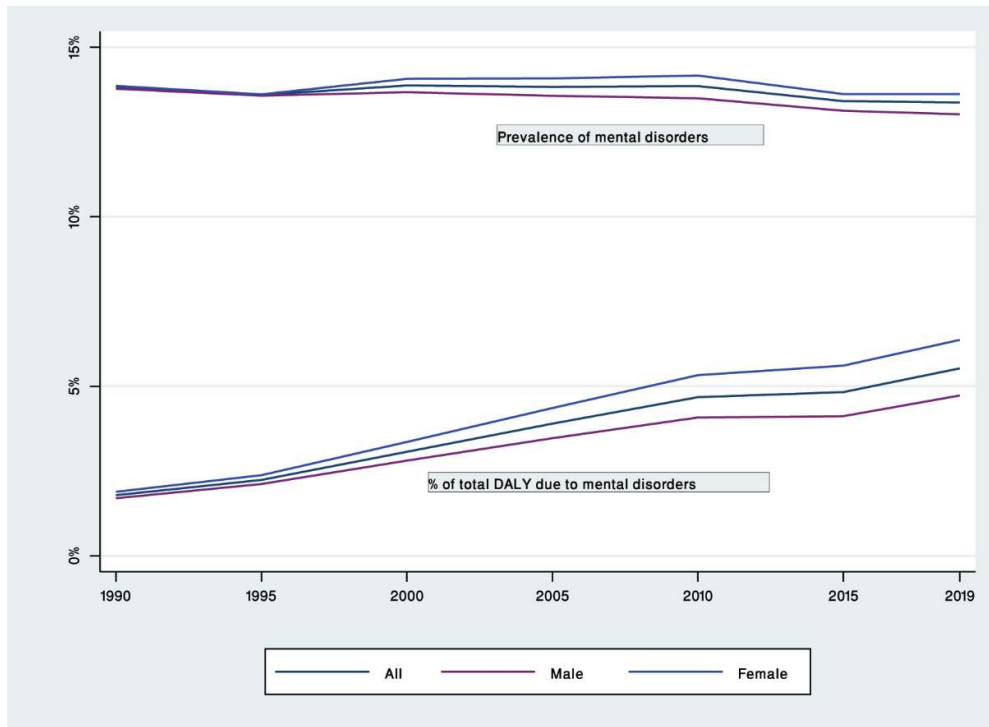
- 400 **Nepal Health Research Council** (2021) National Mental Health Survey, Nepal-2020: Factsheet
 401 (Adults). Available at [http://nhrc.gov.np/wp-content/uploads/2020/09/Factsheet-Adults-](http://nhrc.gov.np/wp-content/uploads/2020/09/Factsheet-Adults-1.pdf)
 402 [1.pdf](http://nhrc.gov.np/wp-content/uploads/2020/09/Factsheet-Adults-1.pdf) (accessed 2021 06/30).
- 403 **Rehm J and Shield KD** (2019) Global Burden of Disease and the Impact of Mental and Addictive
 404 Disorders. *Curr Psychiatry Rep* **21**(2), 10. <https://doi.org/10.1007/s11920-019-0997-0>.
- 405 **Rehm J and Shield KD** (2019) Global Burden of Disease and the Impact of Mental and Addictive
 406 Disorders. *Current Psychiatry Reports* **21**(2), 10. <https://doi.org/10.1007/s11920-019-0997-0>.
- 407 **Risal A, Manandhar K, Linde M, Steiner TJ and Holen A** (2016) Anxiety and depression in Nepal:
 408 prevalence, comorbidity and associations. *BMC Psychiatry* **16**(1), 102.
 409 <https://doi.org/10.1186/s12888-016-0810-0>.
- 410 **Roth GA, Mensah GA, Johnson CO, Addolorato G, Ammirati E, Baddour LM, Barengo NC, Beaton**
 411 **AZ, Benjamin EJ and Benziger CP** (2020) Global burden of cardiovascular diseases and risk
 412 factors, 1990–2019: update from the GBD 2019 study. *Journal of the American College of*
 413 *Cardiology* **76**(25), 2982-3021.
- 414 **Sagar R, Dandona R, Gururaj G, Dhaliwal RS, Singh A, Ferrari A, Dua T, Ganguli A, Varghese M,**
 415 **Chakma JK, Kumar GA, Shaji KS, Ambekar A, Rangaswamy T, Vijayakumar L, Agarwal V,**
 416 **Krishnankutty RP, Bhatia R, Charlson F, Chowdhary N, Erskine HE, Glenn SD, Krish V,**
 417 **Mantilla Herrera AM, Mutreja P, Odell CM, Pal PK, Prakash S, Santomauro D, Shukla DK,**
 418 **Singh R, Singh RKL, Thakur JS, ThekkePurakkal AS, Varghese CM, Reddy KS, Swaminathan**
 419 **S, Whiteford H, Bekedam HJ, Murray CJL, Vos T and Dandona L** (2020) The burden of
 420 mental disorders across the states of India: the Global Burden of Disease Study
 421 1990–2017. *The Lancet Psychiatry* **7**(2), 148-161. [https://doi.org/10.1016/S2215-](https://doi.org/10.1016/S2215-0366(19)30475-4)
 422 [0366\(19\)30475-4](https://doi.org/10.1016/S2215-0366(19)30475-4).
- 423 **Simkhada P, Van Teijlingen E, Gurung M and Wasti SP** (2018) A survey of health problems of
 424 Nepalese female migrants workers in the Middle-East and Malaysia. *BMC international*
 425 *health and human rights* **18**(1), 4.
- 426 **Steel Z, Chey T, Silove D, Marnane C, Bryant RA and van Ommeren M** (2009) Association of Torture
 427 and Other Potentially Traumatic Events With Mental Health Outcomes Among Populations
 428 Exposed to Mass Conflict and Displacement: A Systematic Review and Meta-analysis. *JAMA*
 429 **302**(5), 537-549. <https://doi.org/10.1001/jama.2009.1132>.
- 430 **Upadhaya N, Jordans MJD, Pokhrel R, Gurung D, Adhikari RP, Petersen I and Komproe IH** (2017)
 431 Current situations and future directions for mental health system governance in Nepal:
 432 findings from a qualitative study. *Int J Ment Health Syst* **11**, 37.
 433 <https://doi.org/10.1186/s13033-017-0145-3>.
- 434 **Upadhaya KD and Pol K** (2003) A mental health prevalence survey in two developing towns of
 435 western region. *Journal of Nepal Medical Association* **42**(150), 328-330.
- 436 **Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, Abbasi-Kangevari M, Abbastabar H,**
 437 **Abd-Allah F and Abdelalim A** (2020) Global burden of 369 diseases and injuries in 204
 438 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease
 439 Study 2019. *The Lancet* **396**(10258), 1204-1222.
- 440 **Werling DM and Geschwind DH** (2013) Sex differences in autism spectrum disorders. *Curr Opin*
 441 *Neurol* **26**(2), 146-153. <https://doi.org/10.1097/WCO.0b013e32835ee548>.
- 442 **Whiteford HA, Ferrari AJ and Vos T** (2016) Challenges to estimating the true global burden of
 443 mental disorders. *The Lancet Psychiatry* **3**(5), 402-403. [https://doi.org/10.1016/S2215-](https://doi.org/10.1016/S2215-0366(16)30026-8)
 444 [0366\(16\)30026-8](https://doi.org/10.1016/S2215-0366(16)30026-8).
- 445 **World Health Organization** (2018) The Burden of Mental Disorders in the Region of the Americas.
 446 *World Health Organization*.

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449 **Figures**

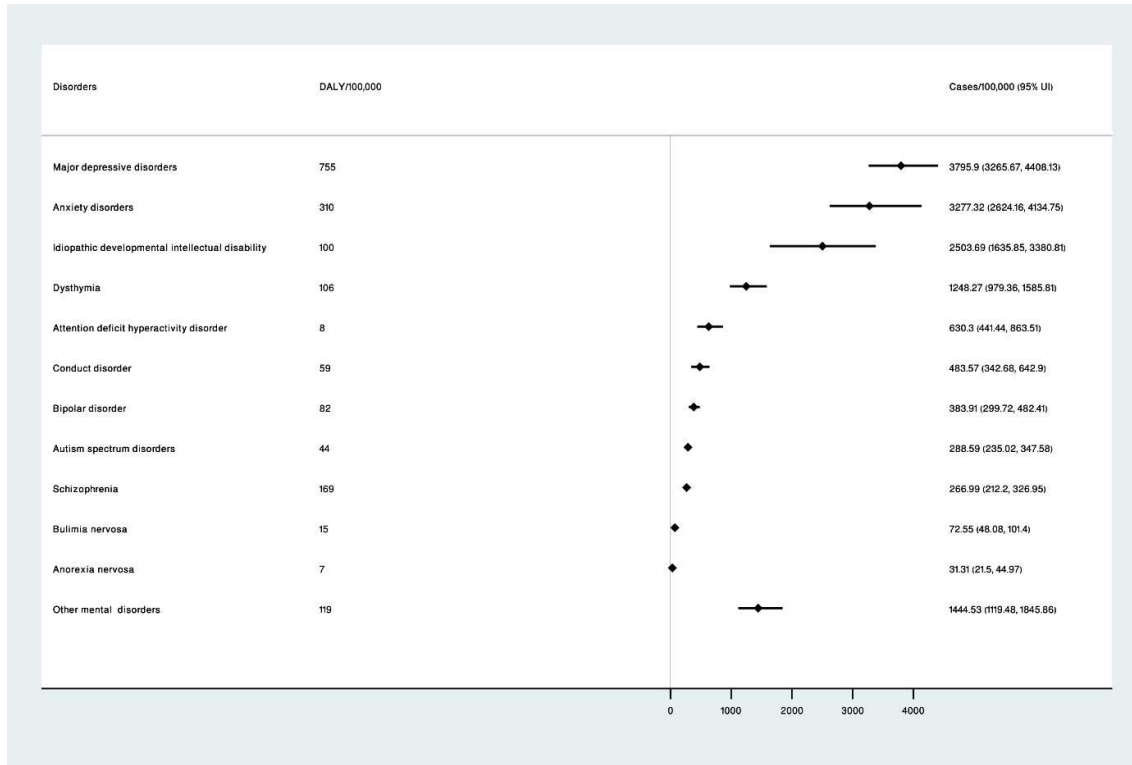
450 Figure 1. Trends in the prevalence of mental disorders and proportional contribution to
451 overall DALYs between 1990 and 2019



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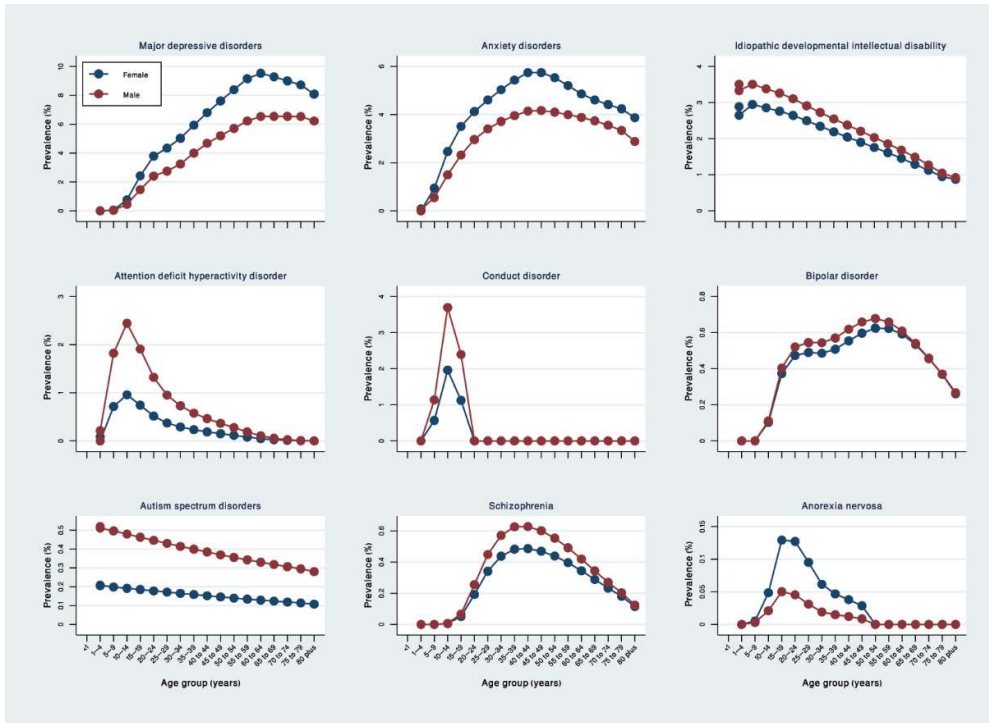
454 Figure 2. Prevalence of and DALYs due to mental disorders in 2019



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457 Figure 3. Prevalence of mental disorders by age and sex in 2019



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