


# BMJ Open Prevalence of anxiety and depressive symptoms and their association with multimorbidity and demographic factors: a community-based, cross-sectional survey in Karachi, Pakistan

Salima Farooq,<sup>1</sup> Tahir Khan ,<sup>2</sup> Sidra Zaheer,<sup>2</sup> Kashif Shafique<sup>2,3</sup>

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<sup>1</sup>Institute of Nursing, Aga Khan University Faculty of Health Sciences, Karachi, Pakistan

<sup>2</sup>School of Public Health, Dow University of Health Sciences, Karachi, Pakistan

<sup>3</sup>Institute of Health and Wellbeing, University of Glasgow, Glasgow, UK

## Correspondence to

Dr Tahir Khan;  
tahir.khan@duhs.edu.pk

## ABSTRACT

**Objective** This study aimed to estimate the prevalence of anxiety and depressive symptoms and their association with multimorbidity and the demographic characteristics of adults aged 30 years and above in Karachi, Pakistan.

**Design** Observational cross-sectional study.

**Study setting and participants** The study was carried out among a general population aged 30 years and above residing in the Gulshan-e-Iqbal town of Karachi, Pakistan. The study participants were recruited using the systematic random sampling approach based on the inclusion criteria. The data collected from 2867 participants were analysed.

**Main outcome measures** The primary outcome of the study was the prevalence of anxiety and depressive symptoms, measured with the Aga Khan University Anxiety Depression Scale. The secondary outcome was the association of anxiety and depressive symptoms with multimorbidity as well as with the sociodemographic characteristics of the participants, using binary logistic regression.

**Results** Out of 2867 individuals, 27.4% reported having anxiety and depressive symptoms. The multivariate logistic regression model revealed that the presence of multimorbidity (adjusted OR (AOR)=1.33, 95% CI 1.11 to 1.58), female gender (AOR=2.40, 95% CI 2.01 to 2.87), illiteracy (AOR=1.51, 95% CI 1.09 to 2.07), more children (AOR=0.74, 95% CI 0.59 to 0.93) and visiting a faith healer (AOR=2.29, 95% CI 1.82 to 2.88) were the significant factors associated with anxiety and depressive symptoms.

**Conclusion** This study revealed a moderately high prevalence of anxiety and depressive symptoms among adults aged 30 years and above in Karachi, Pakistan. The key variables associated with anxiety and depressive symptoms were multimorbidity, female gender, lower level of education, more children and visiting faith healers.

## INTRODUCTION

Mental illness, anxiety and depressive symptoms are major public health issues. Globally, 14% of people suffer from mental illnesses.<sup>1</sup> More than three-quarters of these people belong to low-income and middle-income countries.<sup>2</sup> The magnitude of anxiety and

## Strengths and limitations of this study

- The study sample was a large, community-based, ethnically and socioeconomically diverse group of population.
- A validated screening tool (Aga Khan University Anxiety Depression Scale) assessed the presence of anxiety and depressive symptoms, which enhanced the internal validity of the research.
- Inferences could not be drawn on causality of associations due to the nature of the design.
- The study data were self-reported; hence, the results should be interpreted cautiously.

depression is on the rise among the general population. Additionally, individuals with chronic diseases are at even higher risk of developing anxiety and depressive symptoms.<sup>3-6</sup> In fact, depression has been ranked as the fourth leading cause of disease burden.<sup>7</sup> Moreover, it is predicted that by the year 2020, it will be the second leading cause of disability and death, after cardiovascular disorders.<sup>7-10</sup>

Multimorbidity is the co-occurrence of two or more chronic diseases, such as cancer, diabetes, hypertension, stroke, asthma, heart disease, arthritis or osteoporosis, within an individual.<sup>9 11 12</sup> Research studies suggest that one in four adults in developed countries has multimorbidity.<sup>13 14 15</sup> One study claims that 52% of people, between the ages of 21 and 84 years, are suffering from multimorbidity,<sup>16</sup> whereas a study conducted by Garin *et al*<sup>17</sup> in 2014 found a burden of 67% multimorbidity among elderly Spanish women. Furthermore, among developing countries, in Bangladesh, the prevalence of multimorbidity is 53.8% among older adults,<sup>11</sup> and in India the burden of multimorbidity is at 22%,<sup>18</sup> while among the Pakistani population aged

18 years and older it was reported at 4.9%.<sup>19</sup> Thus, the prevalence of multimorbidity varies from 4.9% to 67% in various countries.<sup>19–21</sup>

The reasons for the variation in prevalence could be due to differences in the definition of multimorbidity, number of chronic conditions included in the studies, diagnostic criteria for medical conditions, as well as the study's sample size and population characteristics. Literature suggests that the prevalence of multimorbidity increases with age,<sup>12 22</sup> and this burden is reported to be more common in women. Additionally, individuals living in underprivileged areas are at a higher risk of developing multimorbidity.<sup>23</sup>

Healthcare providers often face challenges when dealing with clients who have multimorbidity, along with anxiety and depressive symptoms.<sup>24 25</sup> As multimorbidity conditions such as diabetes, hypertension, stroke, asthma, arthritis and osteoporosis have synergistic effects with anxiety and depression, they increase the probability of disabilities among patients.<sup>3</sup> Moreover, individuals with multimorbidity need to deal with multiple treatment recommendations.<sup>6</sup> In addition, the presence of anxiety and depression with multimorbidity leads to increased utilisation of healthcare facilities. This consequently leads to financial healthcare burden and poorer health outcomes.<sup>2 13 26 27</sup> Thus, anxiety and depression, with multimorbidity, are linked with a 50%–100% increase in the utilisation of health services and cost.<sup>28</sup>

Anxiety and depression are extremely common and alarmingly underdiagnosed healthcare problems especially in low-income and middle-income countries. In addition, they are associated with social stigma and self-stigma, which act as a barrier to the mental help-seeking behaviour of individuals suffering from mental health issues, which leads to an even greater public health concern. Furthermore, anxiety and depression are specifically reported to be common in individuals with multimorbidity.<sup>3 6</sup> However, the studies that report these associations have mostly been conducted in high-income countries. To the best of our knowledge, no such population-based study has been reported from Pakistan as yet. In a resource-limited setting like Pakistan, underdiagnosis of mental illnesses can cause potential delay in the initiation of treatment. Hence, it is of utmost importance that anxiety and depression be screened in adults suffering from multimorbidity in order to reduce the burden of complications and suboptimal adherence to the treatment of multimorbidity conditions. Moreover, due to scarcity of literature from Pakistan, quantification of the association between anxiety and depression and multimorbidity within the Pakistani population is an urgent need. In this study, it was hypothesised that there is an association between anxiety and depressive symptoms and multimorbidity among the Pakistani population. Therefore, the purposes of this study were to estimate the prevalence of anxiety and depressive symptoms and to determine their association with multimorbidity

and demographic factors among adults aged 30 years and above in Karachi, Pakistan.

## METHODOLOGY

This study was part of a larger community-based research project titled 'The Burden of Multimorbidity, Its Patterns and Consequences on Health and Well-Being: The IMPACT Study', conducted in 2015–2016.

### Study design

An observational cross-sectional study was conducted to estimate the burden of anxiety and depressive symptoms, and to identify their associated factors.

### Study population

The study population comprised all adults aged 30 years and above living in the Gulshan-e-Iqbal town of Karachi, Pakistan. This particular age group was selected as chronic medical conditions are more prevalent in this group.

### Inclusion criteria

The study included all persons aged 30 years and above who were residents of the Gulshan-e-Iqbal town of Karachi, Pakistan, and who signed the consent form to take part in the study.

### Sample size calculation

To meet the objective of this study, the sample size was calculated using an online version of the OpenEpi calculator. The prevalence of anxiety and depression is reported to be 30%–50% among adults in Pakistan.<sup>29 30</sup> With a 2% margin of error and 95% confidence level, the required sample size was 2401 participants. Similarly, to attain the secondary objective (association of anxiety and depressive symptoms with multimorbidity), keeping CI at 95%, with 90% power, 1:1 ratio of non-depressed and depressed individuals, OR of 1.55, and with proportion of multimorbidity among non-depressed taken as 10%,<sup>31</sup> the required sample size was 2148 individuals. In order to account for missing values, the higher sample size (2401) was chosen. Ultimately, 3250 individuals were recruited for data collection.

### Sampling technique

The present study was conducted in the Gulshan-e-Iqbal town of Karachi, Pakistan. A sample of 3250 participants were recruited using the systematic random sampling technique. This sample was achieved using proportionate estimates of the number of individuals in 13 union councils (UCs) in the selected town. The proportionate allocation method was used in order to allocate appropriate weightage to each UC. Within each UC, blocks of houses were selected with a random start, where every 109th (kth sampling interval) household was selected. Individuals within these households who met the eligibility criteria were included in the study.

## Data collection

Data were collected from participants by interviews using a structured questionnaire; the questionnaire was developed after a thorough literature review. The questionnaire was designed to collect data related to sociodemographic information including age, gender, marital status, educational status, employment status, mother tongue, number of family members and information about housing, presence of any chronic disease, and living conditions of each participant. Participants were interviewed by trained data collectors. Anthropometric measurements as well as blood pressure were measured by trained health professionals, which mainly included doctors and nurses, who were involved in data collection.

## Dependent variable

The Aga Khan University Anxiety Depression Scale (AKUADS) was used to assess the anxiety and depressive symptoms of the participants. This study used the Urdu version of the AKUADS, which had been validated in a previous research.<sup>32</sup> The value of the reliability coefficient tool in the study population was 0.93. This tool had a total of 25 questions, and for each of the questions the participants could choose an answer from never (scored as 0), sometimes (scored as 1), often (scored as 2) and always (scored as 3). A cumulative cut-off score of 20 or greater on this scale was used to label anxiety and depression. At a cut-off score of 20, the AKUADS had a sensitivity of 66% and a specificity of 79%.<sup>32 33</sup>

## Independent variables

The presence of disease was assessed by a combination of self-reported diagnosis, medication use and laboratory findings. Self-reported disease was determined by the question 'Have you ever been told by a doctor, nurse, or other health professional that you have hypertension, obesity, dyslipidemia, diabetes, heart diseases (Myocardial Infarction and/or chronic ischemic heart diseases), stroke, migraines, asthma and chronic obstructive pulmonary disease [COPD], anemia, thyroid disease, diseases of bones and joints, dyspepsia/peptic ulcer, hepatitis B or C, chronic kidney diseases including stones, cancer, and/or disability?'

Individuals with two or more chronic diseases (excluding anxiety and depression) were labelled as having 'multimorbidity', and others who reported one or no chronic medical disease were considered as having 'no multimorbidity'. Set criteria were used to define chronic diseases, such as hypertension, obesity, diabetes and dyspepsia. A person was said to be hypertensive if they had a high systolic blood pressure (>140 mm Hg) or a high diastolic blood pressure (>90 mm Hg). A person was considered obese if they had a calculated body mass index  $\geq 30.0$  kg/m<sup>2</sup>. A person was said to be diabetic if blood glucose level was  $\geq 200$  mg/dL. A person was considered to have dyspepsia if they had four or more symptoms of dyspepsia for at least 6 months, based on the Leeds Dyspepsia Questionnaire.

Besides disease-related variables, other sociodemographic variables were also measured, such as household income, occupation and education. This variable was initially taken as continuous variable, such as what is your monthly income (in Pakistani rupees). Then it was further classified into quintiles, that is, <16 000, 16 001–24 999, 25 000–39 999, 40 000–54 999 and 55 000 rupees and above. The occupation of all the participants was also assessed as a categorical variable and categorised as unemployed, unskilled worker, skilled worker, labour worker, non-manual worker and professional office job. Data on education were collected as the total number of years of full education, which were then categorised into five categories: no education (0 years or those who never attended school), primary (1–5 years), secondary (6–10 years), higher education (11–14 years) and postgraduate ( $\geq 15$  years).

## Statistical analysis

Variables were precoded and data were entered and analysed in SPSS V.19.0. Descriptive statistics were calculated in the form of frequencies and percentages for categorical variables. Descriptive statistics were calculated in order to estimate the prevalence of anxiety and depressive symptoms. Univariate and multivariate binary logistic regressions were used to assess the associations between anxiety and depressive symptoms and multimorbidity. ORs and their 95% CIs were also calculated. The multivariate model was adjusted only for variables with p values <0.250 in univariate analysis, using a stepwise logistic regression method, following the Hosmer and Lemeshow protocol.<sup>34</sup> Moreover, this manuscript followed the cross-sectional reporting guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology.<sup>35</sup>

## Patient and public involvement

In the current study, patients were not involved in the research question, study design, outcome measures and recruitment.

## RESULTS

A total of 3250 participants were interviewed. However, the data were analysed using information from 2867 study participants. Of the total, 383 participants were excluded due to missing information on the following variables: anxiety and depression symptoms (n=06), presence of multimorbidity (n=09), respondents' age (n=06), gender (n=08), education (n=48), income (n=81), occupation (n=72), marital status (n=05), number of children (n=67), ethnicity (n=09), home status (n=14), smoking status (n=66) and visiting faith healer (n=93).

The mean age of the 2867 study participants was 45.5 years (SD  $\pm 11.7$  years). The male to female ratio was approximately equal, 51.5% (n=1477) male and 48.5% (n=1390) female. Regarding the educational level of the participants, 14% (n=404) had no formal education, 38.3% (n=1098) had higher education and 20.4%



(n=585) had postgraduate education. In addition, 22.3% (n=638) reported their monthly household income to be less than 16000 rupees, while 18.2% (n=523) claimed their monthly income to be more than 55000 rupees. The majority of participants (42%, n=1205) had professional jobs, 14% (n=389) were labourers and 17% (n=484) were unemployed. Anxiety and depressive symptoms and multimorbidity were reported by 27.4% (n=786) and 50.2% (n=1440) of the study participants, respectively. The sociodemographic and other characteristics of the participants are shown in [table 1](#).

The adjusted model revealed that participants who had multimorbidity had 33% increased odds of being anxious and depressed (adjusted OR (AOR)=1.33, 95% CI 1.11 to 1.58), as compared with those who did not report multimorbidity. Moreover, the odds of having anxiety and depressive symptoms were 2.40 times higher among female participants, as compared with male participants (AOR=2.40, 95% CI 2.01 to 2.87), and the odds of having anxiety and depressive symptoms were 51% higher among participants who had no formal education (AOR=1.51, 95% CI 1.09 to 2.07), as compared with participants who had postgraduate education. Furthermore, the odds of being anxious and depressed were 1.34 times higher among participants who did labour work as compared with participants who were doing professional office jobs (AOR=1.34, 95% CI 1.00 to 1.79). Also, study participants who had one to two children were at 32% reduced odds (AOR=0.68, 95% CI 0.56, 0.84) and those who had more than two children were at 26% reduced odds (AOR=0.74, 95% CI 0.59 to 0.93) of having anxiety and depressive symptoms, as compared with participants who had no children. Furthermore, subjects belonging to the Punjabi ethnicity (AOR=1.66, 95% CI 1.16 to 2.37) had 66% increased odds of being anxious and depressed as compared with Sindhi subjects. In addition, in subjects who were visiting a faith healer, the odds of exhibiting anxiety and depressive symptoms were 2.29 times (AOR=2.29, 95% CI 1.82 to 2.88), as compared with participants who did not visit a faith healer ([table 2](#)).

[Table 3](#) shows the estimated association of anxiety and depressive symptoms and the number of chronic diseases. The anxiety and depressive symptoms were significantly associated with increasing number of chronic diseases. The odds of anxiety and depressive symptoms were highest among individuals with four chronic diseases (AOR=1.92, 95% CI 1.33 to 2.78) and more than four chronic diseases (AOR=2.62, 95% CI 1.66 to 4.13), as compared with healthy individuals, when adjusted for other variables ([table 3](#)).

## DISCUSSION

This study showed that nearly a quarter of the study participants had symptoms of anxiety and depression. Moreover, it illustrated that the presence of multimorbidity, female gender, lower level of education, more children,

**Table 1** Sociodemographic and other characteristics of participants (N=2867)

Characteristics	n (%)
<b>Anxiety and depressive symptoms</b>	
No	2081 (72.6)
Yes	786 (27.4)
<b>Presence of multimorbidity</b>	
No	1427 (49.8)
Yes	1440 (50.2)
<b>Age (years)</b>	
30–39	1062 (37.0)
40–49	816 (28.5)
50–59	570 (19.9)
60–69	293 (10.2)
≥70	126 (4.4)
<b>Gender</b>	
Male	1477 (51.5)
Female	1390 (48.5)
<b>Education</b>	
No education	404 (14.1)
Primary	133 (4.6)
Secondary	647 (22.6)
Higher/graduate	1098 (38.3)
Postgraduate	585 (20.4)
<b>Income (rupees)</b>	
<16000	638 (22.3)
16001–24 999	426 (14.9)
25000–39 999	636 (22.2)
40000–54 999	644 (22.5)
>55000	523 (18.2)
<b>Occupation</b>	
Unemployed	484 (16.9)
Unskilled worker	243 (8.5)
Skilled worker	250 (8.7)
Labour work	389 (13.6)
Non-manual work	296 (10.3)
Professional office job	1205 (42)
<b>Marital status</b>	
Never married	272 (9.5)
Currently married	2437 (85.0)
Widowed/separated/divorced	158 (5.5)
<b>Number of children</b>	
No child	1250 (43.6)
1–2	974 (34.0)
3 and above	643 (22.4)
<b>Ethnicity</b>	
Sindhi	402 (14.0)

Continued

**Table 1** Continued

Characteristics	n (%)
Punjabi	318 (11.1)
Balochi	94 (3.3)
Pashtu	176 (6.1)
Urdu	1534 (53.5)
Others	343 (12.0)
Home status	
Own	1595 (55.6)
Rent	1155 (40.3)
Other arrangement	117 (4.1)
Smoking status	
No	2323 (81.0)
Yes	544 (19.0)
Visiting faith healer	
No	2471 (86.2)
Yes	396 (13.8)

ethnicity and visiting a faith healer were significantly associated with anxiety and depressive symptoms.

The current study used a screening tool (AKUADS) to assess the presence of anxiety and depressive symptoms. According to the findings, the overall prevalence of anxiety and depressive symptoms was 27.4%. This has previously been reported to be around 10% and 44% in developed and developing countries, respectively.<sup>36 37</sup> Islam *et al.*<sup>38</sup> in their study conducted in 2003, found a 28% prevalence of depression among the Bangladesh population. In the USA, the prevalence of anxiety and depression was reported to be 16.2%.<sup>39</sup> Papadopoulos *et al.*<sup>40</sup> reported that the prevalence of depression in Greece was 27%, whereas in India the prevalence of depression was found to be 28%.<sup>41</sup> However, in Pakistan, the prevalence of depression and anxiety has been found to be around 30%–50%.<sup>29 36 37 42</sup> A plausible reason for the difference in the prevalence of anxiety and depression could be different inclusion criteria, sample sizes, recruitment methods, various screening tools and cut-off points that were employed in these diverse studies.<sup>21</sup>

In the past decade, several research studies have established a strong relationship between anxiety and depression and multimorbidity.<sup>46 9 31</sup> The findings of the present study were in concurrence with the previous studies showing a significant association between anxiety and depression and multimorbidity.<sup>6 9 43–46</sup> A probable reason could be that mental illness is linked with unhealthy habits, such as smoking, poor self-care, lack of physical activities and poor medication compliance.<sup>44 47</sup>

In the present study, anxiety and depressive symptoms were found to be strongly associated with women. The prevalence of anxiety and depressive symptoms was found to be 2.5 times higher in women than in men. Likewise, previous studies have also revealed a positive association

**Table 2** Univariate and multivariate analyses of factors associated with anxiety and depressive symptoms among adults (N=2867)

Characteristics	Anxiety and depressive symptoms			
	COR	95% CI	AOR	95% CI
Presence of multimorbidity				
No	1		1	
Yes	1.39	1.18 to 1.64	1.33	1.11 to 1.58
Age (years)				
30–39	1		–	
40–49	0.95	0.77 to 1.77	–	
50–59	1.14	0.92 to 1.40	–	
60–69	1.02	0.78 to 1.40	–	
≥70	1.26	0.85 to 1.88	–	
Gender				
Male	1		1	
Female	2.58	2.17 to 3.05	2.40	2.01 to 2.87
Education				
Postgraduate	1		1	
Higher/graduate	0.89	0.71 to 1.13	0.86	0.67 to 1.09
Secondary	1.15	0.89 to 1.48	1.05	0.78 to 1.40
Primary	1.22	0.81 to 1.85	1.11	0.70 to 1.77
No education	1.95	1.48 to 2.57	1.51	1.094 to 2.07
Income (rupees)				
>55 000	1		–	
40 000–54 999	0.91	0.69 to 1.17	–	
25 000–39 999	0.99	0.76 to 1.28	–	
16 001–24 999	1.08	0.81 to 1.43	–	
<16 000	1.02	0.79 to 1.32	–	
Occupation				
Professional office job	1		1	
Non-manual work	0.78	0.58 to 1.06	0.81	0.58 to 1.13
Labour work	1.22	0.95 to 1.57	1.34	1.00 to 1.79
Skilled worker	1.15	0.85 to 1.55	1.29	0.93 to 1.78
Unskilled worker	1.17	0.87 to 1.59	1.06	0.75 to 1.48
Unemployed	0.85	0.71 to 1.14	0.90	0.68 to 1.18
Marital status				
Currently married	1		1	
Never married	0.78	0.58 to 1.05	0.87	0.62 to 1.17
Widowed/separated/divorced	1.45	1.03 to 2.03	1.02	0.72 to 1.48
Number of children				
No child	1		1	
1–2	0.68	0.56 to 0.83	0.68	0.56 to 0.84
3 and above	0.84	0.68 to 1.04	0.74	0.59 to 0.93
Ethnicity				
Sindhi	1		1	
Punjabi	1.84	1.31 to 2.58	1.66	1.16 to 2.37
Balochi	1.26	0.74 to 2.14	1.32	0.76 to 2.30
Pashtu	1.68	1.12 to 2.51	1.39	0.90 to 2.13

Continued

**Table 2** Continued

Characteristics	Anxiety and depressive symptoms			
	COR	95% CI	AOR	95% CI
Urdu	1.45	1.11 to 1.89	1.35	1.00 to 1.81
Others	1.84	1.32 to 2.56	1.52	1.07 to 2.17
Home status				
Own	1		–	
Rent	0.96	0.81 to 1.14	–	
Other arrangement	0.70	0.44 to 1.10	–	
Smoking status				
No	1		–	
Yes	0.80	0.65 to 1.00	–	
Visiting faith healer				
No	1		1	
Yes	2.44	1.96 to 3.03	2.29	1.82 to 2.88

For AOR, only variables with p value <0.250 in univariate analysis were entered into adjusted model using stepwise selection (presence of multimorbidity, gender, education, occupation, marital status, number of children, ethnicity and visiting faith healer).  
AOR, adjusted OR; COR, unadjusted OR.

between anxiety, depression and gender. A research conducted by Mirza and Jenkins<sup>42</sup> found that the prevalence of anxiety and depressive symptoms was 29%–66% among women, as compared with 10%–33% in men. Plausible reasons for the higher prevalence of anxiety and depression among women could be biological factors, socioeconomic disadvantages, deprivation of social status, maladaptive coping styles and lack of a support system for women in our country.<sup>48</sup>

The current study also found illiteracy as one of the potential risk factors among participants. Similarly,

**Table 3** Univariate and multivariate analyses of anxiety and depressive symptom with number of chronic diseases among adults (N=2867)

Characteristics	n (%)	Anxiety and depressive symptoms			
		COR	95% CI	AOR	95% CI
Number of chronic diseases					
None	152 (24.6)	1		1	
1	192 (23.7)	0.95	0.74 to 1.21	0.89	0.69 to 1.14
2	181 (25.5)	1.05	0.81 to 1.34	0.98	0.76 to 1.27
3	134 (29.8)	1.30	0.99 to 1.71	1.20	0.90 to 1.59
4	76 (42.2)	2.24	1.58 to 3.17	1.92	1.33 to 2.78
5+	51 (50.0)	3.06	1.99 to 4.70	2.62	1.66 to 4.13

AOR for all variables with p value <0.250 in univariate analysis (age, gender, education, occupation, marital status, number of children, ethnicity, home status, smoking status and visiting faith healer).  
AOR, adjusted OR; AOR, Adjusted Odds Ratio; COR, Crude/unadjusted Odds Ratio.

previous studies have found a strong association between low levels of education and anxiety and depressive symptoms.<sup>49 50</sup> Among the literate population, education could be one of the factors that facilitate adaptive coping skills, and enables them to deal with distress situations and in improving their self-confidence, self-efficacy, social skills building and developing a sense of control over the environment.<sup>51</sup>

According to the findings of the current study, participants who bore more children were less likely to develop anxiety and depressive symptoms. The plausible reason could be that parents tend to be positively engaged with their children and to be bound with their lives by giving them continuous love, time, support and commitment, which can all be coping strategies against distress. Having more children can also act as a buffer, considering the cultural dimension of the South Asian population where older children provide and ensure financial security for the family.<sup>52</sup> Moreover, they also perform the role of a caretaker and/or may help with family household chores. This provides positive hope to the family that their future financial and social security are guaranteed and thus decreases anxiety and depression. In contrast, other studies have found that having more children is a risk factor for anxiety and depression among women.<sup>49 53</sup>

Our study also revealed that ethnicity of a participant is linked with anxiety and depressive symptoms. Subjects who were Punjabi were more likely to have anxiety and depressive symptoms. Consistent findings have been reported by previous studies that ethnicity was a significant risk factor for depression.<sup>54 55</sup> However, another study reported no association between these variables.<sup>53</sup>

A notable finding of the present study was that visiting a faith healer was positively associated with anxiety and depression in both genders. In the Pakistani culture, distressed individuals generally seek help from traditional healers or faith healers prior to visiting a doctor or a psychiatrist for their illness. A few probable reasons why people visit faith healers could be easy accessibility, availability and affordability, cultural beliefs, and the predominant stigma attached to the notion of mental illness.<sup>53 56</sup> Moreover, in Pakistan, many people believe that mental illnesses are due to wrongdoings, being possessed, witchcraft and evil spirits; hence, the affected population consults these faith healers rather than doctors. Our result is consistent with a past study where it was reported that 16% of the Pakistani population first approach faith healers for their illness.<sup>57</sup>

### Strengths and limitations

This is probably the first research that has determined an association between anxiety and depressive symptoms and multimorbidity among Pakistani population. Due to the cross-sectional nature of the study, inferences could not be determined on the causality of the relationship. Potential risk factors such as family history of psychiatric disorders, marital dissatisfaction, domestic violence, maladaptive coping, current life stressors and death of a

loved one could not be addressed in the current study. Moreover, this study was based on self-reported information about multimorbidity and anxiety and depression.

## CONCLUSION

This study suggests that almost a quarter of the study population had anxiety and depressive symptoms. Among women, anxiety and depressive symptoms are twice as common as compared with men. Early prevention through screening is the key measure for preventing the rising burden of mental disorders and their association with chronic physical conditions. Therefore, there is a dire need to create awareness regarding identification of symptoms of mental illness and to develop a proper referral system for essential treatment at the early stage of the disease, to avoid delayed presentation when the disease is more advanced.

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**Patient consent for publication** Not required.

**Ethics approval** The study's proposal was approved by the Institutional Review Board (IRB) of the Dow University of Health Sciences (reference number: IRB-554/DUHS/Approval/2015/04). Only individuals who provided written informed consent were interviewed. A referral plan for counselling was made for participants who scored 20 and above on the AKUADS.

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**Data availability statement** Data are available upon reasonable request by the corresponding author.

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## ORCID iD

Tahir Khan <http://orcid.org/0000-0002-0281-7650>

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