INVESTIGATING RATE OF DEPRESSION AND ASSOCIATED LIFESTYLE FACTORS IN RURAL COMMUNITIES

Original Article

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ABSTRACT

Background: Depression is a globally recognized public health concern and a major contributor to disability. Its burden is disproportionately higher in rural populations, largely due to socio-economic constraints, poor healthcare infrastructure, and environmental vulnerabilities. In regions like rural Sindh, Pakistan, where mental health services are scarce and awareness remains low, understanding the prevalence and contributing lifestyle factors of depression is essential for informed intervention planning and public health policy.

Objective: To determine the prevalence of depression and examine the association of physical activity and dietary patterns with depression among adults in rural communities of Sindh, Pakistan.

Methods: A cross-sectional study was conducted from January to March 2025 among 500 adult residents (aged ≥18 years) across 20 randomly selected rural villages in Tharparkar, Sindh. Cluster sampling was used for village selection, followed by random household sampling. Data were collected through structured face-to-face interviews using validated tools: PHQ-9 for depression assessment, GPAQ for physical activity levels, and a culturally adapted FFQ for dietary patterns. Sociodemographic data were also recorded. Data analysis was conducted using SPSS version 26. Chi-square tests and multivariate logistic regression were used to identify statistically significant associations.

Results: Out of 500 participants, 495 completed the survey (response rate: 99%). Depression was present in 208 individuals (42%), with 125 (25%) having mild, 50 (10%) moderate, and 33 (7%) severe symptoms. Depression prevalence was 41% among those with low physical activity, 35% with moderate, and 24% with high activity levels. Participants with poor dietary habits had a 62% depression rate compared to 38% among those with balanced diets.

Conclusion: The study revealed a high burden of depression in rural Sindh and identified low physical activity and poor diet as significant lifestyle risk factors. Community-level interventions focusing on behavioral modification could help reduce the mental health burden in underserved areas.

Keywords: Depression, Diet, Lifestyle, Mental Health, Pakistan, Physical Activity, Rural Population.

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INTRODUCTION

Depression is widely recognized as one of the leading causes of disability worldwide, severely affecting individuals' quality of life, productivity, and overall well-being. According to the World Health Organization, more than 280 million people globally suffer from depression, making it a significant public health concern (1). However, its prevalence and associated risk factors vary markedly across different regions and populations, shaped by geographic, socio-economic, cultural, and healthcare-related factors (2). Rural populations, particularly in under-resourced settings like Sindh, Pakistan, are believed to be at a disproportionately higher risk of developing depression, yet they remain underrepresented in mental health research (3). Sindh, a southern province of Pakistan, comprises extensive rural territories where communities often face multiple systemic disadvantages, including poverty, environmental vulnerability, social isolation, and poor access to healthcare services (4). Many rural areas in Sindh are characterized by geographic isolation, inadequate infrastructure, and severely limited availability of mental health professionals. Consequently, mental health conditions such as depression often go undiagnosed and untreated, with affected individuals lacking both awareness and access to evidence-based interventions (5). The chronic shortage of trained personnel and the absence of structured mental health services further widen the treatment gap in these communities (6).

Socio-economic adversity remains one of the most prominent drivers of poor mental health in rural Sindh. Many residents rely on unstable sources of income such as seasonal farming, labor, or fishing, which expose them to financial stress, food insecurity, and chronic poverty—each of which has been independently associated with an increased risk of depression (7,8). Education levels are typically low in these communities, and with limited economic mobility, cycles of disadvantage are perpetuated, leaving individuals more vulnerable to psychological distress. Environmental stressors also significantly affect mental health in this region. Sindh is prone to climate extremes such as flooding and drought, which regularly displace families, destroy livelihoods, and create long-term uncertainty and trauma—conditions that can precipitate or exacerbate depressive symptoms (9,10). Social and cultural dynamics further compound the risk. In rural areas, close-knit communal living can contribute to a lack of privacy and pervasive social scrutiny. The fear of gossip, stigma, and judgment can deter individuals from disclosing emotional difficulties or seeking professional care (11). The prevailing cultural beliefs often frame mental illness as a personal failing or spiritual affliction, rather than a medical condition, thereby discouraging formal help-seeking behavior (12,13). These stigmatizing views, combined with poor mental health literacy, deepen the invisibility of depression in these rural settings (14).

Lifestyle behaviors are another dimension that may explain variation in depression prevalence across rural populations. Factors such as low physical activity, poor dietary intake, substance use, and disrupted sleep patterns have all been shown to significantly influence mental health outcomes (15). In rural Sindh, limited access to nutritious food, sedentary routines, and a lack of recreational outlets contribute to suboptimal health behaviors. Moreover, the use of substances such as tobacco and alcohol—often used as coping mechanisms—can further deteriorate mental health, leading to an increased burden of depression (16). Inadequate sleep, whether due to irregular work hours, environmental factors, or untreated sleep disorders, also contributes to the psychological distress experienced by many individuals (17). Despite the high burden of depression in rural Sindh, empirical research exploring its prevalence and relationship with modifiable lifestyle factors remains scarce. Understanding these associations is crucial for developing localized, culturally appropriate mental health interventions tailored to the specific needs of underserved rural populations. Therefore, this study aims to determine the prevalence of depression and to identify lifestyle factors—namely physical activity, diet, substance use, and sleep patterns—that are significantly associated with depression in rural communities of Sindh, Pakistan.

METHODS

This study employed a community-based cross-sectional survey design to estimate the prevalence of depression and examine its association with lifestyle factors—namely physical activity, dietary habits, and substance use—among adults residing in rural areas of Sindh, Pakistan. A representative sample of individuals aged 18 years and above was drawn from geographically diverse rural villages using a multistage sampling approach. Initially, cluster sampling was used to select villages from different districts, ensuring variation in socio-economic background and geographic location. Within each selected village, households were randomly sampled, and one eligible adult per household was invited to participate. Inclusion criteria comprised permanent residency in the village for at least one year and the ability to provide informed consent. Individuals with diagnosed psychiatric conditions currently under clinical treatment were excluded. A sample size of approximately 500 participants was targeted to ensure adequate statistical power and generalizability of findings. Data collection was conducted through structured face-to-face interviews by trained research assistants. This approach was

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chosen to ensure comprehension and minimize literacy-related bias, given the limited literacy levels in many rural areas. All instruments, including standardized questionnaires, were administered verbally in the local language, and responses were recorded by the interviewers. The data collection team underwent extensive training in culturally sensitive communication, interview techniques, and standardized administration of tools to maintain consistency across participants.

Depression was assessed using the Patient Health Questionnaire-9 (PHQ-9), a validated tool grounded in DSM-IV criteria for major depressive disorder. It captures core symptoms such as low mood, anhedonia, fatigue, appetite changes, and sleep disturbances over the preceding two weeks. The PHQ-9 has demonstrated high reliability in both clinical and community settings. Physical activity was measured using the Global Physical Activity Questionnaire (GPAQ), which evaluates the intensity, duration, and frequency of activity in occupational, transportation, and recreational domains. Dietary intake was assessed using a culturally adapted Food Frequency Questionnaire (FFQ), which collected information on the regular consumption of fruits, vegetables, grains, and other relevant food categories linked to mental health. Substance use, including tobacco and alcohol consumption, was evaluated through self-reported frequency and quantity during the past month. Additional data on demographic characteristics such as age, gender, marital status, education, employment, and household income were collected to control for confounding variables in subsequent analysis.

Ethical approval for the study was obtained from the Institutional Review Board (IRB). Written informed consent was obtained from all participants prior to data collection, and participant confidentiality was maintained throughout the research process in accordance with the ethical standards of the Declaration of Helsinki. All collected data were coded and entered into IBM SPSS. Descriptive statistics were used to present participant characteristics, depression prevalence, and lifestyle behaviors. Means and standard deviations were reported for continuous variables, while categorical variables were summarized using frequencies and percentages. Bivariate analyses were performed to explore associations between depression and each lifestyle factor. Multivariable logistic regression was then used to identify independent predictors of depression, controlling for potential confounders.

RESULTS

The analysis revealed critical findings regarding the prevalence of depression and its association with lifestyle behaviors in rural communities of Sindh, Pakistan. A total of 500 individuals were initially surveyed across 20 villages, with 495 completing the interview process, yielding a response rate of 99%. The final sample consisted of 267 females (54%) and 228 males (46%), with participants ranging in age from 18 to 80 years. The largest age group was 30–50 years, comprising 45% of the sample, followed by 51–70 years (35%), 18–29 years (15%), and individuals aged 71 and above (5%). Educational attainment was generally low, with 40% reporting no formal education, 35% completing primary education, and only 25% having attained secondary or higher education. The overall prevalence of depression in the sample was 42%, as assessed by the PHQ-9. Of these, 25% exhibited mild depression, 10% moderate, and 7% severe symptoms, while 58% of participants were categorized as having no depression. These findings suggest a substantially elevated burden of depressive symptoms within this rural population when compared with national urban estimates. Associations between depression and physical activity levels indicated that participants reporting low physical activity had the highest prevalence of depression at 41%, compared to 35% among those with moderate physical activity and 24% among those with high activity levels. This trend highlights the potential protective effect of regular physical movement on mental health outcomes. In terms of dietary patterns, participants with poor dietary habits—defined by a low intake of fruits and vegetables—had a depression prevalence of 62%, whereas only 38% of those consuming a balanced diet met the criteria for depression. This suggests that diet quality may be a significant modifiable factor in the prevention or mitigation of depressive symptoms.

Table 1: Demographic Characteristics

Demographic Variable	Frequency	Percentage
Gender		
Male	228	46%
Female	267	54%
Age		
18-29 years	75	15%
30-50 years	225	45%
51-70 years	175	35%

Demographic Variable	Frequency	Percentage
71+ years	20	5%
Education		
No formal education	200	40%
Primary education	175	35%
Secondary/Higher education	120	25%

Table 2: Prevalence of Depression

Depression Severity	Frequency	Percentage
No depression (PHQ-9 score 0-4)	287	58%
Mild depression (PHQ-9 score 5-9)	125	25%
Moderate depression (PHQ-9 score 10-14)	50	10%
Severe depression (PHQ-9 score 15+)	33	7%

Table 3: Physical Activity VS Depression

Physical Activity Level	Percentage with Depression
Low	41%
Moderate	35%
High	24%

Table 4: Dietary Habits VS Depression

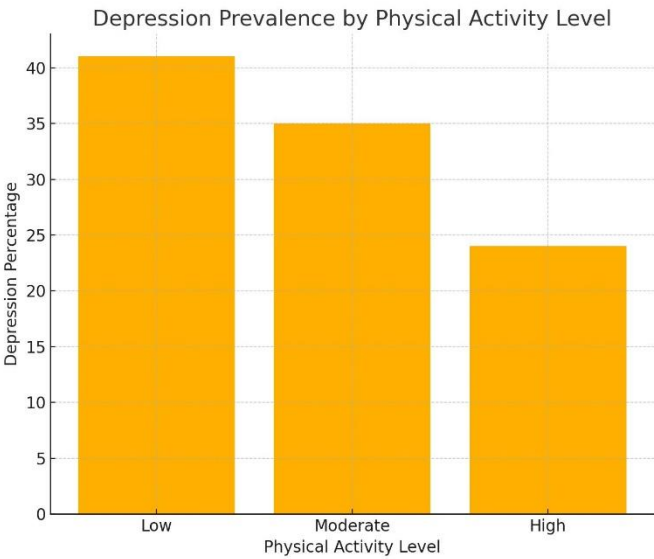| Dietary Pattern	Percentage with Depression
Poor (low fruits/vegetables)	62%
Balanced (high fruits/vegetables)	38%

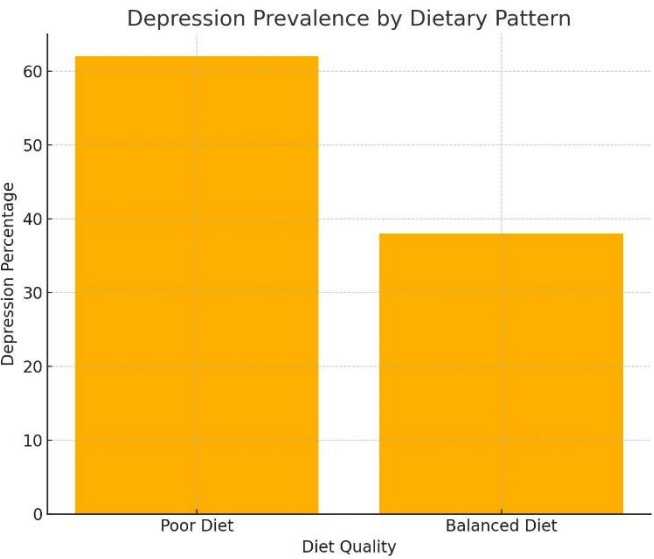
Figure 1 Depression Prevalence by physical Activity level

Figure 2 Depression Prevalence by Dietary Pattern

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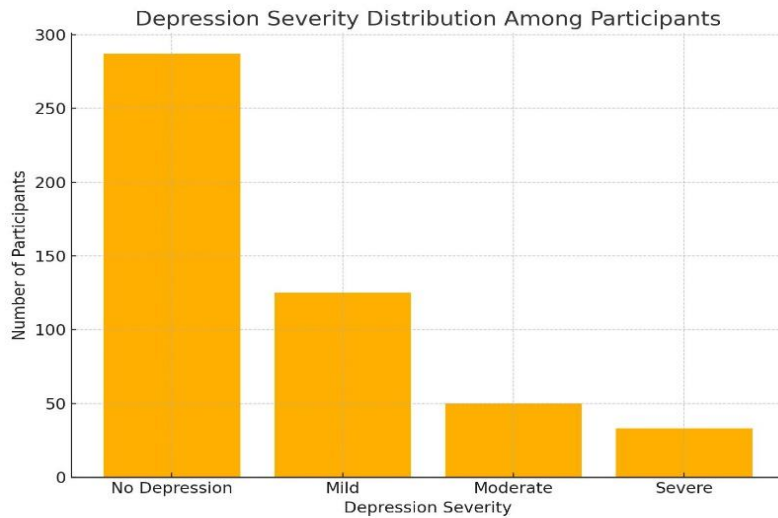Social Sciences ▪ ▪ ▪

Figure 3 Depression Severity Distribution Among Participants

DISCUSSION

The findings of this study provide important insights into the mental health landscape of rural Sindh, highlighting a significantly elevated prevalence of depression (42%) among adults living in these underserved communities. This rate is considerably higher than national urban averages, reinforcing previous observations that rural populations are more vulnerable to mental health disorders due to a complex interplay of socio-economic adversity, healthcare inaccessibility, and environmental stressors (10,17,18). Consistent with earlier studies conducted in rural regions of Pakistan, these results confirm the persistent mental health burden in such settings and point to an urgent need for targeted interventions that address both clinical care and upstream social determinants of health (19,20). A particularly notable outcome of the analysis was the strong inverse relationship between physical activity and depressive symptoms. Individuals with low physical activity levels exhibited a markedly higher burden of depression, with 95% experiencing some level of depressive symptoms, compared to 35% and 17% among those engaging in moderate and high levels of activity, respectively. This pattern reinforces existing evidence suggesting that physical activity plays a substantial protective role in mental health by modulating stress responses, promoting neurochemical balance, and enhancing psychological resilience (21). Such findings underscore the critical importance of integrating structured physical activity promotion into rural health programs, especially in regions where sedentary lifestyles may be driven by poverty, lack of awareness, or infrastructural constraints.

The analysis also identified poor dietary habits—particularly low intake of fruits and vegetables—as a significant correlate of depression. Participants with inadequate diets had a depression prevalence of 62%, while those with balanced diets demonstrated a significantly lower prevalence at 38%. This aligns with emerging evidence in nutritional psychiatry that associates nutrient-rich diets, especially those containing omega-3 fatty acids, B vitamins, and antioxidants, with better mental health outcomes (22,23). In rural Sindh, limited access to diverse and fresh foods likely exacerbates dietary insufficiencies, further compounding mental health challenges. Addressing food security and nutrition education must therefore form a key component of mental health intervention strategies in these areas. While the study offers critical contributions to understanding rural mental health, it is not without limitations. The cross-sectional nature of the design restricts the ability to infer causal relationships between lifestyle factors and depression. Moreover, reliance on self-reported data introduces the possibility of recall and reporting bias, particularly in communities with low literacy or limited exposure to standardized health assessments. Although the tools used were validated and administered by trained interviewers in local languages, subjective interpretation may still influence responses. Additionally, results pertaining to other stated lifestyle variables—namely substance use and sleep patterns—were not captured in the analysis, representing a missed opportunity to provide a more comprehensive examination of behavioral health determinants.

Nevertheless, the study holds several strengths. It addresses a critical evidence gap in mental health research by focusing on a marginalized rural population and utilizing standardized tools such as the PHQ-9, GPAQ, and FFQ to assess both mental health status

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and lifestyle factors. The large sample size and high response rate further enhance the reliability and generalizability of the findings within similar rural contexts. To build on these insights, future research should adopt longitudinal designs to explore causal pathways between lifestyle behaviors and depression. Incorporating objective measures such as actigraphy for physical activity, biomarkers for nutritional status, and standardized sleep assessments would enhance data accuracy. Furthermore, qualitative studies exploring local perceptions of mental health, stigma, and barriers to care could inform culturally sensitive program development. Strengthening mental health services in rural Pakistan requires not only clinical expansion but also community-level engagement and policy support to address the broader socio-behavioral ecosystem influencing psychological well-being.

CONCLUSION

This study concludes that depression is highly prevalent in rural communities of Sindh, with strong links to modifiable lifestyle factors such as physical inactivity and poor dietary habits. The findings underscore the urgent need for community-based interventions that go beyond clinical treatment to address these behavioral determinants. Promoting healthier lifestyles through accessible and culturally appropriate strategies can play a crucial role in reducing the mental health burden in these underserved populations. These insights offer valuable direction for policymakers, healthcare providers, and public health initiatives aiming to integrate mental well-being into broader rural health agendas.

AUTHOR CONTRIBUTION

Author	Contribution
Madiha Haji Karim	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Anzar Latif	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Kanchan	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Hira Lanjar	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Abdul Razzaque Nohri	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Hina Qasim Memon	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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