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COLLEGE OF HEALTH SCIENCES

DEPRESSION SCREENING RATES AND PATTERNS OF MANAGEMENT IN

PRIMARY CARE IN QATAR: A CROSS-SECTIONAL STUDY

BY

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ABSTRACT

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Title: Depression Screening Rates and Patterns of Management in Primary Care in Qatar: A Cross-Sectional Study

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Background: Depression is one of the main public health problems and a leading cause of disability. It was estimated in 2019 that depression affects more than 279 million people worldwide. According to World Health Organization survey in 2017, the estimated global prevalence of depression was 5.1%. Depression screening is considered the cornerstone of managing people with depression in primary care. However, the screening rates remain low worldwide. Up-to-date information on depression screening rates and management patterns in the Primary Health Care Corporation (PHCC) in Qatar is lacking.

Aim: To estimate and compare the annual screening rates for depression and describe management of adults screened for depression in PHCC centers in Qatar in 2017 and 2019.

Methods: This is a cross-sectional study design based on secondary data of individuals aged 18-65 years in the PHCC with a completed Patient Health Questionnaire (PHQ-9) in 2017 and 2019. The number of individuals screened for depression among individuals who consulted a PHCC physician at least once was used to determine the annual depression screening rate. Antidepressants prescribed in the PHCC among individuals screened for depression were used to determine the annual proportion of individuals prescribed antidepressants. Similarly, referral of individuals to different psychiatric clinics in the PHCC and secondary care among individuals screened for depression was used to determine the annual proportion of referrals to

PHCC support clinic, PHCC psychiatry clinic, and secondary care psychiatry clinic. Ordinal regression analysis was used to assess the association between participant characteristics, year of screening, and depression symptoms severity. Similarly, multiple logistic regression was used to assess the association between participant characteristics, year of screening, and receiving antidepressant prescription and referral to psychiatry clinics.

Results: A total of 5,467 patients were screened for depression in 2017 and 2019. The Mean age and standard deviation of patients were 42.8 ± 12.4 years and 37.8 ± 11.4 years in 2017 and 2019, respectively. Of the total patients, 63.4% were female; other nationalities were 73.7% of the total screened patients. Depression screening rates were 6 per 1000 people in 2017 and in 2019. The proportion of persons prescribed antidepressants increased between 2017 and 2019 from 19.4% to 28.2%. The overall referral to any psychiatric clinic increased from 2.5% in 2017 to 8.0% in 2019. Younger age, female, gender, and those screened in 2019 had higher severity of depression symptoms. Older age and those screened in 2019 were more likely to receive antidepressant prescriptions. Older age, female gender, Qatari nationality, and those who were screened in 2019 were more likely to be referred to support and psychiatry clinics.

Conclusion: Depression screening rates in the PHCC are still considered low despite the integration of mental health services into the PHCC centers, despite noticeable increase in referrals to different mental health clinics as well as antidepressants prescribing between 2017 and 2019. Females and younger age groups were more likely to present with more severe symptoms. However, males and younger individuals were less likely to be referred to mental health clinics and prescribed antidepressants. In addition, Qatari individuals were more likely to be referred to mental health clinics

compared to individuals from other nationalities. More research and quality improvement work are needed to further investigate the screening and management patterns for depression focusing on age, gender, nationality and contextual factors which may hinder access or health seeking behavior for mental healthcare services in the PHCC.

DEDICATION

All praise to Allah, all the mighty, the Lord of this World.

To my parents, my wife, my loving kids, my family, and all my friends who supported me throughout my journey.

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TABLE OF CONTENTS

DEDICATION.....	vi
ACKNOWLEDGMENTS	vii
LIST OF TABLES.....	xi
ABBREVIATIONS	xii
CHAPTER 1: INTRODUCTION.....	1
CHAPTER 2: LITERATURE REVIEW	4
2.1 Depression definition	4
2.2 Global, Regional and Local Burden of depression	5
2.3 Risk factors for depression.....	6
2.4 Diagnosis of depression	8
2.5 Depression screening tools.....	8
2.6 Screening for depression in primary care.....	9
2.7 Barriers for depression screening in primary care	10
2.8 Primary Health Care in Qatar and National Guidelines for Screening for Depression.....	12
2.9 Identified Research Gaps	14
Chapter 3: Research Aim, Objectives AND Questions	15
3.1 Aim.....	15
3.2 Research questions	15
3.3 Objectives.....	15
3.4 Research Hypotheses.....	16

CHAPTER 4: METHODS	17
4.1 Study design	17
4.2 Study setting	17
4.3 Study Population	17
4.4 Inclusion criteria.....	17
4.5 Exclusion criteria.....	17
4.6 Data collection.....	18
4.7 Outcome Measures	18
4.8 Statistical analysis	19
4.9 Ethical considerations	20
CHAPTER 5: RESULTS	21
5.1 Demographic characteristics of the participants	21
5.2 Annual Depression Screening Rates	21
5.3 Severity of Depression Symptoms	22
5.4 Antidepressants Prescriptions	23
5.5 Referral Patterns	23
5.6 Association between Patients Characteristics and Depression Symptoms Severity	24
5.7 Association between Patients Characteristics and Antidepressant Prescription	27
5.8 Association between Patients Characteristics and Referral Patterns	28
5.8.1 Referral to the PHCC Support Clinic	28
5.8.2 Referral to the PHCC Psychiatric Clinic.....	29

5.8.3 Referral to the Secondary Care Psychiatric Clinic.....	32
CHAPTER 6: DISCUSSION.....	34
REFERENCES	44
APPENDICES	55
Appendix A: Patient Health Questionnaire (PHQ-9).....	55
Appendix B: PHCC-IRB Approval Letter	56
Appendix C: QU-IRB Approval Letter	57
Appendix D. PHQ-9 scores in 2017 and 2019.....	58
Appendix E. STROBE Statement	59

LIST OF TABLES

Table 1. Characteristics of all Individuals Screened for Depression in 2017 and 2019	21
Table 2. Depression Screening Rates in 2017 and 2019.....	22
Table 3. Distribution of depression symptom severity among screened individuals in 2017 and 2019.....	23
Table 4. Proportion of screened individuals prescribed antidepressant medications in 2017 and 2019.....	23
Table 5. Referral Patterns of Screened individuals in 2017 and 2019.....	24
Table 6. Association between Patients Characteristics and Depression Symptoms Severity based on PHQ-9.....	26
Table 7. Association between Patients Characteristics and Antidepressant Prescription in PHCC.....	28
Table 8. Association between Patients Characteristics and Referral to PHCC Support Clinic.....	29
Table 9. Association between Patients Characteristics and Referral to the PHCC Psychiatric Clinic.....	31
Table 10. Association between Patients Characteristics and Referral to Secondary Care Psychiatric Clinic.....	33

ABBREVIATIONS

PHCC	Primary Health Care Corporation
MOPH	Ministry of Public Health
HMC	Hamad Medical Corporation
EMR	Eastern Mediterranean Region
APA	American Psychiatric Association
PHQ-2	Patient Health Questionnaire (2 items)
PHQ-9	Patient Health Questionnaire (9 items)
DSM-5	Diagnostic and Statistical Manual of Mental Disorders-5 th version
ICD-10	The International Classification of Diseases-10 th Version
DALY	Disability Adjusted Life Years
YLD	Years Lived with Disability
EHR	Electronic Health Records
IRB	Institutional Review Board
PAR	Population Attributable Risk
CPT	Cognitive Behavioral Therapy
ECT	Electroconvulsive Therapy
TSM	Transcranial Magnetic Stimulation
SSRIs	Selective Serotonin Reuptake Inhibitors
SNRIs	Serotonin Norepinephrine Reuptake Inhibitors

CHAPTER 1: INTRODUCTION

Depression is the most prevalent mental disorder worldwide. It was estimated in 2019 that depression affects more than 279 million individuals worldwide (1). In addition, the global incidence of depression among people aged 20 years and older was 1.1% in 2019 (1, 2). According to the WHO survey in 2017, the estimated global prevalence of depression was 5.1%, considered the highest among all mental disorders (3). Depression is also classified as the sixth leading cause of disability-adjusted life years (DALYs) globally among adults aged 25–49 years in 2019 (4). In the last two decades, the prevalence of depression has increased by 18.4% from 3.9% in 2005 to 4.8% in 2015 worldwide (4). In the Eastern Mediterranean Region (EMR), the estimated number of depression cases in 2015 was 52 million cases which were approximately 16% of the total cases in the world (5). Furthermore, the regional estimate of years lived with disability (YLD) in the EMR due to depression was 6.9% of all YLD) in 2015, which ranked the second contributor to non-fatal health loss per 100,000 population (5). In the state of Qatar It was estimated that the total cases of depression in 2017 were 105684 cases, which was approximately 5.1% of the total population (5).

One of the leading causes of suicide is untreated depression, and according to WHO, it was estimated in 2019 that approximately 703000 people die every year due to suicide (6). Furthermore, as per the WHO global health estimates of suicide worldwide, the global suicide rate in 2016 was 10.5 per 100,000 population (6).

Depression is a mental disorder described by a decreased interest in pleasurable activities and a persistent feelings of sadness, in addition, to disrupting appetite and sleeping patterns (5). Depression also affects the quality of life in terms of communication, productivity, and social relationships due to lack of interest and low concentration, and it also leads to self-harm and suicidal thoughts (5). There are many risk factors associated with depression, which include genetics, social, psychological, and biological factors (7). Family

history of depression and sudden changes in life, such as unemployment, traumatic incidents, and changes in social relationships are strongly associated with depression (8). Furthermore, environmental, and social factors, such as poverty, violence, and abuse in addition to physical illnesses like cancer, chronic diseases, and using illegal drugs are also associated with depression (9).

The Diagnostic and statistical manual of mental disorders (DSM-5) is a standardized guide for health care professionals to diagnose many mental disorders including depression, which was developed by the American Psychiatric Association (APA) in 2013 (7). The DSM-5 diagnostic criteria for depression requires the person to have five or more symptoms within the last two weeks and should include either loss of interest (anhedonia) and/or depressed mood, in addition to other symptoms such as sleeping disturbance, change in appetite, change in weight, agitation, fatigue, decreased concentration, feeling of guilt and suicidal ideas (7).

Screening for depression is considered the cornerstone of managing people with depression in primary care as it helps to identify depression cases and select the appropriate treatment accordingly (10, 11). Although the currently available screening tools are effective in detecting depression symptoms, however, it not sufficient as diagnostic tools, therefore, a structured clinical interview based on the DSM-5 diagnosis criteria is necessary to confirm whether the patient is having depression (12). Although depression screening is the most effective way to identify depression cases, the screening remains low worldwide (11). There is a lack of studies about depression screening rates in primary care and only a few studies have estimated the screening rates worldwide. In the US, it was estimated that the rate of depression screening in primary care was 2.2% in 2015 (13). Due to the low screening rates for depression, it was estimated that only 50% of depressed patients were recognized and treated globally in 2015 (14). The low depression screening rates in primary care are mainly attributed to the focus on medical illness and comorbidities rather than asking patients about

any changes in mood, pleasure, and sleeping patterns (15, 16). In addition, many patients deny the symptoms due to the stigma of depression and fear of being labelled as psychiatric patients (15, 16). There are other factors affecting the screening rates in primary care, such as lack of health practitioner training about the appropriate screening for depression and treatment patterns in primary care, in addition to the unavailability of mental health services and treatment plans in primary care (15).

Up-to-date information regarding depression screening rates and patterns of management of individuals screened positive for depression in PHCC in Qatar is lacking. Such information is useful in optimizing delivery and access to mental health facilities in PHCC, which is a national priority for Qatar.

CHAPTER 2: LITERATURE REVIEW

2.1 Depression definition

According to the APA, depression is a mental disorder described by a decreased interest in pleasurable activities and persistent feelings of sadness and disrupt appetite and sleeping patterns (7). Depression also affects the quality of life in terms of communication, productivity, and social relationships due to lack of interest and low concentration, it also leads to self-harm and suicidal thoughts (5). Different types of depression vary based on the causes, nature of the symptoms, and disease prognosis. As per the APA (DSM-5), depression is classified into five main subtypes determined by the number of symptoms and severity in addition to the level of functional impairment, which includes major depressive disorder, depression due to medical conditions, disruptive mood depression, premenstrual dysphoric depression, and persistent depression. Major depression is the most common type, mainly caused by multiple factors, including physical, psychosocial, environmental, and genetic factors (17).

Major depressive disorder is categorized into three categories: mild depression, moderate depression, and severe depression based on the total number of symptoms, the degree of low mood due to the severity of the symptoms, and the impact on patient occupation and social functioning (7). Mild depression is characterized by having few symptoms required to diagnose an individual with depression, however, the severity of the present symptoms is low and manageable which usually causes minimal impairment in individual occupational functioning (7). Moderate and severe depression is defined as having a number of symptoms with high intensity and unmanageable where it seriously affect occupational and social functioning (7). The International Classification of Diseases-10th Version (ICD-10) also categorizes depression into three levels based on the severity which are mild, moderate, and severe taking into account the number and intensity of the symptoms in addition to the functional impairment and degree of distress (18).

2.2 Global, Regional and Local Burden of depression

Depression is the most prevalent mental disorder worldwide. It was estimated in 2019 that depression affects more than 279 million persons worldwide (5). The global incidence of depression among people aged 20 years and older was 1.1% in 2019 (2, 5). Depression is considered a main contributor to the burden of disease globally and according to the WHO survey in 2017, the estimated global prevalence of depression was 5.1%, which is considered the highest among all mental disorders (4). Depression also ranked the sixth leading cause of DALYs globally among adults aged 25–49 years in 2019 (4). Analysis of changes in the global burden of depression showed that incident cases of depression increased from 172 million cases in 1990 to 258 million cases in 2017, which represents an increase of about 50%. (19).

In the EMR, the estimated number of depression cases in 2015 was 52 million which was approximately 16% of the total cases in the world (7). It was estimated that YLD attributable to depression in the EMR was 4049 YLD, which accounts for 6.9 % of the total YLD in the EMR in 2015 and ranked the first contributor to the YLD (20). In a recent study by Zuberi and colleagues, the prevalence of current, lifetime, and period prevalence of mental disorders were about 20.5%, 4.2%, and 4.3%, respectively (21).

In the state of Qatar, a study was conducted in 2017 based on a telephone survey using the PHQ-9 tool revealed that the point prevalence of depression was 4.2% and 6.6% using two cut off points for the PHQ-9 including a score ≥ 10 and ≥ 12 (22). Depression is considered the most prevalent mental disorder in the state of Qatar (23). A study was conducted in 2015 in Qatar using the WHO-CIDI-10 instrument showed that the lifetime prevalence of depression was approximately 18% (23). The same study showed that 59% of depression cases seen in primary care presented with mild depression symptoms, approximately 31% of the cases had moderate symptoms, and 10% had severe depression symptoms (23). Another study was conducted in Qatar in 2009 using the CIDI instrument

demonstrated that the lifetime prevalence of depression in the PHCC centers was 18.7% and 24.6% among males and females, respectively (24).

Depression is known as the main determinant of suicide (25). According to the WHO, it was estimated in 2019 that approximately 703,000 people die every year due to suicide, which places suicide as the fourth leading cause of death among individuals aged 19- 25 years (6). As per the WHO global health estimates of suicide worldwide, the global suicide rate in 2016 was 10.5 per 100000 population (6). A Meta-analysis was conducted in 2015 revealed that in four studies that examined the causes of death, the population attributable risk (PAR) of death was estimated at 12.7% due to suicidal death associated with depression (26). Another study was conducted in 2018 in Australia to predict suicidal ideation and behaviors among Australians with depression, where 1051 participants were interviewed, out of which 364 individuals reported persistent depression symptoms, 48% reported recurrent suicidal thoughts, and 16% reported recurrent attempt of suicide (27).

2.3 Risk factors for depression

There are many risk factors associated with depression including biological factors like chronic illness and cancer in addition to neurodegenerative diseases like multiple sclerosis, Alzheimer's and Parkinson's disease (17). Furthermore, childhood events, traumatic life events like disasters, accidents and loss of family members, and divorce are strongly associated with depression (17). In addition, social, and environmental factors such as unemployment, poverty, violence, adverse childhood events and abuse in addition to biological factors like cancer and chronic diseases and using illegal drugs are risk factors of depression (4, 10). According to the WHO global health estimate, depression is more prevalent among females (5.1%) compared with males (3.6%) (1). A systematic review was conducted in 2013 showed that the risk factors of suicide among people with depression were male gender (OR 1.76, 95% CI 1.09, 2.87) in addition to family history of mental disorder

(OR 1.42, 95% CI 1.10, 1.97), furthermore, chronic comorbidities (OR 1.59, 95% CI 1.03, 2.45) and alcohol and drugs abuse (OR 2.17, 95% CI 1.77, 2.65) (28).

A meta-analysis was conducted in the US in 2017 Assessing differences in depression diagnosis among males and females. The study suggested that depression symptoms were approximately two folds among females compared to males with an overall (OR 1.96% CI 1.88, 2.03) (29). Another study was conducted in the US in 2021 to assess the effect of adverse childhood events and gender on the risk of depression revealed that after stratification by gender, the OR of depression among individuals with a history of 3 to 5 adverse childhood events was 3.91 (95%CI 2.69, 5.69), and the OR among females was 2.42 (95%CI: 1.37, 4.28) compared with males (30). A cohort study was conducted in the Netherlands in 2018 showed that there was association between older age individuals (70 years and above) as compared to individuals aged (18-29 years) with worse depression progression in 4 indicators which include: depression diagnosis (OR 1.08, 95% CI 1.00, 1.17), symptom progression (OR 1.24, 95% CI 1.13, 1.35), period to remission (HR 0.91, 95% CI 0.87, 0.96), and the fourth indicator was depression severity change (regression coefficient 1.06, p-value <0.001, SE 0.21) (31).

In Qatar, a study conducted in 2015 among PHCC Qatari patients revealed that the lifetime prevalence of depression among females and males were 22.0% and 13.8%, respectively (23). In the same study, females had higher odds of having depression by 2.02 (95% CI: 1.44, 2.83) than males (23). Another study was conducted in Qatar in 2017 to investigate the point prevalence and potential determinants of subthreshold and major depression in the general population of Qatar revealed that female gender was significantly associated with major depressive episode (OR=2.00, 95%CI: 1.12-3.60). In addition, chronic health conditions were significantly associated with major depressive episode (OR 2.57, 95%CI: 1.56–4.22), moreover, subthreshold depressive episode, were significantly increased

in low-income migrants (OR 2.96, 95%CI: 1.43 –6.14) and high-income migrants (OR 2.00, 95%CI: 1.15–3.46) compared with non-migrants. Also, Arab ethnicity was significantly associated with prevalence and potential determinants of Subthreshold: relative to South Asians (OR 3.77, 95%CI: 2.10–6.79) and other ethnicities (OR 3.61, 95%CI: 1.14–11.39) (22).

2.4 Diagnosis of depression

As per the DSM-S diagnostic criteria for depression, the individual should have five or more symptoms approximately every day in the last two weeks which include depressed mood, reduced interest in pleasurable activities, significant changes in weight which could be increased or decreased in the individual weight (5% of the bodyweight gain or loss), changes in sleeping patterns, agitation, fatigue, feeling of unimportance or excessive guilt, decrease in the concentration and the ability to think, and having suicidal thought and recurrent thoughts of death (7). In addition to the mentioned symptoms, an individual should have at least one of the following symptoms which include a depressed mood and decrease interest of pleasurable activities. To confirm the diagnosis of depression, the symptoms should affect social and occupational functioning and cause clinically significant distress (7).

2.5 Depression screening tools

A Valid and reliable screening tool is required to accurately detect individuals with depression and manage them accordingly (32). There are several screening tools for depression in primary care such as PHQ-9, Center for Epidemiologic Studies Scale, the Duke Anxiety Scale, Beck Depression Inventory Scale and Geriatric Depression Scale (33). PHQ-2 is a commonly used tool to screen for depression. According to Mitchell and colleagues, the PHQ-2 has shown a sensitivity of 91.8% and specificity of 78% in identifying major depression (34). It includes two questions that mainly focus on the patient feeling of low mood and the inability to feel pleasure (anhedonia) in the last 2 weeks (35). Once the patient has a positive result in PHQ-2 (a score of three or more), then further screening should be

performed using the full version of the PHQ-9, to assess whether the patient has the other symptoms of depression (32). PHQ-9 is based on DSM-5 and shows a sensitivity of 88% and specificity and 91% in detecting major depression (36). PHQ-9 is comprised of 9 questions, and each question scores between 0 and 3 (32). A classification of the severity of depression symptoms is based on the PHQ-9 total score (32). A score of 0 to 4 indicates no or minimal depression symptoms, 5 to 9 indicates mild depression symptoms, 10 to 14 indicates moderate depression symptoms, 15 to 19 indicates moderately severe depression symptoms, and 20 to 27 indicates severe depression symptoms (37).

2.6 Screening for depression in primary care

Primary care settings are considered the first point of assessment for individuals with depression symptoms or have the potential to develop depression, therefore this gives an opportunity to the health care practitioners to detect, diagnose and manage individuals with depression. Accurate and timely screening and diagnosis of depression are crucial in the process of depression management as it leads to prompt initiation of depression treatment, which in return reduces the morbidity and mortality associated with depression (38). Undetected and untreated depression lead to poor quality of life, increase health costs and increase risk of other comorbidities and death (38). Despite the worldwide recommendations to focus on depression screening and management as it considered a leading cause of disability, however, a huge proportion of depression cases are still unrecognized due to the low screening rates in primary care (39).

The U.S. Taskforce for Preventive Services advises to perform screening for depression for all adolescents starting from the age of 12 years, adults, older age, pregnant women and women in their postpartum period in primary care (11). In Canada, the Canadian Taskforce on Preventive Healthcare advises performing screening for depression in primary care only for individuals with risk factors like age, comorbidities, family history of mental disorders and depression symptoms (40). In the UK, The National Institute for Health and

Care Excellence recommend performing depression screening in primary care for patients with chronic comorbidities, functions impairments, and individuals with history of depression (41). In the state of Qatar, the national guidelines for the diagnosis and management of depression which was introduced in 2020 recommend performing depression screening for all adults attending primary care services using PHQ-2 followed by screening using the PHQ-9 for any individual testing positive in the PHQ-2 (a score of 3 or more) (42).

2.7 Barriers for depression screening in primary care

Screening for depression in primary care is a crucial step toward recognizing people who have depression and providing them with the appropriate treatment (10). However, the screening rates remain low worldwide (11). There is a lack of studies about depression screening rates in primary care. A national study was conducted in the US including a sample of 33,653 patients encounters revealed that the screening rate for depression was 4.2% (39). Another national study was conducted in the US in 2018 to examine the patterns, predictors of depression screening among undiagnosed individuals in the US (13). The study showed that the depression screening rate was 1.4% of all patients' visits to ambulatory care. Furthermore, female gender, general and family medicine physicians, and more time spent during physician visits were associated with higher depression screening rates (13). A study was conducted in 2019 to evaluate the attitudes of healthcare providers in the Kingdom of Bahrain demonstrated that general healthcare professionals had a significant stigma related to mental disorders. However, health care professionals who are specialized in treating patients with mental disorders had less stigma related to mental disorders (43).

Due to the low screening rates for depression, it was estimated in 2015 that only 50% of patients having depression are diagnosed globally (14). A meta-analysis was conducted in 2009 demonstrates that globally less 50% of the individuals with depression were diagnosed correctly in primary care (44). A meta-analysis was conducted to quantify the depression treatment cascade in primary care suggested that the proportion of patients who were

clinically recognized among all diagnosed cases was 47% (95% CI 42%, 53%), and the proportion of patients who received treatment among all diagnosed cases was 50% (95% CI 33%, 67%). Furthermore, the proportion of patients who received adequate treatment among all treated patients was 40% (95% CI 30%, 50%) globally (45).

The low depression screening rates in primary care are mainly attributed to the focus on medical illness and other comorbidities and skipping the screening for depression symptoms during assessment (15, 16, 46). A study was conducted in the US to evaluate the reasons for not disclosing depression symptoms among patients in primary care which showed that 43% of patients reported one or more reasons for nondisclosure, and the most common reason was patient's concern that their physician will order antidepressant medication (15). In addition, patients without a family history of depression were likely to assume that depression is not under the scope of service of primary care (15). Furthermore, most of the patients deny the symptoms due to the stigma of depression and fear of being labelled as psychiatric patient (15). A cross sectional study was conducted in Qatar to investigate the knowledge, attitude, and beliefs toward mental illness in primary care revealed that 50.6% of Qatari participants and 44.5% of non-Qatari Arabs believe that mental illness is a punishment from God, in addition a significant proportion (45.1% Qatari and 35.15 Arabs) thought that people with mental illness are mentally retarded. The study showed also that a significant proportion of the participants believe that psychiatric medications cause addiction. Moreover, a significant proportion of the participants preferred traditional healers (47). There are other factors affecting the screening rates in primary care such as lack of health practitioner training about the appropriate screening of depression in primary care, the limited time allocated for each patient during the visit, in addition to the unavailability of mental health services and treatment plans in primary care (13, 15, 16, 46). A study was conducted in the GCC countries suggests that individuals experience of mental illness could

by influenced by religion such as the belief that mental illness is attributed to demons which results in preferring traditional and spiritual healers instead of medical treatment (48).

2.8 Primary Health Care in Qatar and National Guidelines for Screening for Depression

Until 1990, mental health service in Qatar was provided only through hospital-based services and there were no mental health services in PHCC (49). The first national mental health program was introduced in 2009 that prioritized the involvement of primary health settings in providing mental health services (49). PHCC is the leading body of primary health care service in Qatar. Currently, PHCC operates through 28 health centers in Qatar and employs over 4,000 clinicians. PHCC became an independent provider of primary health care in 2012, followed by launching the national mental health strategy 2013-2018 (49). The strategy focused on providing physicians and nurses with mental health training programs and launched the mental health services in the PHCC (49). The following national health strategy (2018-2022) was launched in 2018, which aimed to enhance access to mental health facilities in the PHCC and to address the impact of stigma related to utilizing mental health services in secondary care hospitals (50). The strategy identified mental health as one of the seven key priority areas for improvement, including developing and integrating mental health services into the PHCC to expand the comprehensive community-bases mental health service (51). Currently, the PHCC provides mental health services in support clinics run by clinical psychologists for individuals aged 18 years and above with mild to moderate mental health illness and this service is available in five health centers across the country. In addition, PHCC has an integrated psychiatry service managed by an interdisciplinary team including a psychiatrist, psychologist, mental health nurse and social worker (51). This service targets individual with moderate to severe mental health disorders (51). Furthermore, the community-based outpatient clinics are one of the available mental health services in PHCC which mainly receive referrals from the 28 primary health care centers across Qatar in collaboration with the main outpatient clinics in Hamad Medical Corporation (HMC)

psychiatric hospital which target patients with moderately severe to severe mental illness (52). There are two types of referrals to the mental health services in PHCC which include individual self-referral and general practitioner referral (51).

The clinical guidelines for diagnosis and management of depression were introduced in 2015 and were revised in 2020 by the Ministry of Public Health in Qatar. The guidelines aim to increase the appropriate recognition and management of depression in Qatar by following the clinical practice pathway for screening, diagnosis, and management of depression (42). As per the guidelines, any patient present to a healthcare organization/facility with clinical symptoms should be screened for depression by the nurse using the PHQ-2 screening tool (42). If the patient has a positive result (a score of 3 or more), then another screening should be carried out using the PHQ-9 screening tool, if the score of PHQ-9 is 10 or more, then a further assessment must be done which include assessing the history of medical illness, medication or substance misuse, and history of other psychiatric disorders (42). The guidelines recommend using DSM-5 to confirm the diagnosis of depression (42). The management of depression as per the guidelines will be based on the severity of the disease using the stepped-care model which is a system of delivering and monitoring mental health treatment to the patients starting with the minimal intensive treatment and then stepping up to intensive specialized treatment which includes: psychological therapies, pharmacological therapy, Electroconvulsive Therapy and Transcranial Magnetic Stimulation depending on the level of patient distress and severity of depression symptoms (42). The guidelines recommend that self-management is suitable for mild depression cases in addition to lifestyle improvement, psychoeducation, and low-intensity psychosocial interventions such as CBT guided self-help and Behavioral Activation. Moderate depression cases can be treated in primary care settings using the previous treatment option for mild depression but with high-intensity psychological interventions and

pharmacological interventions. However, for cases with severe depression, cases failed to respond to the interventions provided in primary care and if there is any suicidal attempt should be referred to secondary care for advanced interventions like transcranial magnetic stimulation and electroconvulsive therapy (42). Pharmacological treatment for depression usually will be initiated in primary care for moderate and moderately severe cases which include mainly selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) (42). The treatment guidelines for depression in secondary care include SSRIs and SNRIs and atypical antidepressants, tricyclic antidepressants, and Monoamine oxidase inhibitors (42).

2.9 Identified Research Gaps

Based on the literature review, there is a lack of studies about depression screening rates and management patterns in primary care worldwide. In addition, there are no studies that assessed the depression screening rates and management patterns in Qatar. Aligned with the national health strategy 2018-2022, this study will help in evaluating the current practices related to depression screening and management patterns including pharmacological management and referrals to the different mental health services within PHCC and in the secondary care psychiatric service. Furthermore, the information from this study will be helpful in the future strategy to improve the access to mental health services in PHCC which is less stigmatized than that of secondary care psychiatric service. Also, the findings of this study can be used as baseline information for future evaluation of the screening rates and management of depression in the PHCC in Qatar.

CHAPTER 3: RESEARCH AIM, OBJECTIVES AND QUESTIONS

3.1 Aim

To estimate and compare the annual screening rates for depression and describe management of individuals screened for depression in PHCC centers in Qatar in 2017 and 2019.

3.2 Research questions

Q1: What is the annual depression screening rates among individuals aged 18-65 years in the PHCC in 2017 and 2019?

Q2: What are the management and referral patterns including (antidepressant prescription dispensed in PHCC, referral to PHCC support clinic, referral to PHCC psychiatric clinic, and referral to secondary care psychiatric clinic) of individuals aged 18-65 years who were screened for depression in 2017 and 2019?

Q3: What are the main characteristics of individuals aged 18-65 who were screened for depression associated with symptoms severity, antidepressants prescription, referral to PHCC support clinic, PHCC psychiatric clinic, and secondary care psychiatric clinic in 2017 and 2019?

3.3 Objectives

1. To estimate and compare the annual depression screening rates among individuals aged 18-65 years in the PHCC in 2017 and 2019.

2. To describe and compare the severity of depression symptoms among individuals aged 18-65 years screened for depression in 2017 and 2019.

3. To describe and compare the management and referral patterns of individuals aged 18-65 years who were screened for depression in 2017 and 2019, including prescribed antidepressant medications, referral to support clinic for depression in PHCC, referral to psychiatric clinic in PHCC, and referral to secondary care.

4. To assess the associations between patient characteristics (age, gender, nationality) in addition to the year of depression screening year with the following outcome measures

(depression symptoms severity, antidepressants prescribing, and referral status to support clinic at PHCC, psychiatric clinic at PHCC, and referred to secondary care).

3.4 Research Hypotheses

There is no research hypothesis for research question 1 and 2. For research questions 3, the null and alternative hypotheses are as follows.

H0: There is no association between the characteristics of individuals aged 18-65 who were screened for depression and antidepressants prescription, referral to PHCC support clinic, PHCC psychiatric clinic, and secondary care psychiatric clinic in 2017 and 2019

H1: There is association between the characteristics of individuals aged 18-65 who were screened for depression and antidepressants prescription, referral to PHCC support clinic, PHCC psychiatric clinic, and secondary care psychiatric clinic in 2017 and 2019

CHAPTER 4: METHODS

4.1 Study design

This is a cross-sectional study of secondary data from electronic health records (EHR) of patient-physician encounters of individuals aged 18-65 years seeking health care in PHCC with a completed PHQ-9 questionnaire in 2017 and 2019.

4.2 Study setting

The study used available data extracted from EHR on screening for depression from 23 PHCC centers in 2017 and 27 centers in 2019 (4 centers were opened after 2017). The PHCC uses the Cerner system to archive all EHR for patient-physician encounters in PHCC, including prescribed medications and referrals within the PHCC clinics and referrals to secondary care.

4.3 Study Population

The study included all individuals aged 18-65 years who were screened for depression in PHCC in 2017 and 2019.

4.4 Inclusion criteria

All individuals aged 18-65 years with at least one patient-physician encounters in the PHCC in 2017 and 2019 who have a completed PHQ-9 questionnaire were included in this study.

4.5 Exclusion criteria

We have requested data on all individuals were screened for depression using the PHQ-2 and PHQ-9 between 2017 and 2021, inclusive. However, the Business Health Intelligence (BHI) Unit in the PHCC informed us that extracting the requested data will take at least six months to one year because the BHI team were prioritizing data extractions for COVID-19 related research projects, which does not align with the timeline for this thesis. Therefore, the Clinical Research Affairs Department managing the data request submitted to the PHCC offered us a dataset on screening for depression in the PHCC in 2017 and 2019, which was extracted and available already. Considering the timeline for submitting this thesis, we decided to use this dataset despite the following limitations. The dataset covers only 2017

and 2019 and does not include data on individuals aged less than 18 years and older than 65 years. In addition, the dataset did not include data on pregnant women and those with drugs abuse/addiction disorders.

4.6 Data collection

The data was extracted by the business health intelligence unit and was already available from the Clinical Research Affairs Department of the PHCC. The dataset included the following variables: year (2017 or 2019), age in years and then we categorized it into four age groups (18-29, 30-41, 42-53 and 54-65) in order to have comparable age groups, gender (male, female), nationality (Qatari, other nationalities), PHCC center name, total PHQ-9 score, antidepressants prescribing status (yes, no), referral to PHCC support clinic (yes, no), referral to PHCC psychiatric clinic (yes, no), and referral to secondary care psychiatric clinic/hospital (yes, no). The depression symptoms severity was measured using the PHQ-9.

4.7 Outcome Measures

The first outcome measure was the annual depression screening rates among adults aged 18-65 years in 2017 and 2019. The second outcome measure was the annual proportion of individuals prescribed antidepressant medications. The third outcome measure was the annual proportion of individuals referred to support clinic in PHCC for. The fourth outcome measure was the annual proportion of individuals referred to PHCC psychiatric. The fifth outcome measure was the annual proportion of individuals referred to outpatient psychiatric clinic. The sixth outcome measure was the association between depression symptoms severity, antidepressant prescription, and the referrals to PHCC support clinic, PHCC psychiatric clinic and secondary care psychiatric clinic with age, gender, nationality, year of depression screening. Finally, the depression symptoms severity was categorized based on the PHQ-9 score into five categories: 0-4 mean no or minimal symptoms, 5-9 mean mild symptoms, 10-14 = moderate symptoms, 15-19 indicate moderately severe symptoms, and 20-27 mean severe symptoms (36).

Sampling: The dataset included all individuals meeting inclusion criteria from all PHCC centers in 2017 and 2019. Therefore, no sampling was required.

4.8 Statistical analysis

All statistical analysis was conducted using Stata 17 (Stata Corp. 2017). Descriptive statistics was used to summarize the baseline characteristics of the study participants. Continuous variables were expressed as mean and standard deviation (SD). The categorical variables were summarized using numbers with percentages. The depression screening rates were estimated as total number of individuals screened for depression divided by the total patient-physician encounters in the PHCC. The annual proportion of individuals prescribed antidepressant medications was calculated using the number of individuals prescribed antidepressant medications divided by the number of individuals screened for depression. The annual proportion of individuals referred to support clinic in PHCC for depression was calculated using the number of individuals referred to support clinic in PHCC divided by the number of individuals screened for depression. The annual proportion of individuals referred to PHCC psychiatric clinic was calculated using the number of individuals referred to PHCC psychiatric clinic divided by the number of individuals screened for depression. The annual proportion of individuals referred to outpatient psychiatric clinic was calculated using the number of individuals referred to outpatient psychiatric clinic divided by the number of individuals screened for depression. As the depression symptoms severity variable was ordinal, we used ordinal logistic regression analysis to assess whether there are any significant variations in depression symptoms severity according to year, age, gender, nationality and year of depression screening while accounting for PHCC center to adjust for any clustering of cases within PHCC centers. The first step we conducted a univariate ordinal logistic regression, and then we conducted multivariable ordinal logistic regression including all the covariate in the model (age category, gender, nationality, health center and year of screening). Assessment of the proportional odds assumption was conducted to check if the

assumption was violated using brant test. Moreover, we assessed the other model assumption including multicollinearity, independence, and outliers. Finally, we assessed the model goodness of fit using Hosmer-Lemshow test. The other outcome variables were all binary; hence, a univariate logistic regression analysis was conducted to assess the relationship between the predictors (age groups, gender, nationality and year of depression screening) and the outcome measure, including depression severity, antidepressant prescription and referral patterns. Multivariable logistic regression analysis was used to evaluate whether there are any significant variations in antidepressant prescription and referral patterns according to age, gender, nationality and year of depression screening. A p-value of <0.05 was considered statistically significant. Logistic regression models' assumptions were assessed for any violation. In addition, each model was assessed for goodness of fit using classification table and Receiver operating characteristics (ROC). Finally, a sensitivity analysis was conducted using generalized linear mixed models to assess for in any inadequate control for clustering of cases within PHCC centers in the original analyses (53).

4.9 Ethical considerations

The study was ethically approved by the PHCC IRB Research Subcommittee (Ref No: PHCC/DCR/2021/12/074) and Qatar University IRB (Ref No: QU-IRB 1676-E/22). This study uses de-identified secondary data extracted from EHR to protect the privacy of patient's information. The data was stored in a password-protected computer to avoid unauthorized access, disclosure, loss, or data theft.

CHAPTER 5: RESULTS

5.1 Demographic characteristics of the participants

A total of 5,467 individuals were screened for depression in 2017 and 2019, out of which 2679 patients were screened in 2017 and 2788 patients in 2019. Dataset was inspected for any missing values for each variable, and there was no missing data in all variables. Table 1 shows the characteristics of individuals screened for depression in 2017 and 2019. The Mean age \pm SD of screened individuals was 42.8 ± 12.4 years and 37.8 ± 11.4 years in 2017 and 2019, respectively. About 32% of patients aged 54-65 years in 2017, and 30% fell into the age group 18-29 years in 2019. Of the total patients, 63.4% were female, and 36.6% were male. Other nationalities were 73.7% of the total screened patients, and the rest were Qatari.

Table 1. Characteristics of all Individuals Screened for Depression in 2017 and 2019

Main Characteristics	2017	2019	Total
	N=2,679	N=2,788	N=5,467
	No. (%)	No. (%)	No. (%)
Age in Years, mean (SD)	42.8 (12.4)	37.8 (11.4)	40.2 (12.1)
Age Category			
18-29	542 (20.0)	834 (30.0)	1,376 (25.0)
30-41	585 (22.0)	852 (31.0)	1,437 (26.0)
42-53	689 (26.0)	647 (23.0)	1,336 (24.0)
54-65	863 (32.0)	455 (16.0)	1,318 (24.0)
Nationality			
Qatari	744 (27.8)	695 (24.9)	1,439 (26.3)
Other Nationalities	1,935 (72.2)	2,093 (75.1)	4,028 (73.7)
Gender			
Male	1,028 (38.4)	975 (35.0)	2,003 (36.6)
Female	1,651 (61.6)	1,813 (65.0)	3,464 (63.4)

SD= standard deviation.

5.2 Annual Depression Screening Rates

Table 2 shows depression screening rates in PHCC in 2017 and 2019. To calculate the depression screening rates, we used the total patient-physician encounters in 2017 and 2019

as a denominator provided by the Business Health Intelligence Department of the PHCC. The total patient-physician encounters in 2017 were 427663 encounters, out of which 2679 patients were screened for depression, and the depression screening rate in 2017 was 6 per 1000 individuals (0.63%). In 2019, the total patient-physician encounters were 469247 individuals, out of which 2788 individuals were screened, with a screening rate of approximately 6 per 1000 individuals (0.59%).

Table 2. Depression Screening Rates in 2017 and 2019

Year	Total PHCC Registered Population	Total patient-physician Encounters	Total Screened Individuals	Screening Rate (%)
2017	822681	427663	2679	0.63
2019	955721	469247	2788	0.59

PHCC, Primary Health Care Corporation

5.3 Severity of Depression Symptoms

Table 3 shows the proportions of patients based on the severity of depression symptoms using PHQ-9 in 2017 and 2019. Among screened individuals in 2017, the highest percentage, 57%, were patients with minimal depression symptoms followed by mild symptoms, 18%, compared with 2019, where the proportion of individuals with minimal depression symptoms was 39%, followed by moderate symptoms, 19%. In both years, patients with severe depressive symptoms were the lowest, with 4.6% and 7.2 % in 2017 and 2019, respectively.

Table 3. Distribution of depression symptom severity among screened individuals in 2017 and 2019

	2017	2019	Total
Symptoms Severity	N=2,679	N=2,788	N=5,467
	No. (%)	No. (%)	No. (%)
Minimal	1,539 (57.4)	1,054 (37.8)	2,593 (47.4)
Mild	482 (18.0)	567 (20.3)	1,049 (19.2)
Moderate	357 (13.3)	574 (20.6)	931 (17.0)
Moderately Severe	179 (6.7)	391 (14.0)	570 (10.4)
Severe	122 (4.6)	202 (7.2)	324 (5.9)

5.4 Antidepressants Prescriptions

Table 4. Shows the proportion of antidepressant drugs prescription in 2017 and 2019. Out of 2702 patients screened for depression, 512 patients (19.4%) were prescribed antidepressant drugs. In 2019 out of 2839 patients screened for depression, 802 patients (28.8%) were prescribed antidepressant medications.

Table 4. Proportion of screened individuals prescribed antidepressant medications in 2017 and 2019

	2017	2019	Total
	N=2,702	N=2,839	N= 5,467
Antidepressant Prescription	No. (%)	No. (%)	No. (%)
Yes	512 (19.4)	802 (28.8)	1,323 (24.2)
No	2,158 (80.6)	1,986 (71.2)	4,144 (75.8)

5.5 Referral Patterns

Table 5 shows the proportion of the overall referrals to any of the three mental health clinics (support clinic, PHCC psychiatric clinic and secondary care psychiatric clinic) among screened individuals in 2017 and 2019. In 2017, the percentage of overall patient referrals was 2.5%, whereas the rate in 2019 increased to 8.0%. Out of 2679 patients screened for

depression, 49 (2.0%) patients were referred to PHCC support clinic, 44 (2.0%) individuals were referred to PHCC psychiatric clinic, and 62 (2.3%) referred to secondary care psychiatric clinic. There was an increase in the proportion of referrals in 2019. The percentages of individual's referrals were 6.0% to both the PHCC support clinic and PHCC psychiatric clinic and 6.9% to the secondary care psychiatric clinic.

Table 5. Referral Patterns of Screened individuals in 2017 and 2019

Referral Type	2017	2019	Total
	N= 2,679 No. (%)	N= 2,788 No. (%)	N= 5,467 No. (%)
PHCC Support Clinic			
Yes	49 (2.0)	160 (6.0)	209 (4.0)
No	2,630 (98.0)	2,628 (94.0)	5,258 (96.0)
PHCC Psychiatric Clinic			
Yes	44 (2.0)	162 (6.0)	206 (4.0)
No	2,635 (98.0)	2,626 (94.0)	5,261 (96.0)
Secondary Care Psychiatric Clinic			
Yes	62 (2.3)	191 (6.9)	253 (4.6)
No	2,617 (97.7)	2,597 (93.1)	5,214 (95.4)
Overall referral			
Yes	66 (2.5)	222 (8.0)	288 (5.3)
No	2,613 (97.5)	2,566 (92.0)	5,179 (94.7)

5.6 Association between Patients Characteristics and Depression Symptoms Severity

Table 6 presents the proportions of patients based on the severity of depression symptoms according to their characteristics and the years of screening. Proportion of individuals who had minimal depression symptoms among the age group 45-65 years was 36%, in addition, the proportion of individuals had severe depression symptoms among the age group 18-29 years was 40%. In all levels of depression symptoms severity, the proportion of females was higher than males which ranged between 54% for minimal symptoms and 76% for severe

symptoms. Moreover, the proportion of other nationalities was higher in all symptom's severity levels, which ranged between 41% for minimal symptoms and 77% in severe symptoms. The proportion of individuals who had severe symptoms was higher among individuals screened in 2019, which was 62%. Table 8. Shows the findings of univariate and multivariable ordinal logistic models including the predictors: age category, gender, nationality, and year of screening. adjusted model results were consistent with the unadjusted model findings in which gender, age group and year of screening were significantly associated with higher depression symptoms severity. In the adjusted model, females had increased odds of higher depression symptoms severity than males by 1.92 (95% CI 1.71, 2.14). Age groups also were independently associated with higher depression symptoms severity where individuals aged 30-41 years had lower odds of higher depression symptoms severity by 0.75 (95% CI 0.66, 0.86) than individuals aged 18-29 years. Moreover, individuals aged 42-53 years had lower odds of higher depression symptoms severity by 0.56 (95% CI 0.49, 0.64) compared to individuals aged 18-29 years. In addition, individuals aged 54-65 years have lower odds of higher depression symptoms severity by 0.25 (95% CI 0.21, 0.29). The year of screening was also significantly associated with depression symptoms severity. Individuals screened for depression in 2019 had increased odds of higher depression symptoms severity by 1.84 (95% CI 1.66, 2.05).

Table 6. Association between Patients Characteristics and Depression Symptoms Severity based on PHQ-9

Variable	Depression symptoms severity					Unadjusted association				Adjusted* association			
	Minimal No. (%)	Mild No. (%)	Moderate No. (%)	Moderately severe No. (%)	Severe No. (%)	β	SE	OR (95% CI)	p-value	β	SE	OR (95% CI)	p-value
Age													
18-29	443 (17.0)	294 (28.0)	289 (31.0)	219 (38.0)	131 (40.0)	Ref							
30-41	556 (21.0)	308 (29.0)	296 (32.0)	181 (32.0)	96 (30.0)	-0.30	0.07	0.74 (0.65, 0.85)	<0.001	-0.29	0.07	0.75 (0.66, 0.86)	<0.001
42-53	666 (26.0)	251 (24.0)	222 (24.0)	127 (22.0)	70 (22.0)	-0.71	0.07	0.49 (0.43, 0.57)	<0.001	-0.58	0.07	0.56 (0.49, 0.64)	<0.001
54-65	928 (36.0)	196 (19.0)	124 (13.0)	43 (8.0)	27 (8.0)	-1.62	0.08	0.20 (0.17, 0.23)	<0.001	-1.39	0.08	0.25 (0.21, 0.29)	<0.001
Gender													
Male	1,200 (46.0)	322 (31.0)	254 (27.0)	150 (2.0)	77 (24.0)	Ref							
Female	1,393 (54.0)	727 (69.0)	677 (73.0)	420 (74.0)	247 (76.0)	0.75	0.54	2.12 (1.91, 2.36)	<0.001	0.65	0.06	1.92 (1.71, 2.14)	<0.001
Nationality													
Qatari	688 (27.0)	284 (27.0)	249 (27.0)	143 (25.0)	75 (23.0)	Ref							
Other	1,905 (73.0)	765 (73.0)	682 (73.0)	427 (75.0)	249 (77.0)	0.05	0.06	1.05 (0.94, 1.10)	0.399	0.11	0.06	1.11 (0.99, 1.25)	0.071
Year													
2017	1,539 (59.0)	482 (46.0)	357 (38.0)	179 (31.0)	122 (38.0)	Ref							
2019	1,054 (41.0)	567 (54.0)	574 (62.0)	391 (69.0)	202 (62.0)	0.78	0.05	2.19 (1.98, 2.42)	<0.001	0.61	0.05	1.84 (1.66, 2.05)	<0.001

β , Regression coefficient; SE, Standard Error; OR Odds Ratio; CI, Confidence Interval. *Adjusted for age, gender, nationality, year, and PHCC center (data for PHCC centers (n=27) is not shown)

5.7 Association between Patients Characteristics and Antidepressant Prescription

Table 7 shows the proportions of antidepressant prescription based on patient characteristics, health center and year of screening. The largest proportion of antidepressant prescriptions was among individuals aged 30-41 years 30% and the smallest proportion was among individuals aged 18-29 years 21%. Proportion of antidepressant prescription among females was 65% and among males 35%. Other nationalities had a higher proportion of prescriptions 76% compared with Qatari. The proportion of antidepressant prescriptions was increased from 39% in 2017 to 61% in 2019. A univariate and multivariable logistic regression analysis was conducted to assess the association between patient's characteristics and antidepressant prescriptions. Multivariable logistic regression results were consistent with the univariate analyses findings. In the adjusted model, the age groups (30-41 and 42-53 years) and year of depression screening were significantly associated with antidepressant prescription. Table 9. Shows the results of logistic regression analysis of the association between patient's characteristics and antidepressant prescription in PHCC. Individuals aged 30-41 had an increased odds of having an antidepressant prescription by 1.49 (95% CI 1.25, 1.78) than those aged 18-29 years. Also, individuals aged 42-53 years had increased odds of having an antidepressant prescription by 1.57 (95% CI 1.31, 1.88). Moreover, individuals who were screened for depression in 2019 had increased odds of having an antidepressant prescription by 1.62 (95% CI 1, 46, 1.89).

Table 7. Association between Patients Characteristics and Antidepressant Prescription in PHCC

Variable	Antidepressant Prescription		Unadjusted association				Adjusted* association			
	Yes No. (%)	No No. (%)	β	SE	OR (95% CI)	p-value	β	SE	OR (95% CI)	p-value
Age										
18-29	284 (21.0)	1,092 (26.0)	Ref							
30-41	401 (30.0)	1,036 (25.0)	0.40	0.89	1.50 (1.25, 1.77)	<0.001	0.40	0.09	1.49 (1.25, 1.78)	<0.001
42-53	368 (28.0)	968 (23.0)	0.38	0.09	1.46 (1.22, 1.75)	<0.001	0.45	0.09	1.57 (1.31, 1.88)	<0.001
54-65	270 (20.0)	1,048 (25.0)	-0.01	0.09	0.99 (0.82, 1.19)	0.921	0.14	0.10	1.15 (0.95, 1.39)	0.147
Gender										
Male	462 (35.0)	1,541 (37.0)	Ref							
Female	861 (65.0)	2,603 (63.0)	0.98	0.07	1.10 (0.96, 1.26)	<0.001	0.10	0.07	1.11 (0.97, 1.27)	0.124
Nationality										
Qatari	322 (24.0)	1,541 (37.0)	Ref							
Other	1,001(76.0)	2,603 (63.0)	0.13	0.07	1.15 (0.99,1.32)	0.060	0.09	0.07	1.10 (0.95, 1.28)	0.183
Year										
2017	521 (39.0)	2,158 (52.0)	Ref							
2019	802 (61.0)	1,986 (48.0)	0.51	0.06	1.67 (1.47, 1.90)	<0.001	0.51	0.11	1.62 (1.46, 1.89)	<0.001

β , Regression coefficient; SE, Standard Error; OR Odds Ratio; CI, Confidence Interval. *Adjusted for age, gender, nationality, year, and PHCC center (data for PHCC centers (n=27) is not shown)

5.8 Association between Patients Characteristics and Referral Patterns

5.8.1 Referral to the PHCC Support Clinic

Table 8. shows the proportions of referral to the PHCC support clinic. proportion of referral to the PHCC support clinic was higher among individuals aged 45-65 years 28% compared with younger age group (18-29 years) 23%. There was an enormous variation in the proportion of referral to the PHCC support clinic between males and females, where it was 81% among female and 19% among males. The proportion of individuals referred to the PHCC support clinic was increased from 23% in 2017 to 77% in 2019. Logistic regression analysis was conducted to assess the association between patients' characteristics and referral to PHCC support clinic. Table 10. Shows the predictors of referral to PHCC support clinic. In the adjusted model, nationality, gender, age group and year of depression screening were

significantly associated with referral to PHCC support clinic. Other nationalities had lower odds of being referred to PHCC support clinic by 0.47 (95% CI 0.35, 0.63) compared with Qatari. Females had increased odds of being referred to PHCC support clinic compared with males by 2.36 (95% CI 1.65, 3.39). Individuals aged 53-65 years had increased odds of being referred to PHCC support clinic by 1.83 (95% CI 1.23, 2.72) than those aged 18-29 years. Individuals who were screened for depression in 2019 had increased odds of being referred to PHCC support clinic by 3.67 (95% CI 2.63, 5.11) than those who were screened in 2017.

Table 8. Association between Patients Characteristics and Referral to PHCC Support Clinic

Variable	Referral to PHCC Support Clinic		Unadjusted association				Adjusted* association			
	Yes No. (%)	No No. (%)	β	SE	OR (95% CI)	p-value	β	SE	OR (95% CI)	p-value
Age										
18-29	49 (23.0)	1,327 (25.0)	Ref							
30-41	47 (22.0)	1,390 (26.0)	-0.09	0.21	0.92 (0.61, 1.38)	0.672	0.01	0.21	1.00 (0.67, 1.52)	0.978
42-53	54 (26.0)	1,282 (24.0)	0.13	0.20	1.14 (0.77, 1.69)	0.513	0.36	0.20	1.43 (0.96, 2.14)	0.078
54-65	59 (28.0)	1,259 (24.0)	0.24	0.19	1.27 (0.87, 1.87)	0.227	0.60	0.20	1.83 (1.23, 2.72)	0.003
Gender										
Male	39 (19.0)	1,964 (37.0)	Ref							
Female	170 (81.0)	3,294 (63.0)	0.96	0.18	2.59 (1.82, 3.70)	<0.001	0.86	0.18	2.36 (1.65, 3.39)	<0.001
Nationality										
Qatari	93 (44.0)	1,346 (26.0)	Ref							
Other	116 (56.0)	3,912 (74.0)	-0.85	0.14	0.43 (0.32, 0.57)	<0.001	-0.75	0.15	0.47 (0.35, 0.63)	<0.001
Year										
2017	49 (23.0)	2,630 (50.0)	Ref							
2019	160 (77.0)	2,628 (50.0)	1.18	0.17	3.27 (2.36, 4.52)	<0.001	1.29	0.17	3.67 (2.63, 5.11)	<0.001

β , Regression coefficient; SE, Standard Error; OR Odds Ratio; CI, Confidence Interval. *Adjusted for age, gender, nationality, year, and PHCC center (data for PHCC centers (n=27) is not shown).

5.8.2 Referral to the PHCC Psychiatric Clinic

Table 9. shows the proportion of individuals referred to the PHCC psychiatric clinic. proportion of individuals aged 42-53 years was 28% of the total individuals, followed by individuals aged 54-65 years where the proportion of individuals referred to PHCC psychiatric clinic was 27%. Proportion of referral among females was 81% compared to

males 19%. Logistic regression analysis was conducted to assess the association between patients' characteristics and referral to PHCC psychiatric clinic. Table.11 shows the predictors of referral to PHCC psychiatric clinic. Nationality, gender age group and year of depression screening were significantly associated with referral to PHCC psychiatric clinic. Other nationalities had lower odds of being referred to PHCC psychiatric clinic than Qatari by 0.42 (95% CI 0.31, 0.56). Females had increased odds of being referred to PHCC psychiatric clinic than males by 2.27 (95% CI 1.58, 3.25). Individuals aged 42-53 years had increased odds of being referred to PHCC psychiatric clinic by 1.51 (95% CI 1.02, 2.23) compared with those aged 18-29 years. Individuals aged 54 to 65 years had increased odds of being referred to PHCC psychiatric clinic by 1.71 (95% CI 1.12, 2.55) compared with individuals aged 18-29 years. Moreover, individuals who were screened in 2019 had higher odds of being referred to PHCC support clinic than those who were screened in 2017 by 4.17 (95% CI 2.96, 5.89). The logistic regression assumptions were assessed and there was no evidence of multicollinearity, in addition there was no violation in independence, and there were no outliers. Finally, the model was assessed for the goodness of fit using classification table which show that the model fits the data and there was no evidence for the lack of fit (P-value: 0.320). moreover, Receiver operating characteristics (ROC) tests was used which shows that the area under the curve was 73%.

Table 9. Association between Patients Characteristics and Referral to the PHCC Psychiatric Clinic

Variable	Referral to PHCC Support Clinic		Unadjusted association				Adjusted* association			
	Yes No. (%)	No No. (%)	β	SE	OR (95% CI)	p-value	β	SE	OR (95% CI)	p-value
Age										
18-29	50 (24.0)	1,326 (25.0)	Ref							
30-41	43 (21.0)	1,394 (26.0)	-0.20	0.21	0.82 (0.54, 1.24)	0.342	-0.09	0.21	0.91 (0.60, 1.38)	0.654
42-53	57 (28.0)	1,279 (24.0)	0.17	0.19	1.18 (0.80, 1.74)	0.398	0.41	0.20	1.51 (1.02, 2.23)	0.042
54-65	56 (27.0)	1,262 (24.0)	0.16	0.20	1.18 (0.79, 1.74)	0.412	0.53	0.20	1.71 (1.12, 2.55)	0.009
Gender										
Male	39 (19.0)	1,964 (37.0)	Ref							
Female	167 (81.0)	3,297 (63.0)	0.94	0.18	2.55 (1.79, 3.63)	<0.001	0.82	0.18	2.27 (1.58, 3.25)	<0.001
Nationality										
Qatari	97 (47.0)	1,342 (26.0)	Ref							
Other	109 (53.0)	3,919 (74.0)	-0.96	0.14	0.38 (0.29, 0.51)	<0.001	-0.90	0.15	0.42 (0.31, 0.56)	<0.001
Year										
2017	44 (21.0)	2,635 (50.0)	Ref							
2019	162 (79.0)	2,626 (50.0)	1.31	0.17	3.69 (2.63, 5.18)	<0.001	1.42	0.18	4.17 (2.96, 5.89)	<0.001

β , Regression coefficient; SE, Standard Error; OR Odds Ratio; CI, Confidence Interval. *Adjusted for age, gender, nationality, year, and PHCC center (data for PHCC centers (n=27) is not shown).

5.8.3 Referral to the Secondary Care Psychiatric Clinic

Logistic regression model was conducted to assess the association between patients' characteristics and referral to secondary care psychiatric clinic. Table.10 shows the predictors of referral to secondary care psychiatric clinic. In the adjusted model, nationality, gender, age group and year of depression screening were significantly associated with referral to secondary care psychiatric clinic. Other nationalities had lower odds of being referred to secondary care psychiatric clinic than Qatari by 0.47 (95% CI 0.36, 0.61). Females had increased odds of being referred to secondary care psychiatric clinic than males by 1.83 (95% CI 1.35, 2.49). Individuals aged 54-65 years had increased odds of being referred to secondary care psychiatric clinic by 1.74 (95% CI 1.19, 2.53). Individuals who were screened for depression in 2019 had increased odds of being referred to secondary care psychiatric clinic than those who were screened in 2017 by 3.39 (95% CI 2.52, 4.57). Logistic regression assumptions were assessed and there was no evidence of multicollinearity, in addition there was no violation in independence, and there were no outliers. Finally, the model was assessed for the goodness of fit using classification table which show that the model fits the data and there was no evidence for the lack of fit (P-value: 0.780). moreover, Receiver operating characteristics (ROC) tests was used which shows that the area under the curve was 70%. The gratitude and direction of associations reported in the results sections were identical to Those found in sensitivity analyses performed using Generalized Linear Mixed Models to account for any inadequate adjustment for clustering of cases within PHCC centers.

Table 10. Association between Patients Characteristics and Referral to Secondary Care

Psychiatric Clinic

Variable	Referral to Secondary Care		Unadjusted association				Adjusted* association			
	Yes No. (%)	No No. (%)	β	SE	OR (95% CI)	p-value	β	SE	OR (95% CI)	p-value
Age										
18-29	56 (22.0)	1,320 (25.0)	Ref							
30-41	69 (27.0)	1,368(26.0)	0.17	0.18	1.19 (0.83, 1.70)	0.347	0.28	0.18	1.32 (0.91, 1.89)	0.139
42-53	62 (25.0)	1,274(24.0)	0.13	0.19	1.15 (0.79, 1.71)	0.467	0.35	0.19	1.42 (0.98, 2.07)	0.065
54-65	66 (26.0)	1,252(24.0)	0.22	0.19	1.24 (0.86, 1.79)	0.243	0.55	0.19	1.74 (1.19, 2.53)	0.004
Gender										
Male	57 (23.0)	1,946 (37.0)	Ref							
Female	196 (77.0)	3,268(63.0)	0.72	0.15	2.05 (1.51, 2.67)	<0.001	0.61	0.16	1.83 (1.35, 2.49)	<0.001
Nationality										
Qatari	109 (43.0)	1,330 (26.0)	Ref							
Other	144 (57.0)	3,884(74.0)	-0.79	0.13	0.45 (0.35, 0.58)	<0.001	-0.75	0.13	0.47 (0.36, 0.61)	<0.001
Year										
2017	62 (25.0)	2,617 (50.0)	Ref							
2019	191 (75.0)	2,597(50.0)	1.13	0.15	3.10 (2.32, 4.16)	<0.001	1.22	0.24	3.39 (2.52, 4.57)	<0.001

β , Regression coefficient; SE, Standard Error; OR Odds Ratio; CI, Confidence Interval. *Adjusted for age, gender, nationality, year, and PHCC center (data for PHCC centers (n=27) is not shown)

CHAPTER 6: DISCUSSION

The aim of this study was to estimate the annual screening rates for depression and describe the management of adults screened for depression in PHCC centers in Qatar in 2017 and 2019.

6.1 Depression Screening Rates

The first objective of this study was to estimate the annual depression screening rates in the PHCC based on the total patient-physician encounters in 2017 and 2019. Our findings show that the annual depression screening rate was 6 people per 1000 (0.63%) in 2017 and almost remained the same in 2019 6 person / 1000 (0.59%), which indicate that there was no significant change in the depression screening rates between the years 2017 and 2019. We are not aware of local or regional studies describing screening rates for depression in primary care. A study in the US between 2005 and 2015 reported 1.4% screening rates for depression in primary care settings (13). Another study from the US reported that the overall rate of depression screening was 4.2% in 2013 (39). The low screening rates for depression in Qatar is considered low compared to that of the US and underscores the need for more efforts to enhance screening rates in the light of previous estimates indicating that less than 50% of depression cases are being identified in primary care (14). The reasons for the low screening rates for depression in Qatar is not clear. However, this could be explained by the recent and gradual integration of mental health services in the PHCC and more recent publication of the national clinical guidelines on screening and management of depression in primary care.

6.2 Depression Symptoms Severity

The second objective of our study was to describe the severity of depression symptoms among adults aged 18-56 years screened for depression in 2017 and 2019. Our study demonstrates that among screened individuals for depression in PHCC, severe depression symptoms were the least compared with other levels of severity which ranged between 4.6%

to 7.2% in 2017 and 2019 respectively. A similar study that investigated the distribution of depression symptoms severity in primary care showed that severe symptoms were the least compared with the other levels of depression symptoms severity among screened individuals (54). The National Health Interview Survey in the United States in 2019 showed that severe symptoms were 2.8% followed by moderate symptoms 4.2% (54). Furthermore, another study was conducted in Saudi Arabia demonstrates that among screened individuals, 4.4% had moderately severe symptoms and 1.0% had severe symptoms (55)

In our study, females had higher odds of having severe symptoms by approximately two folds compared with males. These findings are consistent with previous epidemiologic studies in Qatar, Saudi Arabia, and other countries (23, 56-59). For example, a study by Bener and colleagues reported that the prevalence of major depression disorders was 20.0% and 13.8% among Qatari women and men aged 18-65 years presenting to primary care in Qatar, respectively (23). Studies suggested that females are more likely to present with severe symptoms due to many factors and the most common risk factor was hormonal fluctuation, especially before menstruation, during menstruation, during pregnancy, after delivery, and per-menopause periods which makes women more vulnerable to more severe depression symptoms (62-69). For example, one study investigated the relationship between estrogen and mood disorders revealed that estrogen and progesterone hormones are affecting neurotransmitters which may lead to mood disorders (70). The literature also suggests that other factors could increase the vulnerability of women to depression and other mental disorders as compared men, including genetic factors (Sullivan 2000, Flint 2014), lighter levels of inflammatory markers which are associated with more severe depression symptoms (Labaka, 2018), and other socioeconomic inequalities in income, education, and social role (64-69, 71).

In our study, depression symptoms severity decreased with age. This finding agrees with previous primary care studies in Qatar and other regions (23, 56, 59, 72). For example, a study in Qatar showed that mental disorders (depression, anxiety disorder, phobia, personality disorder, bipolar disorder, and obsessive-compulsive disorder) more common in individuals aged 18-34 years (59). The underlying mechanisms for this are not clear. However, there is some evidence that most mental disorders may be genetically determined and that they get triggered in late childhood and adolescence (73, 74). In addition, there is some evidence that childhood adversity and schooling problems are additional risk factors for development of depression (74, 75). Moreover, the literature suggests that younger adults are more likely to react to stressful events than older adults, thus they become more vulnerable to depression (76, 77).

Our study showed that individuals who were screened for depression in 2019 had higher odds of having severe symptoms of depression compared with those who were screened in 2017. The exact reasons for this remain unclear. However, this could be explained integrating the mental health services in the PHCC and upskilling of the PHCC healthcare practitioners to manage individuals with mental health illness which lead to more access to mental health services in primary care for individuals with more depression symptoms severity, which is less stigmatized socially as compared to attending secondary psychiatric hospitals and clinics. Other potential explanation is that people attitude, awareness, and acceptance of mental health issues and related healthcare seeking behavior is improving, but currently there are no data or information from Qatar to support this.

6.3 Depression Management Patterns

The third objective of our study was to describe management and patterns of referral of adults aged 18-65 years who were screened for depression in 2017 and 2019, including prescribed antidepressant medications, referral to support clinic for depression in PHCC, referral to

psychiatric clinic in PHCC, and referral to secondary care. Our study demonstrates that there was an increasing trend in the proportion of antidepressant prescriptions among screened individuals between the years 2017 and 2019. The proportion of antidepressant prescriptions increased from 19.4% to 28.8%. In addition, referrals to the three mental health clinics (PHCC support clinic, PHCC psychiatry clinic, and HMC psychiatry clinic) increased by about 4% between 2017 and 2019. This improvement could be attributed to the implementation of the national health strategy and launching the national clinical guidelines for depression diagnosis and management which recommend timely initiation of antidepressant treatment in primary care settings (42). The findings were consistent with a study conducted in Hong Kong where the proportion of patient referrals was 9% which is similar to the proportion of patient referrals in the state of Qatar (79). In addition, there is evidence that antidepressants prescribing is increasing internationally, which could be attributed to facilitations of access to mental health services in community settings as well as campaigns against stigma and discrimination related to mental health. For example, a study from Korea showed that annual prescription rate of antidepressants increased from 27.3% in 2010 to 33.6% in 2013 (80). A similar study in the United States showed that Antidepressant prescriptions rates increased from 7.3% in 1999 to 2002 to 10.9% in 2015 to 2018 (81). Another cross-sectional study in Hong Kong revealed that the proportion of antidepressant prescriptions in primary care was 50.6% (79). Moreover, a study was conducted in 2014, to evaluate the antidepressant prescribing in 5 European countries revealed that there was an observed increasing antidepressant prescribing over time in those countries (82).

Generally, there was a significant improvement in the population attitude toward seeking help from the mental health services worldwide, furthermore, this improvement was observed in the acceptance of psychotropic medications and referral to the mental health and

psychiatric services (83). However, whether this applies to Qatar or not remains unclear in the lack of research evidence confirming this.

6.4 Association Between patient's characteristics and Depression Management in PHCC

The fourth objective was to assess the associations between patient characteristics (gender, age group, nationality) in addition to the health center and the year of patient screening with antidepressants prescribing, and referral to PHCC support clinic, PHCC psychiatric clinic, and secondary care psychiatric clinic.

6.4.1 Association Between patient's characteristics and Antidepressant Prescription

The findings of our study demonstrate significant association between age group and year of depression screening with receiving antidepressant prescription. Individuals aged 30-41 and 42-53 years had increased odds of receiving antidepressant prescription compared with those aged 18-29 years. In addition, the present study showed that women were more likely to be prescribed antidepressants than men, but this was not statically significant. These findings are consistent with other studies in Qatar and other countries (84-86) . For example, a study from Qatar showed that women and older people were more likely to be prescribed antidepressants across all mental health clinics in Qatar (84). Another study from Japan revealed that individuals aged 34 years and more had higher odds of receiving antidepressant prescription by 1.64 times compared with younger age individuals (87). One potential explanation this is that women present with more depression symptoms severity, which is supported by the findings of this study and other studies as mentioned above. In addition, the research evidence suggests that women are more likely to seek healthcare, more likely to accept treatment using antidepressants than men, and therefore, have higher likelihood to be screened for depression and prescribed antidepressants (85, 88). Another study in the UK

suggested that antidepressant prescriptions are associated with increasing patient's age (89). A study was conducted in the US to estimate antidepressant prescribing among people aged 12 years and above suggested the antidepressant prescribing was higher in individuals aged 40 and more compared with those aged 12–39 years (81). This variation could be explained that older adults are likely to have positive attitude toward using antidepressants compared to the young individuals, in addition, older adults are having positive belief about the effectiveness of depression treatment (90).

6.4.2 Association Between Patient's Characteristics and Referral to the Mental Health Services

The present study showed that women, older people, Qatari individuals, and those who were screened in 2019 compared to 2017 were more likely to be referred mental health clinic. These findings were consistent across the three clinics: PHCC support clinic, PHCC psychiatric clinic, and secondary care psychiatric clinic. Increase referrals in 2019 compared to 2017 could be explained by the recent integration of mental health service in the PHCC and growing number of PHCC clinics staffed with psychologists and psychiatrists. Increased referral to secondary care psychiatry clinic could be explained by the increased number of individuals presenting to the PHCC with more severe depression symptoms. As discussed above, integration of mental health services in the PHCC may have encouraged people to seek healthcare for mental health issues in a less stigmatized setting compared to attending psychiatric hospitals and secondary care clinics. However, more research in Qatar is needed to confirm this.

The current study demonstrated that females had higher odds of being referred to PHCC support clinic, PHCC psychiatric clinic and secondary care psychiatric clinic compared with males. These findings were consistent with other studies which show that females are more likely to be referred to mental health services (85, 88). This could be explained because

females are more likely to have severe depression symptoms compared with males, and therefore, needed referral to mental health support and psychiatry clinics. In addition, as discussed above, there is evidence that women are more likely to seek healthcare and accept treatment for mental health conditions compared to males (85, 88). Moreover, females and older persons may have less stigma towards seeking healthcare and accepting mental healthcare compared to males and younger individuals. For example, a study from Qatar among individuals with mental health illness showed that women and older individuals had lower levels of stigma towards mental health illness compared to males and younger individuals (91). In support of this finding that stigma towards mental health is a major issue among young individuals in Qatar, one study among Qatar University students showed that 50% believed that mental disorders are “a punishment from God” and 88% reported that they would not marry an individual with a mental illness (92).

A population-based study was conducted in Canada suggested that females were more likely to utilize psychological and psychiatric services compared with males (90). Another study investigated the factors associated with underutilization of mental health services revealed that females were more likely to utilize mental health services due to their positive attitude to the mental health services, however, compared to the males who had negative attitude and less openness toward consulting mental health specialist (94). In Qatar a study was conducted in 2019 to explore the barriers to accessing psychological therapy showed that stigma toward mental illness and the impact of family were the most common barriers for accessing psychological support services in Qatar (95). Additionally, another study was conducted in Canada, which revealed that older individuals have positive attitude toward utilizing mental health services, in addition, they have positive belief about the effectiveness of treatment for mental health disorders (96). Another study was conducted in the GCC countries suggests that individuals experience of mental illness could be influenced by religion such as the belief

that mental illness is attributed to demons which results in preferring traditional and spiritual healers instead of medical treatment (48). The potential explanation for our finding that Qatari individuals were more likely to be referred to the three types of mental health clinics is not clear from the current study. One potential explanation for this is differential equity in referrals. However, a new line of research is needed to uncover the underlying mechanisms.

6.5 Implications

This study summarizes the rates of depression screening among adults and the patterns of management of adults screened for depression in PHCC. Although it was not objective of our study to evaluate the efficiency of the national mental health strategy 2018-2022, however, the data was analyzed in 2 time periods (2017 and 2019) before and after the adoption of the national health strategy which could provide insight about implementation of the mental health strategy in terms of improving access to mental health services and incorporate the mental health services into primary care. The current study showed that screening rates for depression in the PHCC are low at 6 per 1000 individuals despite the increase in referral rates to all mental health clinics in the PHCC and increased prescribing of antidepressants. Research and quality improvements work is urgently needed in the PHCC for better understanding of the reasons for the low screening rates and optimal strategies to improve this. Other important implication identified in the present study which require more research include (a) reasons for less referral to mental health clinics and lower antidepressants prescribing for young adults despite the fact they present with more severe depression symptoms compared to older individuals; (b) reasons for lower referral rates different mental health clinics among male and non-Qatari individuals; (c) investigation of potential barriers and facilitators for screening, referral, and antidepressant prescribing perceived by physicians and PHCC registered populations from different ethnic, cultural, and religious backgrounds. In addition, future research assessing screening for depression in the PHCC, and factors

associated with management patterns based on screening using PHQ-2, PHQ-9, and medical diagnoses will provide more rich information, including strengths and areas for improvement. Moreover, using multilevel modelling with data on PHCC center-level characteristics and assessment for interactions between different predictors (at individual-level and center-levels) of management outcomes of patients presenting with depression symptoms will provide more useful information for quality improvement, policy makers, and future research. In addition to integration of mental health services in the PHCC, anti-stigma towards mental health illness, and education programs and increasing public awareness about mental health contextualized and tailored to different age groups and ethnicities may help in improving access to mental healthcare and mental health outcomes among the population of Qatar.

6.6 Strengths and Limitations

The main strength of our study is that it was based on national-level data, including data of all individuals screened for depression from all the 27 primary health centers in Qatar which makes the results high likely to be representative of the PHCC population in Qatar. Another strength in this study is that the data of the referrals and antidepressant prescription extracted from electronic health records which make the results high likely to be accurate and complete. In addition, there was no missing data in our study.

The present study also has some limitations. One limitation is that this study included data on individuals aged 18-65 years only. Excluding the individuals aged 65 and above could underestimate the screening rates and management patterns as it's well-known from literature that depression is more prevalent among older adults (13, 97, 98). Furthermore, pregnant women and individuals with drug and substance misuse issues were excluded due to the unavailability of their data in the dataset provided by PHCC, which also could underestimate the screening rates, management patterns and the other outcome measures and affect the

generalizability of the study results as pregnancy and substance misuse are considered a risk factor for depression (25) (28). Moreover, the confirmed diagnosis of depression was not available in the provided data, which makes it difficult to measure the incidence rate of depression. Additionally, the findings of this study were based on PHQ-9 score only, however, using of PHQ-2 tool could provide a more accurate estimate of the screening rates as it is recommended to be used in the initial screening before using PHQ-9. Furthermore, the data of 2018 was not available in the dataset provided by the Business Intelligence Department in PHCC, which could also underestimate the overall screening rate and management patterns, as including data from 2018 would have provided more information on trends of screening patterns over time. Finally, the nationality was categorized in two categories (Qatari and other nationality) as the ethnicity of the patients was not available in the provided dataset. Categorizing study participants based on ethnicity could provide more understanding about the variations in the depression symptoms severity and the patterns of management.

6.7 Conclusion

Depression screening rates in the PHCC are still considered low despite the integration of mental health services into the PHCC centers, despite noticeable increase in referrals to different mental health clinics as well as antidepressants prescribing. Females and younger age groups were more likely to present with more severe symptoms. However, males and younger individuals were less likely to be referred to mental health clinics and prescribed antidepressants. In addition, Qatari individuals were more likely to be referred to mental health clinics compared to individuals from other nationalities. More research and quality improvement work are needed to further investigate the screening and management patterns for depression focusing on age, gender, nationality, and contextual factors which may hinder access or health seeking behavior for mental healthcare services in the PHCC.

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APPENDICES

Appendix A: Patient Health Questionnaire (PHQ-9)

PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

View Pathway

NAME: _____ **DATE:** _____

Over the *last 2 weeks*, how often have you been bothered by any of the following problems?
(use "✓" to indicate your answer)

	<i>Not at all</i>	<i>Several days</i>	<i>More than half the days</i>	<i>Nearly every day</i>
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself in some way	0	1	2	3

add columns: + +

TOTAL:

(Healthcare professional: For interpretation of TOTAL, please refer to accompanying scoring card.)

10. If you checked off *any* problems, how *difficult* have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____

Somewhat difficult _____

Very difficult _____

Extremely difficult _____

PHQ-9 is adapted from PRIME MD TODAY, developed by Drs Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke, and colleagues, with an educational grant from Pfizer Inc. For research information, contact Dr Spitzer at rls8@columbia.edu. Use of the PHQ-9 may only be made in accordance with the Terms of Use available at <http://www.pfizer.com>. Copyright ©1999 Pfizer Inc. All rights reserved. PRIME MD TODAY is a trademark of Pfizer Inc.

ZT242043

Appendix B: PHCC-IRB Approval Letter



Department of Clinical Research
Primary Health Care Corporation
8th Floor, Tower 1
PO Box 26555
Al Meena Street
Doha, Qatar
Email: researchsection@phcc.gov.qa

Date: 24/01/2022

Dear Dr Mujahed Shraim ,

RE: Data Request Submission Decision Letter

Thank you for your recent submission titled '**National Rates and Patterns of Depression Screening in Primary Care in Qatar: A Cross-Sectional Study**' with reference number **PHCC/DCR/2021/12/074**.

This letter is to inform you that your submission was considered by PHCC's Institutional Review Board (IRB). The committee decided to approve the submission under the exempt category. The approval is valid for one year from date of this letter and is subject to the following conditions:

- You adhere to the principles of good research practice, prioritize patient's safety above all other concerns and ensure confidentiality and data protection throughout the study.
- You do not undertake other procedures and /or use participant materials or data outside of the scope of this present study, or future use beyond this study.
- You agree to provide a progress report within 6 months of the start and a final report at the end of the study or if the study terminated early, an appropriate report.
- You provide the Department of Clinical Research with a copy and the citation of your publication
- You will share the raw data with the Department of Clinical Research.
- You need to acknowledge PHCC Department of Clinical Research for article publication charges (APC's), if you have approved budget for APC's by the Research Budget Working Group

Please note:

- This approval is applicable only if you adhere to the above stated conditions and the committee reserves the right to revise its approval should this become necessary.
- This approval does not apply to any budget requests you may have made. If you have requested for a budget, it will be considered by Research Budget Working Group and a separate letter will be issued.

On behalf of the PHCC's IRB, I wish you success in the conduct of this study and look forward to receiving your final report following its completion.

Yours Sincerely,

Dr Hamda Qotba
Deputy Chair, PHCC Institutional Review Board

Appendix C: QU-IRB Approval Letter



Qatar University Institutional Review Board **QU-IRB**

QU-IRB Registration: IRB-QU-2020-006, QU-IRB, Assurance: IRB-A-QU-2019-0009

DATE: February 23, 2022

TO: Mujahed Shraim, PhD
FROM: Qatar University Institutional Review Board (QU-IRB)

PROJECT TITLE: 1866934-1National Rates and Patterns of Depression Screening in Primary Care in Qatar: A Cross-Sectional Study

QU-IRB REFERENCE #: QU-IRB 1676-E/22
SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: February 23, 2022
REVIEW CATEGORY: Exemption category # 3

Thank you for your submission of New Project materials for this project. The Qatar University Institutional Review Board (QU-IRB) has determined this project is EXEMPT FROM IRB REVIEW according to Qatar Ministry of Public Health regulations. Please note that exempted proposals do not require renewals however, any changes/modifications to the original submitted protocol should be reported to the committee to seek approval prior to continuation.

We will retain a copy of this correspondence within our records.

Documents Reviewed:

- Application Form - QU-IRB Brief Application Form_v5 Maliks project.pdf (UPLOADED: 02/16/2022)
- Data Collection - Data collection form for secondary data.pdf (UPLOADED: 01/26/2022)
- Letter - PHCCDCR202112074 - DCR approval Letter - Dr. Mujahed - DR.pdf (UPLOADED: 01/26/2022)
- Other - QU-IRB Check List.pdf (UPLOADED: 01/26/2022)
- Protocol - PHCCDCR202112074-Data request Form - Final approved - Stamped.pdf (UPLOADED: 01/26/2022)
- Training/Certification - CITI Certificate GJ.pdf (UPLOADED: 02/2/2022)
- Training/Certification - CITI Certificate Malik.pdf (UPLOADED: 02/2/2022)
- Training/Certification - CITI - Mohamed Syed.pdf (UPLOADED: 02/2/2022)
- Training/Certification - CITI Certificate ASA.pdf (UPLOADED: 02/2/2022)

If you have any questions, please contact QU-IRB at 4403 5307 or qu-irb@qu.edu.qa. Please include your project title and reference number in all correspondence with this committee.

Best wishes,

Dr. Mohamed Emara
Chairperson, QU-IRB



Appendix D. PHQ-9 scores in 2017 and 2019

PHQ-9 Score	2017	2019	Total
	N=2,679	N=2,788	N=5,467
Little interest or pleasure in doing things			
1	697 (26%)	764 (27%)	1,461 (27%)
2	257 (10%)	465 (17%)	722 (13%)
3	277 (10%)	445 (16%)	722 (13%)
Feeling down, depressed, or hopeless			
1	699 (26%)	772 (28%)	1,471 (27%)
2	293 (11%)	511 (18%)	804 (15%)
3	282 (11%)	519 (19%)	801 (15%)
Trouble falling or staying asleep, or sleeping too much			
1	617 (23%)	646 (23%)	1,263 (23%)
2	285 (11%)	473 (17%)	758 (14%)
3	331 (12%)	596 (21%)	927 (17%)
Feeling tired or having little energy			
1	747 (28%)	735 (26%)	1,482 (27%)
2	323 (12%)	544 (20%)	867 (16%)
3	389 (15%)	597 (21%)	986 (18%)
Poor Appetite/ overeating			
1	578 (22%)	600 (22%)	1,178 (22%)
2	218 (8%)	427 (15%)	645 (12%)
3	230 (9%)	395 (14%)	625 (11%)
Feeling bad about yourself			
1	513 (19%)	652 (23%)	1,165 (21%)
2	197 (7%)	341 (12%)	538 (10%)
3	199 (7%)	404 (14%)	603 (11%)
Trouble Concentrating on things			
1	513 (19%)	644 (23%)	1,157 (21%)
2	199 (7%)	378 (14%)	577 (11%)
3	151 (6%)	337 (12%)	488 (9%)
Moving or speaking so slowly that other people could			
1	373 (14%)	503 (18%)	876 (16%)
2	143 (5%)	262 (9%)	405 (7%)
3	96 (4%)	154 (6%)	250 (5%)
Thoughts better off dead or hurting self			
1	247 (9%)	306 (11%)	553 (10%)
2	58 (2%)	99 (4%)	157 (3%)
3	49 (2%)	80 (3%)	129 (2%)

Appendix E. STROBE Statement

Checklist of items that should be included in reports of cross-sectional studies

	Item No	Recommendation
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—e.g. numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (e.g. demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data	15*	Report numbers of outcome events or summary measures
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted

		estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—e.g. analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	summarize key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalizability	21	Discuss the generalizability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based