Prevalence and Correlates of Depressive and Generalised Anxiety Symptoms Among Female Adolescents in Nepal: Results of a Cross-sectional National Population-Based Survey in 2022

Karl Peltzer[1,2,3] · Supa Pengpid[2,4,5]

Abstract

The aim of this study was to assess the prevalence and associated factors of major depressive disorder symptoms (MDDs) and generalized anxiety disorder symptoms (GADs) among female adolescents in Nepal. In a national cross-sectional population-based survey of female adolescents ($N = 1379$; 15–19 years) in Nepal, MDDs was assessed with the PHQ-9 and GADs with the GAD-7. Logistic and Poisson regression were used to estimate predictors of MDDs and GADs. The prevalence of MDDs was 7.8% (4.5% with a cut-off of ≥ 10 scores), and the prevalence of GADs was 13.4% (5.6% with a cut-off of ≥ 10 scores). In multivariable models, older age (17–19 years), higher education, greater wealth status, poor self-rated health status, genital sore or ulcer, currently pregnant, pregnancy loss, alcohol use, and early sexual debut were positively associated with MDDs and/or MDD scores. Older age, greater wealth status, living in the Terai region, poor self-rated health status, current alcohol use, pregnancy loss, big problem with getting permission for medical help were positively associated with GADs and/or GAD scores. About one in ten female adolescents report MDDs or GADs, and several associated factors were identified which can be targeted in mental health interventions in this population.

Keywords Adolescents · Females · Anxiety · Depression · Nepal

Introduction

Globally, it is estimated that 14% of adolescents (10–19 years) have a mental disorder (mainly depression, anxiety and behavioural disorders), contributing to 13% of the global burden of disease among adolescents (WHO, 2021). Major depressive disorder (MDD) and generalized anxiety disorder (GAD) form part of common mental disorders, and are frequently comorbid (Goodwin & Stein, 2021). The adolescence stage is a vital period to plan mental health interventions (Marsh et al., 2018). We lack national community-based data on.

MDD symptoms (MDDs) and GAD symptoms (GADs) among adolescents in Nepal. In local studies in Nepal, high rates of MDDs and GADs have been reported, e.g., among school adolescents (15–19 years) in rural Nepal 27% had MDDs (PHQ-9, ≥ 10 scores) (Gautam et al., 2021), among school adolescents in Pokhara Metropolitan, Nepal, 44.2% had depressive symptoms (based on the "Center for Epidemiologic Studies Depression-CESD Scale") (Bhattarai et al., 2020) and among school-going adolescents ($N = 95$), 32.6% reported depressive symptoms, and 37.9% anxiety symptoms (measured with the Depression Anxiety and Stress scale) (Shrestha et al., 2023). In the 2020 National Mental Health Survey in Nepal, adolescents (13–17 years) 5.2% had any mental disorder, 0.6% major depressive

✉ Karl Peltzer
kfpeltzer@gmail.com

1   Department of Psychology, College of Medical and Health Science, Asia University, Wufeng, Taichung 41354, Taiwan

2   Department of Health Education and Behavioral Sciences, Faculty of Public Health, Mahidol University, Bangkok, Thailand

3   Department of Psychology, University of the Free State, Bloemfontein, South Africa

4   Department of Public Health, Sefako Makgatho Health Sciences University, Pretoria, South Africa

5   Department of Healthcare Administration, College of Medical and Health Science, Asia University, Taichung, Taiwan

disorder, and 1.3% phobic anxiety disorder (Nepal Health Research Council, 2020).

In Asia, for example, among secondary school students (13–18 years) in Dhaka city, Bangladesh, the prevalence of MDDs (measured with the PHQ-9, ≥ 10 scores) was 26.5%, and the prevalence of GADs (measured with the GAD-7, ≥ 10 scores) was 18.1% (Islam et al., 2021). Among school adolescents in Zigong, China, the prevalence of MDDs (PHQ-9, ≥ 10 scores) was 23.0% and the prevalence of GADs (GAD-7, ≥ 10 scores) was 13.9% (Chen et al., 2023), and among secondary school students in Kuching, Malaysia, 26.2% reported depressive symptoms (based on the "Children's Depression Inventory") (Ang et al., 2019).

Factors associated with MDDs among adolescents may include socio-demographic factors, health status and health compromising behaviours, and stressors (Khan et al., 2020; Pengpid & Peltzer, 2020). Socio-demographic factors associated with MDDs among adolescents may include older age (Pengpid & Peltzer, 2020), and low family income (Moeini et al., 2019). Health status variables associated with MDD among adolescents may include poor self-rated health status (Okada et al., 2022), anxiety (Islam et al., 2021), and history of sexually transmitted infection (Jackson et al., 2015). Health risk behaviours associated with MDDs among adolescents include poor diet, substance use, such as cigarette smoking (Islam et al., 2021) and tobacco use (Gautam et al., 2021), alcohol use (Balogun et al., 2014), early sexual debut (Adimora & Onwu, 2019), and sexual risk behaviour (Pengpid & Peltzer, 2020). Other health risk behaviours, including sweetened beverages and unhealthy food consumption were associated with psychiatric distress (Pengpid & Peltzer, 2019; Zahedi et al., 2014), and lack of food diversity were associated with poor mental health (Hang et al., 2018; Verger et al., 2021). Stressors associated with MDDs among adolescents may include presence of perceived academic stress (Karki et al., 2022), interpersonal violence, peer bullying (Chen et al., 2023), experience of hunger (Gautam et al., 2021), pregnancy loss (Wheeler & Austin, 2001), and low perceived social support (Bhattarai et al., 2020; Gautam et al., 2021).

Similarly, factors associated with GADs among adolescents may include socio-demographic factors, health status, health compromising behaviours and stressors (Khan et al., 2020; Pengpid & Peltzer, 2020). Socio-demographic factors associated with GADs among adolescents may include younger age (Islam et al., 2021), and low socioeconomic status (Karki et al., 2022). Health status, health risk behaviours and stressors associated with GADs among adolescents may include poor self-rated health status (Balázs et al., 2018), depression (Islam et al., 2021), alcohol use (Balogun et al., 2014), and perceived low social support (Islam et al., 2021).

It is not only important to assess the prevalence and correlates of MDDs and GADs among adolescents, but also to determine the prevalence and correlates of mental health care utilization in order to improve mental health care services for adolescents. In a previous systematic review on mental health care utilization among children and adolescents, Verhoog et al. (2022, p.1) found that the following factors are important:

> Having access to a school-based health center, region of residence, living in an urban area, living in an area with high accessibility of mental health care, living in an area with high socio-economic status, having a mental health parity law, a mental health screening program, extension of health insurance coverage and collaboration between organizations providing care.

Therefore, the aim of the study was to assess the prevalence and correlates of MDDs and GADs and the prevalence and correlates of mental health care utilization among female adolescents in Nepal.

Method

Setting

Nepal with a low-income South Asian economy has a population of over 30 million, concentrated in the southern-most plains of the Tarai region and the central hilly region; overall density is quite low, with an urbanization rate of 21.9%. By religion, most (81.2%) are Hindu, 8.2% Buddhist, and 5.1% Muslim. School life expectancy among females is 13 years, 7.9% and 32.8% of women are married by age of 15 and 18, respectively (The World Fact Book, 2024).

> The status of girl children in Nepal is not much different from the status of girls in other South Asian countries which have similar culture. In Nepal, girl children suffer from two kinds of social injustice: firstly, from the sexual discrimination that is inherent in a male dominated society and, secondly, from the child neglect and exploitation that exist in our society. The female child in Nepal lags behind in every sector of development in every sense. She suffers from low status in the society and receives second priority when compared with boys. The consciously cultivated attitude of the family and community, which is embedded in and legitimized by cultural ideology, is solely responsible for placing her in this situation. (Singh, 1990, p.251).

Sample and Procedure

The sample was restricted to those participants who responded to the mental health module, and adolescents (15–19 years) in the 2022 Nepal Demographic and Health Survey (NDHS). Using a multi-stage sampling design, a nationally representative household-based sample was included; the response rate for the women interview sample was 97% (Ministry of Health and Population, 2023). The multi-stage sampling included:

> In the first stage of sampling, 476 primary sampling units (PSUs) were selected with probability proportional to PSU size and with independent selection in each sampling stratum within the sample allocation. Among the 476 PSUs, 248 were from urban areas and 228 from rural areas. A household listing operation was carried out in all of the selected PSUs before the main survey. The resulting list of households served as the sampling frame for the selection of sample households in the second stage. Thirty households were selected from each cluster, for a total sample size of 14,280 households. Of these households, 7,440 were in urban areas and 6,840 were in rural areas. The survey interviewers interviewed all women age 15–49 years who were permanent residents of the selected households or were visitors who stayed in the households the night before the survey (Ministry of Health and Population, 2023, p.1).

The 2022 NDHS was approved by the "Nepal Health Research Council (NHRC) and the ICF Institutional Review Board," and written informed consent was obtained from the household head to conduct interviews.

Measures

Outcome Variables *Major depressive disorder* symptoms were assessed with 9-items of the Patient health questionnaire (PHQ-9) on common symptoms of depression in the past 2 weeks (Kroenke & Spitzer, 2002). Responses were rated from 0 'not at all' to 3 'always', with a summed cut off score of 8 and more indicating moderate to severe depressive symptoms for Asian adolescents (Panyawong et al., 2020). Cronbach alpha of the PHQ-9 was 0.85 in this sample.

Generalized Anxiety Disorder symptoms were assessed with the seven-item (GAD-7) scale (Spitzer et al., 2006), with scores of 7 or more indicating moderate or severe GAD symptoms in Asian adolescents (Ip et al., 2022). Cronbach alpha of the GAD-7 was 0.84 in this sample.

Sociodemographic factors assessed included age, number of children, education, wealth status, religion, residence status and region (Terai or lowland region, Mountain, and Hill region).

Wealth status is based on scores derived using principal component analysis on the number and kinds of household consumer goods, ranging from a television to a bicycle or car, and housing characteristics such as source of drinking water, toilet facilities, and flooring materials. National wealth quintiles are compiled by assigning the household score to each usual (de jure) household member, ranking each person in the household population by her or his score, and then dividing the distribution into five equal categories, each comprising 20% of the population (Ministry of Health and Population, 2023, p11).

Variables Related with Health Status *Self-rated health status* was classified as 1 = very good or good, 2 = moderate, and 3 = bad or very bad.

Genital sore or ulcer was sourced from the question, "Sometimes women have a genital sore or ulcer. During the last 12 months, have you had a genital sore or ulcer?" (Yes/No).

Genital discharge was sourced from the question, "Sometimes women experience a bad-smelling abnormal genital discharge. During the last 12 months, have you had a bad-smelling abnormal genital discharge?" (Yes/No).

Variables Related with Health Risk Behaviours *Current tobacco use* was assessed from 2 items, "Frequency smokes cigarettes" and "Frequency currently uses other type of tobacco." (Response options were 1 = does not smoke cigarettes/other type of tobacco, 2 = Every day, and 3 = Some days) (since only four responded "every day", responses "every day and some days were combined and coded 1, and non-use of tobacco 0).

Alcohol use was assessed from the item, "We count one drink of alcohol as one can or bottle of beer, one glass of wine, one shot of spirits, or one cup of jaand, chyang. During the last one month, on how many days did you have at least one drink of alcohol?" (response options: never have consumed alcohol, did not even have one drink in the past month, number of days having at least one drink of alcohol) coded 1 = never, 2 = not in the past month and 3 = one or more days in the past months.

Sexual activity was classified as 1 = not had sex, 2 = 13 to 15 years-old, and 3 = 16 to 18 years old sexual debut.

Current pregnancy and avoid pregnancy, "Ever used anything or tried to delay or avoid getting pregnant?" (Yes/no).

Dietary Measures

In a 24-hour food consumption recall 10 food groups were assessed, (1) Grains, (2) Pulses, (3) Nuts and seeds, (4) Dairy, (5) Flesh foods, (6) Eggs, (7) Dark green leafy vegetables, (8) Vitamin A rich fruits and vegetables, (9) Other vegetables and (10) Other fruits (scores $0 = 10$); 5 or more or higher scores represent better food diversity. In addition, sweet beverages (coded 1: 1 or 2 types, $0 = 0$ types) and unhealthy foods (0 types, 1 type or 2 types) (Food and Agriculture Organization, 2021; Ministry of Health and Population, 2023).

Variables Related to Stressors

Pregnancy losses were sourced from the question "How many miscarriages, abortions, and stillbirths have you had?"

Problems in accessing health care were assessed with the question, "Is it a big problem in seeking medical advice or treatment for themselves when they are sick, 1) getting permission to go to the doctor, and 2) getting money for advice or treatment." (Yes/No).

Mental health care utilization included three questions, (1) "During the last 2 weeks, did you take medicine prescribed by a doctor or other healthcare worker for depression or anxiety?" (2) "During the last 2 weeks, did you take medicine prescribed by a doctor or other healthcare worker for any other mental health condition?" and (3) "During the last 2 weeks, did you receive counselling for your mental health condition?" (Yes/No).

Data Analysis

Chi-square tests were used to calculate differences in proportions of MDDs and GADs and mental health care utilization. Binary logistic regression and Poisson regression were.

applied to estimate the associations between sociodemographic factors, health status, health risk behaviours, stressors and prevalence and scores of MDDs and GADs, separately. Variables shown significance ($p < 0.05$) in univariable analyses were subsequently added in the multivariable models. Spearman Rho correlations were calculated for the relationship between MDDs and GADs. Only complete cases were used in the analysis, p significance was set at < 0.05. Collinearity was checked with Variance Inflation Factor (VIF), but none was found. Version 15.0 of the STATA software (Stata Corporation, College Station, TX,

USA) was used for all statistical procedures, taking the complex study design into account.

Results

The female adolescent sample (15–19 years) included 1379 individuals with measurements of the mental health module. Table 1 describes the sample characteristics and the distribution of MDDs and GADs. The prevalence of MDDs was 7.8% (4.5% with a cut-off of ≥ 10 scores), and the prevalence of GADs was 13.4% (5.6% with a cut-off of ≥ 10 scores). The prevalence of MDDs and GADs differed by age, self-rated health status, genital sore or ulcer, genital discharge, pregnancy loss, and sexual activity. Furthermore, the prevalence of GADs differed by current alcohol use, unhealthy food intake, and poor access to health care (see Table 1).

Associations with Major Depressive Disorder Symptoms

Univariable analysis showed that older age, poor self-rated health status, had a genital sore or ulcer and genital discharge in the past 12 months, sexual initiation, and pregnancy loss were positively associated with MDD. In the multivariable model, older age (17–19 years) (AOR: 2.27, 95% CI: 1.28–4.01), poor self-rated health status (AOR: 5.14, 95% CI: 1.72–15.36), genital sore or ulcer (AOR: 18.67, 95% CI: 4.82–72.31), and pregnancy loss (AOR: 3.40, 95% CI: 1.13–10.27) were positively associated with MDDs (see Table 2).

Associations with Major Depressive Disorder Symptom Scores

Univariable analysis showed that older age, higher education, poor self-rated health status, had a genital sore or ulcer and genital discharge in the past 12 months, currently pregnant, alcohol use, sexual initiation, avoiding pregnancy, pregnancy loss and poor health care access were positively associated and poorer wealth status was negatively associated with MDD scores. High comorbidity was observed between GAD scores and MDD scores (correlation 0.69). In the multivariable model, higher education (AIRR: 1.25, 95% CI: 1.05–1.49), poor self-rated health status (AIRR: 2.11, 95% CI: 1.45–3.08), genital sore or ulcer (AIRR: 2.42, 95% CI: 1.50–3.92), currently pregnant (AIRR: 1.91, 95% CI: 1.23–2.97), current alcohol use (AIRR: 1.49, 95% CI: 1.15–1.93), early sexual initiation (AIRR: 1.58, 95% CI: 1.10–2.29) were positively associated with MDD scores,

Table 1 Sample characteristics and distribution of major depressive disorder symptoms (MDDs) and generalized anxiety disorder (GAD) symptoms (GADs) among female adolescents (15–19 years), Demographic and Health Survey, Nepal, 2022

Variable	Sample	MDDs		GADs	
	N (%)	N (%)	p-value[a]	N (%)	p-value[a]
Sociodemographic factors					
All	1379	111 (7.8)		176 (13.4)	
Age (in years)					
15–16	551 (38.1)	23 (4.0)	<0.001	50 (10.8)	0.042
17–19	828 (61.9)	88 (10.1)		126 (15.0)	
Has children	159 (10.2)	19 (9.5)	0.464	29 (15.7)	0.421
Education					
None or basic	563 (39.3)	47 (7.7)	0.950	72 (13.4)	0.988
Secondary or higher	816 (60.7)	64 (7.9)		104 (13.4)	
Wealth status					
Poorest/Poor	719 (40.0)	56 (7.2)	0.378	88 (12.6)	0.592
Middle	246 (19.4)	15 (6.2)		29 (12.3)	
Richest/rich	414 (40.6)	40 (9.2)		59 (14.8)	
Religion					
Hindu	1170 (81.7)	85 (7.2)	0.276	143 (13.2)	0.454
Buddhist	54 (4.6)	7 (11.8)		6 (9.1)	
Muslim/other	155 (13.6)	19 (10.3)		27 (16.2)	
Rural residence	662 (33.5)	58 (8.7)	0.490	85 (13.5)	0.946
Urban residence	717 (66.5)	53 (7.4)		91 (13.4)	
Region					
Terai	646 (56.7)	54 (7.7)	0.406	91 (14.2)	0.432
Mountain	138 (5.6)	7 (4.0)		16 (8.9)	
Hill	505 (37.7)	50 (8.5)		69 (12.8)	
Health status					
Self-rated health status					
Good or very good	489 (46.7)	29 (4.9)	<0.001	47 (9.5)	<0.001
Moderate	616 (50.2)	48 (8.6)		80 (15.1)	
Bad or very bad	38 (3.1)	7 (22.7)		11 (29.6)	
Genital sore/ulcer	12 (0.6)	8 (70.9)	<0.001	6 (54.2)	<0.001
Genital discharge	85 (5.8)	18 (16.9)	0.006	22 (25.2)	0.005
Currently pregnant	50 (3.8)	9 (14.3)	0.073	12 (23.2)	0.109
Health risk behaviours					
Current tobacco use	26 (2.2)	3 (6.9)	0.854	7 (24.7)	0.109
Alcohol use					
Never	968 (81.3)	65 (6.4)	0.086	107 (11.8)	0.019
Not in past month	133 (14.4)	15 (11.2)		21 (15.0)	
Past month	42 (4.3)	4 (11.5)		10 (26.8)	
Sexual activity					
Never	942 (83.7)	52 (6.1)	<0.001	95 (11.3)	<0.001
13–15 years	75 (5.5)	15 (16.8)		19 (22.5)	
16–18 years	126 (10.8)	17 (11.9)		24 (20.7)	
Avoid pregnancy	153 (9.5)	22 (11.6)	0.938	28 (16.8)	0.254
Unhealthy food intake					
0	374 (30.3)	25 (7.9)	0.420	40 (12.3)	0.028
1 type	441 (39.7)	29 (5.8)		49 (10.0)	
2 types	328 (29.9)	30 (8.6)		49 (17.3)	
Sweet beverages	859 (77.4)	60 (6.8)	0.298	103 (13.0)	0.848
Food diversity (≥ 5 scores)	537 (50.5)	41 (8.4)	0.216	56 (11.7)	0.309
Stressors					
Pregnancy loss	29 (1.5)	8 (29.9)	<0.001	12 (45.5)	<0.001
Big problem with getting permission for medical help	238 (14.3)	27 (11.3)	0.064	45 (22.8)	<0.001
Big problem to get money for medical treatment	446 (29.4)	49 (10.1)	0.059	71 (16.9)	0.018

[a]Chi-square statistics

Table 2 Associations with major depressive disorder symptoms, female adolescents, Nepal, 2022

Variable	Crude Odds Ratio (95% CI[a])	p-value	Adjusted Odds Ratio (95% CI[a])	p-value
Sociodemographic factors				
Age (in years)				
15–16	1 (Reference)		1 (Reference)	
17–19	2.69 (1.61 to 4.50)	<0.001	2.27 (1.28 to 4.01)	0.005
Has children	1.28 (0.66 to 2.46)	0.465	---	
Education				
None or basic	1 (Reference)		---	
Secondary or higher	1.02 (0.61 to 1.71)	0.950		
Wealth status				
Richest/rich	1 (Reference)		---	
Middle	0.65 (0.32 to 1.33)	0.237		
Poorest/Poor	0.77 (0.45 to 1.32)	0.343		
Religion				
Hindu	1 (Reference)		---	
Buddhist	1.73 (0.60 to 5.05)	0.311		
Muslim/other	1.49 (0.86 to 2.58)	0.150		
Rural residence	1 (Reference)		---	
Urban residence	0.84 (0.52 to 1.37)	0.490		
Region				
Terai	1 (Reference)		---	
Mountain	0.50 (0.22 to 1.16)	0.106		
Hill	1.11 (0.64 to 1.92)	0.699		
Health status				
Self-rated health status				
Good or very good	1 (Reference)		1 (Reference)	
Moderate	1.81 (1.08 to 3.03)	0.025	1.84 (1.08 to 3.15)	0.025
Bad or very bad	5.67 (2.15 to 14.92)	<0.001	5.14 (1.72 to 15.36)	0.003
Genital sore/ulcer	30.36 (8.27 to 111.44)	<0.001	18.67 (4.82 to 72.31)	<0.001
Genital discharge	2.59 (1.29 to 5.21)	0.008	1.55 (0.64 to 3.76)	0.327
Currently pregnant	2.05 (0.92 to 4.54)	0.079	---	
Health risk behaviours				
Current tobacco use	0.88 (0.21 to 3.63)	0.854	---	
Alcohol use				
Never	1 (Reference)		---	
Not in past month	1.84 (0.88 to 3.81)	0.101		
Past month	1.90 (0.94 to 3.87)	0.075		
Sexual activity				
Never	1 (Reference)		1 (Reference)	
13–15 years	3.10 (1.63 to 5.92)	<0.001	2.02 (0.89 to 4.54)	0.091
16–18 years	2.07 (1.13 to 3.80)	0.019	1.33 (0.64 to 2.76)	0.442
Avoid pregnancy	1.64 (0.91 to 2.93)	0.097	---	
Unhealthy food intake				
0	1 (Reference)		---	
1 type	0.72 (0.35 to 1.48)	0.371		
2 types	1.09 (0.58 to 2.06)	0.779		
Sweet beverages	0.72 (0.39 to 1.34)	0.299	---	
Food diversity score	1.13 (0.94 to 1.36)	0.192	---	
Stressors				
Pregnancy loss	5.28 (2.03 to 13.73)	<0.001	3.40 (1.13 to 10.27)	0.030
Big problem with getting permission for medical help	1.63 (0.98 to 2.73)	0.067	---	
Big problem to get money for medical treatment	1.52 (0.98 to 2.36)	0.061	---	

[a]CI=Confidence Interval

while poorer wealth status (AIRR: 0.80, 95% CI: 0.66–0.97) was negatively associated with MDD scores (see Table 3).

Associations with Generalized Anxiety Disorder Symptoms

Univariable analysis showed that older age, poor self-rated health status, current alcohol use, early sexual debut, had a genital sore or ulcer and genital discharge in the past 12 months, current alcohol use, sexual initiation, pregnancy loss, and big problems in accessing health care were positively associated with GADs. In the multivariable model, poor self-rated health status (AOR: 3.66, 95% CI: 1.60–8.35), current alcohol use (AOR: 2.67, 95% CI: 1.34–5.33), pregnancy loss (AOR: 3.80, 95% CI: 1.48–9.77), and big problem with getting permission for medical help (AOR: 2.09, 95% CI: 1.14–3.89) were positively associated with GADs (see Table 4).

Associations with Generalized Anxiety Disorder Symptom Scores

Univariable analysis showed that older age, poor self-rated health status, had a genital sore or ulcer and genital discharge in the past 12 months, currently pregnant, current alcohol use, sexual initiation, avoiding pregnancy, pregnancy loss and poor health care access were positively associated, and poorer wealth status and living in the Mountain region were negatively associated with GAD scores. In the multivariable model, older age (AIRR: 1.15, 95% CI: 1.01–1.31), poor self-rated health status (AIRR: 1.73, 95% CI: 1.33–2.24), and current alcohol use (AIRR: 1.57, 95% CI: 1.25–1.97), were positively associated with GAD scores, while poorer wealth status (AIRR: 0.81, 95% CI: 0.69–0.95) and living in the Mountain region (AIRR: 0.77, 95% CI: 0.62–0.96) were negatively associated with GAD scores (see Table 5).

Mental Health care Utilization Among Those with MDDs and/or GADs

Among female adolescents, 7.9% had utilized treatment for mental problems in the past 2 weeks. Mental health care utilization did not differ by sociodemographic and health care access characteristics (see Table 6).

Discussion

The study aimed to assess the prevalence and associated factors of MDDs and GADs among female adolescents in a national population-based survey Nepal. The study found a prevalence of MDDs (7.8%; 4.5% with a cut-off of ≥ 10 scores), and a prevalence of GADs (13.4%; 5.6% with a cut-off of ≥ 10 scores), which seem lower than in previous local studies in Nepal. e.g., in rural Nepal (27% had MDD; PHQ-9, ≥ 10 scores) (Gautam et al., 2021), in Pokhara Metropolitan, Nepal (44.2% had depressive symptoms (based on the CESD Scale) (Bhattarai et al., 2020) and among school-going adolescents (N = 95), 32.6% reported depression, and 37.9% anxiety (measured with the Depression Anxiety and Stress scale) (Shrestha et al., 2023), while the rates for diagnosed MDD was 0.6% and diagnosed phobic anxiety disorder was 1.3% (Nepal Health Research Council, 2020). The found rates for MDDs and GADs in this study in Nepal were lower than in Dhaka city, Bangladesh (26.5% MDDs, PHQ-9, ≥ 10 scores, and 18.1% GADs, GAD-7, ≥ 10 scores) (Islam et al., 2021), and in Zigong, a city in Western China (23.0% MDDs, PHQ-9, ≥ 10 scores, and 13.9% GADs, GAD-7, ≥ 10 scores) (Chen et al., 2023).

In the multivariable model, older age (17–19 years), higher education, greater wealth status, poor self-rated health status, genital sore or ulcer, currently pregnant, pregnancy loss, alcohol use, and early sexual debut were positively associated with MDDs and/or MDD scores. Older age, greater wealth status, living in the Terai region, poor self-rated health status, current alcohol use, pregnancy loss, big problem with getting permission for medical help and were positively associated with GADs and/or GAD scores.

Consistent with some research (Pengpid & Peltzer, 2020), this study found that older adolescents had a higher proportion of MDDs or MDD scores and GADs or GAD scores than younger adolescents. Among the reasons for a higher rate of mental distress among older age groups are increased demands and physical and psychosocial changes (Marsh et al., 2018). While some previous studies (Gautman et al., 2021; Karki et al., 2022; Moeini et al., 2019) found that lower socioeconomic status was associated with MDDs and/or GADs, we found that greater wealth status and higher education was associated with MDD scores and/or GAD scores in this study.
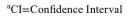
Regarding health status factors, this study found in agreement with some previous studies (Balázs et al., 2018; Jackson et al., 2015) that poor self-rated health, history of genital sore or ulcer and currently pregnant were associated with MDDs and/or GADs. A history of genital sore or ulcer can have psychosocial impacts, such as embarrassment, depression and anxiety (Cunha Ramos et al., 2022). The association between current pregnancy and MDDs may reflect negative effects of adolescent pregnancy. In addition, a high correlation was found between MDD and GAD scores, confirming the high comorbidity of the two conditions in this population (Goodwin & Stein, 2021; Islam et al., 2021).

In terms of health risk behaviours, consistent with previous research (Adimora & Onwu, 2919, Balogun et al., 2014;

Table 3 Associations with depressive symptom scores, female adolescents, Nepal, 2022

Variable	Crude Incidence Risk Ratios (95% CI[a])	p-value	Adjusted Incidence Risk Ratios (95% CI[a])	p-value
Sociodemographic factors				
Age (in years)				
15–16	1 (Reference)		1 (Reference)	0.142
17–19	1.35 (1.12 to 1.62)	0.002	1.15 (0.95 to 1.39)	
Has children	1.18 (0.91 to 1.52)	0.207	---	
Education				
None or basic	1 (Reference)		1 (Reference)	0.012
Secondary or higher	1.23 (1.03 to 1.46)	0.022	1.25 (1.05 to 1.49)	
Wealth status				
Richest/rich	1 (Reference)		1 (Reference)	
Middle	0.78 (0.63 to 0.98)	0.030	0.79 (0.64 to 0.98)	0.031
Poorest/Poor	0.81 (0.68 to 0.98)	0.028	0.80 (0.66 to 0.97)	0.022
Religion				
Hindu	1 (Reference)		---	
Buddhist	1.24 (0.78 to 1.98)	0.364		
Muslim/other	1.15 (0.86 to 1.54)	0.336		
Rural residence	1 (Reference)			
Urban residence	1.03 (0.87 to 1.21)	0.729	---	
Region				
Terai	1 (Reference)		---	
Mountain	0.82 (0.62 to 1.07)	0.142		
Hill	1.02 (0.86 to 1.22)	0.779		
Health status				
Self-rated health status				
Good or very good	1 (Reference)		1 (Reference)	
Moderate	1.33 (1.08 to 1.63)	0.006	1.29 (1.06 to 1.57)	0.010
Bad or very bad	2.58 (1.80 to 3.71)	<0.001	2.11 (1.45 to 3.08)	<0.001
Genital sore/ulcer	3.97 (3.10 to 5.08)	<0.001	2.42 (1.50 to 3.92)	<0.001
Genital discharge	1.70 (1.30 to 2.24)	<0.001	1.11 (0.80 to 1.55)	0.522
Currently pregnant	2.73 (1.87 to 3.98)	<0.001	1.91 (1.23 to 2.97)	0.004
Health risk behaviours				
Current tobacco use	1.22 (0.74 to 2.01)	0.497	---	
Alcohol use				
Never	1 (Reference)		1 (Reference)	
Not in past month	1.51 (1.13 to 2.02)	0.001	1.46 (1.09 to 1.94)	0.010
Past month	1.59 (1.23 to 2.04)	<0.001	1.49 (1.15 to 1.93)	0.003
Sexual activity				
Never	1 (Reference)		1 (Reference)	
13–15 years	1.85 (1.43 to 2.39)	<0.001	1.58 (1.10 to 2.29)	0.014
16–18 years	1.55 (1.18 to 2.03)	<0.001	1.33 (0.90 to 1.98)	0.150
Avoid pregnancy	1.48 (1.16 to 1.89)	<0.001	0.86 (0.62 to 1.19)	0.366
Unhealthy food intake				
0	1 (Reference)		---	
1 type	0.85 (0.64 to 1.14)	0.277		
2 types	1.14 (0.87 to 1.49)	0.341		
Sweet beverages	1.02 (0.78 to 1.34)	0.862	---	
Food diversity score	1.02 (0.95 to 1.10)	0.499	---	
Stressors				
Pregnancy loss	2.03 (1.22 to 3.41)	0.007	1.30 (0.83 to 2.02)	0.247
Big problem with getting permission for medical help	1.32 (1.03 to 1.69)	0.025	1.15 (0.91 to 1.45)	0.256
Big problem to get money for medical treatment	1.22 (1.01 to 1.48)	0.044	1.18 (0.98 to 1.43)	0.083

[a]CI=Confidence Interval

Table 4 Associations with generalized anxiety disorder symptoms, female adolescents, Nepal, 2022

Variable	Crude Odds Ratio (95% CI[a])	p-value	Adjusted Odds Ratio (95% CI[a])	p-value
Sociodemographic factors				
Age (in years)				
15–16	1 (Reference)		1 (Reference)	
17–19	1.45 (1.01 to 2.08)	0.043	1.24 (0.83 to 1.85)	0.287
Has children	1.23 (0.74 to 2.06)	0.422	---	
Education				
None or basic	1 (Reference)		---	
Secondary or higher	1.00 (0.68 to 1.45)	0.988		
Wealth status				
Richest/rich	1 (Reference)		---	
Middle	0.81 (0.48 to 1.37)	0.434		
Poorest/Poor	0.83 (0.54 to 1.29)	0.408		
Religion				
Hindu	1 (Reference)		---	
Buddhist	0.66 (0.24 to 1.82)	0.422		
Muslim/other	1.28 (0.73 to 2.21)	0.386		
Rural residence	1 (Reference)		---	
Urban residence	0.99 (0.68 to 1.44)	0.946		
Region				
Terai	1 (Reference)		---	
Mountain	0.59 (0.29 to 1.20)	0.147		
Hill	0.88 (0.58 to 1.35)	0.572		
Health status				
Self-rated health status				
Good or very good	1 (Reference)		1 (Reference)	
Moderate	1.69 (1.13 to 2.54)	0.011	1.66 (1.10 to 2.51)	0.017
Bad or very bad	4.01 (1.76 to 9.12)	<0.001	3.66 (1.60 to 8.35)	0.002
Genital sore/ulcer	7.80 (2.34 to 25.98)	<0.001	3.65 (0.70 to 18.11)	0.124
Genital discharge	2.32 (1.28 to 4.22)	0.006	1.52 (0.73 to 3.16)	0.260
Currently pregnant	2.02 (0.84 to 4.85)	0.116	---	
Health risk behaviours				
Current tobacco use	2.17 (0.82 to 5.71)	0.117	---	
Alcohol use				
Never	1 (Reference)		1 (Reference)	
Not in past month	1.31 (0.73 to 2.37)	0.361	1.35 (0.74 to 2.46)	0.333
Past month	2.73 (1.44 to 5.19)	0.002	2.67 (1.34 to 5.33)	0.006
Sexual activity				
Never	1 (Reference)		1 (Reference)	
13–15 years	1.29 (1.29 to 4.05)	0.005	1.34 (0.63 to 2.84)	0.448
16–18 years	2.05 (1.23 to 3.43)	0.006	1.76 (0.97 to 3.17)	0.063
Avoid pregnancy	1.34 (0.81 to 2.22)	0.255	---	
Unhealthy food intake				
0	1 (Reference)		---	
1 type	0.80 (0.47 to 1.34)	0.392		
2 types	1.49 (0.92 to 2.43)	0.104		
Sweet beverages	1.05 (0.64 to 1.72)	0.848	---	
Food diversity score	0.98 (0.87 to 1.11)	0.805	---	
Stressors				
Pregnancy loss	5.63 (2.41 to 13.81)	<0.001	3.80 (1.48 to 9.77)	0.006
Big problem with getting permission for medical help	2.20 (1.41 to 3.44)	<0.001	2.09 (1.14 to 3.89)	0.017
Big problem to get money for medical treatment	1.49 (1.07 to 2.09)	0.019	1.13 (0.70 to 1.81)	0.621

[a]CI=Confidence Interval

Table 5 Associations with general anxiety symptom scores, female adolescents, Nepal, 2022

Variable	Crude Incidence Risk Ratios (95% CI[a])	p-value	Adjusted Incidence Risk Ratios (95% CI[a])	p-value
Sociodemographic factors				
Age (in years)				
15–16	1 (Reference)		1 (Reference)	
17–19	1.26 (1.10 to 1.43)	<0.001	1.15 (1.01 to 1.31)	0.030
Has children	1.12 (0.91 to 1.39)	0.286	---	
Education				
None or basic	1 (Reference)		---	
Secondary or higher	1.13 (0.99 to 1.29)	0.064		
Wealth status				
Richest/rich	1 (Reference)		1 (Reference)	
Middle	0.83 (0.69 to 0.99)	0.041	0.80 (0.67 to 0.96)	0.014
Poorest/Poor	0.86 (0.74 to 0.99)	0.034	0.81 (0.69 to 0.95)	0.011
Religion				
Hindu	1 (Reference)		---	
Buddhist	1.04 (0.76 to 1.43)	0.817		
Muslim/other	0.99 (0.80 to 1.23)	0.962		
Rural residence	1 (Reference)		---	
Urban residence	1.13 (0.99 to 1.28)	0.063		
Region				
Terai	1 (Reference)		1 (Reference)	
Mountain	0.76 (0.62 to 0.94)	0.010	0.77 (0.62 to 0.96)	0.020
Hill	1.01 (0.89 to 1.15)	0.844	0.97 (0.85 to 1.11)	0.708
Health status				
Self-rated health status				
Good or very good	1 (Reference)		1 (Reference)	
Moderate	1.32 (1.15 to 1.51)	<0.001	1.32 (1.16 to 1.52)	<0.001
Bad or very bad	1.88 (1.44 to 2.47)	<0.001	1.73 (1.33 to 2.24)	<0.001
Genital sore/ulcer	2.04 (1.42 to 2.94)	<0.001	1.15 (0.72 to 1.83)	0.551
Genital discharge	1.65 (1.27 to 2.14)	<0.001	1.22 (0.88 to 1.69)	0.230
Currently pregnant	1.70 (1.29 to 2.22)	<0.001	1.17 (0.83 to 1.63)	0.367
Health risk behaviours				
Current tobacco use	1.22 (0.88 to 1.71)	0.234	---	
Alcohol use				
Never	1 (Reference)		1 (Reference)	
Not in past month	1.28 (0.99 to 1.64)	0.056	1.25 (0.98 to 1.59)	0.068
Past month	1.64 (1.32 to 2.03)	<0.001	1.57 (1.25 to 1.97)	<0.001
Sexual activity				
Never	1 (Reference)		1 (Reference)	
13–15 years	1.62 (1.34 to 1.95)	<0.001	1.35 (0.98 to 1.86)	0.065
16–18 years	1.45 (1.17 to 1.78)	<0.001	1.31 (0.96 to 1.78)	0.092
Avoid pregnancy	1.40 (1.17 to 1.67)	<0.001	0.89 (0.67 to 1.17)	0.396
Unhealthy food				
0	1 (Reference)		---	
1 type	0.95 (0.76 to 1.18)	0.617		
2 types	1.15 (0.96 to 1.38)	0.135		
Sweet beverages	0.96 (0.78 to 1,17)	0.646	---	
Food diversity score	1.01 (0.96 to 1.07)	0.664	---	
Stressors				
Pregnancy loss	1.76 (1.27 to 2.44)	<0.001	1.32 (0.93 to 1.88)	0.122
Big problem with getting permission for medical help	1.28 (1.07 to 1.50)	0.005	1.19 (0.97 to 1.45)	0.089
Big problem to get money for medical treatment	1.17 (1.02 to 1.34)	0.024	1.10 (0.93 to 1.29)	0.266

[a]CI=Confidence Interval

Table 6 Sociodemographic and health care access characteristics with access to mental problem treatment in the past 2 weeks among female adolescents with depression and/or anxiety (N=203)

Variable	No treatment N (%)	Treatment N (%)	p-value[a]
All	187 (92.1)	16 (7.9)[b]	
Age (in years)			
15–16	53 (93.0)	4 (7.0)	0.772
17–19	134 (91.8)	12 (8.2)	
Education			
None or basic	72 (91.1)	7 (8.9)	0.679
Secondary or higher	115 (92.7)	9 (7.3)	
Wealth status			
Poorest/Poor	93 (93.9)	6 (6.1)	0.152
Middle	32 (97.0)	1 (3.0)	
Richest/rich	62 (87.3)	9 (12.7)	
Religion			
Hindu	151 (92.1)	13 (7.9)	0.909
Buddhist	8 (88.9)	1 (11.1)	
Muslim/other	28 (93.3)	2 (6.7)	
Rural residence	92 (93.9)	6 (6.1)	0.368
Urban residence	95 (90.5)	10 (9.5)	
Region			
Terai	94 (89.5)	11 (10.5)	0.359
Mountain	15 (93.8)	1 (6.3)	
Hill	78 (95.1)	5 (4.9)	
Health insurance coverage			
No	170 (92.9)	13 (7.1)	0.213
Yes	17 (85.0)	3 (15.0)	
Access to health care			
Big problem with getting permission for medical help			
No	139 (90.8)	14 (9.2)	0.241
Yes	48 (96.0)	2 (4.0)	
Big problem to get money for medical treatment			
No	112 (91.1)	11 (8.9)	0.487
Yes	75 (93.8)	5 (6.3)	
Big problem with distance to health facility			
No	104 (92.9)	8 (7.1)	0.665
Yes	83 (91.2)	8 (8.8)	
Big problem not want to go alone to health facility			
No	49 (90.7)	5 (9.3)	0.661
Yes	138 (92.6)	11 (7.4)	

[a]Chi-square statistics; [b]counselling for mental problem 6.9%, medication for depression and/or anxiety 2.0%, and medication for other mental problem 1.5%

Pengpid & Peltzer, 2020), this survey found that alcohol use, and early sexual initiation increased the odds of MDDs and/or GADs. Unlike some previous research (Gautman et al., 2021; Hang et al., 2018; Islam, 2021; Pengpid & Peltzer, 2019; Zahedi et al., 2014; Verger et al., 2021), we did not a significant association between tobacco use, unhealthy food intake, sweetened beverages consumption, lack of food diversity and mental distress measures in this study.

Furthermore, consistent with former research (Bhattarai et al., 2020; Islam et al., 2021; Wheeler & Austin, 2001),

this study found an association between stressors (pregnancy loss and poor health care access) and MDDs and/or GADs. Psychosocial stress in terms of pregnancy loss and difficulty in accessing medical help and engaging in health risk behaviours (alcohol use, early sexual initiation, sexually transmitted infection) may lead to MDDs and/or GADs, which may be integrated into female adolescent mental health promotion.

Moreover, the study found that among those with MDD and/or GAD, 7.9% had accessed mental health care in the past two weeks. In agreement with a previous review (Verhoog et al., 2022), this study showed that female adolescents with higher wealth status, urban residence, had health insurance and no barriers to access health care (no big problem with getting permission for medical help) had a tentatively higher prevalence of mental health care utilization. Nepal has an integrated policy or plan for adolescent mental health and psychosocial interventions for mental health conditions are available, free, and provided at the primary care level (Nepal WHO Special Initiative for Mental Health Situational Assessment, 2021; WHO, 2022). Usually, the first point of adolescent mental health care contact in Nepal is the traditional or religious health sector, and if no improvement, next would the local health service providers or urban hospitals or general health practitioner where there could be poor practitioner awareness of mental health issues delaying access to appropriate mental health services (Karki et al., 2019).

Study limitations include the cross-sectional study design and self-report of the data. Further, certain concepts, such as sleep, victimization, social support, and mental health status of parents, related to mental distress were not assessed in this survey, and may be included in future studies.

Study Implications

The DHS program may expand their mental health module by including questions on sleep, victimization, social support, and mental health status of parents. The finding of higher odds of suffering from mental distress among adolescents experiencing poor health, genital sores or ulcers, alcohol use, early sexual initiation, loss of pregnancy and poor access to health care call for community, school and public health interventions to protect adolescents from adversity, promote socio-emotional learning and well-being, and implement early detection and timely evidence-based mental care service delivery (Chaulagain et al., 2019, WHO, 2021).

Conclusion

Among female adolescents in Nepal the prevalence of MDDs was 7.8% (4.5% with a cut-off of ≥ 10 scores), and the prevalence of GADs was 13.4% (5.6% with a cut-off of ≥ 10 scores). Older age (17–19 years), higher education, greater wealth status, poor self-rated health status, genital sore or ulcer, currently pregnant, pregnancy loss, poor access to health care, alcohol use, and early sexual debut were positively associated with MDDs and/or MDD scores and/or GADs and/or GAD scores. Our results may assist in identifying female adolescents at risk and promote tailored prevention and intervention.

References

Adimora, D. E., & Onwu, A. O. (2019). Socio-demographic factors of early sexual debut and depression among adolescents. *African Health Sciences*, *19*(3), 2634–2644. https://doi.org/10.4314/ahs.v19i3.39.

Ang, A. L., Wahab, S., Abd Rahman, F. N., Hazmi, H., & Yusoff, M., R (2019). Depressive symptoms in adolescents in Kuching, Malaysia: Prevalence and associated factors. *Pediatrics International*, *61*(4), 404–410. https://doi.org/10.1111/ped.13778.

Balázs, J., Miklósi, M., Keresztény, A., Hoven, C. W., Carli, V., Wasserman, C., Hadlaczky, G., Apter, A., Bobes, J., Brunner, R., Corcoran, P., Cosman, D., Haring, C., Kahn, J. P., Postuvan, V., Kaess, M., Varnik, A., Sarchiapone, M., & Wasserman, D. (2018). Comorbidity of physical and anxiety symptoms in adolescent: Functional impairment, self-rated health and subjective well-being. *International Journal of Environmental Research and Public Health*, *15*(8), 1698. https://doi.org/10.3390/ijerph15081698.

Balogun, O., Koyanagi, A., Stickley, A., Gilmour, S., & Shibuya, K. (2014). Alcohol consumption and psychological distress in adolescents: A multi-country study. *The Journal of Adolescent Health*, *54*(2), 228–234. https://doi.org/10.1016/j.jadohealth.2013.07.034.

Bhattarai, D., Shrestha, N., & Paudel, S. (2020). Prevalence and factors associated with depression among higher secondary school adolescents of Pokhara Metropolitan, Nepal: A cross-sectional study. *British Medical Journal Open*, *10*(12), e044042. https://doi.org/10.1136/bmjopen-2020-044042.

Chaulagain, A., Kunwar, A., Watts, S., Guerrero, A. P. S., & Skokauskas, N. (2019). Child and adolescent mental health problems in Nepal: A scoping review. *International Journal of Mental Health Systems*, *13*, 53. https://doi.org/10.1186/s13033-019-0310-y.

Chen, Z., Ren, S., He, R., Liang, Y., Tan, Y., Liu, Y., Wang, F., Shao, X., Chen, S., Liao, Y., He, Y., Li, J. G., Chen, X., & Tang, J. (2023). Prevalence and associated factors of depressive and anxiety symptoms among Chinese secondary school students. *Bmc Psychiatry*, *23*(1), 580. https://doi.org/10.1186/s12888-023-05068-1.

Cunha Ramos, M., Nicola, M. R. C., Bezerra, N. T. C., Sardinha, J. C. G., Sampaio de Souza Morais, J., & Schettini, A. P. (2022). Genital ulcers caused by sexually transmitted agents. *Anais Brasileiros De Dermatologia*, *97*(5), 551–565. https://doi.org/10.1016/j.abd.2022.01.004.

Food and Agriculture Organization (FAO). (2021). Minimum dietary diversity for women. *Rome*. https://doi.org/10.4060/cb3434en.

Gautam, P., Dahal, M., Ghimire, H., Chapagain, S., Baral, K., Acharya, R., Khanal, S., & Neupane, A. (2021). Depression among adolescents of rural Nepal: A community-based study. *Depression Research and Treatment*, *2021*, 7495141. https://doi.org/10.1155/2021/7495141.

Goodwin, G. M., & Stein, D. J. (2021). Generalised anxiety disorder and depression: Contemporary treatment approaches. *Advances in Therapy*, *38*(Suppl 2), 45–51. https://doi.org/10.1007/s12325-021-01859-8.

Ip, H., Suen, Y. N., Hui, C. L. M., Wong, S. M. Y., Chan, S. K. W., Lee, E. H. M., Wong, M. T. H., & Chen, E. Y. H. (2022). Assessing anxiety among adolescents in Hong Kong: Psychometric properties and validity of the Generalised anxiety Disorder-7 (GAD-7) in an epidemiological community sample. *Bmc Psychiatry*, *22*(1), 703. https://doi.org/10.1186/s12888-022-04329-9.

Islam, M. S., Rahman, M. E., Moonajilin, M. S., & van Os, J. (2021). Prevalence of depression, anxiety and associated factors among school going adolescents in Bangladesh: Findings from a cross-sectional study. *PloS One*, *16*(4), e0247898. https://doi.org/10.1371/journal.pone.0247898.

Jackson, J. M., Seth, P., DiClemente, R. J., & Lin, A. (2015). Association of depressive symptoms and substance use with risky sexual behavior and sexually transmitted infections among African American female adolescents seeking sexual health care. *American Journal of Public Health*, *105*(10), 2137–2142. https://doi.org/10.2105/AJPH.2014.302493.

Karki, U., Dhonju, G., Rai, Y., & Kunwar, A. (2019). Child and adolescent mental health in Nepal. URL: https://www.researchgate.net/publication/335789345_Child_and_Adolescent_Mental_Health_in_Nepal (accessed 4 Oct 2023).

Karki, A., Thapa, B., Pradhan, P. M. S., & Basel, P. (2022). Depression, anxiety and stress among high school students: A cross-sectional study in an urban municipality of Kathmandu, Nepal. *PLOS Global Public Health*, *2*(5), e0000516. https://doi.org/10.1371/journal.pgph.0000516.

Khan, M. M. A., Rahman, M. M., Islam, M. R., Karim, M., Hasan, M., & Jesmin, S. S. (2020). Suicidal behavior among school-going adolescents in Bangladesh: Findings of the global school-based student health survey. *Social Psychiatry and Psychiatric Epidemiology*, *55*(11), 1491–1502. https://doi.org/10.1007/s00127-020-01867-z.

Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: A new depression and diagnostic severity measure. *Psychiatric Annals*, *32*, 509–521. https://doi.org/10.3928/0048-5713-20020901-06.

Marsh, I. C., Chan, S. W. Y., & MacBeth, A. (2018). Self-compassion and psychological distress in adolescents—A meta-analysis. *Mindfulness*, *9*(4), 1011–1027. https://doi.org/10.1007/s12671-017-0850-7.

Ministry of Health and Population [Nepal], New ERA & ICF. (2023). *Nepal Demographic and Health Survey 2022*. Ministry of Health and Population [Nepal].

Moeini, B., Bashirian, S., Soltanian, A. R., Ghaleiha, A., & Taheri, M. (2019). Prevalence of depression and its associated sociodemographic factors among Iranian female adolescents in secondary schools. *BMC Psychology*, *7*(1), 25. https://doi.org/10.1186/s40359-019-0298-8.

Nepal Health Research Council (2020). National Mental Health Survey, Nepal-2020 Factsheet (Adolescents). URL: https://nhrc.gov.np/wp-content/uploads/2020/09/Factsheet-Adolescents.pdf (accessed 4 Oct 2023).

Nepal WHO Special Initiative for Mental Health Situational Assessment (2021). URL: https://cdn.who.int/media/docs/default-source/mental-health/special-initiative/who-special-initiative-country-report---nepal---2022.pdf?sfvrsn=714028db_3&download=true (accessed 4 Oct 2023).

Okada, M., Nakadoi, Y., & Fujikawa, A. (2022). Relationship between self-rated health and depression risk among children in Japan. *Humanities and Social Sciences Communication*, *9*, 136. https://doi.org/10.1057/s41599-022-01148-x.

Panyawong, W., Pavasuthipaisit, C., & Santitadakul, R. (2020). Validation of the Thai Version of the Patient Health Questionnaire for adolescents (PHQ-A) in adolescent psychiatric patients: Validation of the Thai version of the PHQ-A. *International Journal of Child Development and Mental Health*, *8*(1), 30–40. https://he01.tci-thaijo.org/index.php/cdmh/article/view/222261.

Pengpid, S., & Peltzer, K. (2019). High carbonated soft drink intake is associated with health risk behavior and poor mental health among school-going adolescents in six southeast Asian countries. *International Journal of Environmental Research and Public Health*, *17*(1), 132. https://doi.org/10.3390/ijerph17010132.

Pengpid, S., & Peltzer, K. (2020). High psychological distress among school-going adolescents in Afghanistan: Prevalence and correlates from a national survey. *Vulnerable Children and Youth Studies*, *15*(1), 40–47. https://doi org/101080/17450128 2019 1679937.

Shrestha, S., Phuyal, R., & Chalise, P. (2023). Depression, anxiety and stress among School-going adolescents of a secondary school: A descriptive cross-sectional study. *Journal of the Nepal Medical Association*, *61*(259), 249–251. https://doi.org/10.31729/jnma.8067.

Singh, I. (1990). Sociocultural factors affecting girl children in Nepal. *Asia-Pacific Journal of Public Health*, *4*(4), 251–254. https://doi.org/10.1177/101053959000400412.

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092.

The World Factbook (2024). Nepal. URL: https://www.cia.gov/the-world-factbook/countries/nepal/ (accessed 30 Jan 2024).

Verger, E. O., Le Port, A., Borderon, A., Bourbon, G., Moursi, M., Savy, M., Mariotti, F., & Martin-Prevel, Y. (2021). Dietary diversity indicators and their associations with dietary adequacy and health outcomes: A systematic scoping review. *Advances in Nutrition (Bethesda Md)*, *12*(5), 1659–1672. https://doi.org/10.1093/advances/nmab009.

Verhoog, S., Eijgermans, D. G. M., Fang, Y., Bramer, W. M., Raat, H., & Jansen, W. (2022). Contextual determinants associated with children's and adolescents' mental health care utilization: a systematic review. *European Child & Adolescent Psychiatry*, 1–15. https://doi.org/10.1007/s00787-022-02077-5. Advance online publication.

Wheeler, S. R., & Austin, J. K. (2001). The impact of early pregnancy loss on adolescents. *MCN the American Journal of Maternal Child Nursing*, *26*(3), 154–159. https://doi.org/10.1097/00005721-200105000-00014.

World Health Organization (WHO) (2022). Mental Health Atlas 2020 Country Profile: Nepal. URL: https://www.who.int/publications/m/item/mental-health-atlas-npl-2020-country-profile (accessed 2 Oct 2023).

World Health Organization (WHO) (2021). Mental health of adolescents, key facts. URL: https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health (accessed 4 Oct 2023).

Zahedi, H., Kelishadi, R., Heshmat, R., Motlagh, M. E., Ranjbar, S. H., Ardalan, G., Payab, M., Chinian, M., Asayesh, H., Larijani, B., & Qorbani, M. (2014). Association between junk food consumption and mental health in a national sample of Iranian children and adolescents: The CASPIAN-IV study. *Nutrition (Burbank Los Angeles County Calif)*, *30*(11–12), 1391–1397. https://doi.org/10.1016/j.nut.2014.04.014.