# Depression among Michigan Adults:

# Results from the 2006 Michigan Behavioral Risk Factor Survey

**Michigan Department of Community Health**

**MDCH**

**Jennifer M. Granholm, Governor**
**Janet Olszewski, Director**

If you have any questions regarding this report, please contact Chris Fussman at MDCH, by phone, 517-335-8144, or by e-mail, MIBRFSS@michigan.gov

## BACKGROUND

Reports from the National Institute of Mental Health indicate that major depressive disorders affect nearly 15 million American adults, or about seven percent of the U.S. population aged $\geq$ 18 years in a given year[1], and are the leading cause of disability in the U.S. for ages 15-44[2]. In addition, major depression is expected to be one of the leading contributors to the global burden of disease by 2020[3].

Analyses of the 2006 Michigan Behavioral Risk Factor Survey (MiBRFS) state-added questions on depression were conducted in order to further characterize the prevalence of major depression in Michigan residents and investigate the association between major depression and other chronic conditions (diabetes, heart attack, coronary heart disease, stroke, asthma, osteoporosis, gum disease, disability, and obesity), health behaviors (current smoking, alcohol consumption, physical activity, routine checkup completion, and general health status), and screening practices (cancer screenings, dental visits, and flu vaccinations).

## METHODS

In 2006, the ten-question CDC Depression and Anxiety optional module was added to the MiBRFS (see Appendix A). The first eight questions within this module were from the Patient Health Questionnaire 8 (PHQ-8). These questions included eight of the nine DSM-IV criteria for diagnosis of major depression and asked respondents questions related to their mood in the past two weeks (DSM-IV suicide question was excluded). The remaining two questions in this module were used to assess provider diagnosis of depressive and anxiety disorders.

Responses to the PHQ-8 questions were combined as follows to classify major depression. First, the number of days reported for each of the eight questions was converted to a particular point value (0-1 day = 0 points; 2-6 days = 1 point; 7-11 days = 2 points; 12-14 days = 3 points). These points were then totaled across the eight questions to get the respondents' depressive symptoms severity score

(PHQ-8 Algorithm #1). Those respondents with a depressive symptoms severity score of ten or greater were classified as having major depression (PHQ-8 Algorithm #2).

The current major depression indicator used in this analysis may result in an underestimation of the true prevalence of current major depression in Michigan because individuals with major depression who are currently taking medication or receiving treatment for their depression may not be classified as having current major depression based on the PHQ-8 questions.

## RESULTS

### Prevalence of Current Major Depression & Lifetime Doctor-Diagnosed Depression

The overall frequency distribution of the depressive symptoms severity score (DSSS) is presented in Table 1. 10.2% of Michigan residents were classified as having major depression (DSSS ≥ 10) (Table 2). Major depression was found to be more prevalent in younger age categories, lower education status, lower household income levels, and in the female population (Table 2). When including the demographic variables from Table 2 within a multivariate logistic regression model with major depression as the outcome of interest, all demographic variables, excluding health care coverage, were significant predictors of major depression (Table 3).

Table 4 reports lifetime prevalence of doctor-diagnosed depression. 15.9% of Michigan adults had ever been diagnosed by a doctor as having a depressive disorder. The prevalence of doctor-diagnosed depression was highest among middle-aged adults, females, and those with lower levels of education, and low household incomes. These distributions are similar to those of the major depression classification data presented in Table 2. Table 5 contains the results of a comparison between current major depression and lifetime doctor-diagnosed depression. The results indicate that 11.5% of Michigan adults without depression in 2006 had actually been diagnosed with a depressive disorder at some point in their lives. On the other hand, 43.9% of Michigan adults who were estimated to have major depression in 2006 had never been diagnosed by a doctor or other health care provider (Table 5).

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**Table 1. Depressive Symptoms Severity Score Distribution**
**(PHQ-8 Algorithm 1)[a]**
**2006 Michigan BRFS**

| Response Category | % |
| --- | --- |
| No Depression (0-4 points) | 72.0 |
| Mild Depression (5-9 points) | 17.8 |
| Moderate Depression (10-14 points) | 6.1 |
| Moderately Severe Depression (15-19 points) | 2.9 |
| Severe Depression (20+ points) | 1.2 |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions to obtain the depressive symptoms severity score (n = 5,077).

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### Table 2. Prevalence of Major Depression
### (Depressive Symptoms Severity Score ≥ 10, Algorithm 2)[a]
### 2006 Michigan BRFS

| Demographic Characteristics | % | 95% CI |
|---|---|---|
| **Total** | 10.2 | 9.2-11.3 |
| **Age** | | |
| 18 - 24 † | 14.0 | 10.0-19.3 |
| 25 - 34 | 12.4 | 9.6-16.0 |
| 35 - 44 | 10.2 | 8.2-12.5 |
| 45 - 54 | 9.5 | 7.8-11.5 |
| 55 - 64 | 10.5 | 8.6-12.8 |
| 65 - 74 | 6.3 | 4.5-8.8 |
| ≥ 75 | 4.5 | 3.0-6.8 |
| **Gender** | | |
| Male | 8.2 | 6.8-9.9 |
| Female | 12.1 | 10.8-13.6 |
| **Race** | | |
| White non-Hispanic | 9.4 | 8.4-10.5 |
| Black non-Hispanic | 12.0 | 8.7-16.5 |
| Other non-Hispanic | 19.2 | 12.8-27.8 |
| Hispanic | 12.0 | 5.9-22.9 |
| **Education** | | |
| Less than high school | 20.6 | 15.2-27.3 |
| High school graduate | 12.5 | 10.6-14.7 |
| Some college | 11.1 | 9.3-13.2 |
| College graduate | 4.4 | 3.4-5.7 |
| **Household Income** | | |
| < $20,000 | 26.0 | 21.7-30.8 |
| $20,000 - $34,999 | 12.7 | 10.2-15.6 |
| $35,000 - $49,999 | 10.7 | 8.3-13.8 |
| $50,000 - $74,999 | 5.8 | 4.4-7.7 |
| ≥ $75,000 | 3.6 | 2.5-5.2 |
| **Health Insurance** | | |
| Has Health Care Coverage | 9.3 | 8.3-10.4 |
| No Health Care Coverage | 17.4 | 13.5-22.2 |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression. (n = 5,077).

### † **Sample Interpretation**

14.0% of Michigan residents aged 18-24 years were estimated to have major depression in 2006.

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## Table 3. Demographic Predictors of Major Depression[a]
### 2006 Michigan BRFS

| Demographic Characteristic | Adjusted Odds Ratio | 95% Confidence Interval |
|---|---|---|
| **Age** | | |
| 18 - 24 | (Reference) | ---- |
| 25 - 34 | 1.09 | (0.62-1.91) |
| 35 - 44 | 1.01 | (0.59-1.73) |
| 45 - 54 | 0.99 | (0.59-1.66) |
| 55 - 64 | 0.90 | (0.53-1.53) |
| 65 - 74 | 0.32* | (0.17-0.59) |
| $\geq 75$ | 0.21* | (0.10-0.43) |
| **Gender** | | |
| Male | (Reference) | ---- |
| Female † | 1.69* | (1.28-2.23) |
| **Race** | | |
| White non-Hispanic | (Reference) | ---- |
| Black non-Hispanic | 0.70 | (0.44-1.11) |
| Other non-Hispanic | 2.08* | (1.24-3.48) |
| Hispanic | 1.13 | (0.53-2.42) |
| **Education** | | |
| Less than high school | (Reference) | ---- |
| High school graduate | 0.79 | (0.48-1.31) |
| Some college | 0.66 | (0.39-1.11) |
| College graduate | 0.40* | (0.23-0.72) |
| **Household Income** | | |
| < $20,000 | 8.69* | (4.99-15.13) |
| $20,000 - $34,999 | 3.61* | (2.15-6.09) |
| $35,000 - $49,999 | 2.92* | (1.74-4.90) |
| $50,000 - $74,999 | 1.49 | (0.90-2.45) |
| $\geq$ $75,000 | (Reference) | ---- |
| **Health Insurance** | | |
| Has Health Care Coverage | (Reference) | ---- |
| No Health Care Coverage | 1.00 | (0.67-1.50) |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.

* Statistically significant at $p = 0.05$.

## † Sample Interpretation

Females were 1.69 times more likely than males to have major depression in 2006.

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## Table 4. Lifetime Prevalence of Doctor-Diagnosed Depression
### 2006 Michigan BRFS

| Demographic Characteristics | Doctor-Diagnosed Depression[a] | |
|---|---|---|
| | % | 95% CI |
| **Total** | 15.9 | 14.8-17.1 |
| **Age** | | |
| 18 - 24 † | 13.9 | 10.2-18.8 |
| 25 - 34 | 17.5 | 14.4-21.1 |
| 35 - 44 | 14.5 | 12.3-17.0 |
| 45 - 54 | 20.5 | 18.1-23.1 |
| 55 - 64 | 18.9 | 16.5-21.6 |
| 65 - 74 | 11.8 | 9.6-14.5 |
| 75 + | 7.8 | 5.9-10.2 |
| **Gender** | | |
| Male | 11.2 | 9.7-12.8 |
| Female | 20.4 | 18.8-22.0 |
| **Race** | | |
| White non-Hispanic | 16.8 | 15.6-18.1 |
| Black non-Hispanic | 10.9 | 8.1-14.4 |
| Other non-Hispanic | 15.6 | 10.3-23.0 |
| Hispanic | 12.8 | 7.6-20.7 |
| **Education** | | |
| Less than high school | 18.3 | 14.0-23.5 |
| High school graduate | 16.9 | 14.9-19.1 |
| Some college | 17.4 | 15.4-19.6 |
| College graduate | 12.7 | 11.1-14.6 |
| **Household Income** | | |
| < $20,000 | 27.4 | 23.5-31.6 |
| $20,000 - $34,999 | 16.6 | 14.1-19.5 |
| $35,000 - $49,999 | 17.4 | 14.4-20.7 |
| $50,000 - $74,999 | 14.0 | 11.6-16.8 |
| ≥ $75,000 | 12.6 | 10.7-14.8 |
| **Health Insurance** | | |
| Has Health Care Coverage | 16.2 | 15.0-17.4 |
| No Health Care Coverage | 14.6 | 11.4-18.4 |

[a] Responded "yes" to the question, "Has a doctor or other healthcare provider ever told you that you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?" (n = 5,485).

## † **Sample Interpretation**

13.9% of Michigan residents aged 18-24 years were estimated to have ever had a doctor's diagnosis of depression in 2006.

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## Table 5. Current Major Depression
## by Lifetime Doctor-Diagnosed Depression
## (Depressive Symptoms Severity Score ≥ 10, Algorithm 2)[a]
## 2006 Michigan BRFS

|  | Doctor-Diagnosed Depression[b] | No Doctor-Diagnosed Depression[c] | Row Totals |
|---|---|---|---|
| **Major Depression** | 56.1% | 43.9% † | 100.0% |
| **No Major Depression** | 11.5% | 88.5% | 100.0% |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression. Any total below 10 points was classified as no major depression (n = 5,053).

[b] Responded "yes" to the question, "Has a doctor or other healthcare provider ever told you that you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?" (n = 5,053).

[c] Responded "no" to the question, "Has a doctor or other healthcare provider ever told you that you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?" (n = 5,053).

## † **Sample Interpretation**

Among Michigan residents classified as having major depression in 2006, 43.9% had never been diagnosed by a doctor as having depression.

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**Characteristics of Individuals with Major Depression**

Individuals with major depression tended to have a higher prevalence of other chronic conditions, excluding stroke, when compared with individuals who were not depressed (Table 6). In order to account for potential confounding within the relationship between major depression and other chronic conditions, each chronic condition that exhibited a significant difference in Table 6 was entered as an outcome variable in a multivariate logistic regression model that included major depression as the independent variable and age, gender, race/ethnicity, education, and income as potential confounders. With the exception of asthma, the odds of ever having each of the other chronic conditions were significantly increased with the presence of major depression (Table 7).

Along the same lines as Tables 6 and 7, individuals with major depression were more likely to report fair to poor health status and participate in adverse health behaviors, such as current smoking, heavy drinking, and no leisure-time physical activity (Table 8). When including the variables that exhibited significant differences in Table 8 as dependent variables within multivariate logistic regression models, the presence of major depression was associated with significantly increased odds of each health status/behavior with exception of heavy drinking (Table 9).

Table 10 reports that individuals with major depression were less likely to follow recommended health screening guidelines for timely dental visits and flu vaccinations compared to those who were not depressed. When including timely dental visits and flu vaccinations within multivariate logistic regression models, the presence of major depression was associated with significantly increased odds of not having had a dental visit within the past year, but not with flu vaccinations (Table 11).

Table 12 focuses on the comparison between the number of co-morbid conditions and major depression status. Individuals without major depression had significantly fewer numbers of co-morbid conditions compared to those classified as having major depression.

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**Table 6. Prevalence of Selected Chronic Conditions Within Major Depression Status**
**(Depressive Symptoms Severity Score ≥ 10, Algorithm 2)[a]**
**2006 Michigan BRFS**

| Chronic Condition | Major Depression (N = 515) | | No Major Depression (N = 4,562) | |
|---|---|---|---|---|
| | % | 95% CI | % | 95% CI |
| **Has a Disability[1] †** | 59.7* | (54.1-65.1) | 18.9 | (17.6-20.2) |
| **Obesity[2]** | 40.1* | (34.8-45.7) | 27.3 | (25.7-29.0) |
| **Ever Told Asthma[3]** | 22.5* | (18.1-27.6) | 13.1 | (11.9-14.3) |
| **Ever Told Diabetes[4]** | 15.6* | (12.2-19.7) | 7.7 | (6.9-8.5) |
| **Ever Told Gum Disease[5]** | 13.4* | (10.0-17.6) | 8.0 | (7.1-9.0) |
| **Ever Told Angina or Coronary Heart Disease[6]** | 10.1* | (7.5-13.4) | 4.3 | (3.7-4.9) |
| **Ever Told Osteoporosis[7]** | 7.7* | (5.7-10.4) | 4.8 | (4.3-5.4) |
| **Ever Told Heart Attack[8]** | 7.3* | (5.2-10.2) | 4.1 | (3.6-4.7) |
| **Ever Told Stroke[9]** | 3.7 | (2.2-6.2) | 2.6 | (2.1-3.1) |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.
* Statistically significant at p=0.05.
**Note**: For more information on indicator definitions see Appendix B.

## † Sample Interpretation

Among Michigan residents classified as having major depression in 2006, 59.7% reported having a disability.  This is compared with the prevalence of disability among individuals who were not depressed which was equal to 18.9%.

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**Table 7. Odds[a] of Selected Chronic Conditions Among Those With Major Depression[b]**
**2006 Michigan BRFS**

| Chronic Condition | Adjusted Odds Ratio | 95% Confidence Interval |
|---|---|---|
| Has a Disability[1] † | 7.48* | (5.58-10.01) |
| Obesity[2] | 1.62* | (1.23-2.14) |
| Ever Told Asthma[3] | 1.24 | (0.90-1.71) |
| Ever Told Diabetes[4] | 2.52* | (1.78-3.56) |
| Ever Told Gum Disease[5] | 1.73* | (1.18-2.53) |
| Ever Told Angina or Coronary Heart Disease[6] | 3.57* | (2.34-5.45) |
| Ever Told Osteoporosis[7] | 2.13* | (1.37-3.31) |
| Ever Told Heart Attack[8] | 2.10* | (1.34-3.28) |

[a] Age, gender, race/ethnicity, education, and income were included as potential confounders in each of the multivariate models.

[b] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.

* Statistically significant at $p = 0.05$.

## † Sample Interpretation

Individuals classified as having major depression in 2006 were 7.48 times more likely to have a disability when compared to those who were not depressed.

**Table 8. Prevalence of Selected Health Status / Behaviors Within Major Depression Status (Depressive Symptoms Severity Score ≥ 10, Algorithm 2)[a]**

**2006 Michigan BRFS**

| Health Status / Behavior | Major Depression (N = 515) | | No Major Depression (N = 4,562) | |
|---|---|---|---|---|
| | % | 95% CI | % | 95% CI |
| **General Health, Fair to Poor[10]** † | 44.0* | (38.8-49.4) | 11.0 | (10.0-12.2) |
| **Current Smoking[11]** | 39.9* | (34.6-45.4) | 20.1 | (18.7-21.7) |
| **No Leisure-Time Physical Activity[12]** | 36.8* | (31.8-42.1) | 20.2 | (18.9-21.6) |
| **No Routine Checkup in Past Year[13]** | 36.6 | (31.3-42.3) | 31.6 | (29.9-33.4) |
| **Binge Drinking[14]** | 19.2 | (14.9-24.4) | 18.0 | (16.5-19.5) |
| **Heavy Drinking[15]** | 7.9* | (5.3-11.5) | 4.5 | (3.7-5.3) |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.

* Statistically significant at p=0.05.

**Note**: For more information on indicator definitions see Appendix B.

† **Sample Interpretation**

Among Michigan residents classified as having major depression in 2006, 44.0% reported that their general health was fair to poor. This is compared with the prevalence of fair to poor general health among individuals who were not depressed which was equal to 11.0%.

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**Table 9. Odds[a] of Selected Health Status / Behaviors Among Those With Major Depression[b]**
**2006 Michigan BRFS**

| Health Status / Behavior | Adjusted Odds Ratio | 95% Confidence Interval |
|---|---|---|
| General Health, Fair to Poor[10] † | 6.06* | (4.47-8.21) |
| Current Smoking[11] | 1.50* | (1.13-2.00) |
| No Leisure-Time Physical Activity[12] | 1.78* | (1.36-2.34) |
| Heavy Drinking[15] | 1.40 | (0.85-2.30) |

[a] Age, gender, race/ethnicity, education, and income were included as potential confounders in each of the multivariate models.

[b] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.

* Statistically significant at $p = 0.05$.

### † Sample Interpretation

Individuals classified as having major depression in 2006 were 6.06 times more likely to have reported fair to poor general health when compared to those who were not depressed.

## Table 10. Prevalence of Selected Screening Practices Within Major Depression Status
### (Depressive Symptoms Severity Score ≥ 10, Algorithm 2)[a]
### 2006 Michigan BRFS

| Screening Practice | Major Depression (N = 515) | | No Major Depression (N = 4,562) | |
|---|---|---|---|---|
| | % | 95% CI | % | 95% CI |
| No Flu Vaccine in the Past Year[16] (Among Adults 65+) | 69.2* | (64.2-73.8) | 37.5 | (35.9-39.1) |
| No Sigmoidoscopy/Colonoscopy in Past 5 Years[17] (Among Adults 50+) | 47.8 | (40.8-54.8) | 42.7 | (40.6-44.9) |
| No Mammography and Clinical Breast Exam in the Past Year[18] (Among Females 40+) | 47.7 | (41.2-54.2) | 40.7 | (38.3-43.0) |
| No Dental Visit in the Past Year[19] † | 42.1* | (36.8-47.5) | 22.4 | (20.9-24.0) |
| No Prostate Specific Antigen Test in the Past Year[20] (Among Males 50+) | 39.7 | (28.3-52.4) | 33.5 | (30.5-36.6) |
| No Pap Test in the Past 3 Years[21] (Among Females 18+) | 18.5 | (14.4-23.4) | 16.2 | (14.5-18.1) |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.

* Statistically significant at p=0.05.

**Note**: For more information on indicator definitions see Appendix B.

### † Sample Interpretation

Among Michigan residents classified as having major depression in 2006, 42.1% reported that they had not visited the dentist within the past year. This is compared with the prevalence of no dental visits in the past year among individuals who were not depressed which was equal to 22.4%.

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**Table 11. Odds[a] of Selected Screening Practices Among Those With Major Depression[b]**
**2006 Michigan BRFS**

| Screening Practice | Adjusted Odds Ratio | 95% Confidence Interval |
|---|---|---|
| **No Flu Vaccine in the Past Year[16] (Among Adults 65+)** | 0.80 | (0.61-1.06) |
| **No Dental Visit in the Past Year[19] †** | 1.64* | (1.21-2.22) |

[a] Age, gender, race/ethnicity, education, and income were included as potential confounders in each of the multivariate models.
[b] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.
* Statistically significant at $p = 0.05$.

**† Sample Interpretation**

Individuals classified as having major depression in 2006 were 1.64 times more likely to have not had a dental visit in the past year when compared to those who were not depressed.

**Table 12. Percentage Distribution of the Number of Co-morbid Conditions**
**Within Major Depression Status**
**(Depressive Symptoms Severity Score ≥ 10, Algorithm 2)[a]**
**2006 Michigan BRFS**

| # of Co-morbid Conditions[b] | Major Depression (N = 515) | | No Major Depression (N = 4,562) | |
|---|---|---|---|---|
| | % | 95% CI | % | 95% CI |
| **No Conditions** | 24.7* | (19.8-30.4) | 62.8 | (61.1-64.5) |
| **1 Condition** | 40.6* | (35.0-46.4) | 25.6 | (24.1-27.2) |
| **2 Conditions ‡** | 20.4* | (16.5-25.1) | 8.0 | (7.2-8.9) |
| **3 Conditions** | 9.5* | (6.8-13.2) | 2.5 | (2.1-3.0) |
| **4 Conditions** | 2.9* | (1.7-5.0) | 0.8 | (0.5-1.1) |
| **5 or more Conditions** | 1.9* | (1.0-3.5) | 0.3 | (0.2-0.5) |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.
[b] Among Diabetes, Heart Attack, Coronary Heart Disease, Stroke, Asthma, Prostate Cancer, Breast Cancer, Osteoporosis, and Gum Disease.
* Statistically significant at $p=0.05$.

**‡ Sample Interpretation**

Among Michigan residents classified as having major depression in 2006, 20.4% reported that they had two other co-morbid conditions. This is compared with the prevalence of having two other co-morbid conditions among individuals who were not depressed which was equal to 8.0%.

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**Major Depression as a Co-morbid Condition**

Table 13 reports the prevalence of major depression by selected chronic conditions. With the exception of stroke, the prevalence of major depression was greater among those with a chronic condition compared to those without the chronic condition (Table 13). In order to account for potential confounding within the relationship between other chronic conditions and major depression, each chronic condition that exhibited a significant difference in Table 13 was entered into a multivariate logistic regression model with major depression as the dependent variable, the chronic condition as the independent variable, and age, gender, race/ethnicity, education, and income as potential confounders. Excluding asthma, the odds of major depression were significantly increased due to the presence of all other chronic conditions (Table 14).

Along the same lines as Tables 13 and 14, individuals who reported fair to poor general health, as well as those who participated in certain risky health behaviors (i.e. current smoking, heavy drinking, and not participating in any leisure-time physical activity) were more likely to have major depression when compared to those who reported excellent to good health status and those who did not participate in such risky health behaviors (Table 15). When including the variables that exhibited significant differences in Table 15 within multivariate logistic regression models, each health status/behavior, with the exception of heavy drinking, was associated with significantly increased odds of major depression (Table 16).

Table 17 reports the prevalence of major depression by the number of co-morbid conditions. The prevalence of major depression dramatically increased with increasing number of co-morbid conditions. When including the number of co-morbid conditions in a multivariate logistic regression model with major depression as the outcome, the odds of major depression significantly increased with increasing number of co-morbid conditions (Table 18).

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## Table 13. Prevalence of Major Depression by Selected Chronic Conditions
## (Depressive Symptoms Severity Score ≥ 10, Algorithm 2)[a]
## 2006 Michigan BRFS

| Chronic Condition | % | 95% CI |
|---|---|---|
| **Disability[1] †** | | |
| Has A Disability | 26.5* | 23.6-29.5 |
| No Disability | 5.4 | 4.5-6.4 |
| **Angina or Coronary Heart Disease[2]** | | |
| Told Angina or Coronary Heart Disease | 21.0* | 16.0-26.9 |
| Never Told Angina or Coronary Heart Disease | 9.6 | 8.6-10.7 |
| **Diabetes[3]** | | |
| Told Diabetes | 18.9* | 15.0-23.4 |
| Never Told Diabetes | 9.4 | 8.4-10.6 |
| **Heart Attack[4]** | | |
| Told Heart Attack | 16.8* | 12.2-22.8 |
| Never Told Heart Attack | 9.9 | 8.8-11.0 |
| **Asthma[5]** | | |
| Told Asthma | 16.4* | 13.1-20.3 |
| Never Told Asthma | 9.2 | 8.2-10.4 |
| **Gum Disease[6]** | | |
| Told Gum Disease | 15.8* | 12.0-20.6 |
| Never Told Gum Disease | 9.6 | 8.6-10.7 |
| **Osteoporosis[7]** | | |
| Told Osteoporosis | 15.5* | 11.7-20.2 |
| Never Told Osteoporosis | 9.9 | 8.9-11.1 |
| **Obesity[8]** | | |
| Currently Obese | 14.1* | 12.0-16.5 |
| Not Obese | 8.4 | 7.3-9.7 |
| **Stroke[9]** | | |
| Told Stroke | 14.1 | 8.5-22.4 |
| Never Told Stroke | 10.1 | 9.1-11.2 |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression (n = 5,077).
* Statistically significant at p=0.05.
**Note**: For more information on indicator definitions see Appendix B.


## † Sample Interpretation

Among Michigan residents who reported having a disability in 2006, 26.5% were classified as having major depression.  This is compared with the prevalence of major depression among individuals without a disability which was equal to 5.4%.

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**Table 14. Odds[a] of Major Depression[b] Among Those With Selected Chronic Conditions
2006 Michigan BRFS**

| Chronic Condition | Adjusted Odds Ratio | 95% Confidence Interval |
|---|---|---|
| Has a Disability[1] † | 7.40* | (5.49-9.99) |
| Ever Told Angina or Coronary Heart Disease[2] | 3.31* | (2.13-5.16) |
| Ever Told Diabetes[3] | 2.37* | (1.68-3.34) |
| Ever Told Heart Attack[4] | 2.05* | (1.30-3.22) |
| Ever Told Asthma[5] | 1.20 | (0.86-1.66) |
| Ever Told Gum Disease[6] | 1.67* | (1.14-2.44) |
| Ever Told Osteoporosis[7] | 1.80* | (1.13-2.87) |
| Obesity[8] | 1.60* | (1.21-2.10) |

[a] Age, gender, race/ethnicity, education, and income were included as potential confounders in each of the multivariate models.

[b] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.

* Statistically significant at $p = 0.05$.

### † Sample Interpretation

Individuals who reported having a disability in 2006 were 7.40 times more likely to be classified as having major depression when compared to those without a disability.

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## Table 15. Prevalence of Major Depression by Selected Health Status / Behaviors (Depressive Symptoms Severity Score ≥ 10, Algorithm 2)[a]
## 2006 Michigan BRFS

| Health Status / Behavior | % | 95% CI |
|---|---|---|
| **General Health[10] †** | | |
| Fair to Poor | 31.3* | 27.5-35.3 |
| Excellent to Good | 6.7 | 5.8-7.8 |
| **Smoking[11]** | | |
| Current Smoker | 18.5* | 15.7-21.6 |
| Former Smoker | 9.7 | 7.9-11.7 |
| Never Smoked | 7.1 | 5.9-8.5 |
| **Leisure-Time Physical Activity[12]** | | |
| No Leisure-Time Physical Activity | 17.2* | 14.7-20.0 |
| Some Leisure-Time Physical Activity | 8.3 | 7.2-9.5 |
| **Heavy Drinking[13]** | | |
| Heavy Drinking | 16.9* | 11.5-24.0 |
| No Heavy Drinking | 10.0 | 8.9-11.1 |
| **Routine Checkup[14]** | | |
| Checkup Not Within the Past Year or Never | 11.5 | 9.5-13.9 |
| Checkup Within the Past Year | 9.5 | 8.4-10.7 |
| **Binge Drinking[15]** | | |
| Binge Drinking | 10.9 | 8.3-14.2 |
| No Binge Drinking | 10.2 | 9.1-11.4 |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression (n = 5,077).
* Statistically significant at p=0.05.
**Note**: For more information on indicator definitions see Appendix B.

### † Sample Interpretation

Among Michigan residents who reported fair to poor general health in 2006, 31.3% were classified as having major depression. This is compared with the prevalence of major depression among individuals who reported excellent to good general health which was equal to 6.7%.

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**Table 16. Odds[a] of Major Depression[b] Among Those With Selected Health Status / Behaviors**
**2006 Michigan BRFS**

| Chronic Condition | Adjusted Odds Ratio | 95% Confidence Interval |
|---|---|---|
| General Health - Fair to Poor[10] † | 6.08* | (4.45-8.30) |
| Current Smoking[11] | 1.51* | (1.14-2.01) |
| No Leisure-Time Physical Activity[12] | 1.80* | (1.36-2.37) |
| Heavy Drinking[13] | 1.41 | (0.85-2.33) |

[a] Age, gender, race/ethnicity, education, and income were included as potential confounders in each of the multivariate models.
[b] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.
* Statistically significant at p = 0.05.

† **Sample Interpretation**

Individuals who reported fair to poor general health in 2006 were 6.08 times more likely to be classified as having major depression when compared to those who reported excellent to good general health.

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## Table 17. Prevalence of Major Depression by Number of Co-morbid Conditions
### (Depressive Symptoms Severity Score ≥ 10, Algorithm 2)[a]
### 2006 Michigan BRFS

| # of Co-morbid Conditions[b] | % | 95% CI |
|---|---|---|
| No Conditions | 4.1 | 3.2-5.2 |
| 1 Condition | 14.5 | 12.2-17.2 |
| 2 Conditions | 21.5 | 17.6-26.1 |
| 3 Conditions | 29.3 | 21.9-38.0 |
| 4 Conditions | 29.2 | 17.7-44.3 |
| 5 or more Conditions | 40.1 | 23.3-59.7 |

[a] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression (n = 5,077).

[b] Among Diabetes, Heart Attack, Coronary Heart Disease, Stroke, Asthma, Prostate Cancer, Breast Cancer, Osteoporosis, and Gum Disease.

### † Sample Interpretation

Among Michigan residents who reported having five or more co-morbid conditions in 2006, 40.1% were classified as having major depression. This is compared with the prevalence of major depression among individuals who reported no co-morbid conditions which was equal to 4.1%.

## Table 18. Odds[a] of Major Depression[b] Among Those With Multiple Co-morbid Conditions
### 2006 Michigan BRFS

| Co-morbid Conditions[c] | Adjusted Odds Ratio | 95% Confidence Interval |
|---|---|---|
| 1 Condition | 3.58* | (2.50-5.12) |
| 2 Conditions | 7.09* | (4.69-10.72) |
| 3 Conditions | 11.62* | (6.94-19.46) |
| 4 Conditions | 8.28* | (3.82-17.94) |
| 5 or more Conditions ‡ | 17.47* | (6.33-48.21) |

[a] Age, gender, race/ethnicity, education, and income were included as potential confounders in each of the multivariate models.

[b] Calculated from responses to Q.1-8 of the CDC BRFSS Anxiety and Depression optional module. Responses in number of days were converted to points (0-1 days = 0 points, 2-6 days = 1 point, 7-11 days = 2 points, 12-14 days = 3 points). Points were summed across the eight questions and a total of 10 points or greater was classified as major depression.

[c] Among Diabetes, Heart Attack, Coronary Heart Disease, Stroke, Asthma, Prostate Cancer, Breast Cancer, Osteoporosis, and Gum Disease.

* Statistically significant at $p = 0.05$.

### ‡ Sample Interpretation

Individuals who reported having five or more co-morbid conditions in 2006 were 17.47 times more likely to be classified as having major depression when compared to those who reported no other co-morbid conditions.

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**References:**

1. Kessler RC, Chiu WT, Demler O, Walters EE. Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Arch Gen Psychiatry* 2005 June;62(6):617-27.

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3. Chapman DP, Perry GS. Depression as a major component of public health for older adults. *Prev Chronic Dis* 2008;5(1). http://www.cdc.gov/pcd/issues/2008/jan/07_0150.htm. Accessed [3/26/08].

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# Appendix A: 2006 CDC Anxiety & Depression Module

Now, I am going to ask you some questions about your mood. When answering these questions, please think about how many days each of the following has occurred in the past two weeks.

**1.** Over the last two weeks, how many days have you had little interest or pleasure in doing things?

     _ _    01-14 days
     8 8   None
     7 7   Don't know / Not sure
     9 9   Refused

**2.** Over the last two weeks, how many days have you felt down, depressed or hopeless?

     _ _    01-14 days
     8 8   None
     7 7   Don't know / Not sure
     9 9   Refused

**3.** Over the last two weeks, how many days have you had trouble falling asleep or staying asleep, or sleeping too much?

     _ _    01-14 days
     8 8   None
     7 7   Don't know / Not sure
     9 9   Refused

**4.** Over the last two weeks, how many days have you felt tired or had little energy?

     _ _    01-14 days
     8 8   None
     7 7   Don't know / Not sure
     9 9   Refused

**5.** Over the last two weeks, how many days have you had a poor appetite **or** eaten too much?

     _ _    01-14 days
     8 8   None
     7 7   Don't know / Not sure
     9 9   Refused

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**6.** Over the last two weeks, how many days have you felt bad about yourself, **or** that you were a failure or had let yourself or your family down?

       _ _     01-14 days
       8 8    None
       7 7    Don't know / Not sure
       9 9    Refused

**7.** Over the last two weeks, how many days have you had trouble concentrating on things, such as reading the newspaper or watching TV?

       _ _     01-14 days
       8 8    None
       7 7    Don't know / Not sure
       9 9    Refused

**8.** Over the last two weeks, how many days have you moved or spoken so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you were moving around a lot more than usual?

       _ _     01-14 days
       8 8    None
       7 7    Don't know / Not sure
       9 9    Refused

**9.** Has a doctor or other healthcare provider ever told you that you had an anxiety disorder (including acute stress disorder, anxiety, generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, phobia, posttraumatic stress disorder, or social anxiety disorder)?

       1     Yes
       2     No
       7     Don't know / Not sure
       9     Refused

**10.** Has a doctor or other healthcare provider ever told you that you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?

       1     Yes
       2     No
       7     Don't know / Not sure
       9     Refused

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# Appendix B: Indicator Definitions

[1] The proportion who reported being limited in any activities because of physical, mental, or emotional problems, or reported that they required use of special equipment (such as a cane, a wheelchair, a special bed, or a special telephone) due to a health problem.

[2] Note: BMI, body mass index, is defined as weight (in kilograms) divided by height (in meters) squared [weight in kg/(height in meters)$^2$]. Weight and height were self-reported. Pregnant women were excluded. The proportion of respondents whose BMI was greater than or equal to 30.0.

[3] The proportion who reported that they were ever told by a doctor, nurse, or other health care professional that they had asthma.

[4] The proportion who reported that they were ever told by a doctor that they have diabetes. Women who had diabetes only during pregnancy and adults who were diagnosed with pre-diabetes were considered to not have been diagnosed with diabetes.

[5] The proportion who reported being told by a doctor, dentist, or dental hygienist that they currently have gum disease, such as gingivitis or periodontal disease.

[6] Among all adults, the proportion who had ever been told by a doctor that they had angina or coronary heart disease.

[7] The proportion who reported that they were ever told by a health care professional that they have osteoporosis.

[8] Among all adults, the proportion who had ever been told by a doctor that they had a heart attack or myocardial infarction.

[9] Among all adults, the proportion who had ever been told by a doctor that they had a stroke.

[10] The proportion who reported that their health, in general, was fair to poor.

[11] The proportion who reported that they had ever smoked at least 100 cigarettes in their life and that they smoke cigarettes now, either every day or on some days.

[12] The proportion who reported not having participated in any leisure-time physical activities or exercises such as running, calisthenics, golf, gardening, or walking during the past month.

[13] The proportion who reported that they had not had a routine checkup within the past year.

[14] The proportion who reported consuming five or more drinks per occasion (for men) or four or more drinks per occasion (for women) at least once in the previous month.

[15] The proportion who reported consuming an average of more than two alcoholic drinks per day for men or more than one per day for women in the previous month.

[16] Among those aged 65 years and older, the proportion who reported that they had not had a flu vaccine, either by an injection in the arm or sprayed in the nose during the past 12 months.

[17] Among those aged 50 years and older, the proportion who had not had a sigmoidoscopy or colonoscopy within the past five years.

[18] Among women aged 40 years and older, the proportion who had not had both a clinical breast exam and mammogram in the previous year.

[19] The proportion who reported that they had not visited a dentist or dental clinic for any reason in the previous year.

[20] Among men aged 50 years and older, the proportion who reported not having a prostate specific antigen (PSA) test in the past year.

[21] Among women aged 18 years and older, the proportion who had not had a Pap test within the previous three years.

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**Michigan Department of Community Health**

**MDCH**

**Jennifer M. Granholm, Governor**
**Janet Olszewski, Director**

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