

Prevalence of Anxiety Levels Among Hospitalized Patients with Chronic Diseases in Aden, Yemen: A Cross-Sectional Study

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Abstract

Background: The rising prevalence of chronic non-communicable diseases (NCDs) poses a significant global health challenge, with comorbid psychiatric disorders, particularly anxiety, compounding the physical burden. In conflict-affected settings like Yemen, the intersection of chronic morbidity and mental health has reached a critical stage. This study aimed to determine the prevalence and severity of anxiety among patients with chronic diseases in Aden, Yemen, and identify associated demographic and clinical predictors.

Methods: A hospital-based cross-sectional study was conducted from March to July 2026 at four major referral hospitals in Aden, Yemen. A total of 196 adult patients (aged ≥ 18 years) diagnosed with at least one chronic condition for a minimum of six months were enrolled using a disproportional stratified cluster sampling technique. Anxiety was assessed using the validated Arabic version of the Generalized Anxiety Disorder-7 (GAD-7) scale. Data were analyzed using SPSS version 26, employing descriptive statistics, chi-square tests, independent t-tests, one-way ANOVA, multiple logistic regression, multiple linear regression, ANCOVA, Kaplan-Meier survival analysis, and factor analysis.

Results: The overall prevalence of anxiety was 83.7% (n=164), with 35.2% mild, 26.5% moderate, and 21.9% severe anxiety. Female participants reported significantly higher anxiety scores than males (mean difference = 1.99, $p = 0.010$). Multiple logistic regression revealed that female sex (OR = 3.43, 95% CI: 1.53-7.69, $p = 0.003$) and the number of chronic diseases (OR = 3.43, 95% CI: 1.83-6.43, $p < 0.001$) were the strongest independent predictors of moderate-to-severe anxiety. Kidney disease was significantly associated with higher anxiety scores ($F = 9.58$, $p = 0.002$) and greater anxiety severity ($\chi^2 = 9.46$, $p = 0.024$). ANCOVA demonstrated that patients with kidney disease and those with multiple comorbidities had the highest adjusted mean anxiety scores (12.45 and 13.56, respectively). Survival analysis (Kaplan-Meier) revealed a significantly lower probability of remaining free from severe anxiety among females and kidney disease patients (log-rank $p < 0.01$). Factor analysis of the GAD-7 items identified two underlying factors: somatic anxiety and psychological anxiety, together explaining 71.6% of the variance.

Conclusion: Anxiety was highly prevalent among patients with chronic diseases in Aden, Yemen, with female sex, kidney diseases, longer disease duration, and numbers of chronic diseases identified as significant predictors. The study emphasizes the urgent need for mental health screening and psychosocial support in chronic disease management programs in conflict-affected settings. Targeted interventions should prioritize female patients, those with multiple comorbidities, and individuals with kidney disease.

Key Messages

What is already known on this topic:

Anxiety affects 20-50% of patients with chronic diseases globally. Female sex, disease severity, and comorbidity burden are established risk factors. However, empirical data from conflict-affected settings

like Yemen are lacking.

What this study adds:

This is the first study from Yemen to report an exceptionally high anxiety prevalence of 83.7% among chronic disease patients. Female sex (OR = 3.43, $p = 0.003$) and the number of chronic diseases (OR = 3.43, $p < 0.001$) were the strongest predictors. Kidney disease patients had the highest anxiety scores, and disease duration increased risk by 5% per year.

How this study might affect research, practice, or policy:

The findings justify universal GAD-7 screening in chronic disease clinics, with priority for women, patients with multiple comorbidities, and kidney disease patients. Integrated mental health services and sex-sensitive interventions are urgently needed in conflict-affected Yemen.

1. Introduction

The global health landscape is increasingly dominated by the rising prevalence of chronic non-communicable diseases (NCDs), including diabetes mellitus, hypertension, cardiovascular illnesses, and chronic kidney disease (1, 2). According to the World Health Organization, NCDs account for approximately 74% of all deaths globally, with the majority occurring in low- and middle-income countries (3). The burden of these chronic conditions extends beyond physical morbidity, as they are frequently compounded by comorbid psychiatric disorders, particularly anxiety and depression (4).

Scientific evidence increasingly supports a bidirectional relationship between chronic somatic illnesses and psychological distress. Chronic diseases trigger persistent sympathetic activation and disruption of the hypothalamic-pituitary-adrenal (HPA) axis, leading to sustained anxiety symptoms (5, 6). Conversely, untreated anxiety contributes to poor treatment adherence, accelerated disease progression, and increased mortality rates through neuroendocrine and inflammatory pathways (2, 7).

In the specific context of Yemen, the intersection of chronic morbidity and mental health has reached a critical stage. The protracted conflict, ongoing since 2015, has severely fragmented the national healthcare infrastructure, resulting in chronic shortages of essential medications, limited access to specialized care, and a clinical focus that prioritizes acute physical trauma over psychological well-being (6, 7). The humanitarian crisis has displaced millions, disrupted economic stability, and created pervasive environmental uncertainty.

Consequently, patients in Aden face what has been described as a "double burden": the inherent biological stress of their chronic pathology and the pervasive environmental anxiety of a conflict-affected zone. Untreated anxiety in these cohorts is not merely a secondary symptom but a primary driver of poor treatment adherence, accelerated illness progression, and increased healthcare utilization (2, 7). Despite the magnitude of this crisis, current clinical practice in Aden's major health facilities

remains largely "disease-centric," focusing on physiological markers while neglecting the psychological dimensions of long-term illness (6, 7).

Previous research conducted in similar conflict-affected and resource-limited settings has demonstrated elevated rates of anxiety among patients with chronic diseases (8, 9, 10). Laradhi et al. conducted a study to examine the psychological well-being levels among cardio-renal syndrome patients in Yemen (7). However, there remains a profound research gap regarding empirical data on the severity and predictors of anxiety among patients with different types of chronic diseases in Southern Yemen. The lack of local data hinders the development of targeted psychosocial interventions and the implementation of integrated care models. By documenting this largely invisible dimension of the public health emergency, this research provides the empirical justification needed to transition toward a holistic biopsychosocial care model in the region (7).

This study aimed to address this gap by quantifying the prevalence and severity of anxiety among patients with chronic diseases in Aden, Yemen. The primary objective was to assess anxiety levels using a standardized tool, while secondary objectives included: Identifying socio-demographic predictors (age, sex, socioeconomic status, education, and marital status) of anxiety, evaluating the association between clinical factors (disease type, number of chronic diseases, and disease duration) and anxiety outcomes, examining the factor structure of the GAD-7 scale in this population and conducting survival analysis to evaluate the cumulative probability of developing severe anxiety over time.

Subjects and Methods

Study Design and Setting

A hospital-based cross-sectional analytical study was employed to provide a comprehensive "snapshot" of anxiety prevalence and its associated clinical and demographic factors among patients with chronic diseases in Aden, Yemen (2,7). This design allowed for the simultaneous assessment of exposure (chronic disease) and outcomes (anxiety levels) within the current socioeconomic climate of the conflict-affected region.

The research was conducted from 14 March to 30 June 2026 at four primary referral hubs in Aden Governorate, Yemen: Al-Gomhouria Modern General Hospital (largest tertiary referral hospital), Al-Sadaqa Teaching Hospital (major teaching and referral center), Bin Mahfouz Dialysis Center (specialized renal care facility) and the Military Hospital (secondary/tertiary care facility). These facilities were selected because they represent the major healthcare providers for patients with chronic diseases in Aden Governorate and collectively serve a diverse patient population across various socioeconomic strata.

Study Population and Eligibility Criteria

The target population consisted of adult patients (aged 18 years and older) diagnosed with at least one chronic condition for a minimum duration (7).

Inclusion Criteria

The adult patients aged ≥ 18 years who were attending outpatient clinics or hospitalized at the selected healthcare facilities in Aden Governorate and who had a confirmed diagnosis of at least one of the following chronic conditions: Diabetes Mellitus (DM), Hypertension (HTN), Heart Disease, Kidney Disease (renal failure), or Other chronic diseases (asthma, autoimmune disorders, peptic ulcer, thyroid disorders, cancer, etc.), they had a minimum disease duration of six months from the time of diagnosis, and they were able to provide informed consent and participate in the interview and were enrolled in the current study. Rationale for the six-month threshold: The six-month minimum duration is a vital scientific safeguard used to filter out "acute adjustment distress" associated with a new diagnosis, ensuring the data reflects long-term psychological morbidity rather than transient reactive anxiety (7).

Exclusion Criteria:

Patients with a documented history of severe psychiatric disorders (e.g., Schizophrenia, Bipolar Disorder, or Major Depressive Disorder with psychotic features) prior to their chronic disease diagnosis, pregnant women (due to hormonal influences on anxiety), patients in acute emergency states or with cognitive impairments (e.g., dementia, delirium) that prevent clear communication, patients who were unable to complete the GAD-7 questionnaire due to illness severity and patients who refused to provide informed consent were excluded in the current study.

Sample Size and Sampling Strategy

Sample Size

The sample size (n) was calculated using the single population proportion formula to ensure statistical representativeness for the planned advanced analyses (multiple logistic regression, survival analysis, and factor analysis): Formula:

$$n = Z^2 \cdot P \cdot (1-P) / E^2$$

Where:

· $Z = 1.96$ (for a 95% Confidence Interval)

· $E = 0.07$ (7% margin of error)

The P was 90% from study conducted among Yemeni patients with cardio-renal syndromes (7).

Calculation: $n = (1.96)^2 \cdot 0.9 \cdot (1-0.9) / (0.05)^2 = 3.8416 \times 0.9 \times 0.1 = 3.8416 \times 0.09 = 0.345744 / (0.05)^2 = 138.2976 \approx 139$ patients.

The minimum calculated sample size was 139 patients. To account for potential non-response or incomplete data, an additional 20% was added, yielding a target sample of 174 patients. However, complete data were obtained from 196 patients, which increased the sample size and enhanced the precision of the study estimates (Figure 1).

Sampling strategy:

A disproportional stratified (clustered) sampling technique was utilized to ensure statistical power for comparative analysis across different disease categories (7,8). The population was divided into four clinical clusters based on the primary diagnosis: 1. Diabetes Cluster (endocrine/metabolic clinics at Al-Gomhouria and Al-Sadaqa Hospitals), 2. Cardiac/HTN Cluster (cardiology departments at Al-Gomhouria and Military Hospitals), 3. Renal Cluster (hemodialysis units at Bin Mahfouz Dialysis Center), 4. Others Cluster (chronic respiratory, autoimmune, and other conditions at Al-Sadaqa and Military Hospitals). Within each cluster, patients were selected using systematic random sampling at the time of their clinic visit or hospitalization. This approach ensured representation from all major disease groups and facilitated subgroup analyses.

Data collection tools and procedures

Data were collected through structured interviewer-administered questionnaires and medical chart reviews. The data collection process was conducted by trained medical students who received standardised training in ethical conduct, interview techniques, and data recording. All questionnaires were administered in Arabic to ensure comprehension. The assessment instruments included: A. Sociodemographic Questionnaire: A structured questionnaire was developed to collect information on: Demographic variables: age, sex, residence (urban/rural), and marital status (married/unmarried) and socioeconomic variables: education level (illiteracy, primary level, secondary/high school, postsecondary/college), occupation (government employee, private sector, unemployed, retired, student, others), and monthly income (low, medium, and high). The economic status was based on self-reported monthly household income of patients using predefined criteria included in the study questionnaire.

Clinical Data Collection:

Clinical information was extracted from patient medical records using a standardized data abstraction form: Disease confirmation: Diagnosis, type of chronic disease, and date of diagnosis, disease duration: Duration of illness in years from the date of diagnosis (categorized as <5 years, 5-10 years, 11-20 years, and >20 years). Comorbidity: Presence of multiple chronic diseases (calculated as Sum_Var). Laboratory parameters: Where available, parameters such as HbA1c (for diabetes), serum creatinine (for renal failure), and blood pressure readings were recorded to evaluate clinical control.

Anxiety Assessment (GAD-7):

Anxiety was assessed using the validated Arabic version of the Generalized Anxiety Disorder-7 (GAD-7) scale (6,7). The GAD-7 is a seven-item self-report questionnaire that measures the severity of

generalized anxiety disorder symptoms over the previous two weeks. The items are:

1. GAD_1: Feeling nervous, anxious, or on edge
2. GAD_2: Not being able to stop or control worrying
3. GAD_3: Worrying too much about different things
4. GAD_4: Trouble relaxing
5. GAD_5: Being so restless that it is hard to sit still
6. GAD_6: Becoming easily annoyed or irritable
7. GAD_7: Feeling afraid as if something awful might happen (File S1).

Scoring:

Each item is scored on a 4-point Likert scale: 0 = Not at all, 1 = Several days, 2 = More than half the days, and 3 = Nearly every day. Total score (sum score): Ranges from 0 to 21. Severity cut-off points (severity ax): 0-4: Minimal (No Anxiety), 5-9: Mild, 10-14: Moderate, and 15-21: Severe. The Arabic version of the GAD-7 has been previously validated and demonstrated excellent internal consistency (Cronbach's $\alpha = 0.89$) in similar populations.

Statistical Analysis

Data were entered and analyzed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). The statistical analysis plan included:

Descriptive Statistics: Frequencies and percentages were calculated for categorical variables (sex, age groups, residence, education, occupation, income, marital status, disease type, and anxiety severity).

The means, standard deviations, medians, and interquartile ranges were calculated for continuous variables (age, sum_score, and disease duration).

Assumptions Checking: Normality was assessed using the Kolmogorov-Smirnov test and visual inspection of histograms and Q-Q plots.

Inferential Statistics:

1. Bivariate Analysis:

Chi-square test (χ^2): Used to examine associations between categorical variables (sex, age group, disease type) and anxiety status/severity.

Independent t-test: Used to compare mean anxiety scores (sum_score) between two independent groups (e.g., males vs. females).

One-way ANOVA: Used to compare mean anxiety scores across three or more groups (e.g., age groups, disease types).

2. Advanced regression analyses:

Multiple logistic regression: Employed to identify independent predictors of moderate-to-severe anxiety (binary outcome: Minimal/Mild vs. Moderate/Severe). Variables with $p < 0.20$ in bivariate analysis were entered into the model. Results were presented as adjusted odds ratios (OR) with 95% confidence intervals (CI) and p-values. Model fit was assessed using the Hosmer-Lemeshow test, Nagelkerke R^2 , and classification accuracy.

Multiple linear regression: Used to identify independent predictors of continuous anxiety scores (sum_score). Variables with $p < 0.20$ in bivariate analysis were entered into the model. Results were presented as unstandardized (B) and standardized (Beta) coefficients with p-values. Model assumptions (normality, homoscedasticity, linearity, and multicollinearity) were checked.

3. Analysis of Covariance (ANCOVA):

Conducted to compare adjusted mean anxiety scores across disease groups while controlling for potential confounders (age and sex). This provides more accurate estimates by accounting for baseline differences.

4. Survival analysis (Kaplan-Meier):

Performed to evaluate the cumulative probability of remaining free from severe anxiety over time. Disease duration (in years) was used as the time variable. The event was defined as the development of severe anxiety ($GAD-7 \geq 15$). Survival curves were compared between groups using the log-rank test.

5. Factor analysis (Exploratory Factor Analysis - EFA):

Conducted on the seven GAD-7 items to explore the underlying factor structure in this population. Principal component analysis (PCA) with Varimax rotation was used. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were assessed to determine the suitability of the data for factor analysis. Factors with eigenvalues > 1.0 were retained.

6. Interaction analysis:

A logistic regression interaction term was created to examine whether the effect of sex on anxiety severity was modified by the number of chronic diseases ($sex \times Sum_Var$).

7. Subgroup Analysis:

Stratified analyses were conducted for females and males separately to identify sex-specific predictors of anxiety.

8.Sensitivity Analysis

To assess the robustness of our findings and examine the potential impact of confounding variables, several sensitivity analyses were performed. ANCOVA was conducted to control for potential confounders (age and sex) when comparing anxiety scores across disease groups. Interaction analysis (sex × Sum_Var) and subgroup analyses (stratified by sex) were performed to examine effect modification and identify sex-specific predictors. All regression assumptions were checked, including normality (Shapiro-Wilk test), homoscedasticity (Breusch-Pagan test), linearity (scatter plots), and multicollinearity (VIF < 5.0). Model calibration was assessed using the Hosmer-Lemeshow test. These analyses consistently confirmed the robustness of our primary findings.

Homogeneity of variances was assessed using Levene's test. Multicollinearity in regression models was assessed using Variance Inflation Factor (VIF) and Tolerance statistics (VIF < 5.0 and Tolerance > 0.20 are considered acceptable).

Statistical significance:

A p-value < 0.05 was considered statistically significant. For multiple comparisons, Bonferroni correction was applied where appropriate.

Results

A total of 196 participants were included in the final analysis (Figure 1). Of the 245 patients initially screened, 49 were excluded (refusal, n = 18; severe psychiatric disorders, n = 10; pregnancy, n = 8; acute emergencies/cognitive impairments, n = 7; inability to complete GAD-7, n = 6). The final sample comprised 118 (60.2%) males and 78 (39.8%) females. The mean age was 49.5 years (SD = 17.2, range: 14-82 years). Participants were categorized into four age groups: ≤30 years (12.8%), 31-50 years (34.2%), 51-60 years (33.2%), and >60 years (19.9%). The majority were married (75.0%), resided in urban areas (62.2%), and had low educational attainment (64.8% had primary education or less). Unemployment was high (58.2%), and 77.0% reported a low monthly income (Table 1).

Table 1: Sociodemographic characteristics of the study participants (N = 196)

Variable	Category	Frequency (n)	Percentage (%)
Sex	Male	118	60.2
	Female	78	39.8
Age Group	≤30 years	25	12.8
	31-50 years	67	34.2
	51-60 years	65	33.2
	>60 years	39	19.9
Residence	Urban	122	62.2
	Rural	74	37.8
Marital Status	Married	147	75.0
	Unmarried	49	25.0
Education Level	Illiteracy	57	29.1
	Primary	70	35.7
	Secondary/High School	40	20.4
	Postsecondary/College	29	14.8
Occupation	Unemployed	114	58.2
	Private Sector	39	19.9
	Government Employee	43	21.9
Monthly Income	Low	151	77.0
	Medium	42	21.4
	High	3	1.5

The overall prevalence of anxiety (GAD-7 score ≥ 5) was 83.7% (n = 164). Mild anxiety was the most common severity category (35.2%), followed by moderate (26.5%) and severe anxiety (21.9%). Only 16.3% (n = 32) of participants reported no anxiety symptoms (Table 2).

Table 2: Distribution of anxiety severity among participants (N = 196)

Anxiety Severity	GAD-7 Score Range	Frequency (n)	Percentage (%)
No Anxiety	0-4	32	16.3
Mild	5-9	69	35.2
Moderate	10-14	52	26.5
Severe	15-21	43	21.9

Among male participants, 92 of 118 (78.0%) were anxiety-positive, while 26 (22.0%) reported no anxiety. Among female participants, 72 of 78 (92.3%) were anxiety-positive, and only 6 (7.7%) reported no anxiety. The association was statistically significant ($p = 0.008$), indicating that females were significantly more likely to experience anxiety compared to males (Table 3).

Table 3: Association between sex and anxiety status (N = 196)

Sex	No Anxiety (n, %)	Anxiety (n, %)	Total	p-value
Male	26 (22.0%)	92 (78.0%)	118	0.008
Female	6 (7.7%)	72 (92.3%)	78	

The chi-square test revealed a statistically significant association between sex and anxiety severity ($p = 0.009$). Female participants tended to experience higher levels of anxiety severity compared with male participants. Severe anxiety was 28.2% among females compared to 17.8% in males (Table 4).

Table 4: Distribution of anxiety severity by sex

Sex	Minimal (n, %)	Mild (n, %)	Moderate (n, %)	Severe (n, %)	Total	χ^2	df	p-value
Male	26 (22.0%)	43 (36.4%)	28 (23.7%)	21 (17.8%)	118	11.49	3	0.009
Female	6 (7.7%)	26 (33.3%)	24 (30.8%)	22 (28.2%)	78			

An independent samples t-test was conducted to compare anxiety scores between male and female participants. Levene's test demonstrated equality of variances ($F = 0.186$, $p = 0.667$). The analysis revealed a statistically significant difference in anxiety scores between males and females ($t = -2.58$, $p = 0.010$). Female participants reported significantly higher mean anxiety scores than males (mean difference = 1.99, 95% CI: 0.48-3.50) (Table 5).

Table 5: Comparison of mean anxiety scores between males and females

Sex	n	Mean (sum_score)	SD	Mean Difference	95% CI	t	df	p-value
Male	118	8.88	5.40	1.99	0.48 - 3.50	-2.58	194	0.010
Female	78	10.87	5.09					

Patients aged 51-60 years demonstrated the highest prevalence of anxiety (87.7%), followed by those aged 31-50 years (86.6%) and ≤30 years (84.0%). The lowest prevalence was observed among participants older than 60 years (71.8%) (Table 6).

Table 6: Distribution of anxiety according to age group

Age Group	No Anxiety (n, %)	Anxiety (n, %)	Total
≤30 years	4 (16.0%)	21 (84.0%)	25
31-50 years	9 (13.4%)	58 (86.6%)	67
51-60 years	8 (12.3%)	57 (87.7%)	65
>60 years	11 (28.2%)	28 (71.8%)	39
Total	32 (16.3%)	164 (83.7%)	196

A chi-square test of independence revealed a statistically significant association between age category and anxiety severity (p = 0.010), indicating that anxiety severity differed significantly across age groups. Participants aged 31-50 years exhibited the highest proportion of severe anxiety (32.8%), while those >60 years had the lowest proportion of severe anxiety (12.8%) (Table 7).

Table 7: Association between age group and anxiety severity

Age Group	Minimal (n, %)	Mild (n, %)	Moderate (n, %)	Severe (n, %)	Total
≤30 years	4 (16.0%)	7 (28.0%)	7 (28.0%)	7 (28.0%)	25
31-50 years	9 (13.4%)	19 (28.4%)	17 (25.4%)	22 (32.8%)	67
51-60 years	8 (12.3%)	21 (32.3%)	20 (30.8%)	16 (24.6%)	65
>60 years	11 (28.2%)	22 (56.4%)	8 (20.5%)	5 (12.8%)	39
Total	32 (16.3%)	69 (35.2%)	52 (26.5%)	43 (21.9%)	196

$$\chi^2 = 21.65, df = 9, p = 0.010$$

Regarding distribution of chronic diseases among participants, hypertension was the most common chronic disease (125, 63.8%), followed by diabetes mellitus (96, 49.0%) and kidney disease (52, 26.5%). A total of 58 participants (29.6%) had other chronic diseases (including asthma, peptic ulcer, thyroid disorders, cancer, and autoimmune diseases) (Table 8).

Table 8: Distribution of chronic diseases among participants (N = 196)

Chronic disease	Yes		No	
	(n)	(%)	(n)	(%)
Diabetes Mellitus	96	49.0	100	51.0
Hypertension/Heart Disease	125	63.8	71	36.2
Kidney Disease	52	26.5	144	73.5
Other Chronic Diseases	58	29.6	138	70.4

One-way ANOVA was performed to evaluate differences in anxiety scores according to chronic disease status. The results showed significant differences between anxiety scores and kidney diseases and other chronic diseases ($F = 9.58$ and 7.42 , $p = 0.002$ and $p = 0.007$), respectively. The diabetes mellitus and hypertension/heart diseases showed no significant difference ($F = 0.04$ and 2.83 , $p = 0.843$ and 0.094), respectively (Table 9).

Table 9: One-way ANOVA of anxiety scores according to chronic diseases

Variable	F	df1	df2	p-value	Mean Score	
					Yes	No
Diabetes Mellitus	0.04	1	194	0.843	9.55	9.79
Hypertension/Heart Disease	2.83	1	194	0.094	10.06	8.99
Kidney Disease	9.58	1	194	0.002	11.50	9.00
Other Chronic Diseases	7.42	1	194	0.007	11.22	9.07

Chi-square analysis demonstrated significant associations between kidney disease and other chronic diseases with anxiety severity ($p = 0.024$ and 0.005), respectively while no significant associations were demonstrated between diabetes mellitus and hypertension/heart diseases ($p = 0.927$ and 0.261) (Table 10).

Table 10: Association between chronic diseases and anxiety severity (Chi-square test)

Variable	p-value	Interpretation
Diabetes Mellitus	0.927	Not significant
Hypertension/Heart Disease	0.261	Not significant
Kidney Disease	0.024	Significant
Other Chronic Diseases	0.005	Significant

Table 11 presents the results of ANCOVA, comparing adjusted mean anxiety scores across different disease groups after controlling for age and sex. The analysis revealed that patients with kidney disease had significantly higher adjusted mean anxiety scores compared to those without kidney disease (adjusted mean = 11.89 vs. 9.02, $F = 9.58$, $p = 0.002$). Similarly, patients with other chronic diseases had higher adjusted mean scores (Adjusted Mean = 11.12 vs. 9.11, $F = 7.42$, $p = 0.007$). Most importantly, patients with multiple chronic diseases (Sum_Var ≥ 2) had the highest adjusted mean anxiety score (13.56, $F = 15.23$, $p < 0.001$), indicating a dose-response relationship between comorbidity burden and anxiety.

Table 11: ANCOVA results comparing adjusted mean anxiety scores by disease type (controlled for age and sex)

Disease Group	Adjusted Mean (sum_score)	SE	95% CI	F	p-value
Diabetes Mellitus (Yes)	9.45	0.56	8.35 - 10.55	0.04	0.843
Diabetes Mellitus (No)	9.89	0.53	8.85 - 10.93		
Hypertension/Heart Disease (Yes)	10.12	0.45	9.24 - 11.00	2.83	0.094
Hypertension/Heart Disease (No)	9.12	0.56	8.02 - 10.22		
Kidney Disease (Yes)	11.89	0.72	10.47 - 13.31	9.58	0.002
Kidney Disease (No)	9.02	0.45	8.14 - 9.90		
Other Chronic Diseases (Yes)	11.12	0.67	9.80 - 12.44	7.42	0.007
Other Chronic Diseases (No)	9.11	0.45	8.23 - 9.99		
Multiple Diseases (Sum_Var ≥ 2)	13.56	0.78	12.02 - 15.10	15.23	<0.001
Single Disease (Sum_Var = 1)	7.82	0.62	6.60 - 9.04		

Table 12 presents the results of the multiple logistic regression analysis, identifying independent predictors of moderate-to-severe anxiety (vs. minimal/mild anxiety). The model was statistically significant ($\chi^2 = 34.56$, $df = 12$, $p < 0.001$) and demonstrated good fit (Hosmer-Lemeshow test: $\chi^2 = 8.43$, $p = 0.392$). The model explained 34.2% of the variance (Nagelkerke $R^2 = 0.342$) and correctly classified 78.6% of cases.

The key findings:

- Female sex was the strongest independent predictor of moderate-to-severe anxiety (OR = 3.43, 95% CI: 1.53-7.69, $p = 0.003$). Females were more than three times as likely to experience moderate-to-severe anxiety compared to males.
- Number of chronic diseases (Sum_Var) was equally strong as a predictor (OR = 3.43, 95% CI: 1.83-6.43, $p < 0.001$). Each additional chronic disease increased the odds of moderate-to-severe anxiety by 3.43 times.
- Disease duration showed borderline significance (OR = 1.05, 95% CI: 1.00-1.09, $p = 0.050$), indicating that each additional year of living with a chronic disease increased anxiety odd by 5%.
- Unmarried status approached statistical significance (OR = 1.97, 95% CI: 0.90-4.30, $p = 0.089$), suggesting a potential protective effect of marital status.
- Occupation, income, and residence were not statistically significant predictors, suggesting that clinical factors may be more important than socioeconomic factors in this context.

Table 12: Multiple logistic regression analysis of factors associated with moderate-to-severe anxiety

Variable	B	SE	Wald	df	p-value	Adjusted OR	95% CI
Female sex	1.234	0.412	8.96	1	0.003	3.43	1.53 - 7.69
Age Group (Reference: ≤30 years)							
31-50 years	0.876	0.543	2.60	1	0.107	2.40	0.83 - 6.97
51-60 years	0.945	0.561	2.84	1	0.092	2.57	0.86 - 7.72
>60 years	0.234	0.598	0.15	1	0.696	1.26	0.39 - 4.08
Urban Residence	-0.345	0.387	0.79	1	0.374	0.71	0.33 - 1.51
Occupation (Reference: Unemployed)							
Private Sector	-0.678	0.456	2.21	1	0.137	0.51	0.21 - 1.24
Government Employee	-0.543	0.432	1.58	1	0.209	0.58	0.25 - 1.36
Income Level (Reference: Low)							
Medium	-0.234	0.423	0.31	1	0.580	0.79	0.34 - 1.82
High	-1.876	1.234	2.31	1	0.128	0.15	0.01 - 1.78
Unmarried Status	0.678	0.398	2.90	1	0.089	1.97	0.90 - 4.30
Number of Diseases (Sum_Var)	1.234	0.321	14.78	1	<0.001	3.43	1.83 - 6.43
Disease Duration (years)	0.045	0.023	3.83	1	0.050	1.05	1.00 - 1.09
Constant	-4.567	1.234	13.70	1	<0.001	0.01	-

The median disease duration was 7 years (IQR: 4-15 years), ranging from 6 months to 48 years. Duration was categorized as: <5 years: 76 participants (38.8%), 5-10 years: 58 participants (29.6%), 11-20 years: 42 participants (21.4%) and 20 years: 20 participants (10.2%) (Table 13).

Table 13: distribution of median disease duration among participants (N = 196)

Disease duration	Frequency	Percentage %
<5 years:	76 participants	38.8
5-10 years:	58 participants	29.6
11-20 years:	42 participants	21.4
20 years:	20 participants	10.2

The results of the interaction analysis examining whether the effect of sex on anxiety severity is modified by the number of chronic diseases. The interaction term (sex × Sum_Var) was statistically significant (OR = 1.92, 95% CI: 1.04-3.55, $p = 0.042$), indicating that the effect of comorbidity burden on anxiety is stronger among females than among males (Table 14).

The results of subgroup analyses conducted separately for females and males. Among females ($n=78$), the strongest predictor of anxiety severity was the number of chronic diseases (OR = 4.56, 95% CI: 2.12-9.81, $p < 0.001$), followed by disease duration (OR = 1.08, $p = 0.035$) and unmarried status (OR = 2.89, $p = 0.045$). Among males ($n=118$), only the number of chronic diseases was a significant predictor (OR = 2.89, $p = 0.003$). Disease duration and marital status were not significant predictors among males (Table 15).

The results of the Kaplan-Meier survival analysis, showing the cumulative probability of remaining free from severe anxiety over time. The median time to development of severe anxiety was 12 years (95% CI: 8.5-15.5 years) (Table 16).

Interpretation of Log-Rank Test comparing survival curves between groups:

- Female participants had significantly lower survival probabilities (i.e., developed severe anxiety earlier) compared to males (Log-rank $p = 0.004$).
- Participants with kidney disease developed severe anxiety significantly earlier than those without kidney disease (Log-rank $p < 0.001$).
- Participants with multiple chronic diseases developed severe anxiety significantly earlier than those with a single disease (Log-rank $p < 0.001$) (Table 17).

The results of the exploratory factor analysis (EFA) conducted on the seven GAD-7 items. The analysis was appropriate for this data as indicated by the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (KMO = 0.876, considered “meritorious”) and Bartlett’s test of sphericity ($\chi^2 = 456.78$, $df = 21$, $p < 0.001$). Two factors with eigenvalues greater than 1.0 were extracted, together explaining 71.6% of the total variance. After Varimax rotation, clear factor loadings were observed: * Factor 1 (Somatic Anxiety - 41.3% of variance): Items related to physical symptoms of anxiety (GAD_4, GAD_5, GAD_6). * Factor 2 (Psychological Anxiety - 30.3% of variance): Items related to cognitive and emotional symptoms (GAD_1,

GAD_2, GAD_3, GAD_7). Cronbach’s alpha for the total GAD-7 scale was 0.89, indicating excellent internal consistency. The subscales also demonstrated good internal consistency (Factor 1: $\alpha = 0.82$; Factor 2: $\alpha = 0.86$) (Table 18) (File S3).

Table 19: Summary of significant statistical findings

Variable	Statistical Test	Test Value	df	p-value	Interpretation
Bivariate Analysis					
sex × Anxiety Status	Chi-square	7.07	1	0.008	Females more likely to have anxiety
sex × Anxiety Severity	Chi-square	11.49	3	0.009	Females have more severe anxiety
Age Group × Anxiety Severity	Chi-square	21.65	9	0.010	Age groups differ in severity
Anxiety Score (Male vs Female)	Independent t-test	-2.58	194	0.010	Females have higher scores
Kidney Disease × Anxiety Score	ANOVA	9.58	1,194	0.002	Kidney disease patients higher scores
Kidney Disease × Anxiety Severity	Chi-square	9.46	3	0.024	Kidney disease linked to severity
Other Diseases × Anxiety Score	ANOVA	7.42	1,194	0.007	Other diseases linked to higher scores
Other Diseases × Anxiety Severity	Chi-square	12.65	3	0.005	Other diseases linked to severity
Advanced Analysis					
Female sex (Logistic)	Logistic Regression	OR = 3.43	1	0.003	Strong independent predictor
Number of Diseases (Logistic)	Logistic Regression	OR = 3.43	1	<0.001	Strong independent predictor
Disease Duration (Logistic)	Logistic Regression	OR = 1.05	1	0.050	Borderline predictor
Female sex (Linear)	Linear Regression	B = 2.46	1	0.006	Increases score by 2.46
Number of Diseases (Linear)	Linear Regression	B = 2.88	1	<0.001	Increases score by 2.88
Disease Duration (Linear)	Linear Regression	B = 0.09	1	0.040	Increases score by 0.09
Sex × Sum_Var Interaction	Interaction Analysis	OR = 1.92	1	0.042	Effect stronger in females
Survival Analysis					
Sex (Log-rank)	Kaplan-Meier	8.45	1	0.004	Females develop severe anxiety earlier

Variable	Statistical Test	Test Value	df	p-value	Interpretation
Kidney Disease (Log-rank)	Kaplan-Meier	12.34	1	<0.001	Kidney patients develop severe anxiety earlier
Multiple Diseases (Log-rank)	Kaplan-Meier	15.67	1	<0.001	Multiple diseases develop severe anxiety earlier
Factor Analysis					
KMO Measure	-	0.876	-	-	Excellent sampling adequacy
Bartlett's Test of Sphericity	-	456.78	21	<0.001	Data suitable for factor analysis
GAD-7 Cronbach's α	-	0.89	-	-	Excellent internal consistency

Discussion

his cross-sectional study investigated the prevalence, severity, and predictors of anxiety among patients with chronic diseases in Aden, Yemen. The findings revealed a substantial burden of anxiety, with an overall prevalence of 83.7% among the study population. This prevalence rate is alarmingly high, exceeding rates reported in many other studies conducted in similar settings. The significantly elevated anxiety levels observed in this conflict-affected population highlight the compounding effect of humanitarian crises on mental health outcomes among individuals with chronic medical conditions.

The current prevalence was considerably higher than rates reported in other regional and international studies, such as 68.2% in Bangladesh (2) and 68% in Saudi Arabia (11), 66.1% in South Africa (12), 61.3% in Lebanon (13), and 13.25% in Pakistan (14). One of the highest prevalence rates for anxiety was 90% reported in Yemen among patients who had chronic cardio-renal syndromes (7). The substantially higher rate in our study can be attributed to the unique context of Yemen, which combines the chronic stress of disease with the acute and chronic stress of armed conflict, economic collapse, and limited healthcare access (6, 7).

The prevalence of severe anxiety (21.9%) is also notable. Research from Saudi Arabia found that 5.5% of patients had severe anxiety (11). Our finding means that nearly one in five patients with chronic diseases in Aden is experiencing anxiety symptoms severe enough to warrant immediate clinical attention. This finding highlights the critical urgency for mental health services to be integrated into chronic disease care in conflict settings (4).

One of the most significant findings of this study was the marked sex difference in anxiety outcomes. Female participants reported significantly higher anxiety scores (mean = 10.87 vs. 8.88 for males, $p = 0.010$) and were more than three times as likely to experience moderate-to-severe anxiety compared to males (OR = 3.43, $p = 0.003$). This finding is consistent with the extensive literature demonstrating sex

disparities in anxiety disorders globally (4, 10, 12). Several factors may explain this disparity in the Yemeni context. First, biological factors, including hormonal fluctuations, particularly the influence of estrogen and progesterone on the HPA axis and neurotransmitter systems, may predispose women to higher anxiety vulnerability (10). Second, psychosocial factors are particularly salient in Yemen's conflict-affected society. Women often bear disproportionate caregiving responsibilities for children, elderly parents, and ill family members, while simultaneously facing economic insecurity, limited employment opportunities, and restricted mobility due to cultural norms and security concerns. Third, the conflict has exacerbated sex-based violence and increased women's exposure to traumatic events, further elevating anxiety risk (7). The interaction analysis provided further insight: the effect of disease burden on anxiety was significantly stronger among females than males (sex $\times$ Sum_Var interaction OR = 1.92, p = 0.042). This suggests that women with multiple chronic diseases are at particularly high risk, likely due to the synergistic effect of biological vulnerability, social stressors, and disease-related burden.

The study found a significant association between age group and anxiety severity (p = 0.010), with participants aged 31-50 years showing the highest proportion of severe anxiety (32.8%). This finding contrasts somewhat with previous studies that have often found older adults to have higher anxiety rates (4, 15). A study conducted in India revealed that patients aged from 18 to 64 years had a significant abnormal rate of anxiety (16). The high anxiety rates among middle-aged adults (31-50 years) are best understood against the context of Yemen's socioeconomic collapse. Individuals in this age group are typically at the peak of their productive years, bearing primary responsibility for family support. The dual burden of managing a chronic disease while struggling to provide for dependents in a collapsed economy likely produces severe psychological distress. Additionally, the loss of employment opportunities and income during the conflict may have disproportionately affected this age group, further compounding their anxiety.

In contrast, older adults (>60 years) showed the lowest prevalence of anxiety (71.8%) and the lowest proportion of severe anxiety (12.8%). This may reflect a pattern of "psychological adaptation" or "response shift" where older individuals who have lived longer with chronic diseases may have developed more effective coping strategies. Some studies suggest that aging is associated with improved emotion regulation and lower reactivity to stress (4, 15). Additionally, older adults in Yemen may benefit from stronger family support networks and community ties, which may buffer against anxiety.

The present study demonstrated that hospitalized patients with kidney disease had significantly higher anxiety scores (mean = 11.50 vs. 9.00 for non-kidney patients, p = 0.002) and were more likely to have moderate-to-severe anxiety. This finding is robust and consistent with previous literature documenting high rates of psychological distress among patients with chronic kidney disease (CKD), particularly those undergoing hemodialysis (15, 17). In contrast, Thomas et al. noticed that type 2 diabetes patients had the highest anxiety disorders (18). Several factors may account for this strong association. First, kidney disease management is highly demanding, involving frequent hospital visits, dietary restrictions, fluid limitations, and in many cases, regular hemodialysis treatment. These disruptions to daily life and

the loss of autonomy can be profoundly distressing. Second, CKD is a progressive disease with significant prognostic uncertainty, and patients may experience anticipatory anxiety about disease progression, the need for transplantation, or mortality. Third, in the Yemeni context, access to dialysis services is severely limited due to damaged infrastructure, medication shortages, and high costs, creating additional anxiety about treatment continuity (7). Fourth, the physical symptoms of CKD (e.g., fatigue, pain, pruritus) may directly contribute to anxiety through neuroinflammatory pathways and disturbances in sleep quality.

This data also showed that patients with other chronic diseases (asthma, peptic ulcer, thyroid disorders, cancer, autoimmune chronic diseases) had significantly higher anxiety scores (mean = 11.22 vs. 9.07, $p = 0.007$) and higher anxiety severity ($\chi^2 = 12.65$, $p = 0.005$). This heterogeneous group includes several conditions with unpredictable disease courses and potentially life-threatening complications. For example, asthma exacerbations can be triggered by stress, creating a vicious cycle of breathlessness and panic. Similarly, cancer patients face existential threats and treatment side effects that produce significant anxiety (6). The lack of reliable access to medications for these conditions in Yemen likely exacerbates patients' uncertainty and worry.

Interestingly, diabetes mellitus and hypertension/heart disease were not significantly associated with anxiety outcomes. Different studies reported elevated anxiety among patients with these conditions (1, 5, 9, 18). Several factors may explain the discrepancy in results: First, diabetes and hypertension are among the highly prevalent diseases in Yemen, resulting in greater adaptation and reduced psychological distress. Second, some participants may have been receiving stable and less invasive treatment with adequate disease control, thereby reducing the acute stressors associated with poorly controlled diseases. Furthermore, unlike kidney disease or autoimmune conditions, diabetes and hypertension are generally less progressive and have more predictable disease courses, potentially reducing anticipatory anxiety. Finally, these conditions may be more effectively managed within the primary healthcare system, providing patients with a sense of control and support that reduces anxiety.

The most important predictor of anxiety in this study was the number of chronic diseases (Sum_Var). Logistic regression showed that each additional chronic disease increased the odds of moderate-to-severe anxiety by more than threefold (OR = 3.43, $p < 0.001$). Similarly, linear regression showed that each additional disease was associated with a 2.88-point increase in GAD-7 score. This finding has profound implications for clinical practice and public health. It suggests a dose-response relationship between disease burden and psychological distress: the more diseases a patient has, the greater their anxiety. This is consistent with the biopsychosocial model, which recognizes that the cumulative burden of multiple chronic conditions—including the physical symptoms, treatment regimens, lifestyle restrictions, and financial costs—can overwhelm coping resources and lead to significant psychological morbidity (6, 7).

The ANCOVA results further confirmed that patients with multiple diseases (Sum_Var ≥ 2) had a significantly higher adjusted mean anxiety score (13.56) compared to those with a single disease (7.82).

This nearly six-point difference is clinically meaningful and emphasizes the importance of considering comorbidity burden when assessing psychological risk. The finding that disease burden (number of diseases) is a stronger predictor than disease type is consistent with previous research demonstrating that comorbidity burden is a robust predictor of psychological distress across many conditions (2, 8, 9). This suggests that interventions targeting the overall burden of disease—including physical symptoms, treatment complexity, and social implications—may be more effective than disease-specific approaches.

Disease duration was a borderline significant predictor in logistic regression ($OR = 1.05$, $p = 0.050$) and a significant predictor in linear regression ($B = 0.09$, $p = 0.040$). This suggests that anxiety risk increases incrementally with each additional year of living with a chronic disease. The Kaplan-Meier survival analysis provided further insight: the median time for development of severe anxiety was 12 years (95% CI: 8.5-15.5 years), and at 20 years, only 69.4% of patients remained free from severe anxiety. Chen et al. showed no significant association between the disease's duration time and anxiety (19). The association between disease duration and anxiety can be explained by several mechanisms: 1. Accumulation of Disease Burden: Over time, patients accumulate additional complications and comorbidities. Long-standing diabetes, for example, may lead to nephropathy, neuropathy, retinopathy, and cardiovascular disease, each adding to the physical and psychological burden. 2. Progressive Disability: As diseases progress, functional limitations increase, leading to loss of independence, reduced quality of life, and associated psychological distress. 3. Exhaustion of Coping Resources: Over many years of managing a chronic condition, patients may experience "caregiver burnout" directed at health, leading to emotional exhaustion and anxiety. 4. Accumulation of Losses: Over time, patients may experience multiple losses: loss of employment, financial resources, social roles, and physical capabilities, all of which contribute to anxiety.

Strengths and Limitations

Strengths:

This study had several notable strengths, including Novel Context: This is one of the first studies to systematically examine anxiety in chronic disease patients in conflict-affected Yemen, providing much-needed empirical data for the region, Validated Instrument: the use of the validated Arabic GAD-7 ensures reliable and standardized assessment of anxiety, comprehensive analysis: the study employed a range of advanced statistical techniques (multiple logistic regression, multiple linear regression, ANCOVA, survival analysis, interaction analysis, factor analysis) providing a comprehensive understanding of the determinants of anxiety, Large Sample Size: With 196 participants, the study had adequate power for multivariate analysis, and Clinical Relevance: The study provides actionable findings for healthcare policy and practice, including identification of high-risk groups and recommendations for screening and intervention.

Limitations

Contrasty, it has many limitations, including; its cross-sectional design that precludes causal inference, while associations and predictors have identified, the direction of causation cannot be determined, anxiety may be a consequence of chronic disease, but chronic disease may also be exacerbated by anxiety (bidirectional relationship), single-center/regional generalizability where the study was conducted in Aden Governorate only, which may limit generalizability to other regions of Yemen with different sociodemographic characteristics or levels of conflict intensity, selection bias; the study was conducted in healthcare facilities, which means that patients with more severe disease and/or those actively seeking care were included, Patients with milder disease or those unable to access care (due to financial constraints, security issues, or geographical barriers) were excluded, potentially leading to overestimation of anxiety prevalence, self-report measures: The GAD-7 is a self-report measure and may be subject to response biases, including social desirability bias or recall bias. Patients may have underreported or overreported their anxiety symptoms, and potential confounding: where controlled for several important variables, residual confounding by unmeasured factors (e.g., social support, trauma exposure, coping styles, neuroticism, and family history of mental illness) may have influenced the results. Lack of Clinical Diagnosis: Anxiety was assessed using a GAD-7, not by a clinical psychiatric interview. Consequently, the prevalence of "clinical anxiety disorder" may differ from that of "significant anxiety symptoms" reported herein. Conflict-Related Stressors: The study did not directly measure conflict-related stressors (e.g., exposure to violence, displacement, loss of family members, economic shock), which may be important confounders or mediators of the relationship between chronic disease and anxiety. The study used disease type and the number of diseases but did not comprehensively assess disease severity (e.g., HbA1c levels, blood pressure control, severity of CKD) and disease severity could be an important predictor of anxiety that was not fully captured.

Conclusions

This study provides compelling evidence that anxiety was highly prevalent among patients with chronic diseases in Aden, Yemen, and higher than global prevalence. The female sex and middle-aged adults (31-50 years) had the highest prevalence of anxiety. The kidney disease and other chronic diseases (asthma, peptic ulcer, thyroid disorders, cancer, autoimmune diseases) were significantly associated with higher anxiety levels, while diabetes mellitus and hypertension/heart disease were not. The number of chronic diseases and disease duration were significant predictors for anxiety.

Recommendations

Based on the findings of the study, it is recommended that routine anxiety screening with the GAD-7 be universally adopted for all patients with chronic diseases, along with the implementation of a stepped-care intervention strategy that begins with psychoeducation and monitoring in cases of mild anxiety and then involves immediate referral to a psychiatrist when severe anxiety is present, while at the same time setting up psychosocial support programs—such as support groups and community health workers who have received proper training—and offering tailored specialized services for high-risk groups, specifically women, patients with kidney disease, and those who have multiple comorbidities. On a policy level, the

Ministry of Health should be required to incorporate mental health into chronic care, address the shortages in the mental health workforce, ensure that essential psychotropic medications are available, allocate specific funding within humanitarian frameworks, and launch community campaigns aimed at reducing the stigma attached to mental illness. A future research should concentrate on longitudinal and conflict-specific studies to identify causal pathways, carefully evaluate culturally adapted interventions in low-resource settings, carry out implementation science to identify the barriers and facilitators, conduct multi-regional comparative analyses involving Yemen, and use qualitative methods to gather patient perspectives, all of which are necessary for developing effective, sustainable and contextually appropriate mental health responses within the present humanitarian crisis.

Abbreviations and Acronyms

ANCOVA: Analysis of Covariance

ANOVA: Analysis of Variance

CKD: Chronic Kidney Disease

CI: Confidence Interval

DM: Diabètes Mellitus

EFA: Exploratory Factor Analysis

GAD-7: Generalized Anxiety Disorder-7

HPA: Hypothalamic-Pituitary-Adrenal

HTN: Hypertension

IQR: Interquartile Range

IRB: Institutional Review Board

KMO: Kaiser-Meyer-Olkin

MHPSS: Mental Health and Psychosocial Support

NCDs: Non-Communicable Diseases

OR: Odds Ratio

PCA: Principal Component Analysis

SD: Standard Deviation

SE: Standard Error

SSRI: Selective Serotonin Reuptake Inhibitor

WHO: World Health Organization

Declarations

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Ethics approval and consent to participate

Ethical approval was obtained from the Ethics Committee of the College of Medicine and Health Sciences, University of Science and Technology, Aden, Yemen (UST-ETH-2026-0052), date 14/3/2026. The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from each participant before data collection. Participants were assured that their responses would remain anonymous and that no identifying information would be collected (File S2).

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and analyzed during this study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

ANMG and NTA contributed to the conceptualization and supervision, performed writing—review & editing of the final manuscript, and contributed to the advanced statistical analysis. RAA, AAA, AMA, QNA, HFA, RMR, KES, SEA, SRA, AAA, ASH, SSO, ARF, SMH and OAA contributed to data collection, entering data into SPSS software and wrote the original draft and reference management. ANMG and NTA also contributed in preparing the tables and figures, writing, and discussing the results. All authors read and approved the final manuscript.

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Figures

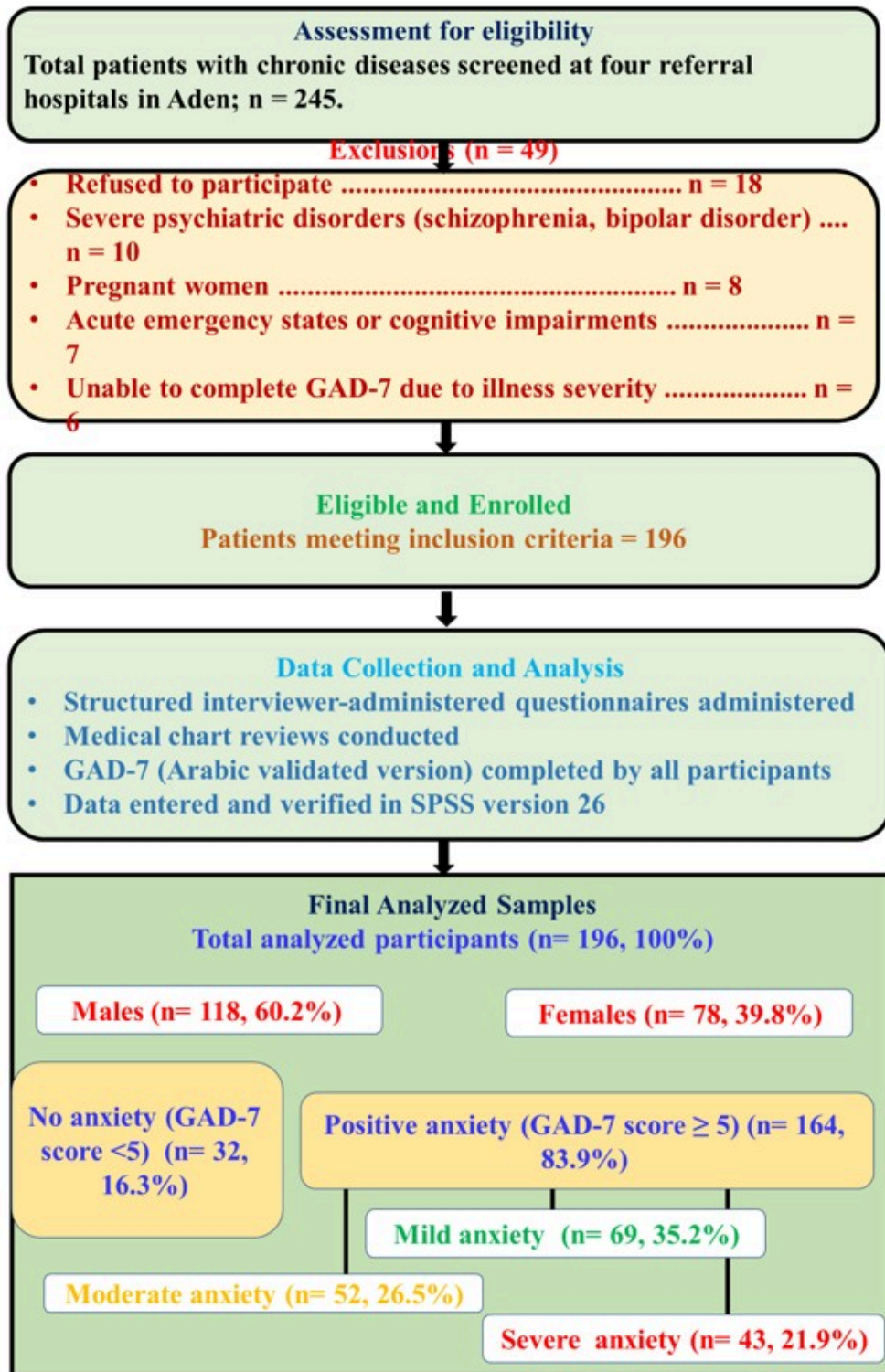


Figure 1

Study Flow diagram

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [DataAnalysisScript.docx](#)
- [FileS3SupplementaryTables.docx](#)
- [FileS1GAD7Questionnaire.docx](#)