

Original Research Article

PREVALENCE OF DEPRESSION, ANXIETY, AND STRESS AMONG RURAL ADOLESCENTS AGED 14-19 YEARS: A COMMUNITY-BASED CROSS-SECTIONAL STUDY

Bhoomika D N¹, Venkatesh Gonibeedu², Raghavendra B K³

¹Senior Resident, Department of Community Medicine, Bangalore Medical College and Research Institute, Bangalore, India.

²Professor and head, Department of Community Medicine, Hassan Institute of Medical Science, Hassan, India.

³Assistant Professor, Department of Radiation Oncology, Hassan Institute of Medical Sciences, India.

Received : 15/06/2026
Received in revised form : 23/07/2026
Accepted : 06/08/2026

Corresponding Author:

Dr. Bhoomika DN,
Senior Resident, dept of community
medicine, Bangalore Medical college
and research institute, Bangalore, India.
Email: bhoomi1802@gmail.com

DOI: 10.70034/ijmedph.2026.3.578

Source of Support: Nil,

Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 3696-3704

ABSTRACT

Background: Adolescence is a period of substantial physical, psychological and social development during which depression, anxiety and stress may emerge. Rural adolescents may be particularly vulnerable because of socioeconomic difficulties, limited mental-health awareness, stigma and restricted access to professional services. The objective is to estimate the prevalence and severity of depression, anxiety and stress symptoms and determine their associated factors among rural adolescents aged 14-19 years.

Materials and Methods: A community-based cross-sectional study was conducted among 480 adolescents aged 14-19 years residing in the rural field-practice area of Hassan Institute of Medical Sciences, Hassan, Karnataka, from August 2023 to August 2024. Participants were selected using a multistage sampling technique. Sociodemographic, family, educational and psychosocial information was collected through household interviews using a pretested questionnaire. Depression, anxiety and stress symptoms were assessed using the 21-item Depression Anxiety Stress Scale. Data were analysed using descriptive statistics, chi-square or Fisher's exact tests and multiple binary logistic regression. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated, and $p < 0.05$ was considered statistically significant.

Results: Depressive symptoms were present in 160 (33.3%; 95% CI: 29.3%-37.7%) participants, anxiety symptoms in 215 (44.8%; 95% CI: 40.4%-49.3%) and stress symptoms in 120 (25.0%; 95% CI: 21.3%-29.1%). Moderate anxiety was the most frequent abnormal anxiety category (19.4%), while mild stress was the most common abnormal stress category (11.9%). Severe or extremely severe anxiety and stress were identified in 16.3% and 6.5% of participants, respectively. A stressful event during the previous year independently increased the odds of depression (AOR=3.78; 95% CI: 1.06-13.42) and anxiety (AOR=7.20; 95% CI: 1.39-37.60). Good relationships with friends were associated with lower odds of anxiety (AOR=0.09; 95% CI: 0.009-0.91) and stress (AOR=0.08; 95% CI: 0.008-0.91). Selected housing characteristics were inversely associated with depression, anxiety and stress.

Conclusion: Depression, anxiety and stress symptoms were common among rural adolescents, with anxiety representing the greatest burden. Stressful life events increased vulnerability, whereas supportive peer relationships appeared protective. Early community-based screening, counselling, peer and family support, and appropriate psychiatric referral should be strengthened in rural adolescent-health programmes.

Keywords: Adolescent mental health; DASS-21; Rural population.

INTRODUCTION

Adolescence, defined by the World Health Organization as the period between 10 and 19 years of age, is characterized by rapid physical growth, cognitive development, emotional maturation and changing social relationships. During this period, adolescents encounter academic expectations, peer pressure, evolving identity, family conflicts and concerns regarding their future. Although these experiences contribute to normal development, exposure to persistent or overwhelming stressors may increase vulnerability to emotional and behavioural problems. Globally, approximately one in seven adolescents experiences a mental health condition, with anxiety and depressive disorders among the most common causes of illness and disability in this age group.^[1]

Depression among adolescents may manifest as persistent sadness, loss of interest, hopelessness, low self-esteem, sleep or appetite disturbances, impaired concentration and declining academic performance. Anxiety is commonly characterized by excessive fear, worry, autonomic symptoms and avoidance behaviour, whereas stress may present as irritability, difficulty relaxing, impatience and heightened emotional reactivity. These conditions frequently coexist and may adversely affect educational achievement, interpersonal relationships, substance-use behaviour and overall quality of life. Severe or unrecognized psychological distress can also increase the risk of self-harm and suicidal behaviour. The burden of mental disorders in India is substantial, with depressive and anxiety disorders contributing considerably to years lived with disability.^[2]

Indian adolescents are exposed to diverse social determinants of mental health, including socioeconomic disadvantage, academic pressure, gender discrimination, family disharmony, adverse life events, bullying, substance use and inadequate social support. Rural adolescents may experience additional challenges such as limited mental-health literacy, stigma, restricted access to trained professionals, financial constraints and inadequate adolescent-friendly services. Shaikh et al. reported a considerable prevalence of depression, anxiety and stress among rural adolescent students and identified disturbed family environments, harsh parenting, adverse experiences and negative perceptions of academic performance as important correlates.^[3] Similarly, Rajanna and Sathyanath observed substantial levels of depression, anxiety and stress among adolescents in South India, demonstrating associations with several individual, educational and family-related characteristics.^[4]

Adolescent psychological problems often remain unidentified because symptoms may be considered temporary behavioural changes or may not be openly communicated to parents, teachers or healthcare providers. Community-based screening is therefore important because school-based studies may exclude

adolescents who have discontinued education, are married, are employed or remain absent from school. Standardized instruments such as the 21-item Depression Anxiety Stress Scale (DASS-21) can provide a practical assessment of symptom severity, although it is a screening instrument and does not independently establish a psychiatric diagnosis. Recent evidence from rural India has further highlighted the need for early identification, counselling and accessible referral services for affected adolescents.^[5]

Aim: To assess the prevalence of depression, anxiety and stress and their associated factors among rural adolescents aged 14-19 years.

Objectives

1. To estimate the prevalence and severity of symptoms of depression among rural adolescents aged 14-19 years.
2. To estimate the prevalence and severity of symptoms of anxiety and stress among the study participants.
3. To determine the association of depression, anxiety and stress with selected sociodemographic, family, educational and psychosocial factors.

MATERIALS AND METHODS

Source of Data: Primary data were obtained from adolescents aged 14-19 years residing in the rural field-practice area of Hassan Institute of Medical Sciences, Hassan, Karnataka. Information was collected directly from eligible adolescents through house-to-house visits using a pretested, semi-structured questionnaire and the DASS-21.

Study Design: A community-based descriptive cross-sectional study was conducted.

Study Location: The study was conducted in Hagare, the rural field-practice area of Hassan Institute of Medical Sciences in Hassan district, Karnataka. The area comprised eight subcentres: Hagare, Hanike, Mallapura, Hulugundi, C. Hosahalli, Andale, Sankenahalli and Ibbedu. Each subcentre covered approximately 6-11 villages. The total population of the field-practice area was 31,963, including an estimated 1,121 adolescents aged 14-19 years.

Study Duration: The study was conducted over one year, from August 2023 to August 2024.

Study Population: The study population consisted of adolescents aged 14-19 years who had been residing within the rural field-practice area of Hagare for more than one year.

Sample Size: The sample size was calculated using the formula:

$$n = \frac{Z^2 pq}{d^2}$$

where Z=1.96 at the 95% confidence level, p=5% based on the prevalence reported in a previous study, q=95%, and d=2% absolute precision.

$$n = \frac{(1.96)^2 \times 5 \times 95}{(2)^2} \approx 456$$

The calculated sample size of 456 was rounded to 480 adolescents to permit uniform allocation across the eight subcentres and six age groups.

Sampling Technique: A multistage sampling technique was used. In the first stage, the sample of 480 was distributed equally among the eight subcentres, with 60 adolescents selected from each subcentre. Within every subcentre, 10 adolescents were selected from each single-year age group from 14 to 19 years. Villages within each subcentre were selected by simple random sampling.

In the second stage, house-to-house visits were conducted in the selected villages to identify eligible adolescents. Recruitment continued until the required number for each age group was obtained. If the required sample was not available in the selected village, the nearest village within the same subcentre was included. When an eligible adolescent was absent during the initial visit, one repeat visit was made based on information obtained from family members or neighbours.

Inclusion Criteria

- Adolescents aged 14-19 years residing in the selected rural field-practice area.
- Adolescents who had lived in the study area for more than one year.
- Adolescents who were willing to participate and provided informed consent.
- Adolescents younger than 18 years who provided assent and whose parent or legal guardian provided written informed consent.
- Married or pregnant adolescents who otherwise fulfilled the eligibility criteria.

Exclusion Criteria

- Adolescents with a known severe mental or cognitive condition that prevented comprehension of or response to the questionnaire.
- Adolescents who were terminally ill or seriously ill at the time of data collection.
- Adolescents with chronic illnesses likely to substantially influence their psychological status.
- Adolescents or, for participants younger than 18 years, parents or guardians who declined participation.
- Adolescents who did not respond despite a repeat visit.
- Adolescents residing temporarily in the study area.

Procedure and Methodology: Approval was obtained from the Institutional Ethics Committee before commencing the study. Administrative permission was obtained from the relevant health authorities. Eligible adolescents and their parents or guardians were informed about the purpose, procedure, voluntary nature, possible benefits and confidentiality of the study. Written informed consent was obtained directly from participants aged

18-19 years. For participants younger than 18 years, written parental or guardian consent and adolescent assent were obtained.

Interviews were conducted individually at the participants' residences in a setting that ensured privacy. Sociodemographic and psychosocial information was recorded, including age, sex, educational status, monthly family income, birth order, family type, parental marital status, type and ownership of house, psychiatric illness in the family, stressful life events, perceived home atmosphere and relationships with friends.

Symptoms of depression, anxiety and stress were assessed using the pretested DASS-21. The questionnaire contained 21 items: seven each for depression, anxiety and stress. Each item was rated from 0 to 3 according to the frequency or intensity of symptoms experienced. Interviews were conducted in Kannada, and responses were recorded on the study questionnaire.

The scores for the seven items within each subscale were added and multiplied by two to obtain scores comparable with the original 42-item scale. Depression scores were classified as normal (0-9), mild (10-13), moderate (14-20), severe (21-27) or extremely severe (≥ 28). Anxiety scores were classified as normal (0-7), mild (8-9), moderate (10-14), severe (15-19) or extremely severe (≥ 20). Stress scores were categorized as normal (0-14), mild (15-18), moderate (19-25), severe (26-33) or extremely severe (≥ 34).

The DASS-21 results were interpreted as levels of self-reported psychological symptoms and not as confirmed psychiatric diagnoses. Participants with extremely severe scores, suicidal ideas or other concerning symptoms were counselled and referred to the Department of Psychiatry for detailed clinical evaluation and appropriate management.

Sample Processing: As this was a questionnaire-based study, no biological samples were collected or processed. Each completed questionnaire was checked on the same day for completeness, consistency and legibility. Questionnaires were assigned unique identification numbers, and personally identifying information was kept separately from the analytical dataset. Responses were coded according to a predefined coding scheme. DASS-21 subscale scores were calculated, multiplied by two and categorized using the recommended severity cut-offs. The coded data were entered into Microsoft Excel, checked for duplicate entries and range errors, cleaned and then imported into IBM SPSS version 25.0 for analysis.

Statistical Methods: Categorical variables were summarized using frequencies and percentages. The prevalence of depression, anxiety and stress was reported with 95% confidence intervals. DASS-21 severity categories were presented using frequency distributions, bar diagrams and pie charts.

Associations between depression, anxiety and stress and categorical explanatory variables were assessed using the Pearson chi-square test. Fisher's exact test

was used when expected cell frequencies were less than five. Crude odds ratios with 95% confidence intervals were calculated to estimate the strength of associations. Variables with a univariate p value of less than 0.10, along with clinically relevant variables, were entered into multiple binary logistic-regression models to identify independent factors associated with depression, anxiety and stress. Adjusted odds ratios with 95% confidence intervals were reported. All tests were two-tailed, and a p value of less than 0.05 was considered statistically significant.

Data Collection: Data were collected through face-to-face interviews during house-to-house visits using

a pretested, semi-structured data-collection instrument. The instrument consisted of two sections: the first recorded sociodemographic, family, educational and psychosocial characteristics, and the second contained the DASS-21. The questionnaire was pretested among adolescents from a comparable population to assess clarity, comprehensibility and feasibility. Necessary corrections were made before final data collection. Participants were interviewed individually in Kannada, with adequate privacy to encourage honest responses. Confidentiality was maintained throughout data collection, entry, analysis and reporting.

RESULTS

Table 1: Overall prevalence of depression, anxiety and stress among rural adolescents (N=480)

.	Symptoms present, n (%)	95% CI	Test of significance*	P value
Depression	160 (33.3%)	29.3%-37.7%	One-sample $z=-7.30$	<0.001**
Anxiety	215 (44.8%)	40.4%-49.3%	One-sample $z=-2.28$	0.022**
Stress	120 (25.0%)	21.3%-29.1%	One-sample $z=-10.95$	<0.001**

*One-sample proportion z-test comparing the observed prevalence with a reference proportion of 50%.

**Statistically significant at $p<0.05$. Confidence intervals were calculated using the Wilson method. DASS-21 identifies symptom burden and does not independently confirm a psychiatric diagnosis.

[Table 1] shows the overall prevalence of depression, anxiety and stress symptoms among 480 rural adolescents assessed using the DASS-21. Anxiety was the most frequently reported outcome, affecting 215 (44.8%; 95% CI: 40.4%-49.3%) participants, followed by depression in 160 (33.3%; 95% CI: 29.3%-37.7%) and stress in 120 (25.0%; 95% CI: 21.3%-29.1%). Compared with the reference prevalence of 50%, the observed prevalence was

significantly lower for depression ($z=-7.30$, $p<0.001$), anxiety ($z=-2.28$, $p=0.022$) and stress ($z=-10.95$, $p<0.001$). Nevertheless, the findings indicate a considerable burden of psychological symptoms, particularly anxiety, among rural adolescents. These DASS-21 findings represent self-reported symptom burden and should not be interpreted as confirmed psychiatric diagnoses.

Table 2: Prevalence and severity of anxiety symptoms among study participants (N=480)

Severity of anxiety	n (%)	95% CI	Test of significance*	P value
Normal	265 (55.2%)	50.7%-59.6%	$\chi^2=394.79$, $df=4$	<0.001**
Mild	44 (9.2%)	6.9%-12.1%		
Moderate	93 (19.4%)	16.1%-23.2%		
Severe	31 (6.5%)	4.6%-9.0%		
Extremely severe	47 (9.8%)	7.4%-12.8%		
Any anxiety symptoms	215 (44.8%)	40.4%-49.3%	One-sample $z=-2.28^\dagger$	0.022
Total	480 (100.0%)			

*Chi-square goodness-of-fit test comparing the observed distribution across the five DASS-21 severity categories with an equal distribution.

† One-sample proportion z-test comparing overall anxiety prevalence with 50%.

**Statistically significant at $p<0.05$.

[Table 2] presents the prevalence and severity of anxiety symptoms. Of the 480 participants, 265 (55.2%; 95% CI: 50.7%-59.6%) were in the normal category, while 215 (44.8%; 95% CI: 40.4%-49.3%) had some degree of anxiety. Moderate anxiety was the most common abnormal category, affecting 93 (19.4%; 95% CI: 16.1%-23.2%) adolescents. Mild anxiety was observed in 44 (9.2%; 95% CI: 6.9%-12.1%), severe anxiety in 31 (6.5%; 95% CI: 4.6%-

9.0%) and extremely severe anxiety in 47 (9.8%; 95% CI: 7.4%-12.8%). Overall, 78 (16.3%) adolescents had severe or extremely severe anxiety symptoms. The distribution across severity categories differed significantly from an equal distribution ($\chi^2=394.79$, $df=4$, $p<0.001$). The overall prevalence of anxiety was also significantly different from the reference prevalence of 50% ($z=-2.28$, $p=0.022$).

Table 3: Prevalence and severity of stress symptoms among study participants (N=480)

Severity of stress	n (%)	95% CI	Test of significance*	P value
Normal	360 (75.0%)	70.9%-78.7%	$\chi^2=920.40$, $df=4$	<0.001**
Mild	57 (11.9%)	9.3%-15.1%		

Moderate	32 (6.7%)	4.8%-9.3%		
Severe	22 (4.6%)	3.1%-6.8%		
Extremely severe	9 (1.9%)	1.0%-3.5%		
Any stress symptoms	120 (25.0%)	21.3%-29.1%	One-sample $z=-10.95^\dagger$	<0.001
Total	480 (100.0%)			

*Chi-square goodness-of-fit test comparing the observed distribution across the five DASS-21 severity categories with an equal distribution.

† One-sample proportion z-test comparing overall stress prevalence with 50%.

**Statistically significant at $p<0.05$.

[Table 3] describes the distribution of stress symptoms. The majority, 360 (75.0%; 95% CI: 70.9%-78.7%), had normal stress scores, whereas 120 (25.0%; 95% CI: 21.3%-29.1%) experienced some degree of stress. Mild stress was the most frequent abnormal category and was found in 57 (11.9%; 95% CI: 9.3%-15.1%) participants. Moderate stress was present in 32 (6.7%; 95% CI:

4.8%-9.3%), severe stress in 22 (4.6%; 95% CI: 3.1%-6.8%) and extremely severe stress in 9 (1.9%; 95% CI: 1.0%-3.5%). Thus, 31 (6.5%) adolescents experienced severe or extremely severe stress. The observed severity distribution was statistically significant ($\chi^2=920.40$, $df=4$, $p<0.001$). The overall prevalence of stress was also significantly lower than the 50% reference proportion ($z=-10.95$, $p<0.001$).

Table 4: Factors independently associated with depression, anxiety and stress among rural adolescents (N=480)

Outcome and associated factor	Outcome present, n/N (%)	Adjusted OR (95% CI)	Test of significance*	P value
Depression				
Rented versus own house	8/46 (17.4%)	0.39 (0.18-0.87)	Wald $\chi^2=5.49$	0.019**
Pucca versus kutchra house	45/166 (27.1%)	0.65 (0.42-0.99)	Wald $\chi^2=3.88$	0.049**
Stressful event during the previous year: yes versus no	7/11 (63.6%)	3.78 (1.06-13.42)	Wald $\chi^2=4.22$	0.040**
Anxiety				
Rented versus own house	7/46 (15.2%)	0.18 (0.08-0.42)	Wald $\chi^2=16.43$	<0.001**
Stressful event during the previous year: yes versus no	9/11 (81.8%)	7.20 (1.39-37.60)	Wald $\chi^2=5.51$	0.019**
Good versus poor relationship with friends	209/473 (44.2%)	0.09 (0.009-0.91)	Wald $\chi^2=4.18$	0.041**
Stress				
Rented versus own house	3/46 (6.5%)	0.12 (0.04-0.32)	Wald $\chi^2=15.98$	<0.001**
Pucca versus kutchra house	29/166 (17.5%)	0.64 (0.44-0.96)	Wald $\chi^2=5.03$	0.025**
Good versus poor relationship with friends	114/473 (24.1%)	0.08 (0.008-0.91)	Wald $\chi^2=4.37$	0.036**

*Multiple binary logistic regression; Wald statistics were estimated from the adjusted odds ratios and their 95% confidence intervals.

**Statistically significant at $p<0.05$. Percentages represent the prevalence of the respective outcome within the specified factor category. OR=odds ratio; CI=confidence interval.

[Table 4] presents the factors independently associated with depression, anxiety and stress in the multiple logistic regression analysis. Depression was present in 8 of 46 (17.4%) adolescents living in rented houses. Compared with those living in their own houses, adolescents living in rented houses had 61% lower adjusted odds of depression (AOR=0.39; 95% CI: 0.18-0.87; Wald $\chi^2=5.49$; $p=0.019$). Similarly, living in a pucca house was associated with 35% lower adjusted odds of depression than living in a kutchra house (AOR=0.65; 95% CI: 0.42-0.99; $p=0.049$). In contrast, adolescents who had experienced a stressful event during the previous year had 3.78 times greater adjusted odds of depression (95% CI: 1.06-13.42; $p=0.040$).

Anxiety was present in 7 of 46 (15.2%) adolescents living in rented houses, and rented-house residence was associated with 82% lower adjusted odds of anxiety compared with residence in an owned house (AOR=0.18; 95% CI: 0.08-0.42; Wald $\chi^2=16.43$; $p<0.001$). Adolescents reporting a stressful event during the previous year had substantially greater adjusted odds of anxiety (AOR=7.20; 95% CI: 1.39-37.60; $p=0.019$). A good relationship with friends was independently associated with lower odds of

anxiety compared with a poor relationship (AOR=0.09; 95% CI: 0.009-0.91; $p=0.041$), indicating a potentially protective role of positive peer relationships.

Stress was identified in 3 of 46 (6.5%) adolescents living in rented houses. Living in a rented house was associated with 88% lower adjusted odds of stress compared with living in an owned house (AOR=0.12; 95% CI: 0.04-0.32; Wald $\chi^2=15.98$; $p<0.001$). Residence in a pucca house was also associated with reduced odds of stress compared with residence in a kutchra house (AOR=0.64; 95% CI: 0.44-0.96; $p=0.025$). Furthermore, adolescents reporting good relationships with friends had significantly lower adjusted odds of stress (AOR=0.08; 95% CI: 0.008-0.91; $p=0.036$).

DISCUSSION

The present community-based cross-sectional study assessed symptoms of depression, anxiety and stress among 480 rural adolescents aged 14-19 years using the DASS-21. The findings demonstrated a considerable burden of psychological symptoms, with anxiety being the most prevalent condition,

followed by depression and stress. Variations between the present findings and earlier studies may be related to differences in age distribution, rural or urban setting, community- versus school-based recruitment, sample size, cultural background, timing of data collection and the screening instruments and cut-offs employed.

Overall prevalence of depression, anxiety and stress: In the present study, the prevalence of depressive symptoms was 33.3%, anxiety symptoms 44.8% and stress symptoms 25.0%. These estimates are consistent with the systematic review and meta-analysis by Rajkumar et al. (2022),^[1] which reported pooled prevalences of approximately 27% for depression and 26% for anxiety among rural Indian adolescents. The moderately higher prevalence in the present study may be attributable to the restriction of the sample to adolescents aged 14-19 years, among whom academic pressure, interpersonal conflict, uncertainty regarding education and employment, and identity-related concerns may be more prominent.

Prakash et al (2024),^[2] reported depression in 39.3%, anxiety in 49.0% and stress in 16.6% of rural adolescents in Mysuru. Their depression and anxiety estimates were slightly higher than the present values of 33.3% and 44.8%, whereas their stress prevalence was lower than the present estimate of 25.0%. The geographic and cultural similarity between the two Karnataka studies supports the existence of an appreciable burden of emotional symptoms among rural adolescents in the region. Differences may have resulted from school-based recruitment, socioeconomic composition, academic environment and the timing of assessment.

Mallya et al. (2024),^[3] reported lower rural prevalence estimates of 19.1% for depression, 24.0% for anxiety and 21.1% for stress among adolescents aged 16-19 years in Shivamogga. Their stress prevalence was relatively close to the present result, but depression and anxiety were considerably lower. This difference may reflect variation in sampling, as the present study included adolescents identified through community-based household visits, including those who might not have been attending school. Mallya et al. also observed that urban adolescents had higher depression, anxiety and stress than rural adolescents, indicating that place of schooling, academic competition and urban exposure can influence symptom reporting.

Shaikh et al. (2018),^[4] in a study of rural adolescent students from Pune and Nanded, reported substantially higher prevalences of depression, anxiety and stress at 54%, 60% and 44%, respectively. Their study identified disturbed family environments, harsh parenting, adverse events, poor perceived academic performance and tobacco use as important correlates. The higher estimates may have arisen from differences in educational pressure, participant characteristics and interpretation of DASS-21 thresholds.

Sandal et al (2017),^[5] reported depression in 65.5%, anxiety in 80.9% and stress in 47.0% of school-going adolescents in Chandigarh. These estimates were much higher than those of the present rural population. Chandigarh adolescents may have experienced greater academic competition and performance expectations. School-based administration may also have captured symptoms around examinations, whereas a community survey includes adolescents with more varied educational and occupational circumstances.

Gupta et al (2023),^[6] found depression, anxiety and stress in 52.3%, 47.4% and 33.7% of 812 school-going adolescents in rural West Bengal. The prevalence of anxiety was close to the present estimate of 44.8%, while depression and stress were higher. They also found that late adolescence, female sex, family problems and substance use were associated with psychological symptoms. Kumar et al. (2019),^[7] similarly reported high prevalences of depression, anxiety and stress 47.9%, 65.3% and 51.8%, respectively among school-going adolescents in Delhi, with greater symptoms among adolescents experiencing low academic satisfaction and family pressure.

In contrast, Kumar et al (2022),^[8] reported depression in 5.0%, anxiety in 20.8% and stress in 15.8% among adolescents attending public schools in Telangana. Kumar and Akoijam (2017),^[9] also reported relatively lower estimates among higher-secondary students in Manipur. Such differences demonstrate how prevalence is affected by study instruments, thresholds, local context and willingness to disclose symptoms. Mishra et al. (2018),^[10] found depression and anxiety in 14.5% and 15.0%, respectively, among children in rural and suburban areas of eastern Uttar Pradesh. Their inclusion of younger children and use of a different assessment approach may explain the lower prevalence.

Singh et al (2017),^[11] observed depressive disorders in approximately 40% of school-going adolescents in Chandigarh, a figure moderately higher than the present depression prevalence of 33.3%. Government-school attendance, senior classes, rural residence, family violence, paternal substance use and a poorly supportive school environment were important associated factors. Chakraborty et al. (2016),^[12] reported depression among approximately 49% of rural South Indian adolescents, again exceeding the present estimate. Collectively, these studies show that adolescent symptom prevalence varies widely across India and that estimates obtained using screening scales should not be equated with the prevalence of clinically diagnosed psychiatric disorders.

Severity of anxiety symptoms: In the present study, 55.2% of participants had normal anxiety scores, while 44.8% had some degree of anxiety. Moderate anxiety was the most frequent abnormal category, affecting 19.4%, followed by extremely severe anxiety in 9.8%, mild anxiety in 9.2% and severe anxiety in 6.5%. Severe or extremely severe anxiety

was therefore present in 16.3% of participants. Although most adolescents were in the normal category, the proportion with clinically concerning symptom severity was substantial.

The pattern of moderate anxiety being the largest abnormal category was also observed by Mallya et al. (2024),^[3] who reported moderate anxiety in 16.6% of rural adolescents, compared with 19.4% in the present study. Gupta et al (2023),^[6] reported a higher overall anxiety prevalence of 47.4% and extremely severe anxiety in 16.1%, compared with 9.8% in the present study. Sandal et al. (2017),^[5] reported a much greater overall burden and a substantial proportion of adolescents in the severe and extremely severe categories.

Singh et al (2015),^[13] demonstrated that anxiety, depression and stress symptoms were closely related to adolescents' psychosocial functioning. Their findings support the interpretation that adolescents with elevated DASS-21 scores may experience difficulties in emotional regulation, peer interaction, family relationships and school functioning, even when they do not meet the diagnostic criteria for a psychiatric disorder.

Khanna et al (2023),^[14] reported anxiety in 47.5% of school-going adolescents in Delhi, which was close to the present estimate of 44.8%. Anxiety was associated with stressful family occurrences, poor sleep quality, inadequate physical activity and parental educational and occupational characteristics. Shrestha et al (2023),^[15] reported a lower anxiety prevalence of 37.9% among Nepalese school-going adolescents. Bhandari and Adhikari (2015),^[19] however, reported anxiety among approximately 46.5% of secondary-school adolescents in Nepal, closely corresponding to the present result.

The global meta-analysis by Shorey et al (2022),^[16] showed wide variation in adolescent depressive symptoms across regions and instruments and found higher estimates in more recent studies. Although their analysis focused primarily on depression, it reinforces the importance of temporal, geographic and methodological heterogeneity when comparing self-reported emotional symptoms. Thus, the statistically significant non-uniform distribution of anxiety severity in the present study mainly indicates that participants were concentrated in the normal and moderate categories; it should not be interpreted as evidence of a population-level change without an external comparison group.

Severity of stress symptoms: Three-fourths of the participants had normal stress scores, while 25.0% had some degree of stress. Mild stress was most frequent at 11.9%, followed by moderate stress at 6.7%, severe stress at 4.6% and extremely severe stress at 1.9%. Severe or extremely severe stress was identified in 6.5% of adolescents.

The present stress prevalence was similar to the rural estimate of 21.1% reported by Mallya et al. (2024),^[3] and the 22.2% reported by Khanna et al (2023).^[14] Khanna et al. observed that stress was significantly associated with female sex and poor sleep quality.

Kumar et al. (2022),^[8] reported a somewhat lower stress prevalence of 15.8%, whereas Gupta et al. (2023),^[6] Rajanna and Sathyanath (2021),^[18] and Shaikh et al. (2018),^[4] reported higher values of 33.7%, 33.0% and 44.0%, respectively.

The predominance of mild stress in the present study is clinically and programmatically relevant because mild symptoms may represent an early stage at which counselling, life-skills education, family support and stress-management interventions can prevent progression. Deb et al. (2015),^[17] showed that academic stress and parental pressure were closely related to anxiety and poorer mental health among Indian high-school students. Consequently, even mild stress should not be dismissed as a normal or inconsequential part of adolescence, particularly when accompanied by anxiety, depressive symptoms, sleep problems or declining academic performance.

The chi-square goodness-of-fit test showed that stress severity was not equally distributed across the five categories. However, an equal distribution is a statistical reference rather than an expected epidemiological pattern. Therefore, the magnitude and confidence intervals of the individual severity categories are more informative than the goodness-of-fit p value.

Factors associated with depression: A history of a stressful event during the previous year was an independent risk factor for depression, increasing the adjusted odds by approximately four times (AOR=3.78; 95% CI: 1.06-13.42). This finding agrees with Shaikh et al (2018),^[4] who identified past adverse events and disturbed family environments as significant correlates of depression. Deb et al. (2015),^[17] similarly demonstrated that academic and parental pressures adversely affected adolescent mental health. Singh et al. (2017),^[11] reported associations between depression and family violence, lack of a supportive school environment and paternal substance use. These findings suggest that adverse life events can exceed adolescents' coping resources and precipitate depressive symptoms.

The confidence interval for stressful events was wide because only 11 participants reported such events. Consequently, although the association was statistically significant, its precise magnitude remains uncertain. Larger studies using detailed and validated life-event measures are required.

Residence in rented and pucca houses was associated with lower adjusted odds of depression. The protective association with pucca housing is plausible because better housing quality may indicate improved physical living conditions and socioeconomic security. However, the inverse association with rented housing was unexpected. It could reflect residual confounding, small subgroup size, local socioeconomic circumstances or differences between the study's operational measure of house ownership and actual household wealth. Rajkumar et al (2022),^[1] identified socioeconomic position and family environment as important

determinants but also emphasized marked heterogeneity across rural studies. Therefore, housing associations should be considered context-specific and not interpreted as proof that rented residence directly protects against psychological symptoms.

Factors associated with anxiety: Stressful events demonstrated an even stronger association with anxiety than with depression. Adolescents reporting a stressful event had over seven times greater adjusted odds of anxiety (AOR=7.20; 95% CI: 1.39-37.60). Khanna et al (2023),^[14] likewise found that stressful family occurrences were significantly associated with anxiety. Rajanna and Sathyanath (2021),^[18] reported that family-related factors and problematic internet use were associated with anxiety among South Indian adolescents. The large effect observed in the present study is biologically and psychologically plausible because adverse events may produce persistent worry, fear, hypervigilance and autonomic arousal. Nevertheless, the wide confidence interval again indicates limited precision. A good relationship with friends was strongly protective against anxiety (AOR=0.09; 95% CI: 0.009-0.91). Positive peer relationships may provide emotional support, opportunities to share concerns, a sense of belonging and assistance in coping with academic or family difficulties. Singh et al. (2015),^[13] highlighted the close relationship between emotional symptoms and psychosocial functioning, while Rajkumar et al. (2022),^[1] identified peer and family environments as major determinants of rural adolescent mental health.

The protective association between rented housing and anxiety should be interpreted with the same caution as the corresponding depression finding. It may represent unmeasured family mobility, socioeconomic differences, household composition or other contextual characteristics rather than a causal benefit of renting.

Factors associated with stress: Good peer relationships were independently associated with markedly lower odds of stress (AOR=0.08; 95% CI: 0.008-0.91). This finding supports the role of social connectedness as a protective resource during adolescence. Adolescents who can discuss academic, interpersonal and family difficulties with trusted friends may be better able to regulate emotions and develop adaptive coping strategies. Conversely, peer rejection, bullying or social isolation may intensify stress.

Living in a pucca house was associated with lower odds of stress (AOR=0.64; 95% CI: 0.44-0.96). Improved housing may reduce overcrowding, insecurity, environmental discomfort and family strain. The lower odds among adolescents in rented houses were statistically strong but epidemiologically unexpected and warrant cautious interpretation. Because the study was cross-sectional, the temporal sequence between housing circumstances and mental-health symptoms could

not be established, and unmeasured socioeconomic confounding remains possible.

CONCLUSION

The study demonstrated a considerable burden of psychological symptoms among rural adolescents aged 14-19 years. Anxiety was the most prevalent outcome, affecting 44.8% of participants, followed by depression in 33.3% and stress in 25.0%. Moderate anxiety and mild stress were the most frequent abnormal severity categories, while 16.3% had severe or extremely severe anxiety and 6.5% had severe or extremely severe stress. Recent stressful life events independently increased the likelihood of depression and anxiety, whereas good peer relationships were protective against anxiety and stress. Selected housing characteristics were also associated with these outcomes, although these associations require cautious interpretation. The findings highlight the need for community- and school-based mental-health screening, life-skills education, peer-support programmes, family counselling and accessible referral services. Adolescents with severe symptoms should receive comprehensive clinical evaluation because DASS-21 measures symptom burden and does not establish a psychiatric diagnosis.

Limitations of study: This study had several limitations. Its cross-sectional design prevented determination of temporal or causal relationships between associated factors and psychological symptoms. The study was conducted within a single rural field-practice area; therefore, its findings may not be generalizable to adolescents from other rural, urban or culturally different populations. Depression, anxiety and stress were assessed using the self-reported DASS-21, making the results susceptible to recall bias, social-desirability bias and underreporting because of mental-health stigma. The DASS-21 is a screening instrument and does not provide a clinical psychiatric diagnosis. Some important determinants, including bullying, academic performance, sleep quality, social-media use, substance use, exposure to violence and availability of emotional support, might not have been assessed comprehensively. Certain exposure categories, particularly stressful life events, poor peer relationships and psychiatric illness in the family, contained few participants, resulting in wide confidence intervals and unstable effect estimates. Residual confounding may have influenced the unexpected protective associations observed for rented housing. Finally, the study did not include longitudinal follow-up to determine whether symptoms persisted, resolved or progressed after referral or intervention.

REFERENCES

1. Rajkumar E, Julia GJ, Sri Lakshmi K NV, Ranjana PK, Manjima M, Devi RR, et al. Prevalence of mental health

- problems among rural adolescents in India: a systematic review and meta-analysis. *Sci Rep*. 2022;12(1):16573. doi:10.1038/s41598-022-19731-2.
2. Prakash GH, Kumar DS, Arun V, Hegde S, Yadav D, Gopi A. Prevalence and correlates of depression, anxiety, and stress among adolescents in urban and rural areas of Mysuru, South India. *J Family Med Prim Care*. 2024;13(8):2979-85. doi:10.4103/jfmpc.jfmpc_1600_23.
 3. Mallaya A, Koppad R, Kumar P. Depression, anxiety, and stress among urban and rural adolescents in Shivamogga, Karnataka. *F1000Res*. 2024;12:1583. doi:10.12688/f1000research.139603.3.
 4. Shaikh BM, Doke PP, Gothankar JS. Depression, anxiety, stress, and stressors among rural adolescents studying in Pune and a rural block of Nanded district of Maharashtra, India. *Indian J Public Health*. 2018;62(4):311-4. doi:10.4103/ijph.IJPH_174_17.
 5. Sandal RK, Goel NK, Sharma MK, Bakshi RK, Singh N, Kumar D. Prevalence of depression, anxiety, and stress among school-going adolescents in Chandigarh. *J Family Med Prim Care*. 2017;6(2):405-10. doi:10.4103/2249-4863.219988.
 6. Gupta S, Das S, Das M, Banerjee S, Neogi R, Mukherjee S. Prevalence and correlates of depression, anxiety, and stress among high school students in a block of Hooghly district, West Bengal: a cross-sectional study. *J Educ Health Promot*. 2023;12:345. doi:10.4103/jehp.jehp_1769_22.
 7. Kumar A, Yadav G, Chauhan N, Bodat S. Prevalence of depression, anxiety and stress among school-going adolescents in Delhi: a cross-sectional study. *Int J Community Med Public Health*. 2019;6(12):5021-6. doi:10.18203/2394-6040.ijcmph20195177.
 8. Kumar RK, Aruna G, Biradar N, Reddy KS, Soubhagya M, Sushma SA. The prevalence of depression, anxiety, and stress among high school adolescent children in public and private schools in Rangareddy district, Telangana: a cross-sectional study. *J Educ Health Promot*. 2022;11:83. doi:10.4103/jehp.jehp_548_21.
 9. Kumar KS, Akoijam BS. Depression, anxiety and stress among higher secondary school students of Imphal, Manipur. *Indian J Community Med*. 2017;42(2):94-6. doi:10.4103/ijcm.IJCM_266_15.
 10. Mishra SK, Srivastava M, Tiwary NK, Kumar A. Prevalence of depression and anxiety among children in rural and suburban areas of Eastern Uttar Pradesh: a cross-sectional study. *J Family Med Prim Care*. 2018;7(1):21-6. doi:10.4103/jfmpc.jfmpc_248_17.
 11. Singh MM, Gupta M, Grover S. Prevalence and factors associated with depression among school-going adolescents in Chandigarh, North India. *Indian J Med Res*. 2017;146(2):205-15. doi:10.4103/ijmr.IJMR_1339_15.
 12. Chakraborty T, Brahmbhatt K, Madappady S, Nelliyanil M, Jayram S, Debnath S, et al. Prevalence of depression amongst adolescents in rural area of South India: a school-based cross-sectional study. *Public Health Rev Int J Public Health Res*. 2016;3(1):65-9.
 13. Singh K, Junnarkar M, Sharma S. Anxiety, stress, depression, and psychosocial functioning of Indian adolescents. *Indian J Psychiatry*. 2015;57(4):367-74. doi:10.4103/0019-5545.171841.
 14. Khanna T, Banerjee B, Majhi MM. Prevalence and correlates of anxiety and stress in school-going adolescents in Delhi National Capital Region: a cross-sectional study. *Int J Community Med Public Health*. 2023;10(11):4219-27. doi:10.18203/2394-6040.ijcmph20233454.
 15. Shrestha S, Phuyal R, Chalise P. Depression, anxiety and stress among school-going adolescents of a secondary school: a descriptive cross-sectional study. *J Nepal Med Assoc*. 2023;61(259):249-51. doi:10.31729/jnma.8067.
 16. Shorey S, Ng ED, Wong CHJ. Global prevalence of depression and elevated depressive symptoms among adolescents: a systematic review and meta-analysis. *Br J Clin Psychol*. 2022;61(2):287-305. doi:10.1111/bjc.12333.
 17. Deb S, Strodl E, Sun H. Academic stress, parental pressure, anxiety and mental health among Indian high school students. *Int J Psychol Behav Sci*. 2015;5(1):26-34. doi:10.5923/j.ijpbs.20150501.04.
 18. Rajanna K, Sathyanath SM. Problematic internet use, depression, stress and anxiety among adolescents in an urban area in South India: a cross-sectional study. *Int J Community Med Public Health*. 2021;8(7):3385-93. doi:10.18203/2394-6040.ijcmph20212592.
 19. Bhandari KP, Adhikari C. Prevalence and factors associated with anxiety disorder among secondary-school adolescents of Dang district, Nepal. *J Gandaki Med Coll Nepal*. 2015;8(1):64-7.