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# Prevalence and associated factors of depression among general population in Al-Ahsa, Kingdom of Saudi Arabia: A community-based survey

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ABSTRACT

*Objective:* This study investigates the prevalence of depression and its predictors among the general population in Al-Ahsa, a city in the Eastern Province of the Kingdom of Saudi Arabia.
*Methods:* A cross-sectional study was conducted from June 2015 to January 2016 at three of the biggest shopping malls in Al-Ahsa. Depression was assessed with an Arabic version of the Patient Health Questionnaire (PHQ-9). Logistic regression was conducted to determine the predictors of depression. Adjusted odds ratios (ORa) with 95% confidence intervals (CI) are reported.
*Results:* The prevalence of depression was 8.6% (95% CI: 7.8–9.4%) among 5172 participants in the study. A depression diagnosis was significantly associated with being female (9.7% vs. 7.2%; p = .002), low education level (11.3% vs. 7.5%; p = .0001), and unemployment (9.2% vs. 6.9%; p = .014). However, no significant association was observed between depression and age, marital status, monthly income or place of living. Multiple logistic regression analyses suggest that the main predictors of depression were having difficulties at work and home (ORa = 5.8; 95% CI: 4.20–8.05; p < .001) and lower education level (ORa = 1.5; 95% CI: 1.21–1.88; p < .0001).
*Conclusion:* The prevalence of depression in Al-Ahsa is lower than in other regions of Saudi Arabia. Lower education level, being female or unemployed appear to be the most important risk factors for depression.

## 1. Introduction

Mental health has been described as the ability to live a balanced life (Sadock & Sadock, 2007). Throughout life, changes in mental state may occur as a consequence of various factors, including environmental, biological, physical, hereditary, prenatal, neuroendocrine, organic, social, cultural, and/or economic factors. These factors can lead to mental disorders, which are recognized as a disruption of clarity, humor, emotion, affect, psychomotor behavior, speech, memory, attention, and sleep (Sadock & Sadock, 2007).

One such mental disorder, depression, is a significant contributor to the global burden of disease and affects people in all communities all over the world (Mathers, 2008). Depression is characterized by a consistent low mood. Many factors can contribute to the development of depression, with studies suggesting that stressful life events (Bruce, 2002; Kraaij, Arensman, & Spinhoven, 2002; Stanley, 2013), gender (Stanley, 2013; Wolters, Ströhle, & Hahn, 2004), chronic physical pain (Remick, 2002; Stanley, 2013), low self-esteem, extreme dependency, pessimism, low socio-economic status, and poor educational background are predisposing factors for depression (Stanley, 2013).

Depression is estimated to affect 350 million people globally (Marcus, Yasamy, van Ommeren, Chisholm, & Saxena, 2012). According to the World Health Organization (WHO), depression will be the second-leading cause of world disability by the year 2020 and is expected to be the largest contributor to disease burden by 2030 (Mathers, 2008). In Saudi Arabia, several studies have been conducted to determine the prevalence rate of depression. One study reported that 30–46% of patients visiting primary health care centers had psychiatric morbidity (Al-Faris, Al-Hamad, & Al-Shammari, 1995). Another study conducted in the central region of Saudi Arabia reported that almost 18% of adults experienced anxiety and depression (Al-Khathami & Ogbeide, 2002). More recently, Alibrahim, Al-Sadat, and Elawad,

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(2010) conducted a systematic review of depression in Saudi Arabia and observed a prevalence rate of 41%. el-Rufaie, Albar, and Al-Dabal, (1988) observed the prevalence of depression in Dammam city residents to be nearly 17%. In a study in the Asir region, the depression prevalence reached 27% (Alqahtani & Salmon, 2008). Meanwhile, Abdelwahid and Al-Shahrani (2011) reported that depression prevalence is 12%, 6% of which was considered severe, in the southeast region of Saudi Arabia. These high figures for the prevalence of depression indicate that depression may be a serious problem in Saudi Arabia. Accordingly, there is an urgent need for action and strategies to significantly reduce the prevalence of depression (Hickie, 2004; Sartorius, 2004).

To our knowledge, no studies have been conducted to investigate the prevalence of depression in the Al-Ahsa population. This study aims to assess the prevalence of depression among the Al-Ahsa population and determine its risk factors.

## 2. Material and methods

### 2.1. Study participants and setting

A cross-sectional study was conducted across eight months from June 2015 to January 2016. The study was conducted in Al-Ahsa, one of the biggest cities in the Eastern Province of the Kingdom of Saudi Arabia. Al-Ahsa is considered one of the most important cities of Saudi Arabia because of its natural resources, including oil, water springs, and rocks.

Using the method of convenience sampling, participants were recruited consecutively from the three biggest shopping malls located in Al-Ahsa. Saudi citizens aged 18 years or older who were residents of Al-Ahsa, and who provided verbal consent after receiving an explanation of the purpose of the study were included in the study. People who were unable to communicate due to speech or hearing difficulties were excluded from the survey.

The study protocol was approved by the research and ethics committee of the College of Medicine, King Faisal University.

### 2.2. Measures

A validated Arabic version of the Patient Health Questionnaire (PHQ-9) was used in this study to assess depressive symptoms (AlHadi et al., 2017; Becker, Al Zaid, Faris, 2002). They followed the guidelines of Sousa and Rojjanasrirat (2011) in translation, adaptation, and validation of PHQ-9. The steps of the validation were: Step 1: forward translation—translation of the PHQ-9 into the Arabic language by two independent translators. Step 2: synthesis I—comparison of the two translated versions of the PHQ-9 and the development of an initial translated version. Step 3: blind back-translation of the preliminary initial translated version of the PHQ-9 from Arabic to English. Step 4: synthesis II—comparison of the two back-translated versions of the PHQ-9. Step 5: pilot testing of the pre-final version of the instrument in Arabic. They also conducted face validity by sending the pre-final version to eight referees from mental health experts (AlHadi et al., 2017).

The PHQ-9 contains nine items, each of which is scored from 0 (never) to 3 (almost every day) to produce a total score ranging from 0 to 27. The diagnosis of depression in this study was performed by following DSM-IV diagnostic criteria for major depressive disorder and done by a psychiatrist after the data collection.

### 2.3. Data collection

Data was collected by 10 fourth-year medical students at King Faisal University, who attended a day of training about the study questionnaire and interview techniques. Mall visitors were asked if they would consent to participate in the study. Subsequently, the questionnaires were handed to the participants and collected after 15 min. Interviews were conducted with participants who can't read and write. Participants with suspected depression were encouraged to visit a psychiatrist for further investigation. Demographic information were also collected including age, gender, education level, occupation, place of living, marital status, and monthly income. Data was collected on one day a week during the study period, with the day selected randomly. All data remained confidential.

### 2.4. Statistical analysis

Results are reported as percentages for categorical variables and mean ± standard deviation for quantitative variables. Pearson chi-squared test was used to investigate associations between categorical variables and depression status. To identify factors independently associated with depression, all variables with a p-value less than 0.05 in the univariate analysis were included in a multivariate logistic regression. Adjusted odd ratios (ORa) and 95% confidence intervals (CI) are presented. Cronbach's alpha was used to measure the internal reliability of the PHQ-9.

Statistical significance was accepted at $p < .05$. All statistical analyses were performed with the Statistical Package for Social Sciences 22.0 software (SPSS/IBM, Chicago, IL).

## 3. Results

Total of 5372 adults was interviewed, 5172 participants accepted to participates in the study and were included in this survey, of which 3048 (58.9%) were females, and 2597 (50.2%) were married. Most of the participants (55%) were living in an urban area. (Table 1) The response rate was 96.3%.

The Arabic version of the PHQ-9 had good reliability with a calculated Cronbach's alpha of 0.857 (AlHadi et al., 2017). Among the

**Table 1**
Sociodemographic data of participants (n = 5172).

| Variable | n | % |
|---|---|---|
| **Gender** | | |
| Male | 2,122 | 41.0 |
| Female | 3,048 | 58.9 |
| Missing | 2 | 0.1 |
| **Education level** | | |
| Elementary | 41 | 0.8 |
| Intermediate | 229 | 4.4 |
| Secondary | 1,251 | 24.2 |
| Diploma | 183 | 3.5 |
| Bachelor | 2,846 | 55.0 |
| Masters | 63 | 1.2 |
| PhD | 35 | 0.7 |
| Not mentioned | 453 | 8.8 |
| **Occupation** | | |
| Employed | 1,177 | 22.8 |
| Unemployed | 3,890 | 75.2 |
| Retired | 34 | 0.7 |
| Missing | 71 | 1.3 |
| **Location** | | |
| Urban | 4047 | 78.2 |
| Rural | 820 | 15.9 |
| Missing | 305 | 5.9 |
| **Marital status** | | |
| Single | 2,572 | 49.7 |
| Married | 2,597 | 50.2 |
| Missing | 3 | 0.1 |
| **Monthly income** | | |
| < 10,000 SR (< 2666 USD) | 3,968 | 76.7 |
| > 10,000 SR (> 2666 USD) | 1,204 | 23.3 |
| **Age (years)** | | |
| Youths (18–24) | 2,374 | 45.9 |
| Adults (25–64) | 2,788 | 53.9 |
| Seniors (≥ 65) | 10 | 0.2 |

**Table 2**
Risk factors for depression: univariate analysis.

| Variable | Diagnosis | | p-value |
|---|---|---|---|
| | Not depressed n (%) | Depressed n (%) | |
| **Gender** | | | |
| Male | 1,970 (92.8) | 152 (7.2) | .002* |
| Female | 2753 (90.3) | 295 (9.7) | |
| **Education level** | | | |
| Elementary, primary, secondary | 1349 (88.7) | 172 (11.3) | < .0001* |
| Diploma, Bachelors, Masters, or PhD | 2,891 (92.5) | 236 (7.5) | |
| **Occupation** | | | |
| Unemployed or retired | 3564 (90.8) | 360 (9.2) | .014* |
| Employed | 1,096 (93.1) | 81 (6.9) | |
| **Location** | | | |
| Rural | 758 (92.4) | 62 (7.6) | .352 |
| Urban | 3,701 (91.5) | 346 (8.5) | |
| **Marital status** | | | |
| Single | 2333 (90.7) | 239 (9.3) | .101 |
| Married | 2,389 (92.0) | 208 (8.0) | |
| **Monthly income** | | | |
| < 10,000 SR | 3,611 (91.0) | 357 (9.0) | .100 |
| > 10,000 SR | 1,141 (92.5) | 90 (7.5) | |

* Significant relationship at $p < .05$.

total sample, 447 participants were diagnosed with depression giving a prevalence of 8.6% (95% CI: 7.8–9.4%).

In the present study, a diagnosis of depression was significantly associated with female gender (9.7% vs. 7.2%; p = .002), low education level (11.3% vs. 7.5%; p < .0001), and unemployment (9.2% vs. 6.9%; p = .014). However, no significant association was observed between depression and age, marital status, monthly income, or place of living (Table 2).

The multiple logistic regression analysis identified two variables as predictors of depression (Table 3). These were having difficulties at work and home (ORa = 5.8; 95% CI: 4.20–8.05; p < .0001), and a lower education (ORa = 1.5; 95% CI: 1.21–1.88; p < .001).

## 4. Discussion

In the current study, the prevalence of major depressive disorder in Al-Ahsa was found to be 8.6% using the PHQ-9 as a diagnostic tool. A review of the literature suggests that this value is lower than that of other recent studies conducted in other regions of Saudi Arabia. For example, in Riyadh, the prevalence of depression was 20% among primary healthcare patients (Becker et al., 2002). Moreover, Abdelwahid and Al-Shahrani (2011) observed a prevalence of depression of 12% in Sharurah, a southeastern region of Saudi Arabia. Another study in Riyadh reported that the prevalence of depression is around 19% among King Abdulaziz Medical City-National Guard patients (Al-Qadhi, ur Rahman, Ferwana, & Abdulmajeed, 2014). The low prevalence rate in the current study could be explained by the fact that it was conducted among the general population visiting shopping malls. In contrast, the other studies had specific target populations and were mostly conducted in healthcare settings.

In the current study, the relationship between age and depression was also assessed, and no significant association was observed between the two. This finding is similar to that reported by others (Cole & Dendukuri, 2003; Scott et al., 2008). It is possible that the lack of an association is due to the PHQ-9 being inappropriate for use by different age groups, or that participants were inappropriately reporting their symptoms. Despite the lack of a significant relationship between age and depression, it was observed that patients aged 55 to 64 years had the highest scores, which differs from previous studies (Chen, Huang, Chang, & Chung, 2006). This difference may be explained by the fact that physical illness among the elderly can precipitate the development of depression, and most of our participants were young adults.

It was observed that depression is more prevalent in females than in males in Al-Ahsa, which is consistent with studies conducted in other regions (Alibrahim et al., 2010; Becker et al., 2002; Asal & Abdel-Fattah, 2007; Ferrari et al., 2013).

It was also observed that respondents with an educational level of less than secondary school had the highest rate of depression (11.3% vs. 7.5%; p < .0001), which is consistent with previously reported results (Chazelle et al., 2011; Fryers, Melzer, & Jenkins, 2003; Lorant et al., 2003). However, in contrast, one study conducted in Riyadh using the PHQ-9 reported a significant relationship between depression and a higher level of education (Al-Qadhi et al., 2014). This may be explained by differences in living conditions, the population background, employment, and different professions with variable levels of stress. Most importantly, it might reflect where the data was collected as primary care centers in Riyadh have an increased risk of patients with comorbidities, while the current study recruited respondents in public places.

Among participants in the current sample, 4047 were from urban areas. There was no significant relationship between urban or rural living and the prevalence of depression. This is consistent with other studies conducted in the US and Korea (Kessler et al., 2003; Kim, Shin, Yoon, & Stewart, 2002). However, some studies in the US have reported that the prevalence of depression is significantly higher in residents from rural areas (Probst et al., 2006). The absence of a significant impact of urbanicity in the current study could be explained by the fact that more than two-thirds of the participants were from urban areas. Another possibility is that the population in Al-Ahsa is globally

**Table 3**
Multiple logistic regression model for predicting depression diagnosis in Al-Ahsa.

| Variable | Depression | | Initial model | | Final model | |
|---|---|---|---|---|---|---|
| | Yes (n = 447) n (%) | No (n = 4623) n (%) | ORc* (95% CI) | p-value | ORa** (95% CI) | p-value |
| Gender (female) | 295 (65.9) | 2753 (59.5) | 1.91 (0.9–1.4) | .100 | – | – |
| Marital status (single) | 239 (53.4) | 2333 (50.4) | 1.07 (0.8–1.3) | .400 | – | – |
| Presence of difficulties (yes) | 397 (88.8) | 2776 (60.0) | 5.7 (4.1–8.0) | < .001 | 5.8 (4.2–8.0) | < .001 |
| Occupation (unemployed) | 360 (80.5) | 3564 (77.0) | 1.12 (0.8–1.5) | .400 | – | – |
| Income (high) | 90 (20.1) | 1114 (24.0) | 1.11 (0.8–1.4) | .400 | – | – |
| Education level (low) | 172 (38.4) | 1349 (29.1) | 1.50 (1.2–1.8) | < .001 | 1.5 (1.2–1.8) | < .001 |

*ORc: crude odds ratio; **ORa: adjusted odds ratio.

homogeneous, with people living in urban and rural areas having a similar education level, working status, and marital status. (Central department of statistics & information, 2010)

We did observe a significant relationship between depression and occupation, with unemployment or retirement increasing the risk of having depression (9.2% vs. 6.9%; p = .014). In contrast, Abdelwahid and Al-Shahrani (2011) reported that employed individuals are more prone to depression than are unemployed individuals. It is possible that the specific type of job may affect the relationship between employment and depression. However, this information was not collected in the current study. Moreover, most employees in the studied region work in offices unlike those in the previous study, which was conducted in a region with more factories and potentially more stressful jobs.

There was no significant relationship between marital status and depression in the current sample. This is in contrast with several other studies reporting an association, particularly between depression and being divorced or widowed (Al-Kuwari et al., 2010; Maimanee & Al-Hazmi, 2009; Maurer, 2012). This discrepancy may be due to that most of the participants were young who may recently get married, unlike the other studies that targeted older age groups.

In conclusion, the prevalence of depression in Al-Ahsa is lower than in other regions of Saudi Arabia. A lower education level, being female or unemployed were the most important risk factors for depression.

## 5. Limitations

To the best of our knowledge, this is the first study conducted to assess the prevalence of depression in Al-Ahsa. However, the study is subject to some limitations. First, large numbers of participants were reluctant to participate because depression and mental disorders are still considered as taboo subjects that should not be discussed in Saudi Arabia. This may also explain the low prevalence rate of depression in the current study compared with other studies. This problem was overcome by explaining that the study's purpose is to aid clinicians in diagnosis, improving mental health care in Saudi Arabia, and by assuring potential participants that responses were entirely anonymous.

Second, the convenience sampling method applied in this study may introduce selection bias to the results. However, because of cultural constraints in Saudi Arabia; it is difficult to get a representative sample of the general population with in-home surveys. To reduce this bias, participants were recruited from shopping malls, which are frequented by large numbers of Saudis.

Third, because the characteristics of mall visitors may vary by the season, or the week and day of the month, a time-sampling bias may have been introduced to our study (Bruwer, Haydam, & Lin, 1996). To avoid this, one day a week was randomly selected for data collection during the study period.

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## Conflict of interests

The authors declare that they have no conflict of interests and confirm that all authors have seen and agree with the contents of the manuscript and agree that the work has not been submitted or published elsewhere in whole or in part.

## Ethical statement

Not applicable for this article.

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