

BMJ Open Employing telepsychiatry services to assess the prevalence and identify mental health disorders using the PHQ-9 and GAD-7 in resource-constrained regions of Dadar Mansehra, Pakistan: an observational cross-sectional study

Iffat Zafar Aga ^{1,2}, Sara Saeed Khurram,^{1,3} Mahek Karim ^{1,4}, Muhammad Muzzamil ^{1,5}, Shahkamal Hashmi,⁶ Kashif Shafique⁷

To cite: Aga IZ, Khurram SS, Karim M, *et al.* Employing telepsychiatry services to assess the prevalence and identify mental health disorders using the PHQ-9 and GAD-7 in resource-constrained regions of Dadar Mansehra, Pakistan: an observational cross-sectional study. *BMJ Open* 2023;**13**:e078976. doi:10.1136/bmjopen-2023-078976

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2023-078976>).

Received 17 August 2023
Accepted 09 November 2023



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to

Dr Iffat Zafar Aga;
iffatzaga@gmail.com

ABSTRACT

Objective This study aims to measure the prevalence of mental health disorders in low-resource settings through telepsychiatry and evaluate data from Pakistan's Sehat Kahani nurse-assisted online clinics serving low-income communities. This will help to understand the magnitude and nature of the demand for contextual therapies to promote mental health. The paper will discuss the challenges faced in these settings, such as limited access to mental health facilities, stigma and opportunities telemedicine brings.

Design An observational cross-sectional study of telepsychiatry consultations using Patient Health Questionnaire-9 and Generalised Anxiety Disorder-7 to screen for depression and anxiety was conducted between October and December 2022.

Setting This research was conducted at Dadar Mansehra e-health clinics of Sehat Kahani with telepsychiatry services in Pakistan.

Participants The study included 2660 participants who visited Sehat Kahani e-health clinics between October and December 2022 and voluntarily completed the questionnaire for data collection.

Results The study was comprised of 2660 participants with a mean age of 34.3 years. The study findings show that the majority of participants were females (98.4%), 16.9% of participants had moderate depression, and 20.8% had severe depression. Furthermore, the participants who were widowed/divorced were more likely to have depression than those who were single (OR=3.3, 95% CI (2.0 to 5.2)).

Conclusions Based on the findings, most study participants were female, and their mental health was negatively impacted. Women in Pakistan are disproportionately affected by the rising rates of depression and anxiety, and telepsychiatry therapies effectively respond to this growing need. Potentially, it is a game-changer for dealing with mental health problems. Telepsychiatry can help policymakers and mental health professionals to develop effective low-income mental health initiatives.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The Patient Health Questionnaire-9 and Generalised Anxiety Disorder-7 can effectively screen and detect common mental health disorders, especially in constrained settings and with low resources.
- ⇒ The research confirmed that eliminating geographical barriers enabled telepsychiatry to provide better initial screening in disadvantaged locations.
- ⇒ Observational cross-sectional designs can assess mental health prevalence over a specific period, providing valuable insights for developing interventions.
- ⇒ The study's cross-sectional design limits the capacity to monitor longitudinal changes in mental health status.
- ⇒ Telepsychiatry services may exclude people with limited access to technology or technological competency, which can introduce a bias in the study's findings.

INTRODUCTION

The Islamic Republic of Pakistan, a developing Muslim nation, faces a significant challenge in mental disorders, characterised by a notable deficiency in the prompt identification and efficient treatment of such conditions. Around 10%–16% of the population in Pakistan struggle with mental illnesses. This significant prevalence of mental disorders contributes substantially to the overall burden of disease. However, it is concerning that mental illness continues to be disregarded when establishing national priorities.¹

While the provision of mental health services is widely recognised as an essential component of effective healthcare systems, many low-income and middle-income countries (LMICs) struggle to adequately meet the requirements of vulnerable populations.²

Pakistan needs to address this urgent issue because it affects about 24 million people. Estimates show that Pakistan is currently short on mental healthcare providers. The exact breakdown is as follows: 342 psychiatrists, 478 psychologists, 3145 social workers, 22 occupational therapists, 13 643 nurses, 102 597 other health or mental health workers and 25 782 general practitioners not specialising in psychiatry. There is a wide gap in access to mental health services as a result of how mental health practitioners are dispersed. Pakistan reportedly has the lowest psychiatric density in the WHO Eastern Mediterranean Region, at 0.19 per 100 000 people.^{3 4}

Social stigma and people's unwillingness to seek help for their health problems compound an already dire situation in Pakistan's mental healthcare system. Telepsychiatry, which uses tools like phone calls and virtual meetings to provide mental healthcare to people in remote areas, is one potential solution. With the rise of telepsychiatry, patients now have an advanced option that increases their accessibility to qualified mental healthcare professionals at a reduced time and financial investment.⁵

Telepsychiatry: a successful form of telemedicine

The adoption of telepsychiatry treatment has the capacity to optimise the allocation of mental health resources, allowing for a broader reach to a more significant number of patients. Consequently, mental health professionals can exert a more substantial influence at a population level when compared with the conventional approach of inperson consultations.⁶ Multiple comprehensive reviews have found substantial evidence supporting the effectiveness of interactive video and audio consultations as a means of connecting patients in primary care settings with specialists.^{7–11} Further evidence suggests that telehealth-based psychotherapy could be a viable substitute for inperson psychotherapy in addressing less prevalent mental health disorders and physical illnesses that necessitate psychological intervention.¹²

Telepsychiatry has the potential to readily enhance the already existing infrastructure of mental healthcare delivery in LMICs and, therefore, can serve as a crucial step in lowering healthcare access discrepancies. Telecommunication innovations like telepsychiatry have the potential to streamline access to specialists and facilitate referrals, thereby addressing access gaps in mental healthcare in LMICs.¹³ The anticipated outcome of this study is to assess the efficacy of telepsychiatry services in measuring the prevalence and diagnosing mental health disorders, including depression and anxiety, within low-income areas in Pakistan.

MATERIALS AND METHODS

This study employed a cross-sectional observational design, utilising data obtained from 2660 telepsychiatry consultations conducted by Sehat Kahani (Sehat Kahani's one window digital healthcare platform connects a network of globally recognised and highly qualified

online doctors to patients for online chat-enabled, audio-enabled and video-enabled instant/on-appointment consultations, online diagnostics and at-home pharmacy services. Our service lines allow individual consumers, corporate employees and patients in hard-to-reach underserved areas to access doctors via a mobile application and intermediary assisted telemedicine facilitation centres.) during the period comprising from October 2022 to December 2022 at Dadar Mansehra e-clinic of Sehat Kahani. The patients received medical care at the Sehat Kahani e-clinic for their scheduled sessions, during which a nurse assessed their vital signs and body mass index (BMI). Following this, the patients were linked to a telepsychiatry professional through the utilisation of a laptop at the e-clinic, where their counselling sessions were carried out.

Sehat Kahani has emerged as the leading telepsychiatry platform in Pakistan since its inception in 2017. The organisation places significant emphasis on providing medical care as a fundamental human right and actions to make dedicated efforts in accommodating those it serves. The organisation strongly supports Sustainable Developmental Goal 3 (SDG-3), Good Health and Well-Being, which endeavours to guarantee universal access to quality healthcare and promote well-being for all individuals.

This study followed a strict methodology to introduce and illustrate the consent procedure. It was clear to the participants that their anonymity would be protected at all costs. The telepsychiatry specialist would use an online data collection form to gather information from the patient during the consultation. The individuals that were included in the study were chosen according to predetermined criteria that are described as follows: 'Patients seeking treatment at the Sehat Kahani clinic, those who willingly agree to partake in mental health evaluations and online consultations with psychiatric consultants. Excluded from the study were people with serious medical illnesses that would make video conferencing difficult and those who were already under the care of a psychiatrist for their mental health issues'.

Data collection tool

The tool used for data collection in this study included the Patient Health Questionnaire-9 (PHQ-9) and the Generalised Anxiety Disorder-7 (GAD-7) scale for screening and assessing depression and anxiety symptoms. The combination of these questions allowed for a comprehensive assessment of the patient's mental and physical health status and their general habits and risk factors for developing mental health disorders. The PHQ-9 and GAD-7 questionnaires are widely used and validated tools for screening and assessing depression and anxiety symptoms. Including additional questions on demographics, habits and comorbidities further enhanced the tool's ability to capture a complete picture of the patient's health status. Overall, the tool provided a thorough and standardised approach to collecting patient data during telepsychiatry consultations.

Table 1 General characteristic of participants (n=2660)

Variables	Total	PHQ-9	P value*	GAD-7	P value*
Age group, year					
<25	340 (12.8)	7.7±6.2	0.011	6.7±5.2	<0.001
25–34	1087 (40.9)	8.7±6.3		7.6±5.2	
35–44	846 (31.8)	8.9±6.0		7.4±5.2	
>45	387 (14.5)	8.3±5.4		5.8±4.6	
Gender					
Male	42 (1.6)	7.6±5.5	0.295	6.9±4.9	0.764
Female	2618 (98.4)	8.6±6.1		7.2±5.2	
BMI, kg/m ²					
Underweight (<18.5)	94 (3.5)	8.1±5.7	0.002	6.9±5.0	0.665
Normal weight (18.5–22.9)	684 (25.7)	8.2±5.7		7.4±4.8	
Overweight (23–27.4)	1119 (42.1)	8.4±6.1		7.1±5.3	
Obese (≥27.5)	763 (28.7)	9.3±6.2		7.1±5.3	
Education level					
No education	1624 (61.1)	8.4±5.8	<0.001	6.9±5.1	<0.001
Primary	331 (12.4)	10.1±6.8		8.7±5.7	
Secondary	568 (21.4)	8.5±6.3		7.6±5.0	
Tertiary	137 (5.2)	7.8±5.7		5.4±4.4	
Marital status					
Single	313 (11.8)	7.7±6.3	<0.001	6.9±5.5	0.577
Married	2165 (81.4)	8.5±6.0		7.2±5.1	
Widow/divorced/separated	182 (6.8)	10.9±5.4		7.1±5.0	
Work status					
Employed	193 (7.3)	7.5±5.2	<0.001	7.4±3.9	0.044
Self-employed	280 (10.5)	9.9±5.5		7.0±4.9	
Unemployed	260 (9.8)	7.2±5.2		6.8±5.3	
Student	90 (3.4)	10.6±7.4		8.7±6.2	
Housewife	1837 (69.1)	8.6±6.2		7.2±5.2	
Household income, PKR					
<20 000	1513 (56.9)	8.5±6.0	0.381	7.1±5.2	0.193
20 000–30 000	853 (32.1)	8.8±6.2		7.4±5.2	
>30 000	294 (11.1)	8.3±5.9		6.9±4.9	
Habits					
None	2109 (79.3)	7.5±5.3	<0.001	6.0±4.5	<0.001
Smoking	146 (5.5)	8.1±5.6		8.6±4.5	
Use of any kind of drugs	74 (2.8)	18.7±1.9		15.8±1.5	
Naswar/gutkha/paan/chalia	331 (12.4)	13.5±6.9		12.1±5.3	
Comorbidity					
None	1598 (60.1)	7.5±5.7	<0.001	6.5±4.9	<0.001
Hypertension	774 (29.1)	10.4±6.2		8.0±5.5	
Diabetes miletus	168 (6.3)	7.3±4.5		7.7±4.1	
Obesity	86 (3.2)	10.5±7.0		9.4±4.8	
History of cardiac disease	34 (1.3)	16.9±4.6		13.2±4.5	
Sleeping hours					
≤6	1866 (70.2)	8.4±6.0	0.007	7.0±5.1	0.037
>6	794 (29.8)	9.1±6.1		7.5±5.3	

n (%) and mean±SD are reported.

*P value was calculated by two independent sample t-test/one-way analysis of variance.

BMI, body mass index; GAD-7, Generalised Anxiety Disorder-7; PHQ-9, Patient Health Questionnaire-9.

Table 2 Depression and anxiety levels among participants (n=2660)

PHQ-9 depression	n	%
PHQ-9 score (0–4)	881	33.1
Mild depression (5–9)	776	29.2
Moderate depression (10–14)	449	16.9
Severe depression (15–27)	554	20.8
GAD-7 anxiety		
Minimal anxiety (0–4)	1012	38.0
Mild anxiety (5–9)	889	33.4
Moderate anxiety (10–14)	386	14.5
Severe anxiety (15–21)	373	14.0

GAD-7, Generalised Anxiety Disorder-7; PHQ-9, Patient Health Questionnaire-9.

Statistical analysis

Data was analysed by using the Statistical Package for Social Sciences V.22. The frequencies and percentages were calculated to determine the descriptive statistics of the sociodemographic variables. Mean depression and anxiety scores were compared between the participants' sociodemographic characteristic categories using two independent sample t-test/one-way analysis of variance. Scores were categorised, then binary logistics regression analysis was applied, and ORs with 95% CIs were reported to estimate the effects of important covariates on depression and anxiety levels. Multivariate model was adjusted for those covariates whose p values were less than 0.25 in univariate regression model. Statistical significance was considered at a p value less than or equal to 0.05.

Patient and public involvement

None.

RESULTS

The study comprised 2660 participants with a mean ($\pm$ SD) age of 34.3 ($\pm$ 9.1) years. The majority of them were females (n=2618, 98.4%), uneducated (n=1624, 61.1%), married (n=2165, 81.4%) and earned household income less than 20 000 (n=1513, 56.9%). The most common comorbidity among the participants was hypertension (n=774, 29.1%). Overall, mean ($\pm$ SD) score of depression and anxiety was 8.6 ($\pm$ 6.1) and 7.2 ($\pm$ 5.2), respectively. Average depression scores were higher in those participants who were widow/divorced (10.9 $\pm$ 5.4, p value <0.001), students (10.6 $\pm$ 7.4, p value <0.001), used any drug (18.7 $\pm$ 1.9, p value <0.001) and had a history of cardiovascular disease (16.9 $\pm$ 4.6, p value <0.001) than in other respective groups. Age (p value=0.011), BMI (p value=0.002), education level (p value <0.001) and sleeping hours (p value=0.007) were also significantly associated with depression scores. Average anxiety scores were found higher in those participants who used any kind of drug (15.8 $\pm$ 1.5, p value <0.001) and had history

of cardiovascular disease (13.2 $\pm$ 4.5, p value <0.001). Age (p value <0.001), education level (p value <0.001), work status (p value=0.044) and sleeping hours (p value=0.037) were also significantly associated with anxiety scores (table 1).

Depression and anxiety scores were categorised based on the cut-off values of ≥ 5 (mild), ≥ 10 (moderate) and ≥ 15 (severe). Of all participants, 449 (16.9%) were observed with moderate depression and 554 (20.8%) with severe depression, whereas 386 (14.5%) were found to have moderate anxiety and 373 (14.0%) had severe anxiety (table 2).

Binary logistic regression analysis was carried out to estimate the risk of depression (score ≥ 10 vs <10) and anxiety (score ≥ 10 vs <10). Multivariate regression model indicated that those who were widow/divorced were more likely to have depression than those who were single (OR=3.3, 95% CI (2.0 to 5.2)). Students (OR=4.9, 95% CI (2.6 to 9.2)) and self-employed participants (OR=2.9, 95% CI (1.9 to 4.4)) were more likely to have depression as compared with those participants who were employed. Those who were comorbid with cardiac disease (OR=14.5, 95% CI (5.0 to 41.9)) showed more chances of having depression than participants with no other comorbidity. Multivariate logistic regression model for anxiety revealed that students (OR=4.6, 95% CI (2.5 to 8.4)) and unemployed participants (OR=2.4, 95% CI (1.5 to 3.8)) were more likely to have anxiety as compared with those participants who were employed. Similarly, those who had history of cardiac disease (OR=16.1, 95% CI (6.5 to 40.2)) had more chances to be anxious as compared with those who had no other medical condition (table 3).

Distribution of depression and anxiety levels with responses of 'patient referred to any tertiary care facility' was plotted in figures 1 and 2, respectively. The figures depict that participants who were observing mild to severe depression (64.5%) and those who had mild to severe anxiety (83.6%) were referred to any tertiary care facility.

DISCUSSION

The current research examines the mental health problems that bring people to Sehat Kahani clinics. There are 2660 people who have been found to have mental health issues that require treatment. The patient's symptoms were categorised into depression and anxiety using the PHQ-9 and GAD-7 questionnaires. The study's overarching goal was to assess the extent to which members of a socioeconomic group with low income and limited financial means struggle with mental health difficulties. The results of this study confirmed the presence of depressive and anxious conditions. Telepsychiatry has the potential to enhance mental health outcomes and mitigate the burden of such mental health disorders.

The present study showed that out of 2660 participants, the majority were females (2618, 98.4%), married (2165, 81.4%), unemployed (260, 9.8%), housewife (1837, 69.1%) and uneducated (1624, 61.1%) women with

Table 3 Multivariable logistic regression analysis of depression and anxiety by important risk factors

Characteristics	PHQ-9 depression ≥ 10		GAD-7 anxiety ≥ 10	
	OR (95% CI)	P value	OR (95% CI)	P value
Age group, year				
<25	Ref		Ref	
25–34	1.29 (0.94 to 1.78)	0.110	1.62 (1.16 to 2.24)	0.004
35–44	1.43 (1.02 to 1.98)	0.035	1.45 (1.03 to 2.05)	0.034
>45	0.79 (0.53 to 1.16)	0.229	0.61 (0.40 to 0.93)	0.022
BMI, kg/m ²				
Underweight (<18.5)	Ref		–	
Normal weight (18.5–22.9)	1.12 (0.69 to 1.79)	0.637	–	
Overweight (23–27.4)	1.17 (0.74 to 1.87)	0.494	–	
Obese (≥ 27.5)	1.55 (0.97 to 2.47)	0.068	–	
Education level				
No education	Ref		Ref	
Primary	1.68 (1.30 to 2.15)	<0.001	1.79 (1.38 to 2.32)	<0.001
Secondary	0.98 (0.78 to 1.23)	0.870	1.05 (0.83 to 1.33)	0.698
Tertiary	1.13 (0.77 to 1.67)	0.534	0.45 (0.27 to 0.76)	0.003
Marital status				
Single	Ref		–	
Married	1.27 (0.87 to 1.86)	0.207	–	
Widow/divorced/separated	3.27 (2.04 to 5.23)	<0.001	–	
Work status				
Employed	Ref		Ref	
Self-employed	2.88 (1.88 to 4.41)	<0.001	1.61 (1.02 to 2.56)	0.043
Unemployed	1.45 (0.91 to 2.30)	0.121	2.38 (1.49 to 3.81)	<0.001
Student	4.92 (2.63 to 9.18)	<0.001	4.58 (2.48 to 8.43)	<0.001
Housewife	1.67 (1.16 to 2.39)	0.006	1.67 (1.13 to 2.46)	0.011
Comorbidity				
None	Ref		Ref	
Hypertension	1.85 (1.53 to 2.23)	<0.001	2.04 (1.67 to 2.49)	<0.001
Diabetes miletus	0.72 (0.49 to 1.06)	0.095	1.49 (1.03 to 2.17)	0.036
Obesity	1.78 (1.13 to 2.81)	0.013	2.19 (1.37 to 3.49)	0.001
History of cardiac disease	14.54 (5.04 to 41.95)	<0.001	16.15 (6.48 to 40.25)	<0.001
Sleeping hours				
≤ 6	Ref		Ref	
>6	1.30 (1.09 to 1.55)	0.004	1.22 (1.01 to 1.47)	0.040

OR adjusted for variables had p value ≤ 0.250 in univariate analysis.

BMI, body mass index; GAD-7, Generalised Anxiety Disorder-7; PHQ-9, Patient Health Questionnaire-9.

low household income 1513 (56.9%) who were mainly suffering from mental disorder. This result corresponds with the other cross-sectional studies from Kuala Lumpur, Malaysia, where primarily females (71%), married (68.5%) and unemployed (8.6%) women with low socio-demographic status were suffering from anxiety disorder as well.¹⁴

Similarly, the findings of a study conducted in Iran, when comparing the adjusted OR (AOR) of both studies, indicate that a significant number of participants were

women who were married (AOR 1.06), widowed (AOR 1.30), overweight or obese (AOR 1.07) and hypertensive (AOR 1.25). These factors were found to be positively correlated with anxiety, with the exception of hypertension, which did not show any association with depression. In the present study, however, it was observed that being married (AOR 1.27), widowed (AOR 3.27), overweight or obese (AOR 1.17) and hypertensive (AOR 1.85 for depression and AOR 2.04 for anxiety) were associated with both anxiety and depression.¹⁵

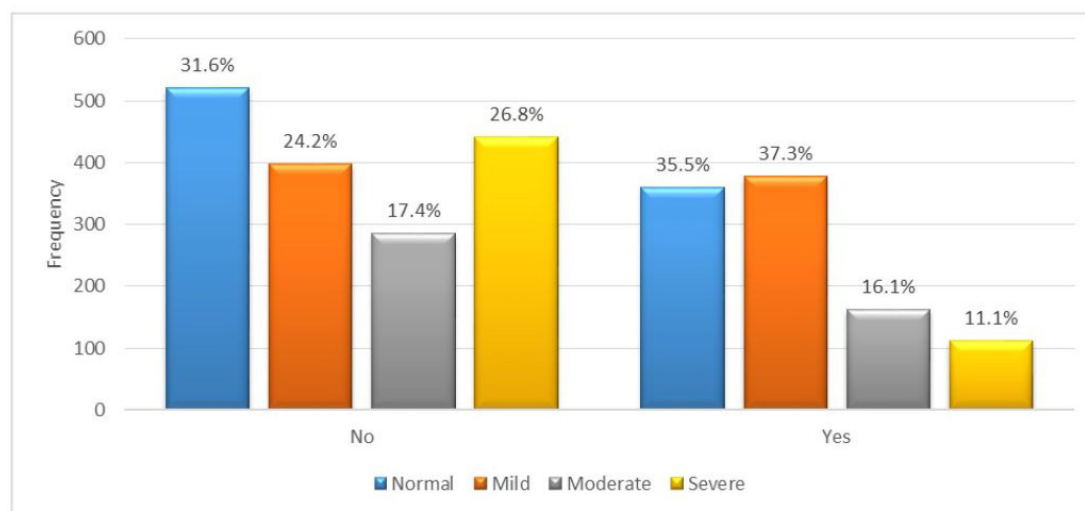


Figure 1 Association of Patient Health Questionnaire-9 depression score categories and patient referred to any tertiary care facility ($\chi^2=115.6$, p value <0.001).

Numerous studies have provided evidence suggesting that the experience of losing a spouse is linked to a range of negative health consequences. These consequences encompass a decline in physical well-being and a deterioration in cognitive and functional health when compared with individuals who are still married. The demise of a spousal partner is often associated with a rapid decline in mental health.^{16 17} This outcome can be attributed to the observation that women tend to experience positive and negative emotions with a higher degree of intensity than that of men.¹⁸

Persistent sleeplessness is the most commonly observed residual symptom among individuals with depression. This symptom is considered a significant predictor of relapse into depression and has the potential to negatively impact clinical outcomes, leading to unsatisfactory results.^{19–22} According to the present study's findings, a significant proportion of the participants, specifically 70.2%, reported experiencing a duration of sleep that

is less than or equal to 6 hours. A study conducted in Tanzania found that 16% of the participants encountered difficulties in sleeping.²³

The result of this current study also found that women who had symptoms of severe anxiety (15–21) were 373 (14.0%) between the age of 25 and 34. This result is consistent with the other research study that women who had symptoms of a severe anxiety disorder (16.6%) suffered at age 34.²⁴

Moreover, the results of this current study showed that overall GAD scores were significantly associated with those women who were unemployed (OR 2.38, 95% CI (1.49 to 3.81)). When compared with the Watterson study, it showed that GAD was higher than the other research study (OR 1.9, 95% CI (1.5 to 2.5)).²⁵

Depression and anxiety are common among substance abusers seeking treatment. In this study, 2.8% of individuals used drugs. Due to their prevalence and negative effects, depression and drug addiction are major

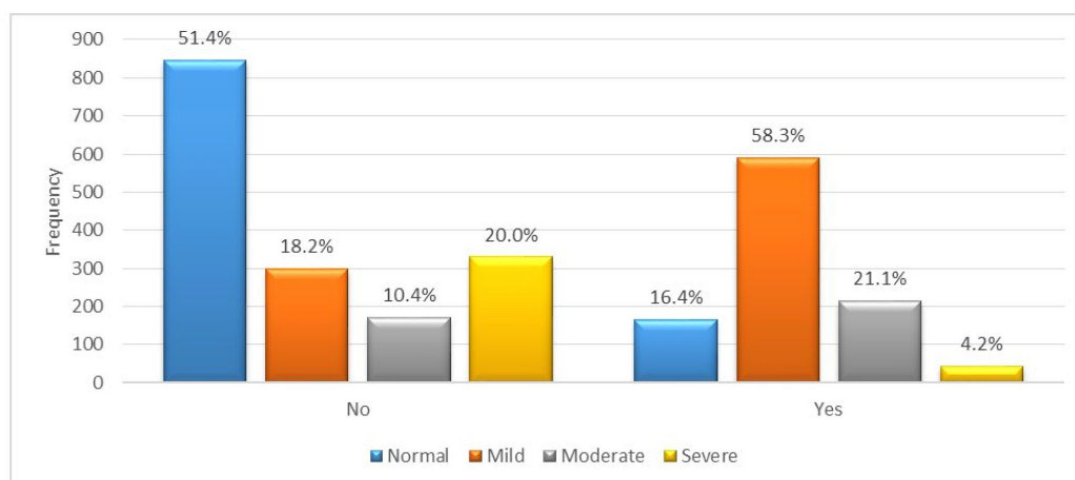


Figure 2 Association of Generalised Anxiety Disorder-7 anxiety score categories and patient referred to any tertiary care facility ($\chi^2=664.1$, p value <0.001).

challenges. Mental health issues and substance misuse often cause severe morbidity, disability and unsatisfactory treatment effects.^{26 27}

Conclusion

The findings of this study provide vital insights into the mental health challenges faced by a substantial portion of the female population. Specifically, the study investigated the potential benefits of telepsychiatry consultation in addressing these challenges. This inquiry pertains to the impact of geographical isolation on mental health within various regions of Pakistan. Furthermore, this can serve as a foundation for policymakers and mental health practitioners to formulate efficacious mental health interventions that specifically address the distinctive requirements of low-income communities where access to mental well-being experts is minimal. It is crucial to conduct additional research and allocate appropriate resources to accurately represent the prevalence of mental health disorders in these regions. Additionally, it is important to implement innovative strategies, such as telepsychiatry, to address the growing demand for mental health interventions within marginalised populations. In order to effectively cater to the requirements of the low-to-middle-income demographic, it is essential to devise customised strategies and interventions.

Limitations

- Anxiety and depression were the only psychiatric conditions looked at in depth; other disorders were not addressed.
- The study relied primarily on demographic information to predict cases of mental illness. Other factors may also play a role in the onset of mental health problems.
- Establishing a strong rapport with a patient constitutes a crucial component in delivering efficacious mental healthcare. Performing psychiatric evaluations in a telepsychiatry context presents additional challenges due to the absence of face-to-face interaction between the patient and the psychiatrist.
- Both questionnaires are self-administered and the patient may not be able or willing to answer the questions accurately and truthfully.

Recommendations

- Raise awareness and promote the use of telepsychiatry. One way to achieve this goal is to make telepsychiatry consultations accessible via government healthcare facilities and provide financial support to mental health specialists who wish to establish such practices.
- Inform the general people about telepsychiatry. Educating the public and medical professionals on the benefits of telepsychiatry constitutes an additional approach.

Author affiliations

¹Public Health & Digital Health, Sehat Kahani C/O Community Innovation Hub, Karachi, Sindh, Pakistan

²Global Health, University of Edinburgh, Edinburgh, UK

³Health Policy and Management, The Aga Khan University, Karachi, Sindh, Pakistan

⁴Department of Community Health Sciences, The Aga Khan University, Karachi, Sindh, Pakistan

⁵Public Health, Health Services Academy, Islamabad, Punjab, Pakistan

⁶Public Health, Ziauddin Medical University, Karachi, Sindh, Pakistan

⁷Public Health, Dow University of Health Sciences, Karachi, Sindh, Pakistan

Acknowledgements Umar Farooq (Tech Valley Pakistan) for support. Management of Dadar Mansehra Mental Hospital, for enabling us for setting telemedicine clinics. Dr Waseema Sheikh for facilitation of Sehat Kahani clinic. To all the patient advisors.

Contributors IZA developed the study's framework and methodology. Data was gathered and organised by MK and MM. SH did the analysis and interpretation. The manuscript was initially drafted by IZA and MK and finished by MM. The manuscript was edited for clarity and accuracy by SSK and KS. IZA, as guarantor, IZA accepts the full responsibility of work and/or the conduct of the study. All authors have critically reviewed and approved the final draft.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval Ethical approval was given by Dow University of Health Sciences, Karachi IRB reference number IRB-2220/DUHS/2021. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Iffat Zafar Aga <http://orcid.org/0009-0002-3621-6922>

Mahek Karim <http://orcid.org/0009-0003-8300-9210>

Muhammad Muzzamil <http://orcid.org/0000-0001-9871-5837>

REFERENCES

- 1 Ansari I. Mental health Pakistan: optimizing brains. *Int J Emerg Ment Health* 2015;17:288.
- 2 Sharpe I, Davison CM. Climate change, climate-related disasters and mental disorder in low-and middle-income countries: a Scoping review. *BMJ Open* 2021;11:e051908.
- 3 Administrator. WHO Pakistan celebrates World Mental Health Day. World Health Organization - Regional Office for the Eastern Mediterranean, Available: <http://www.emro.who.int/pak/pakistan-news/who-pakistan-celebrates-world-mental-health-day.html>
- 4 World Health Organization. WHO MiNDbank - WHO-AIMS Report on Mental Health System in Pakistan. WHO MiNDbank - WHO-AIMS Report on Mental Health System in Pakistan. Available: <https://extranet.who.int/mindbank/item/1305>
- 5 Ali NA, Khoja A. Digital innovation: Telepsychiatry for measuring psychiatric disorders. *J Coll Physicians Surg Pak* 2020;30:233-4.
- 6 Fortney JC, Pyne JM, Turner EE, et al. Telepsychiatry integration of mental health services into rural primary care settings. *Int Rev Psychiatry* 2015;27:525-39.
- 7 Hilty DM, Rabinowitz T, McCarron RM, et al. An update on Telepsychiatry and how it can leverage collaborative, stepped, and integrated services to primary care. *Psychosomatics* 2018;59:227-50.
- 8 Hilty DM, Sunderji N, Suo S, et al. Telepsychiatry and other technologies for integrated care: evidence base, best practice models and competencies. *Int Rev Psychiatry* 2018;30:292-309.

- 9 Ratzliff A, Sunderji N. Tele-behavioral health, collaborative care, and integrated care: learning to leverage scarce psychiatric resources over distance, populations, and time. *Acad Psychiatry* 2018;42:834–40.
- 10 Sanchez Gonzalez ML, McCord CE, Dopp AR, et al. Telemental health training and delivery in primary care: A case report of Interdisciplinary treatment. *J Clin Psychol* 2019;75:260–70.
- 11 Waugh M, Calderone J, Brown Levey S, et al. Using telepsychiatry to enrich existing integrated primary care. *Telemed J E Health* 2019;25:762–8.
- 12 Greenwood H, Krzyzaniak N, Peiris R, et al. Telehealth versus face-to-face psychotherapy for less common mental health conditions: systematic review and meta-analysis of randomized controlled trials. *JMIR Ment Health* 2022;9:e31780.
- 13 Junaid Tahir M, Waheed S, Ullah I, et al. Telepsychiatry and mental Healthcare referrals: recommendations for low-and middle-income countries. *Perspect Psychiatr Care* 2021;57:2035–6.
- 14 Lugova H, Andoy-Galvan JA, Patil SS, et al. Prevalence and associated factors of the severity of depression, anxiety and stress among low-income community-dwelling adults in Kuala Lumpur, Malaysia. *Community Ment Health J* 2021;57:1489–98.
- 15 Najafipour H, Shahrokhbabadi MS, Banivaheb G, et al. Trends in the prevalence and incidence of anxiety and depressive symptoms in Iran: findings from KERCADRS. *Fam Med Community Health* 2021;9:e000937.
- 16 Jadhav A, Weir D. Widowhood and depression in a cross-national perspective: evidence from the United States, Europe, Korea, and China. *The Journals of Gerontology* 2018;73:e143–53.
- 17 Vable AM, Subramanian SV, Rist PM, et al. “Does the “widowhood effect” precede spousal bereavement? results from a nationally representative sample of older adults”. *Am J Geriatr Psychiatry* 2015;23:283–92.
- 18 Veytia-López M, Calvete E, Sánchez-Álvarez N, et al. Relationship between stressful life events and emotional intelligence in Mexican adolescents: male vs. female comparative study. *Salud Ment* 2019;42:261–8.
- 19 Jaussent I, Bouyer J, Ancelin M-L, et al. Insomnia and daytime Sleepiness are risk factors for depressive symptoms in the elderly. *Sleep* 2011;34:1103–10.
- 20 Lauer CJ, Schreiber W, Holsboer F, et al. In quest of identifying vulnerability markers for psychiatric disorders by all-night Polysomnography. *Arch Gen Psychiatry* 1995;52:145–53.
- 21 Hinkelmann K, Moritz S, Botzenhardt J, et al. Changes in Cortisol secretion during antidepressive treatment and cognitive improvement in patients with major depression: a longitudinal study. *Psychoneuroendocrinology* 2012;37:685–92.
- 22 Benca RM, Peterson MJ. Insomnia and depression. *Sleep Med* 2008;9 Suppl 1:S3–9.
- 23 Smith Fawzi MC, Ngakongwa F, Liu Y, et al. Validating the patient health Questionnaire-9 (PHQ-9) for screening of depression in Tanzania. *Neurology, Psychiatry and Brain Research* 2019;31:9–14.
- 24 Terlizzi EP, Villarroel MA. *Symptoms of generalized anxiety disorder among adults: United States 2019*. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2020.
- 25 Watterson RA, Williams JVA, Lavorato DH, et al. Descriptive epidemiology of generalized anxiety disorder in Canada. *Can J Psychiatry* 2017;62:24–9.
- 26 Begg S, Vos T, Barker B, et al. *The burden of disease and injury in Australia*. 2003.
- 27 Najt P, Fusar-Poli P, Brambilla P. Co-occurring mental and substance abuse disorders: a review on the potential predictors and clinical outcomes. *Psychiatry Res* 2011;186:159–64.